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Good Morning,

Please find attached previously released documents which you agreed to accept in lieu of processing your current request. As a reminder, by accepting these documents as previously released you waive the right to appeal. This response is a final response and your request will now be closed. Please let me know if you have any questions.

Thank you for the opportunity to assist you in this matter.

All the Best,

Chidinma Nwosu, Esq. FOIA Analyst Wits Solutions, Inc., Contractor U.S. Department of Energy 1000 Independence Avenue, SW Washington, DC 20585

DOCUMENT 1



Transition 2020 Corporate Overview

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Department of Energy Overview

Introduction

The United States Department of Energy (DOE) is entrusted with a broad and diverse portfolio across its major mission areas of nuclear security, science, energy, and environmental remediation. At its core, DOE is a science and technology powerhouse with an unparalleled network of 17 National Laboratories. DOE spearheads innovation to successfully address national security challenges, promote energy independence, create jobs, increase economic prosperity, and boost U.S. manufacturing competitiveness. The Laboratory network provides a unique capability to the Nation in that it serves not only DOE's missions but also provides research and development support to multiple other Federal departments and agencies (e.g., Department of Defense; Intelligence Community; National Aeronautics and Space Administration; and National Institutes of Health), as well as numerous universities and industry partners.

A Rich History

The Department of Energy has a rich and diverse history; one that is inextricably linked with the history of the National Laboratories and the evolution of science-based public policy. DOE's origins start with the Manhattan Project and the race to develop the atomic bomb during World War II. Some of the world's foremost scientists from the University of California, Berkeley, including Ernest O. Lawrence and J. Robert Oppenheimer, led the theoretical research that became the basis for the design of the atomic bomb. Both Lawrence and Oppenheimer went on to become the leading scientists of the Manhattan Project and, along with Brigadier General Leslie Groves, established a laboratory at an isolated site in Los Alamos, New Mexico, where the atomic bomb was designed and developed.

Following the war, Congress engaged in a vigorous and contentious debate on whether authority over atomic power should reside with the civilian or military branches of government. *The Atomic Energy Act of 1946* settled the debate by creating the civilian Atomic Energy Commission (AEC), which took over the Manhattan Engineer District's sprawling scientific and industrial complex. The Los Alamos site later became DOE's Los Alamos National Laboratory (LANL). In 2015, parts of LANL were included in the newly-established Manhattan Project National Historical Park along with other DOE sites that were integral to the development of the atomic bomb at Hanford, Washington and Oak Ridge, Tennessee.

The government had a clear interest in controlling the production of fissionable materials while continuing to benefit from the kind of academic scientific expertise and industry capabilities that were brought to bear for the Manhattan Project. To address these competing interests, the government developed a flexible agreement for managing government-owned, contractor-operated (aka "GoCo") scientific, engineering, and production facilities, later known as Management and Operating (M&O) contracts. With few exceptions, DOE still uses the M&O contract model to manage its National Laboratories, sites, and facilities, and this model is credited with being an important reason for the sustained vitality of the DOE National Laboratories.

In 1953, President Eisenhower gave his famous "Atoms for Peace" speech to the United Nation's General Assembly to promote the peaceful use of nuclear energy. Shortly thereafter, the President asked Congress to pass legislation "making it possible for American atomic energy development, public and private, to play a full and effective part in leading mankind into a new era of progress and peace." The result was the Atomic Energy Act of 1954, which ended exclusive government use of the atom and began the growth of the commercial nuclear power industry, to be regulated by the AEC. This also added an international dimension to the AEC's responsibilities in that nuclear technology was to be advanced globally for peaceful purposes. Much of DOE's authority today is still based on this Act.

In response to changing needs in the mid-1970s, in particular the oil embargoes, the AEC was abolished and, in its place, the *Energy Reorganization Act of 1974* created two new agencies: the Nuclear Regulatory Commission (NRC) to regulate the nuclear power industry and the Energy Research and Development Administration (ERDA) to manage the nuclear weapons, naval reactor, and energy development programs. The extended energy crisis of the 1970s soon demonstrated the need for more coherent governmental organization and planning around energy. The Department of Energy Organization Act created DOE in 1977 by bringing together several Federal agencies and programs. The Department of Energy, activated on October 1, 1977, as the 12th Cabinet agency, assumed the responsibilities of the Energy Research and Development Administration, the Federal Energy Administration, the Federal Power Commission, and parts of several other agencies. The Federal Energy Regulatory Commission (FERC) was also established within the Department as an independent commission to regulate the natural gas, electricity, oil, and hydropower industries.

The Department of Energy brought many Federal energy activities under one umbrella and provided the framework for a comprehensive and balanced national energy plan. The Department undertook responsibility for long-term, high-risk scientific research and development of energy technologies, Federal power marketing, energy conservation, the nuclear weapons and non-proliferation programs, naval reactors, some energy regulatory programs, and central energy data collection and analysis. The Department also acted on its new energy emergency response authorities to create the Strategic Petroleum Reserve. Most notably, the establishment of the Department brought Cabinet-level support to a unique and growing system of National Laboratories that today serves as the backbone of the Nation's scientific research enterprise and the most comprehensive research network of its kind in the world. Like the Nation's energy infrastructure itself, a resource on the scale of the National Laboratories would be virtually impossible to build from scratch today, making support and maintenance of this system all the more critical.

While there have been several amendments to the DOE Organization Act that have changed the makeup of DOE, including one to establish the Office of Environmental Management (EM), the most significant amendment took place in 1999. The *National Defense Authorization Act for Fiscal Year 2000* amended the DOE Organization Act by establishing the National Nuclear Security Administration (NNSA) as a semi-autonomous organization within the Department. The amendment (known as the *NNSA Act*), which took effect on March 1, 2000, provides the guidance and authority necessary for the NNSA Administrator to carry out NNSA's various missions under the direction of the Secretary and Deputy Secretary.

In the first decades of the 2000's, Congress has continued to reshape the Department's profile. This has included legislation such as the *Energy Policy Act of 2005*, which authorized what is now the Office of Technology Transitions and the "Title XVII" Loan Guarantee program, and the *Energy Independence and Security Act of 2007*, which established the Advanced Technology Vehicles Manufacturing Loan Program.

The America COMPETES Act of 2007 authorized the Advanced Research Projects Agency – Energy (ARPA–E), and the American Recovery and Reinvestment Act of 2009 provided DOE with an unprecedented level of funding for energy research, development, demonstration, and deployment (RDD&D) programs. DOE was also given additional authorities and responsibilities for energy emergency response in the Bipartisan Budget Act of 2015 and the 2015 FAST Act.

More recently, the *DOE Research and Innovation Act* of 2018 was passed to strengthen DOE efforts to support technology transfer for early stage and precommercial technology demonstration activities and to promote strategic opportunities for collaborative RDD&D of innovative science and technologies. The *Nuclear Energy Innovation Capabilities Act (NEICA)* and the *Nuclear Energy Innovation and Modernization Act (NEIMA)* were passed in 2018 and 2019, respectively, in an effort to facilitate reactor licensing and expedite the creation of the Versatile Test Reactor.

While remaining focused on its primary missions, DOE has continued to evolve to meet the pressing challenges and emerging threats facing our Nation, as well as promote opportunities for growth and prosperity. Most importantly, DOE has proactively launched initiatives and taken actions to ensure our national security and promote American energy independence. For example:

 To achieve energy independence, DOE has championed energy policies and programs that lower costs and maximize the use of energy resources while maintaining responsible stewardship of the environment.

- To defend against potential threats to our Nation's energy infrastructure, in February 2018, DOE established the Office of Cybersecurity, Energy Security, and Emergency Response (CESER), which is dedicated to protecting against disruptions to our energy infrastructure caused by cyber threats, physical attacks, and natural disasters.
- To showcase the vast research and development portfolio of DOE's National Laboratories and catalyze private-public partnerships, DOE launched a series of Innovation XLab summits that facilitate the exchange of information and ideas among industry, universities, and investors with innovators and experts from the National Laboratories.
- To propel the United States to the forefront of the global quantum race, DOE unveiled a strategy for the development of a national quantum internet which will usher in a new era of communications as part of the 2018 National Quantum Initiative Act.
- To keep our Nation safe and protect our national interests, DOE and NNSA have collaborated with the Department of Defense to maintain and modernize our Nation's nuclear weapons stockpile.
- To address the global COVID-19 crisis, DOE labs have established an unprecedented high performance computing consortium with universities and the private sector to discover promising treatments to ensure the health and safety of our citizens.

Today, as in the past, the Department of Energy is called upon to tackle some of the most significant and daunting energy, nuclear security, economic, and environmental challenges facing the United States. The Department will continue to leverage its long history and its unique scientific resources to meet these challenges to help ensure our Nation's peace and prosperity for generations to come.

DOE Leadership and Management Structure

The Department of Energy's leadership and management structure is designed to address the evolving science, energy, security, and environmental challenges facing the Nation. The enterprise is comprised of the Office of the Secretary, including the Deputy Secretary, which provides leadership and strategic direction to achieve the Department's missions, and three Under Secretariats, which manage the core functions that carry out DOE missions. For information about the current leadership team, visit: <u>https://www.energy.gov/</u> <u>leadership.</u>

DOE has approximately 13,000 Federal employees and over 95,000 National Laboratory staff and contractor employees at DOE's nuclear security plants and environmental clean-up sites at 85 field locations throughout the United States. To coordinate the vast array of mission areas for which DOE has responsibility, the Department also uses boards, councils, and committees to address issues that cut across organizational lines.

The organizational chart on page 9 (Figure 1) depicts the Department's structure, and descriptions of each DOE organization are included in the Organization Overviews.

Office of the Secretary

The *Department of Energy Organization Act*, as amended, establishes the Secretary, Deputy Secretary, and Under Secretaries as the principal officers of the Department.

The Secretary (S1) leads the Department of Energy across all of its missions and serves as a member of the President's Cabinet and fourteenth in the line of Presidential succession. In accordance with the April 4, 2017, *National Security Presidential Memorandum,* the Secretary serves as a permanent member of both the National Security Council, which advises the President on the integration of domestic, foreign, and military policies relating to national security, and the Homeland Security Council, which advises the

President on homeland security issues. In addition to attending regular meetings of each Council, which are chaired by the President, the Secretary participates in Principals Committee meetings, led by the National Security Advisor. As a key member of the President's national security team, the Secretary also represents the United States at international forums on energy policy, energy security, and national security matters, and engages in bilateral and multilateral negotiations with heads of foreign governments.

The Deputy Secretary (S2) serves as the chief advisor to the Secretary and is a permanent member of the National Security Council's Deputies Committee, an interagency forum chaired by the Deputy National Security Advisor, which addresses policy issues affecting national security interests.

The Deputy Secretary also is the Department's Chief Operating Officer. In that role, the Deputy Secretary leads major DOE initiatives in several priority areas, including cyber security, project management, and emergency preparedness and response. The Deputy Secretary also chairs a number of corporate councils, including, but not limited to, the Energy Systems Acquisition Advisory Board (ESAAB), which provides the Deputy Secretary with recommendations on DOE's major construction projects (over \$750 million); and the Cyber Council, which is the principal forum for coordinating cyber-related activities across DOE.

Several organizations report directly to the Secretary, including, for example, the Office of the General Counsel (GC); the Office of Congressional and Intergovernmental Affairs (CI); and the Office of Public Affairs (PA). Other organizations are unique to DOE and play a vital role in supporting the Secretary's and Deputy Secretary's efforts to achieve the Department's strategic policy goals. They are also instrumental in ensuring an enterprise-wide approach, resulting in greater consistency across the DOE complex. These organizations include:

• Office of Strategic Planning and Policy (SP) was created to streamline the formulation, development, and advancement of Departmental and Secretarial energy policy. SP shapes longterm strategic planning and policy consistent with the Secretary's vision for DOE. SP also leads cross-program working groups to address longstanding challenges in such areas as critical minerals and collaborates with other agencies to leverage DOE expertise in advancing national priorities such as expanding space exploration. In addition, the National Laboratory Operations Board (LOB) reports to SP in order to coordinate DOE strategic planning and policy development efforts with the National Laboratories, as needed.

- Office of the Chief Financial Officer (CF) ensures the Department's priorities are reflected in the annual budget, which the CFO has primary responsibility for developing. The budget is a key strategic tool for planning and shaping initiatives in support of the Department's major mission areas, including those that cut across organizational lines, such as cyber security, energy storage, and artificial intelligence.
- Office of International Affairs (IA) advances United States objectives in energy security and represents the Department in intergovernmental forums and bilateral and multilateral proceedings that address the development and implementation of energy and economic strategies. IA advises the Secretary, Deputy Secretary, and other DOE leadership on strategic implementation of United States' energy policy. IA works closely with the State Department and the National Security Council in pursuit of Administration objectives.
- Office of Intelligence and Counterintelligence (IN) identifies and mitigates threats to DOE personnel, facilities, technology, and information; and also provides scientifically sound technical analysis on intelligence challenges. IN is an integral part of DOE's national security mission and is well-integrated into the Intelligence Community (IC), allowing the IC to rely on DOE's vast technical expertise.
- Office of Enterprise Assessments (EA) provides objective assessments on behalf of the Secretary and Deputy Secretary in the areas of nuclear and industrial safety; cyber and physical security; and other critical functions as directed by the Secretary and Deputy Secretary. The results of EA's assessments provide valuable insights that are used to strengthen DOE operations, especially those involving security and worker safety.
- Advanced Research Project Agency Energy (ARPA-E) invests in high-risk, high-impact technologies until the technologies attract investment for continued development from

the private sector. ARPA-E focuses exclusively on early-stage technologies that could fundamentally change the way Americans receive, use, and store energy.

Energy Information Administration (EIA) is a statistical and analytical agency within the Department that collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. EIA is the Nation's premier source of energy information and, by law, its data, analyses, and forecasts are independent of approval by any other officer or employee of the United States government. EIA prepares informative energy analyses, monthly short-term forecasts of energy market trends and longterm United States and international energy outlooks. Its <u>Annual Energy Outlook</u> provides vital information that is used by both United States government policymakers and energy industry leaders.

In addition, several other offices that perform mission support functions report directly to the Secretary and Deputy Secretary. This alignment strengthens lines of authority for these functions and promotes a coordinated approach to business operations across DOE. These offices include the Office of the Chief Human Capital Officer (HC); Office of Management (MA); Office of the Chief Information Officer (IM); Office of Small and Disadvantaged Business Utilization (SB); Office of Hearings and Appeals (HG); and the Office of Economic Impact and Diversity (ED).

The Under Secretaries

The Department of Energy's three Under Secretaries lead the Department's critical mission areas and advise the Secretary and Deputy Secretary on policy matters to advance the Department's strategic priorities and address complex challenges facing the Department. The Under Secretary organizations are integral to ensuring that DOE line management has the resources and support needed to achieve their mission objectives. For example, the Under Secretary organizations coordinate the development of budget proposals with line management and advocate for those proposals. They also represent line organizations on various policy and operations councils, including the LOB and Cyber Council. In addition, the Under Secretaries provide oversight to ensure effective program execution.

The Under Secretary of Energy (S3) serves as the principal Under Secretary and the Department's principal advisor on energy policy, energy security, and applied technology research and development. To position the Nation to become more energy independent and develop energy policies and programs that lower costs and maximize the use of resources, the Under Secretary of Energy is focused on applied technologies that pertain to the operation and reliability of our Nation's energy infrastructure. The Under Secretary of Energy has management responsibility for DOE's three applied research laboratories as well as DOE's four Power Marketing Administrations (PMAs). In addition, the Under Secretary of Energy is responsible for policy and oversight of safety, security, and project management across the DOE complex.

The Office of Cybersecurity, Energy Security, and Emergency Response (CESER), which was established in 2018, reports to the Under Secretary of Energy. CESER was formed to better position the Department to protect the energy infrastructure from emerging threats, especially cyber threats, and natural disasters. In addition, the Arctic Energy Office, which was recently established, reports to the Under Secretary of Energy to coordinate Arctic-related DOE initiatives in the areas of energy, science and national security.

Other organizations reporting to the Under Secretary include the Assistant Secretary for Energy Efficiency and Renewable Energy (EE); Assistant Secretary for Fossil Energy (FE); Assistant Secretary for Nuclear Energy (NE); Assistant Secretary for Electricity (OE), which has responsibility for the four PMAs; Office of Indian Energy Policy and Programs (IE); Associate Under Secretary for Environment, Health, Safety and Security (AU); Loan Programs Office (LP); and Office of Project Management (PM).

The Under Secretary for Science (S4) serves as the Department's principal advisor on fundamental energy research, energy technologies, and science. The Under Secretary drives this mission through programs, including nuclear and high energy particle physics; basic energy; science; advanced computing; fusion; and biological and environmental research. In executing the Department's scientific mission, the Under Secretary for Science manages ten of the Department's National Laboratories.

In addition, the Under Secretary for Science manages the vast environmental remediation and legacy management missions of the Department, addressing the U.S. legacy of nuclear weapons production and government-sponsored nuclear energy research, including management of a DOE National Laboratory dedicated to research and development in support of the Department's environmental remediation mission. The Under Secretary for Science also leads the Department's expanding role in technology commercialization, especially for DOE's National Laboratories.

In 2019, the Artificial Intelligence and Technology Office (AI), which reports to the Under Secretary for Science, was established to coordinate DOE's vast artificial intelligence research portfolio. Other offices reporting to the Under Secretary for Science include the Office of Science (SC); Office of Technology Transitions (TT); Assistant Secretary for Environmental Management (EM); and Office of Legacy Management (LM).

The Under Secretary for Nuclear Security (S5)

also serves as the NNSA Administrator (NA-1). The Administrator's responsibilities in leading the NNSA are outlined in the NNSA Act, most recently updated in February 2020. These responsibilities are operationally represented by NNSA's three core missions: maintaining the safety, security and effectiveness of the nuclear deterrent; preventing, countering and responding to proliferation and terrorism threats; and providing operational support for naval nuclear propulsion.

NNSA continues to make great strides in executing its missions in the face of the COVID-19 pandemic, meeting major milestones on-time and within budget. Efforts are now underway to institutionalize the many lessons learned from operating during the pandemic to ensure NNSA's ability to operate with minimal disruption in future emergency situations.

As NNSA's mission scope continues to grow to meet national security requirements, NNSA's workforce has adopted an enterprise-wide approach, instilling a culture of safety, efficiency, and effectiveness across all core mission areas. Within NNSA, and with the Secretary's support, the Agency has implemented numerous improvements in management and governance which are producing tangible results. This has been recognized in the recent findings of the National Academy of Sciences and National Academy of Public Administration under their congressionallymandated independent study assessing the governance and management of the Nuclear Security Enterprise.

In addition to the Federal workforce, the Administrator is responsible for the oversight of three National Laboratories, two laboratories managed by Naval Reactors, several production sites, and the Nevada Nuclear Security Site.

Independent Organization

The Federal Energy Regulatory Commission (FERC) is an independent regulatory commission within the Department that regulates the interstate transmission of electricity, natural gas, and oil. FERC also reviews proposals to build liquefied natural gas (LNG) terminals and interstate natural gas pipelines. These functions are not carried out by delegation from the Secretary; instead, these authorities are vested in the Commission itself. By statute, employees of FERC are not responsible or subject to the supervision or direction of any employee of any other part of the Department, including the Secretary. However, the Secretary may delegate functions to the Commission.

DOE Organizational Chart



DOE Installations and Operations

At its core, the Department is a science and technology organization that advances critical missions for the American people, including nuclear security; scientific leadership and discovery; clean energy innovation; environmental remediation; and energy security. Meeting these challenges requires a geographically dispersed presence, complex facilities, and highly-trained workforce. The map on page 12 (Figure 2) shows the location of DOE's National Laboratories, production facilities, and other field sites.

National Laboratories

Founded as part of an immense national investment in scientific research during and following World War II, DOE's system of National Laboratories is comprised of 17 world-class research institutions that constitute the most comprehensive research network of its kind. For more than seventy years, the National Laboratories have brought deep science and technology innovation to bear against major challenges in the United States, and they continue to serve as an integral component of the U.S. research enterprise and invaluable strategic partners for DOE in evolving with its modern-day missions.

DOE's National Laboratories each have distinct but complementary resources and capabilities, with scientists, engineers, technicians, and analysts collaborating throughout the system, as well as with academia and industry, to ensure the best solutions are pursued without regard to organizational boundaries. The labs operate one-of-a-kind national scientific user facilities that are used annually by over 32,000 researchers from universities, federal laboratories, and the private sector.

The National Laboratories fill a critical gap in the Nation's energy innovation ecosystem. Universities emphasize early discovery and tend to focus on research associated with small groups of faculty members, while companies respond to market needs and typically focus their R&D on nearterm solutions or the integration of multiple technologies. National Laboratories tackle multidisciplinary problems with a long-time horizon, often joining fundamental discovery research, technology development, and demonstration projects. In addition, the National Laboratories conduct R&D in areas that are not pursued by either universities or companies, such as safeguarding and managing the Nation's nuclear stockpile.

Specifically, the National Laboratories conduct activities across several main mission areas:

- Advance United States energy independence and leadership in clean energy technologies to ensure the ready availability of clean, secure, reliable, and affordable energy.
- Deliver discovery and innovation in physical, chemical, biological, engineering, and computational and information sciences that advance our understanding of the world around us.
- Enhance global, national, and homeland security by ensuring the safety and reliability of the United States nuclear deterrent, helping to prevent the proliferation of weapons of mass destruction, and securing the Nation's borders.
- Develop deployable technologies for the safe cleanup of the environmental legacy from five decades of nuclear weapons development, production, and testing.
- Design, build, and operate distinctive scientific instrumentation and facilities, and make these resources available to the research community.
- Serve the national interest not only as leaders in science and technology, but also as quickly mobilized national assets in times of national need.
- Move innovation to the marketplace and strengthen United States competitiveness.
- Train the next generation of scientists and engineers, particularly in DOE core mission areas.

DOE's National Laboratories have a substantial record of accomplishment and demonstrated return on investment for the American taxpayer. For example, the DOE National Laboratories have:

 Driven U.S. leadership in supercomputing, including exascale and quantum computing, and led application of supercomputing to address complex problems.

- Developed energy efficiency technologies and standards that have saved United States taxpayers over \$1 trillion.
- Conducted the fundamental and applied research that enabled the shale gas revolution and the development of nuclear, photovoltaics, and energy storage for transportation industries.
- Made scientific discoveries, from new chemicals and new states of matter to an improved understanding of the origins of the universe.
- Sustained confidence in the Nation's nuclear weapons stockpile in the absence of nuclear testing, identifying and dealing with arising issues in weapon systems through life extension programs.
- Provided to the DOE Office of Environmental Management purpose-built technical capabilities and process improvements that have achieved life cycle savings of over \$5 billion.
- Served as an "on call" resource for tackling unprecedented challenges—from the threat of unsecured nuclear materials as the Soviet Union collapsed, to the Macondo oil spill in the Gulf of Mexico, to the Fukushima nuclear disaster, to the COVID-19 global health crisis.

For more information on the National Laboratories please visit <u>page 51</u> of this book.

Weapons Plants and Remediation Sites

In addition to its National Laboratories, DOE performs its nuclear security mission at multiple sites around the country. These government-owned sites are typically operated by management and operating (M&O) contractors who employ the bulk of personnel at the sites, performing highly technical and often hazardous work.

In addition to its three national security laboratories, NNSA operates four nuclear weapons production facilities and the Nevada National Security Site. The NNSA nuclear security enterprise's M&O workforce consists of over 50,000 contractor employees.

EM, with an annual budget of about \$7 billion, uses over 30,000 contractor employees at 16 sites in 11 states to perform vital cleanup work resulting from legacy nuclear weapons production, including the deactivation, decommissioning, decontamination and demolition of thousands of aging facilities; safe management and disposition of radioactive and hazardous liquid and solid wastes; and remediation of contamination in soil and groundwater. Many of the contractor employees performing NNSA and EM work are represented by trade unions.

Power Marketing Administrations

The Power Marketing Administrations (PMAs) are agencies within DOE whose primary mission is to market hydroelectric power produced at Federal dams. These multipurpose water projects are owned and operated primarily by the Department of Interior's Bureau of Reclamation and the U.S. Army Corps of Engineers. There are four PMAs-Bonneville Power Administration (BPA), Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA)—each operating in a different geographic region. In FY 2019, DOE's four PMAs marketed power primarily from 133 Federal hydro power plants with maximum operating capabilities of 38,613 megawatts, approximately three percent of the Nation's power plant capacity. The PMAs report to the Assistant Secretary for Electricity.

DOE Laboratories, Plants, and other Field Sites



Alabama

Power Systems Development Facility 1.

Alaska

Arctic Energy Office 2.

California

- Energy Technology Engineering Center 3.
- 4 Lawrence Berkeley National Laboratory
- Lawrence Livermore National Laboratory* 5 6. Sandia National Laboratories
- SLAC National Accelerator Laboratory* 7

Colorado

- LM Grand Junction Office
- National Renewable Energy Laboratory* 9
- 10. Western Area Power Administration
- 11. LM Westminster Office

Connecticut

12. Northeast Home Heating Oil Reserves

District of Columbia

13. DOE Headquarters - Forrestal Building

Georgia

14. Southeastern Power Administration

Idaho

- 15. Idaho National Laboratory*
- 16. Radiological Environmental Sciences Laboratory

Illinois

- 17. Argonne National Laboratory*
- 18. SC Consolidated Service Center
- 19. Fermi National Accelerator Laboratory*

lowa

20. Ames Laboratory

Kentucky

- 21. Paducah Gaseous Diffusion Plant 22. Portsmouth/Paducah Project Office

* EFFECTIVE DATE: OCTOBER 2020

Louisiana

- 23. Strategic Petroleum Reserve West Hackberry Site
- 24. Strategic Petroleum Reserve Bayou Choctaw Site 25
- Strategic Petroleum Reserve Project Management Office 26. Strategic Petroleum Reserve - St. James Terminal

Maine

27. Northeast Gasoline Supply Reserve

Maryland

28. DOE Headquarters - Germantown Campus

Massachusetts

- 29. Northeast Gasoline Supply Reserve
- 30. Northeast Home Heating Oil Reserve

Mississippi

31. SPR Emergency Equipment Warehouse

Missouri

32. Kansas City National Security Campus

Nevada

33. Nevada National Security Site

New Jersey

Northeast Home Heating Oil Reserve
 Princeton Plasma Physics Laboratory*

New Mexico

- 36. Inhalation Toxicology Research Institute
- 37. Los Alamos National Laboratory*
- 38. National Training Center 39. NNSA Albuquerque Complex
- 40 Sandia National Laboratories
- 41. Waste Isolation Pilot Plant*

New York

- 42. Separations Process Research Unit
- 43. Northeast Gasoline Supply Reserve
- 44. Brookhaven National Laboratory 45. Knolls Atomic Power Laboratory
- 46. West Valley Demonstration Project

Ohio

DOE CORPORATE OVERVIEW | DOE Laboratories, Plants, And Other Field Sites

- 47. EM Consolidated Business Center
- 48. Portsmouth Gaseous Diffusion Plant

Oklahoma

49. Southwestern Power Administration

Oregon

- 50. Bonneville Power Administration
- 51. National Energy Technology Laboratory Albany

Figure 2

Pennsylvania

- 52. Bettis Atomic Power Laboratory
- 53. National Energy Technology Laboratory Pittsburgh

South Carolina 54. Savannah River National Laboratory* 55. Savannah River Site

Tennessee

- 56. East Tennessee Technology Park
- 57. Oak Ridge National Laboratory*
 58. Office Scientific and Technical Information
- 59. Y-12 Plant

Texas

- 60. Strategic Petroleum Reserve Big Hill Site
- 61. Strategic Petroleum Reserve Bryan Mound Site
- 62. Pantex Plant*
- 63. National Energy Technology Laboratory Houston

Utah

64. Moab UMTRA Project

Virginia

65. Thomas Jefferson National Accelerator Facility*

Washington

66. Hanford 67. Pacific Northwest National Laboratory*

West Virginia

68. National Energy Technology Laboratory – Morgantown 69. LM Business Center

12

Wyoming

70. Rocky Mountain Oil Field Testing Center

Boards, Councils, and Committees

Given its diverse, complex missions, DOE has established several high-level boards, councils, and committees to: identify issues and challenges requiring attention; facilitate collaborative, decision-making; and offer recommendations on challenges facing the Department. In most cases, these groups are comprised of senior leaders from headquarters program and mission support offices; field organizations; and laboratories. They have been essential to building stronger relationships and developing strategies to achieve DOE's goals.

In addition, DOE has twenty-one advisory committees that are managed in accordance with the *Federal Advisory Committee Act*. These committees are comprised of experts in specific disciplines and represent the users, industries, and organizations in the public and private sectors that could be directly affected by the work of the committees. The committees provide relevant, objective advice to DOE and their proceedings are open to the public. DOE manages two of these advisory committees in support of the President.

Internal DOE Boards, Councils and Committees

The following includes boards, councils, and committees that are internal to DOE, most of which are chaired by the Deputy Secretary.

Research and Technology Investment Committee

(RTIC), chaired by the Deputy Secretary, convenes key elements of the Department that support research and development activities to share and coordinate their strategic research priorities, identify potential cross-cutting opportunities in both basic and applied science and technology, and ensure key upcoming decisions are effectively leveraged. The RTIC membership includes the Under Secretaries, ARPA-E Director, and other senior officials. The RTIC is supported by the RTIC Working Group, which is comprised of senior level staff representing the RTIC members. RTIC initiatives have focused on increased transparency and collaboration across programs, especially on specific technologies, including energy storage, artificial intelligence, critical materials, STEM, biotechnology, polymers, and integrated energy systems.

Cyber Council, chaired by the Deputy Secretary, is the principal forum for coordination of cyberrelated activities across the Department and serves as an advisory body to the Deputy Secretary. DOE is engaged in three categories of cyber-related activities: (1) protecting the DOE enterprise – including government-owned, contractor-operated sites and facilities – from a range of cyber threats that can adversely impact mission capabilities; (2) bolstering the United States Government's capabilities to address cyber threats; and (3) supporting energy sector efforts to strengthen cybersecurity. Membership includes the Under Secretaries and other senior leadership with responsibilities for cyber security. The Council meets guarterly or as required by the Chair.

Energy Systems Acquisition Advisory Board

(ESAAB), chaired by the Deputy Secretary, supports the Department's objective of achieving and maintaining excellence in project management, advises the Deputy Secretary on enterprise-wide project management policy and issues, and supports decision-making on critical decision (CD) milestones for major system projects greater than \$750 million. The ESAAB also reviews other projects of lessor value to raise awareness of problems and solutions. Recent highlights include: the approval of a project alternative (CD-1) of a new \$5.8 billion Versatile Test Reactor (VTR) at the Idaho National Lab; a mission need approval (CD-0) for a new \$4.2 billion Science Electron Ion Collider (EIC); and the project completion (CD-4) of a new, \$2.34 billion nuclear chemical processing facility, the Salt Waste Processing Facility (SWPF) at the Savannah River Site.

Emergency and Incident Management Council

(EIMC), chaired by the Deputy Secretary, serves as a forum to promote coordination across the Department to prepare for, mitigate, respond to, and recover from emergency situations. Most recently, for example, the EIMC has played a significant role in ensuring a coordinated Departmental response to COVID-19. The Council, made up of senior leaders from across the Department, addresses strategiclevel aspects of the emergency management enterprise and identifies department-wide capabilities that can be utilized, as appropriate, in response, consultation, and technical assistance and restoration activities.

Credit Review Board (CRB), chaired by the Deputy Secretary, is charged with ensuring full consideration

of credit management, debt collection, and policy issues, to make recommendations to the Secretary of Energy prior to the Secretary's granting final approval for any conditional commitment for a loan guarantee or loan, and to participate in the oversight of the Loan Program's portfolio. The CRB seeks to confirm the commercial viability of a project receiving a loan or loan guarantee; thoroughly examine the project or activities benefitting from the program in light of DOE's objectives, including the portfolio objectives for the program; and oversee the development of a strategy for managing risks taken on by the Department in association with its loans, loan guarantees, and portfolio.

Laboratory Operations Board (LOB) was chartered in 2013 to strengthen the partnership between the Department and the National Laboratories, and to improve management and performance in order to more effectively and efficiently execute the missions of the Department and the National Laboratories. The LOB holds monthly meetings and is chaired by the Director, Office of Strategic Planning and Policy. Its membership includes senior program and staff office officials; National Laboratory Chief Operating Officers (COOs) and Chief Research Officers (CROs); a representative from the Field Office Managers; and a representative from the Lab M&O contractor group. Most recently, the LOB has focused on developing the 2020 State of the DOE National Laboratories Report and preparing a strategic response to the Secretary of Energy Advisory Board's recommendations on investing in people to retain, grow and inspire top talent.

Security Committee was established by the Secretary and is comprised of Chief Security Officers (CSOs) across DOE. The Security Committee identifies corporate security strategies, guides security policy development, and provides a forum for crossorganizational issues. The Committee oversaw the development of a Design Basis Threat policy, further refining previous threat assessment processes. In addition, the Committee provides guidance for security of special nuclear material, including addressing aging security infrastructure, and material control and accountability. The Committee has also led the Department's efforts to develop counter-unmanned-aerial system security policies and pursue special airspace designations and engagement authorities to best protect DOE assets.

DOE Federal Advisory Committees

The following includes Federal Advisory Committees managed by the Department.

President's Council of Advisors on Science and

Technology (PCAST) advises the President on matters involving science, technology, education, and innovation policy. The Council also provides the President with scientific and technical information that is needed to inform public policy relating to the American economy, the American worker, national and homeland security, and other topics.

National Quantum Initiative Advisory Committee

(NQIAC) provides advice to the President and the Secretary of Energy on the National Quantum Initiative Program. The committee also provides advice to the National Science and Technology Council Subcommittee on Quantum Information Science. The NQIAC conducts independent assessments of trends and developments in quantum information science and technology and tracks the progress and activities of the Program, including the extent to which the Program is helping to maintain United States leadership in quantum information science and technology.

Secretary of Energy Advisory Board (SEAB)

provides the Secretary with timely, balanced, external advice on issues concerning DOE. Comprised of technical experts, business executives, academics, and former government officials, SEAB provides recommendations to the Secretary on DOE's basic and applied research and development activities; economic and national security policy; educational issues; operational issues; and any other issues as directed by the Secretary. Most recently, four SEAB working groups have been established to provide recommendations on maximizing artificial intelligence and machine learning to support DOE's mission; promoting innovation in DOE policies and practices; optimizing DOE efforts to support space exploration; and elevating the profile of DOE's vital missions through improved branding.

DOE's Office of Energy Efficiency and Renewable Energy

The following four Federal advisory committees that support its activities:

Appliance Standards and Rulemaking Advisory

Committee (ASRAC), was established to use negotiated rulemaking to engage all interested parties, gather data, and attempt to reach consensus on establishing energy efficiency standards.

Biomass Research and Development Advisory

Committee (<u>BIOAC</u>), provides expert advice to help craft recommendations on the direction of biomass research and development at DOE.

Hydrogen and Fuel Cell Technical Advisory

Committee (HTAC), provides technical and programmatic advice on DOE's hydrogen research, development, and demonstration efforts.

State Energy Advisory Board (STEAB), develops recommendations regarding initiation, design, implementation, and evaluation of federal energy efficiency and renewable energy programs to help integrate and provide consistency between federal, state, and local activities.

DOE's Office of Electricity

The following Federal advisory committee supports its activities:

Electricity Advisory Committee (EAC), provides expert advice on implementing the *Energy Policy Act of 2005*; executing the *Energy Independence and Security Act of 2007*; and modernizing the nation's electricity delivery infrastructure.

DOE's Office of Fossil Energy

has the following three Federal advisory committees that support its activities:

National Coal Council (NCC), provides advice and recommendations on coal policy, technology and markets.

National Petroleum Council (*NPC*), was established to advise, inform, and make recommendations with respect to any matter relating to oil and natural gas or to the oil and gas industries.

Methane Hydrate Advisory Committee (MHAC),

advises DOE on the potential applications of methane hydrate; assists in developing recommendations and priorities for the methane hydrate research and development program; and submits to Congress one or more reports on an assessment of DOE's research program.

DOE's Office of Nuclear Energy

The following Federal advisory committee supports its activities:

Nuclear Energy Advisory Committee (NEAC),

advises on national policy and scientific aspects of nuclear issues of concern to DOE.

DOE's Office of Science

The following six advisory committees all provide independent advice on specific technological areas:

Advanced Scientific Computing Advisory Committee (ASCAC)

Basic Energy Science Advisory Committee (BESAC)

Biological and Environmental Research Advisory Committee (BERAC)

Fusion Energy Sciences Advisory Committee (FESAC)

High Energy Physics Advisory Panel (HEPAP)

Nuclear Science Advisory Committee (NSAC)

DOE's Office of Environmental Management

The following two Federal advisory committees supports its activities:

Environmental Management Advisory Board

(EMAB), provides independent and external advice, information, and recommendations to the Assistant Secretary for Environmental Management on corporate issues relating to accelerated site cleanup and risk reduction.

Environmental Management Site-Specific

Advisory Board (EMSSAB), was created to involve stakeholders more directly in environmental cleanup discussions, federal decision-making and cleanup activities.

National Nuclear Security Administration

The following Federal advisory committee supports its activities:

Defense Programs Advisory Committee (DPAC),

provides advice and recommendations on the stewardship and maintenance of the Nation's nuclear deterrent.

Department of Energy's Upcoming Critical Decisions and Events

The following includes the Department's highvisibility critical decision points and events, by program, for January 20, 2021 through April 30, 2021.

January 2021 (Post-Inauguration)

Office of Congressional and Intergovernmental Affairs will begin preparing incoming nominees for confirmation hearings, including Congressional courtesy visits.

Energy Information Administration will issue the Annual Energy Outlook (AEO), an integrated long-term projection of U.S. energy consumption, supply, prices, and energy-related carbon dioxide emissions.

National Nuclear Security Administration will provide an annual report (developed jointly with the Department of Defense) to the Secretary of Energy and the Secretary of Defense on the safety, reliability, performance and military effectiveness of the U.S. nuclear weapons stockpile. The Secretaries must submit the report to the President by February 1, 2021.

National Nuclear Security Administration.

Will announce the awardees for a new university consortium under the \$25 million Integrated University Program (IUP) Funding Opportunity Announcement (FOA) to establish basic research and development capabilities at U.S. universities and enable a pipeline of students who have performed nuclear engineering and nuclear physics research into the national laboratory system.

National Nuclear Security Administration will participate in the Treaty on the Nonproliferation of Nuclear Weapons (NPT) 2021 Review Conference, which is tentatively scheduled for January 2021. **Office of the Chief Financial Officer** will develop, if needed, a revised FY 2021 budget request and COVID/stimulus supplemental proposals for Congressional consideration.

Office of Electricity will seek approval to construct the Grid Storage Launchpad (GSL) Research Facility at the Pacific Northwest National Laboratory, which is needed to accelerate vital research and validate the performance of battery technologies for grid applications.

Office of Energy Efficiency and Renewable

Energy will select financial assistance awardees for the Critical Materials FOA: Next-Generation Technologies and Field Validation, which will provide \$30 million for research and development focused on field validation and demonstration, as well as next-generation extraction, separation, and processing technologies for critical materials.

Office of Energy Efficiency and Renewable

Energy will select financial assistance awardees for the Water Security FOA: Research and Development for Advanced Water Resource Recovery Systems, which will provide \$20 million to develop technology innovations that strengthen America's water infrastructure and enable advanced water resource recovery systems that have the potential to be net energy positive.

Office of Energy Efficiency and Renewable

Energy will select financial assistance awardees for the Perovskite FOA, which will provide \$20 million to further advance perovskite research and development in accordance with FY 2020 Congressional direction.

Office of Science will make critical decisions regarding the Nanoscale Science Research Centers (NSRC) Recapitalization at Brookhaven National Laboratory, including determinations on the selected approach for the project, the project's final design, and authorization to release funds for the first phase of construction.

February 2021

Energy Information Administration will issue the February edition of the Short-Term Energy Outlook (STEO), which provides a monthly forecast of U.S. energy consumption, supply, and prices through the end of 2022.

Office of the Chief Financial Officer will develop, if appropriate, a DOE FY 2022 budget request based on new Administration guidance.

Office of Congressional and Intergovernmental Affairs will prepare senior leadership for potential

meetings with intergovernmental groups that are scheduled to hold their annual meetings in February and March.

Office of International Affairs will prepare senior leadership for the Munich Security Conference, scheduled for February 2021, and associated bilateral and multilateral meetings.

Office of Management the Government Accountability Office (GAO) will issue its bi-annual High Risk List, which includes Federal government activities considered to be at high-risk. The National Nuclear Security Administration and Office of Environmental Management's major projects and contracts (over \$750 million) are expected to continue to be on the list, primarily due to challenges in completing large construction projects.

March 2021

Energy Information Administration will issue the March edition of the Short-Term Energy Outlook (STEO), which provides a monthly forecast of U.S. energy consumption, supply, and prices through the end of 2022.

National Nuclear Security Administration the President issues the annual assurance on the safety, security, reliability, and military effectiveness of the nuclear weapons stockpile based on an assessment conducted by DOE and the Department of Defense.

Office of Energy Efficiency and Renewable

Energy will down select from three awardees funded under the FY 2018 Generation 3 Contracting Solar Power (CSP) Systems FOA to one awardee that will build a test facility that allows diverse teams of researchers, laboratories, developers, and manufacturers to test components and systems through a wide range of operating conditions necessary to advance the next generation of CSP technology.

Office of Energy Efficiency and Renewable

Energy expects to announce plans to revise the appliance standards for showerheads

and manufactured housing, which will likely draw significant interest from a diverse set of stakeholders, including members of Congress and the media.

Office of Environmental Management expects to award a new contract to manage and operate the Savannah River National Laboratory, which will enhance and expand the laboratory's research and development capacity.

Office of Fossil Energy to support the \$1.4 billion Strategic Petroleum Reserve Modernization Program's Life Extension 2 (LE2) Project, FE must conclude the fourth and final Energy Security and Infrastructure Modernization (ESIM) Fund crude oil sale to raise the final \$450 million for construction contract commitments prior to June 2021. The Secretary determines whether to authorize the sale.

Office of International Affairs will participate in the International Energy Agency (IEA) Governing Board Meeting scheduled for March 24-25, 2021.

Office of Science will make a decision regarding the High-Luminosity Large Hadron Collider (HL-LHC) ATLAS Upgrade Project at Fermi National Accelerator Laboratory on the approval of the preliminary design of the project as well as consideration of the scope, cost, and schedule.

April 2021

Energy Information Administration will issue the April edition of the Short-Term Energy Outlook (STEO), which provides a monthly forecast of U.S. energy consumption, supply, and prices through the end of 2022.

Office of Electricity will seek resolution regarding an expiring designation (May 1, 2021) in Executive Order 13920, *Securing the United States Bulk-Power System*, which declares threats to the bulk-power system by foreign adversaries to constitute a national emergency. Absent legislation, the national emergency declaration would need to be renewed annually.

Office of Science will host the annual National Science Bowl (NSB), where teams of middle school and high school students across the country compete in the NSB Finals. The President, First Lady, and the Secretary are traditionally invited to address the students or host the finals. All 2021 regional competitions will be virtual (from mid-January to late March). A determination on the location of the National Finals will be made in March 2021.

Budget Overview

This document provides an overview of the Department of Energy (DOE) budget, including highlights of the FY 2021 Budget Request focusing on the funding profiles of the important issues presented in these transition materials, and provides summary tables presenting the FY 2021 request by program office and appropriation, and appropriations by state and by national laboratory. The accompanying FY 2021 Budget in Brief provides more information about the FY 2021 request and funding for individual program offices and their activities.

The DOE budget supports a broad portfolio of energy, science, and national security programs, including support for the 17 national laboratories which carry out critical responsibilities for America's security and economy in three areas:

- Promoting Energy Independence
- Progressing Scientific Research
- Protecting the Nation

The DOE budget is divided into two categories – Defense (budget function 050) and Non-Defense (non-050). The Defense 050 category funds the National Nuclear Security Administration (NNSA); defense environmental cleanup, approximately 82% of the environmental management program; and several other smaller programs. The DOE non-defense category funds energy, science, nondefense environmental cleanup, and management and departmental administration programs.



DOE FY 2017 to FY 2020 Financial Trend (\$B)

Execution and Status of Funds

The graph illustrates a high-level trend of Department of Energy's (DOE) financial execution over the past four years. DOE's discretionary Enacted Budget Authority increased steadily from \$32.4B to \$39.4B between FY 2017 to FY 2020, which is a +7% compounded annual growth rate (CAGR). Over the same time period, DOE's total carryover increased from \$23.4B to \$34.1B, equating to a +13% CAGR. DOE's total carryover is comprised of both unobligated funds (i.e., funds yet to be placed on awards) and uncosted funds (i.e., funds placed on awards, yet to be spent (costs accrued and paid)). The +\$10.7B increase in total carryover in the graph is due primarily by increases in DOE's uncosted balances (+\$9.3B, +16% CAGR).

This pie chart illustrates DOE's obligations by functional category. Nearly half of DOE's FY 2020 obligations were issued to the site facility contractors which lead work at DOE's National Laboratories and field sites.



FY 2020 Obligations by Functional Category

Departmental Summary

The following is excerpted from the **Department of Energy FY 2021 Congressional Budget Request.** It was submitted to the U.S. Congress in February 2020 and is available on the website at: <u>https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf</u>. Throughout the overview, we have provided updates from the FY 2021 House Energy and Water Development Appropriations (HEWD) bill. The Senate Energy and Water Subcommittee has not yet released a bill for FY 2021.

The mission of the Department of Energy (DOE) is to advance U.S. national security and economic growth through transformative science and technology innovation that promotes affordable and reliable energy through market solutions, and meets nuclear security and environmental cleanup challenges. DOE's Fiscal Year (FY) 2021 Budget Request provides for research, emerging energy technologies, and nuclear capabilities to support DOE's mission, activities, and policies.

Overview

The President's Budget for FY 2021 requests \$35.4B for the Department of Energy to meet today and tomorrow's challenges by promoting energy independence, progressing scientific research, and protecting the Nation. The Budget highlights crosscutting, early-stage applied research in energy storage, grid integration, critical minerals, and harsh environment materials for a secure, resilient, affordable, and integrated energy system. The Budget maintains global leadership in scientific and technological innovation in part through 17 National Laboratories, including basic research to support Industries of the Future. DOE remains committed to managing and cleaning up nuclear waste. The Budget also supports aggressively modernizing the nuclear security enterprise for the safety and security of America.

House Action: The FY 2021 House Energy and Water Development Appropriations (HEWD) bill would fund the Department of Energy at over \$40B; \$1.5B above the FY 2020 enacted level and \$4.7B above the FY 2021 request. The bill prioritizes funds to mitigate and adapt to climate change, and strengthen national security.

The FY 2021 Budget Request provides:

- \$3.6B for technologies that will make the Nation's energy supply more affordable, reliable, and efficient promoting energy independence and dominance.
- \$5.9 B to progress cutting-edge scientific R&D, including support for Industries of the Future, such as quantum information science (QIS) and AI. The Budget also funds key technologies such as microelectronics, advanced manufacturing, biotechnology, and technology transfer. The Budget also supports state-of-the art scientific tools and facilities keeping U.S. researchers at the forefront of scientific innovation.
- 26.9B to support national security, and includes:
 - \$6.1B to continue cleanup of sites resulting from six decades of nuclear weapons development and production and Government-sponsored nuclear energy research.
 - \$19.8B to sustain and modernize the U.S. nuclear stockpile and aging infrastructure, reduce global nuclear threats, and propel the nuclear Navy.

DEPARTMENT OF ENERGY	
FY 2021	
DOE	\$M
 Energy 	3,603
Science	5,856
 National Security 	26,891
 Administration and Oversight 	215
 Savings and Receipts 	-722
Reduction for Loan Programs and ARPA-E	-480
DOE Total	35,363

The Budget also emphasizes coordinated crosscutting research of technologies for energy storage, critical minerals, harsh environment materials, grid integration, advanced manufacturing, exascale computing, and microelectronics.

The Budget seeks innovations and includes \$190M for Advanced Energy Storage Initiative (AESI) to support the Energy Storage Grand Challenge (ESGC), a holistic approach to accelerate the development, commercialization, and utilization of next-generation energy storage technologies. The Department integrated the existing dispersed storage efforts from the Office of Science (SC), Grid Modernization Initiative, AESI, Beyond Batteries, and others into ESGC, an integrated, comprehensive DOE- wide strategy. The vision for the ESGC is to create and sustain global leadership in energy storage utilization and exports, with a secure domestic manufacturing supply chain that is independent of foreign sources of critical materials, by 2030.

To promote efficiency and maximize impact, the Budget maintains momentum on the Harsh Environment Materials Initiative (HEMI) launched in FY 2020. The Budget provides approximately \$58.5M for HEMI, including \$6.5M from the Office of Energy Efficiency and Renewable Energy (EERE), up to \$22M from the Office of Fossil Energy (FE), and \$30M from the Office of Nuclear Energy (NE). The initiative exploits synergies in materials and component manufacturing process research for advanced thermoelectric power plants. Building on current applied energy programs, this initiative leverages activities related to advanced reactor technologies and high efficiency low emission modular coal plants to align R&D of novel materials, integrated sensors, and manufacturing processes.

The Budget also establishes a \$131M Critical Minerals Initiative (CMI) to coordinate research across the Department. Funds will come from program offices including, EERE with \$53M, FE with \$32M, NE with \$1M, and SC with \$45M, to initiate a National Laboratory-led team approach modeled after the Grid Modernization Laboratory Consortium to elevate and coordinate research activities.

To maintain U.S. leadership in supercomputing, the Budget provides almost \$710M from SC (\$475M) and the National Nuclear Security Administration (NNSA) (\$235M). In FY 2021, funding will support continued development of two SC-supported exascale systems. The first of these two exascale systems will be deployed calendar year 2021 at Argonne National Laboratory, with the second coming online in the 2021 – 2022 timeline at Oak Ridge National Laboratory. In addition, the FY 2021 Request will provide support for the procurement of and site preparation for a third exascale system delivered to NNSA at Lawrence Livermore National Laboratory in FY 2023. The SC and NNSA partnership will bolster America's national security by strengthening the nuclear stockpile and next generation of science breakthroughs not possible with today's fastest computing systems.

In FY 2021, the Budget provides \$249M from SC (\$237M) and NNSA (\$12M) in support of QIS research. Supporting the National Quantum Initiative and the Administration's Industries of the Future initiative, the Budget provides funding for research activities including strategic partnerships in quantum computing and data intensive applications, development of quantum sensors based on atomic-nuclear interactions, and development of quantum computing algorithms, and early stage research associated with the initial steps to establish a dedicated Quantum Network.

To support fiscal responsibility and streamline DOE activities, the Budget eliminates the Advanced Research Projects Agency—Energy (ARPA-E) program, the Title XVII Innovative Technology Loan Guarantee Program, the Advanced Technology Vehicle Manufacturing Loan Program, and the Tribal Energy Loan Guarantee Program. ARPA-E elimination facilitates opportunities to integrate the positive aspects of ARPA-E into DOE's applied energy research programs including through changes to the implementation of the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) program. Loan programs are eliminated because the private sector is better positioned to finance deployment of commercially viable projects. To further achieve fiscal discipline and reduce taxpayer risk, the request proposes to repeal the Western Area Power Administration's (WAPA) borrowing authority that finances the construction of electricity transmission projects. Investments in transmission assets are best carried out by the private sector with appropriate market and regulatory incentives.

House Action: The FY 2021 HEWD bill funds ARPA-E at \$435M, increasing funding \$10M over FY 2020 enacted. The bill also maintains FY 2020 funding levels for the Loan Guarantee Programs, providing \$29M for the Title 17 Innovative Technology Loan Guarantee Program, \$5M for the Advanced Technology Vehicles Manufacturing, and \$10.5M for the Tribal Energy Loan Guarantee programs. Finally, the bill retains WAPA's borrowing authority.

Promoting Energy Independence

Recognizing that the U.S. has among the most abundant and diverse energy resources in the world, including oil, gas, coal, nuclear, and renewables, the FY 2021 Budget Request supports a variety of efforts that emphasize and strengthen that unique advantage, including establishing a uranium reserve, to promote energy independence. The Budget provides \$3.6B for energy and related programs and funds basic research while continuing the Administration's support of earlystage applied R&D, and targeted later-stage R&D to address unique challenges. DOE is committed to supporting energy initiatives that will attract investments, safeguard the environment, and strengthen energy security.

Highlights include:

\$719.6M for EERE prioritizing core lab activities, particularly in renewables and energy efficiency. The Budget also maintains funding at the National Renewable Energy Laboratory. EERE invests in early- stage research to spur private-sector research, development, and commercialization of critical energy technologies such as: sustainable transportation technologies to increase fuel diversity and improve efficiency across the transportation sector (\$161M); renewable power generation technologies to compete with other electricity sources without subsidies (\$160M); and energy efficiency to improve affordability, energy productivity, and resiliency of homes, buildings, and manufacturing sectors (\$164M). The Budget invests in the Plastics Innovation Challenge and continues to support AESI in support of ESGC, HEMI, CMI, and other cross- cutting activities. The Budget divests from Weatherization and State Energy subprograms which are more appropriately funded at the state level.

House Action: The FY 2021 HEWD bill includes a net appropriation of \$2.85B for EERE, which is \$58 million above the FY 2020 enacted level and \$2.1 billion above the FY 2021 request. This funding provides for clean, affordable, and secure energy and supports American leadership in the transition to a global clean energy economy. The bill rejects the Administration's proposal to eliminate the Weatherization Assistance Program and provides \$310M for the program.

	ENERGY	
	FY 2021	
Ene	ergy Programs	\$M
	Energy Efficiency and RenewableEnergy	720
	Cyber Security, Energy Security, & Emergency Respo	onse 185
•	Electricity	195
	Nuclear Energy	1,180
	Interim Storage and Nuclear Waste Fund Oversight	28
	Uranium Reserve	150
	Fossil Energy Research and Development	731
•	Petroleum Reserves	200
•	Energy Information Administration	129
	Indian Energy	8
	Power Marketing Administrations	79
Ene	ergy Total	3,603

 \$184.6M for Cybersecurity, Energy Security, and Emergency Response (CESER) to invest in an all hazards approach to energy- sector cybersecurity. The Budget supports development of capabilities to identify, prevent, protect against, mitigate, and respond to cybersecurity threats during an emergency event that pose risk to energy delivery operations. The Budget funds R&D, public and private-sector partnerships, and emergency preparedness and response.

House Action: The FY 2021 HEWD bill includes a net appropriation of \$160M for CESER. This is an increase of \$4 million above the FY 2020 enacted level and is \$24M below the request. This funding provides for efforts to secure the nation's energy infrastructure against all hazards, reduce the risks of and impacts from cybersecurity events, and assist with restoration activities, including not less than \$90M for the Grid Modernization Initiative.

 \$195M for the Office of Electricity to support the mission of secure and resilient sources of electricity. The investment addresses the challenges of increased threats to energy infrastructure, increased demand, changes in supply mix and location of the Nation's generation portfolio, and increased variability and uncertainty of supply and demand. The Budget will support four priorities: develop and implement an integrated North American Energy Resiliency Model; pursue a megawatt-scale storage; revolutionize sensing technology; and pursue transmission permitting and technical assistance.

House Action: The FY 2021 HEWD bill includes \$195 million for the Office of Electricity, which is an increase of \$5 million above the FY 2020 enacted level and flat with the budget request. This funding will advance technologies to increase the resiliency and efficiency of the nation's electricity delivery system with capabilities to incorporate growing amounts of clean energy technologies. For the Grid Modernization Initiative, the bill requires not less than \$172M. The bill also includes \$15.5M for the Grid Storage Launchpad.

 \$1.2B for Office of Nuclear Energy to fund a diverse set of programs to advance nuclear energy technologies that are critical to the Nation's energy mix. The Budget supports early-stage R&D and targeted later-stage R&D to address unique challenges. The Budget provides for the Reactor Concepts R&D, Fuel Cycle R&D, and Nuclear Energy Enabling Technologies as critical laboratory infrastructure and safeguards needed to support nuclear energy R&D. Of the \$1.2B, \$295M is for the Versatile Test Reactor (VTR) project, one of the Department's highest priorities. The VTR is a first-of-a-kind fast reactor that would assist the private sector to develop and demonstrate new energy technologies. The Budget request reinforces the Administration's commitment to re-energize the U.S. nuclear sector with funds to support design and construction of the VTR.

House Action: The FY 2021 HEWD bill includes \$1.43b for Nuclear Energy, which is \$60M below the FY 2020 enacted level and \$250M above the request. The bill supports the development of next generation nuclear reactors and improving the safety and economic viability of the current reactor fleet. The Department is directed to continue allocating up to 20 percent of funds appropriated to Nuclear Energy Research and Development programs and fund university-led research and development. Within available funds, the recommendation also provides \$10M to support new or previously awarded hydrogen demonstration project in the Light Water Reactor Sustainability program within Reactor Concepts Research, Development and Demonstration. The Committee continued to include additional control points established in the FY 2020 enacted bill.

\$27.5M for the Interim Storage and Nuclear Waste Fund Oversight program to fund the development and implementation of a robust interim storage program, DOE's fiduciary responsibility for Yucca Mountain, and oversight of the Nuclear Waste Fund. Coupled with DOE's funding for storage, transportation, and disposal R&D, the Budget supports the development of a durable, predictable yet flexible plan that addresses more efficiently storing waste temporarily in the near term, followed by permanent disposal, and the Administration will establish an interagency working group to develop this plan in consultation with States.

House Action: The FY 2021 HEWD bill includes \$27.5M for interim storage of nuclear waste and oversight of the Nuclear Waste fund. No funds were provided for this purpose in the FY 2020 enacted bill. The FY 2021 HEWD bill directs the Department to move forward under existing authority to identify a site for a federal interim storage facility. The Department is further directed to use a consentbased approach.

 \$150M to establish a Uranium Reserve that provides assurance of availability of uranium in the event of a market disruption and supports strategic U.S. fuel cycle capabilities. This action addresses the immediate challenge to the production of domestic uranium and reflects the Administration's Nuclear Fuel Working Group priorities.

House Action: No funding was provided in the FY 2021 HEWD bill for the establishment of a Uranium Reserve and no funds can be spent on activities related to the establishment of a Uranium Reserve other than the development of a required plan. The committee asked that a plan include the legal authorities in place or needed to establish and operate a uranium reserve, including the purchase, conversion, and sale of uranium; a ten-year implementation plan of the activities for establishment and operations of a uranium reserve; and a ten-year cost estimate.

 \$730.6M for Fossil Energy R&D to conduct research that supports the clean, affordable, and efficient use of domestic fossil energy resources. The program funds early-stage R&D with academia, National Laboratories, and the private sector to generate knowledge that industry can use to develop new products and processes. Funding is also provided to support competitive awards with industry, National Laboratories and academia focused on innovative early-stage R&D to improve the reliability, availability, efficiency, and environmental performance of advanced fossil-based power systems.

House Action: The FY 2021 HEWD bill provides \$727.5M for Fossil Energy, which is \$22.5M below the FY 2020 enacted level and \$3.1M below the request. The funding provides for research, development, and demonstration activities for the safe, efficient, and environmentally sound use of fossil energy resources. The committee encouraged the Department to continue to support the Clean Energy Research Consortium and recognized continue investment in research and development of unconventional fossil energy technologies.

\$200M net amount for the Office of Petroleum Reserves, with \$187M for the Strategic Petroleum Reserve (SPR). The SPR provides strategic and economic security against potential interruptions in U.S. petroleum supplies. The Budget supports the programs operational readiness and drawdown capabilities. Consistent with prior budget requests, the Administration is reproposing the sale and closure of the Northeast Gasoline Supply Reserve (NGSR), which has not been used since establishment. Proceeds from the sale from the NGSR will be contributed to deficit reduction. Additionally, the Department is proposing to close the Northeast Home Heating Oil Reserve which has also never been used for intended purposed and is not a good use of taxpayer funds. The Budget further proposes a sale of 15 million barrels of SPR crude oil to raise funds for other Departmental priorities, including \$242M needed to fund the completion of remediation work at the NPR-1 site. The Naval Petroleum and Oil Shale Reserves will be funded at \$13M.

House Action: The FY 2021 HEWD bill includes \$202.5M for the Strategic Petroleum Reserve and Account, which is \$2.5M below FY 2020 enacted and \$15M above the request. Of these funds, \$195M is included for the SPR. The recommendation includes funding to address facilities development and operations, including physical security and cavern integrity. The recommendation provides \$20M to maintain 1 million barrels of gasoline blendstock in the Northeast Gasoline Supply Reserve. \$128.7M for the Energy Information Administration (EIA) to continue supporting the collection, analysis, and dissemination of independent and impartial energy information and analysis to promote sound policymaking, efficient markets, and public understanding. EIA will also begin a multi-year effort to modernize energy modeling capabilities. Expected benefits include greater agility in EIA's modeling system to address key current and emerging trends. The Budget also supports EIA to continue planned cybersecurity initiatives to bolster information security.

House Action: The FY 2021 HEWD bill provides \$126.8M for the Energy Information Administration, which is flat with FY 2020 enacted and \$1.9M below the budget request. The bill encourages additional data collection on light-emitting diode bulbs, commercial building codes, and electric transmission.

 \$8M for the Office of Indian Energy Policy and Programs for energy development and deployment on Indian lands, reduction of energy costs, assistance in economic development, and electrification in tribal communities where unemployment and poverty rates far exceed national averages.

House Action: The FY 2021 HEWD bill provides \$22.25M for Indian Energy, which is \$250K above FY 2020 enacted and \$14.25M above the budget request. Consistent with prior years, the increased funding is intended to provide financial assistance for Indian country grants toward energy development and electrification, and provide technical assistance to overcome barriers to energy project development on tribal land.

\$78.6M for the four Power Marketing Administrations (PMA) to sell electricity primarily generated by federally owned hydropower projects to public entities and electric cooperatives. The Budget again proposes to repeal WAPA's borrowing authority that finances the construction of electricity transmission projects. Investments in transmission assets are best carried out by the private sector with appropriate market and regulatory incentives that support resiliency and reliability. The Request again proposes to sell the transmission assets owned and operated by the PMAs, and authorize the PMAs to charge rates comparable to those charged by for-profit investor owned utilities. Reducing the government's role in electricity transmission infrastructure ownership, and introducing market-based incentives for power sales from Federal dams would encourage an efficient allocation of economic resources and mitigate risk to taxpayers.

House Action: The FY 2021 HEWD bill provides \$100M for the PMAs. The difference between this mark, and the FY 2020 enacted level of \$78M and the FY 2021 budget request level of \$78.6M has to do with a scoring issue related to the Colorado River Basin.

Progressing Scientific Research

The FY 2021 Budget Request includes \$5.9B to progress scientific research continuing U.S. dominance in research and science. The Budget funds the science mission by focusing on earlystage research, operating the national laboratories, and continuing high priority construction projects. The Budget includes ongoing investments for exascale and QIS for creating new ways of processing and analyzing information.

House Action: The FY 2021 HEWD bill provides \$7.05B for the Office of Science, an increase of \$50M above the FY 2020 enacted level and \$1.2 billion above the request. Primary increases above the Request in FY 2021 HEWD mark focus on facilities and infrastructure, and line items, including:

- Basic Energy Sciences, \$2.24B;
- Fusion Energy Sciences, \$680M including a \$260M for the U.S. contribution to the ITER project;
- High Energy Physics, \$1.05B; and
- Science Laboratories Infrastructure, \$68.75M.

The FY 2021 HEWD mark also includes increases for research in specific areas, including exascale computing, the Innovation Network for Fusion Energy (INFUSE) R&D program; and Electron Ion Collider research.

The FY 2021 HEWD bill supports the Office of Science's coordinated and focused research program in quantum information science and technology. The recommendation provides \$235M for quantum information science, including not less than \$120M for research and not less than \$100M for up to five National Quantum Information Science Research Centers. President's Budget Highlights include:

- \$988M for Advanced Scientific Computing Research (ASCR) to strengthen U.S. leadership in strategic computing, the foundations of AI and OIS, and the infrastructure that supports and facilitates data-driven science. To meet SC's high performance computing mission for the exascale project, the Budget prioritizes basic research in Applied Mathematics and Computer Science with emphasis on the challenges of data intensive science, including AI and machine learning, and computing technologies. The Budget increases support for ASCR's Computational Partnerships focusing on developing partnerships in quantum computing and data intensive applications, and new partnerships in exascale and data infrastructure. The Budget also provides support for ASCR user facilities operations to support the availability of high performance computing, data, and networking to the scientific community.
- \$1.9B for Basic Energy Sciences (BES) to support fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels providing foundations for new energy technologies, to mitigate the environmental impact of energy use. BES supports DOE missions in energy, environment, and national security. DOE aims to better understand the physical world and harness nature to benefit people and society. Specifically, funds provide for exascale computing, QIS, and operation of user facilities. The Budget will continue ongoing construction projects and fund a new construction project, the Cryomodule Repair and Maintenance Facility.
- \$516.9M for Biological and Environmental Research (BER) to support fundamental research to understand complex biological, biogeochemical, and physical principles of natural systems at scales extending from the genome of microbes and plants to the environmental and ecological processes at the scale of the planet Earth. The Budget supports research in biological systems science, earth and environmental systems science, and new efforts in translating biodesign rules to functional properties of novel biological polymers. The Budget continues operation of the three BER scientific user facilities: the Joint Genome Institute, the Atmospheric Radiation Measurement Research Facility, and the Environmental Molecular Sciences Laboratory.

	SCIENCE	
	FY 2021	
Sci	ence	\$M
Of	fice of Science Programs	
٠	Advanced Scientific Computing Research	988
	Basic Energy Sciences	1,936
٠	Biological and Environmental Research	517
	Fusion Energy Sciences	454
	High Energy Physics	818
	Nuclear Physics	653
	Workforce Development for Teachers and Scientists	21
	Science Laboratory Infrastructure	174
	Safeguards and Security	116
	Program Direction	190
Of	fice of Science Programs Total	5,867
Ar	tificial Intelligence and Technology Office	5
Of	fice of Technology Transitions	13
Sci	ence Total	5,885

- \$425.1M for the Office of Fusion Energy Sciences (FES) for research to develop a fusion energy source and to understand matter at very high temperatures and densities. Fusion energy is a carbon-free energy source with enormous potential, such as combatting climate change, serving as a vast energy source, providing economic benefits, and promoting national security. The Budget continues to support research and facility operations, including research at international facilities with unique capabilities, research in QIS, and research in high-density laboratory plasma science. Funding for facilities operations includes DIII-D for magnetic fusion, the National Spherical Torus Experiment Upgrade facility repairs, and upgrades at the Matter in Extreme Conditions Petawatt facility project. The Budget also funds the U.S. in- kind hardware contribution for the ITER international research project.
- \$818.1M for High Energy Physics (HEP) for research to understand how the universe works at the most fundamental level by discovering the most elementary constituents of matter and energy, probing the interactions among these, and exploring the basic nature of space and time. HEP underpins and advances DOE mission and objectives through this research. The Budget funds core research activities including QIS, AI, exascale computing, and next-generation microelectronics. The Budget further funds the Accelerator Traineeship Program to expand workforce development in advanced technology and HEP facilities.

- \$653.2M for Nuclear Physics to support research to discover, explore, and understand all forms of nuclear matter. The Budget funds world class nuclear physics, QIS, the DOE Isotope program. The Budget also supports new initiatives in Al and Strategic Accelerator R&D in relationship to nuclear physics.
- \$20.5M for Workforce Development for Teachers and Scientists to provide for a sustained pipeline of science, technology, engineering, and mathematics (STEM) professionals to meet current and future national goals and objectives. Maintaining U.S. leadership requires specialized computer scientists and applied mathematicians to develop supercomputing methods to solve real world problems today and develop technology of the future. The Budget funds programs that place highly qualified applicants in authentic STEM learning and training opportunities at DOE laboratories, as well as supports the National Science Bowl® competition.
- \$174.1M for Science Laboratories Infrastructure to sustain mission-ready infrastructure and safe and environmentally responsible operations by providing the infrastructure necessary to support leading edge research at ten national science laboratories. The Budget funds the new and ongoing construction projects that will address inadequate core infrastructure and utility needs.

The Budget funds \$5M for operations of the Artificial Intelligence and Technology Office (AITO). AI is a foundational technology that is transformational and will affect decades of innovation. AITO leads Department-wide efforts to evaluate the scope and effectiveness of DOE's AI programs and identify gaps not addressed by programs, functional offices, sites, or associated National Laboratories. AITO is uniquely situated to develop and lead collaborative solutions across the Department that are consistent with the Secretary's priorities and objectives. The office will also be instrumental in supporting the Administration's Industries of the Future Initiative.

House Action: the FY 2021 House bill zeroes out funding for AITO and recommends that unused FY 2020 carryover funds be used to close out activities in this office. The Budget funds \$12.6M for the Office of Technology Transitions to support ongoing activities, including the Technology Commercialization Fund, Lab Partnering Service, Energy I-Corps, and Innovation XLab summits. The Budget will fully implement the Empowering Novel American Businesses with Laboratory Embedding competition.

House Action: The House bill provides \$5M above the Budget Request for Office of Technology Transitions for a competitive funding opportunity for incubators building energy innovation clusters.

Protecting The Nation

Environmental Management

The Department must continue to manage nuclear waste in all forms including some of the most dangerous materials known. The FY 2021 Budget Request includes \$6.1B for environmental management to continue cleanup resulting from six decades of nuclear weapons development and production and Government-sponsored nuclear energy research. Funds will support cleanup of millions of gallons of liquid radioactive waste and thousands of tons of spent nuclear fuel and nuclear materials. DOE will dispose of large volumes of transuranic and mixed/low-level waste, and huge quantities of contaminated soil and water. To date, the Office of Environmental Management (EM) has completed cleanup activities at 91 sites in 30 states and in the Commonwealth of Puerto Rico. EM is responsible for cleanup at 16 remaining sites in 11 states.

House Action: The bill provides \$7.46B, an increase of \$1.4B above the request. This funding is used for nuclear cleanup work at 16 sites across the country. This includes:

- Non-Defense Environmental Cleanup \$315M, a decrease of \$4.2M below FY 2020 enacted, and an increase of \$39M above the Budget Request.
- Uranium Enrichment Decontamination and Decommissioning – \$821.6M, an increase of \$15M above the Budget Request.
- Defense Environmental Cleanup \$6.3B, an increase of \$66M above FY 2020 enacted and \$1.3B above the Budget Request.

While the Budget Request for the Office of Environmental Management (EM) included increases at some sites, the FY 2021 HEWD report noted that those increases were at the expense of other important cleanup activities at sites, including Hanford, Idaho, and Oak Ridge. The FY 2021 HEWD bill continues to sustain the momentum of ongoing cleanup activities across all Department cleanup sites.

FY 2021 Budget Request Highlights include:

- \$1.7B to support the Liquid Waste Program at Savannah River Site (SRS) to achieve additional risk reduction by stabilization and immobilization of high activity radionuclides through vitrification into canisters at the Defense Waste Processing Facility and disposition of decontaminated salt waste in Saltstone Disposal Units. The Request supports continuing construction of Saltstone Disposal Units. The Salt Waste Processing Facility is poised to start in FY 2020 and in FY 2021 will begin 24-7 operations. The Budget also includes \$25M for the design and construction of the Advanced Manufacturing Collaborative Facility.
- \$1.3B for the Office of River Protection to safely manage and treat approximately 56 million gallons of radioactive liquid and chemical waste currently stored in 177 underground storage tanks at Hanford. The Budget supports construction, start up, and commissioning of facilities that are integral to begin treating Hanford low-activity tank waste by December 2023 as required by the 2016 Amended Consent Decree.
- \$655M for the Richland site to support continued achievement of important progress required by the Tri-Party Agreement for cleanup activities other than tank waste managed by the Office of River Protection. The Budget will maintain safe operations, provide Hanford site-wide services, and conduct critical site infrastructure projects, as well as startup preparation activities for the Integrated Disposal Facility to support Direct Feed Low Activity Waste commissioning and startup.
- \$491M for the decontamination and decommissioning of the Portsmouth Gaseous Diffusion Plant facilities, including construction and design of on-site waste disposal facilities.
- \$432M for cleanup activities at the Oak Ridge site, including continued slab and soil remediation at the East Tennessee Technology Park, mercury characterization and remediation technologies, planning for construction of the mercury treatment facility at the Y-12 National Security

Complex, as well as continued design for the On-Site Disposal Facility to support Y-12 National Security Complex and Oak Ridge National Laboratory.

ENVIRONMENTAL MANAGEMENT

	FY 2021	
Env	vironmental Management	\$M
•	Savannah River	1,703
•	RiverProtection	1,258
•	Richland/Hanford	655
	Portsmouth	491
•	Oak Ridge	432
•	Carlsbad/Waste Isolation Pilot Plant	390
•	Idaho	271
•	Program Direction	275
•	Paducah	282
	Los Alamos	120
•	West Valley Demonstration Project	92
•	Lawrence Livermore National Laboratory	2
	Nevada	61
é.	Moab	48
	Technology Development	25
•	Uranium Thorium Reimbursements	21
	Separation Process Research Unit (SPRU)	15
•	Headquarters Operations	13
	Energy Technology Engineering Center	11
•	Other Sites	5
	Sandia National Laboratory	5
	Offset (Rescission of Prior Year Balances)	-109
EM	Total	6,066

- \$390M to safely continue waste emplacement at the Waste Isolation Pilot Plant, the Nation's only mined geologic repository for permanent disposal of defense-generated transuranic waste, including \$50M for continued progress on the utility shaft project to increase underground airflow for simultaneous mining and waste emplacement operations, as well as \$10M to begin the Hoisting Capability Project.
- \$271M to continue cleanup at the Idaho site. The Budget supports Integrated Waste Treatment operations and additional treated sodium bearing waste storage capacity, supports completing buried waste exhumation activities, and continued progress in characterizing, packing, and shipping stored contact-handled and remote handled transuranic waste, as well as spent nuclear fuel activities in order to meet the Idaho Settlement Agreement milestone for 2023.

- \$282M for the Paducah site to continue environmental remediation and further stabilize the gaseous diffusion plant.
- \$120M to continue focus on surface and groundwater management at Los Alamos National Lab (LANL). The Budget also continues activities to control migration of a hexavalent chromium plume beneath Montana and Sandia Canyons. DOE will plan and execute retrieval and repackaging of the below-grade transuranic waste.

Legacy Management

- The Budget provides \$317M for Legacy Management (LM) to support long-term activities, administer an interagency agreement addressing abandoned defense related uranium mines, execute the Department's Uranium Leasing Program, develop applied studies and technology to reduce scope and costs, and close the Grand Junction, Colorado Disposal Site.
- The Budget also includes \$150M to support and expand the Reform Proposal to consolidate funding for the administration for Formerly Utilized Sites Remedial Action Program under LM.

House Action: The FY 2021 HEWD bill provides \$167M for LM, which is \$5M above the FY 2020 enacted level and \$150M below the FY 2020 Budget Request. The House did not authorize a move of Formerly Utilized Sites Remedial Action Program activities from the U.S. Army Corps of Engineers to LM.

National Nuclear Security Administration

NNSA is responsible for maintaining a safe, secure, and effective nuclear weapons stockpile that preserves a credible nuclear deterrent in the return of great power competition, for preventing, countering, and responding to evolving and emerging nuclear proliferation and terrorism threats. NNSA also provides safe, reliable, and longterm nuclear propulsion to the Nation's Navy as it protects American and allied interests around the world.

To support these activities the Budget proposes \$19.8B for NNSA. Consistent with the nation's nuclear deterrence mission and the policy set forth in the 2018 Nuclear Posture Review (NPR), the Budget invests in the security and safety of the Nation by maintaining a safe, secure, and effective nuclear weapons stockpile; reducing global nuclear threats and keeping material out of the hands of terrorists; strengthening key science, technology, and engineering capabilities; providing safe and effective integrated nuclear propulsion systems for the U.S. Navy; and modernizing the national security infrastructure as well as funding for staff critical to carry out the NNSA mission.

House Action: The FY 2021 HEWD bill provides \$188 for NNSA, a decrease of \$1.7B below the request and \$1.3B above the FY 2020 Enacted levels for the activities required to support the nuclear security complex. The bill prohibits funding for nuclear weapons testing.

Funding in the FY 2021 HEWD bill includes:

- Weapons Activities \$13.7B, an increase of \$1.2B above FY 2020 Enacted, and \$1.94B below the FY 2021 Budget Request.
- Defense Nuclear Nonproliferation \$2.2B, an increase of \$75M over FY 2020 enacted, and \$209M above the Budget Request.
- Naval Reactors \$1.7B, which is an increase of \$35M above FY 2020 enacted, and flat with the FY 2021 Budget Request.
- Federal Salaries and Expenses \$454M, which is \$19.3M above FY 2020 enacted, and flat with the FY 2021 Budget Request.

FY 2021 Budget Request Highlights include:

 \$15.6B for Weapons Activities to maintain the safety, security, and effectiveness of the nuclear stockpile, continue the nuclear modernization program, and modernize and recapitalize NNSA's nuclear security infrastructure portfolio in alignment with the NPR.

House Action: The FY 2021 HEWD bill provides \$13.7B for Weapons Activities. The bill partially adopts a new structure for Weapons Activities that replaces work funded within Directed Stockpile Work and Research, Development, Test and Evaluation with three new elements: Stockpile Management; Production Modernization; and Stockpile Research, Technology, and Engineering.

The FY 2021 HEWD bill directs NNSA to provide a classified integrated priorities report (IPR) for Weapons Activities each year with the budget request, beginning with the fiscal year 2022 budget request. The purpose is to provide an integrated look at the priorities, assumptions, and risks underpinning the budget request and the Future Years Nuclear Security Program, and to delineate changes from the prior year.

NATIONAL SECURITY	
FY 2021	
National Security Programs	\$M
NNSA Programs	
 Weapons Activities 	15,602
 Defense Nuclear Nonproliferation 	2,031
Naval Reactors	1,684
 Federal Salaries and Expenses 	454
NNSA Total	19,771
Environmental Management	6,066
Other Defense Activities	1,054
 Legacy Management 	317
National Security Total	26,891

 \$4.3B for Stockpile Management to support stockpile sustainment, dismantlement, and modernization of the nuclear weapons program. The Budget funds sustainment of the current stockpile, major warhead modernization efforts, safe and secure dismantlement of weapons, and production operations.

House Action: in the FY 2021 HEWD bill, no funding is provided for the W93 and directed that no funding shall be spent on this activity. The Committee also determined that the W87-1 Modification Program requires close synchronization with the NNSA's primary capability and non-nuclear modernization efforts, which carry significant risk; and directed that quarterly briefings be provided on the status, scope, and cost of the program, beginning not later than 90 days after enactment of the Act.

 \$2.5B for Production Modernization to support strategic materials production capabilities for nuclear weapons, including primaries, canned subassemblies, radiation cases and non-nuclear components needed to sustain the nuclear stockpile near- to long-term. The Budget funds equipment, facilities, and personnel required to reestablish the Nation's ability to produce pits with the goal of producing 80 pits per year by 2030 at LANL and SRS.

House Action: The FY 2021 HEWD bill includes \$1.9 billion for Plutonium Modernization, \$599 million below the request.

\$2.8B for Stockpile Research, Technology, and Engineering to provide the scientific foundation for science-based stockpile decisions and actions, including the capabilities, tools, and components enabling assessment of the active stockpile and certification of warhead modernization programs. The Budget for FY 2021 supports the continued implementation of the Enhanced Capabilities for Subcritical Experiments (ECSE). Funding includes \$235M for activities and research leading to deployment of exascale capability for national security applications. This includes \$85.5M for a multi-year non-recurring engineering collaboration focusing on advanced system engineering efforts and software technologies to make the 2023 exascale system a capable and productive computing resource for the Stockpile Stewardship Program.

House Action: The FY 2021 HEWD bill includes \$2.7 billion for Stockpile Research, Technology, and Engineering, \$122 million below the request.

 \$4.4B for Infrastructure and Operations to continue the long-term effort to modernize NNSA infrastructure, improve working conditions of NNSA's deteriorating facilities and equipment, and address safety and programmatic risks. The Request includes increased funding for the construction of the Uranium Processing Facility project and design of the Lithium Processing Facility at Y-12 and the Tritium Finishing Facility at SRS. The Budget also continues construction of the Chemistry and Metallurgical Research Replacement project to sustain plutonium science activities.

House Action: The FY 2021 HEWD bill includes \$3.4 billion for Infrastructure and Operations, \$1.0 billion below the request.

 \$2B for Defense Nuclear Nonproliferation to address nuclear threats by preventing the unwanted acquisition of nuclear weapons or weapons-usable materials, countering efforts to acquire such weapons or materials, and responding to nuclear or radiological incidents. The Budget supports design, long lead procurements, and site preparation for the Surplus Plutonium Disposition project, increases funding for nuclear forensics, and continues support of non-Highly Enriched Uranium-based Molybdenum-99 production facilities in the U.S.

House Action: The FY 2021 HEWD bill includes \$3.4B for Infrastructure and Operations, \$1B below the request.

 \$1.7B for Naval Reactors to continue funding for delivery of the reactor core for the Columbia-class submarine and refueling of the S8G prototype reactor. The Request also supports recapitalizing the capability to handle naval spent nuclear fuel and continued work for the fleet remains the most advanced, well-maintained, and capable nuclear fleet in the world.

House Action: The FY 2021 HEWD bill provides \$1.65B for Infrastructure and Operations, which is \$35M above FY 2020 enacted and flat with the FY 2021 Budget Request.

Cybersecurity

Cyberattacks pose an increasing threat to the Nation's energy infrastructure. Recognizing the seriousness of the threat against critical infrastructure, the Budget supports increased funding for cyber and energy security initiatives. DOE will improve energy infrastructure security by addressing the emerging threats of tomorrow while protecting the reliable flow of energy to Americans today. The Budget includes \$158.8M in program office budgets to support improved energysector cybersecurity, in addition to \$375M for the information technology and cybersecurity of NNSA.

Other Defense Activities

The FY 2021 Budget Request provides \$1.1B to support defense activities conducted by the Department including \$317M for LM. These include Environment, Health, Safety and Security, Enterprise Assessments, Specialized Security Activities, Hearings and Appeals, and Defense Related Administrative Support (DRAS). Funding from DRAS is used to offset administrative expenses for work supporting defense-oriented activities.

House Action: The FY 2021 HEWD bill provides \$942M for Other Defense Activities, which is \$36M above FY 2020 enacted and \$313M above the FY 2021 Budget Request.

Administration And Oversight

The FY 2021 Budget Request includes \$215M for Administration and Oversight activities, including Departmental Administration (DA), International Affairs, the Office of the Inspector General, and offsets. Highlights include:

 \$123.5M for DA to fund management and mission support organizations that have enterprise-wide responsibility for administration, accounting, budgeting, contract and project management, human resources, congressional and intergovernmental liaison, energy policy, information management, life-cycle asset management, legal services, workforce diversity and equal employment opportunity, ombudsman services, small business advocacy, sustainability, and public affairs. In January 2020, the Secretary of Energy announced that the Office of Policy will be restructured to the Office of Strategic Planning and Policy (OSPP). OSPP will become a direct report to the Office of the Secretary for a more efficient and effective approach to the analysis, formulation, development, and advancement of all policy across the Department.

ADMINISTRATION AND OVERSIG	GHT
FY 2021	
	\$K
Administration and Oversight	215
Savings and Receipts	-722

 \$33M for International Affairs (IA) to coordinate the Department's international work and promote global market opportunities for U.S. energy companies and technology exports.

House Action: The FY 2021 HEWD bill provides \$27M for International Affairs, which is \$175K above FY 2020 enacted and \$6M below the Budget Request.

 \$58M for Office of the Inspector General to review the integrity, economy, and efficiency of DOE programs and operations, including NNSA and the Federal Energy Regulatory Commission.

House Action: The FY 2021 HEWD bill provides the full request, which is \$3.5M above FY 2020 enacted.

 -\$722M in savings and receipts including from the sale of the NEHHOR (-\$75M), sale of oil from SPR and gasoline from the NGSR (-\$589M), and savings from the Federal Energy Regulatory Commission fees and recoveries in excess of annual appropriations (-\$9M).

House Action: The FY 2021 HEWD bill rejects the proposed elimination of the Northeast Home Heating Oil Reserve and instead provides \$10,000,000 to maintain the reserve.

Conclusion

The Department of Energy FY 2021 President's Budget Request provides for America's future by promoting energy independence, progressing scientific research, and protecting the Nation. The Budget demonstrates fiscal discipline and commitment to an efficient and effective Federal government. To that end, DOE will focus spending in areas with the highest return on investment of tax payer dollars. Achieving goals established in the Request requires an exceptional workforce. The Department will invest in the workforce by attracting, training, and retaining the Nation's best talent. The Budget supports the critical role the Department of Energy has in energy independence and dominance, economic growth, and the safety and security of the Nation. The Department appreciates the support of Congress and looks forward to continuing to work together.

Appendix

Spending by Location

DOE spends money in all 50 states, in Washington, D.C., in Puerto Rico, and in U.S. territories. These funds are spent at or through DOE's 17 National Laboratories, cleanup sites, nuclear production facilities, and dozens of other locations across the country. Locations are detailed in these tables.

Long Term Obligations

The Department has extensive infrastructure the Department must maintain, and simultaneously continues to build new facilities and procure upgraded and new equipment. The Department is also responsible for some benefits costs of the nearly 100,000 contractors. These obligations cost nearly \$10 billion a year, nearly one quarter of the annual appropriation. Long-term obligations are summarized.

DEPARTMENT OF ENERGY

Appropriation Summary FY 2021

(Dollars in Thousands)

Department of Energy Budget by Appropriation	FY 2019 Enacted	FY 2020 Enacted	FY 2021 Request	FY 2021 Request vs. FY 2020 Enacted	
				\$	%
Energy Efficiency and Renewable Energy	2,379,000	2,777,277	719,563	-2,057,714	-74.09%
Electricity	156,000	190,000	195,045	5,045	2.66%
Cybersecurity, Energy Security and Emergency Response	120,000	156,000	184,621	28,621	18.35%
Nuclear Energy*	1,180,000	1,340,000	1,042,131	-297,869	-22.23%
Uranium Reserve	0	0	150,000	150,000	0.00%
Interim Storage and Nuclear Waste Fund Oversight	0	0	27,500	27,500	0.00%
Fossil Energy Research and Development	740,000	750,000	730,601	-19,399	-2.59%
Strategic Petroleum Reserve	235,000	195,000	187,081	-7,919	-4.06%
Naval Petroleum and Oil Shale Reserve	10,000	14,000	13,006	-994	-7.10%
Strategic Petroleum Reserve Petroleum Account	10,000	10,000	0	-10,000	-100.00%
Northeast Home Heating Oil Reserve	10,000	10,000	0	-10,000	-100.00%
Total, Fossil Energy Petroleum Reserve Accounts	265,000	229,000	200,087	-28,913	-12.63%
Total, Fossil Energy Programs	1,005,000	979,000	930,688	-48,312	-4.93%
Uranium Enrichment Decontamination and Decommissioning (D&D) Fund	841,129	881,000	806,244	-74,756	-8.49%
Energy Information Administration	125,000	126,800	128,710	1,910	1.51%
Non-Defense Environmental Cleanup	310,000	319,200	275,820	-43,380	-13.59%
Science	6,585,000	7,000,000	5,837,806	-1,162,194	-16.60%
Artificial Intelligence Technology Office	0	0	4,912	4,912	0.00%
Advanced Research Projects Agency - Energy	366,000	425,000	-310,744	-735,744	-173.12%

(Continued on next page)

(Continued from previous page)

Department of Energy Budget by Appropriation	FY 2019 Enacted	FY 2020 Enacted	FY 2021 Request	FY 2021 Request vs. FY 2020 Enacted	
				\$	%
Departmental Administration	165,858	161,000	136,094	-24,906	-15.47%
Indian Energy Policy and Programs	18,000	22,000	8,005	-13,995	-63.61%
Inspector General	51,330	54,215	57,739	3,524	6.50%
International Affairs	0	0	32,959	32,959	0.00%
Title 17 Innovative Technology Loan Guarantee Program	12,311	29,000	-160,659	-189,659	-654.00%
Advanced Technology Vehicles Manufacturing Loan Program	5,000	5,000	0	-5,000	-100.00%
Tribal Energy Loan Guarantee Program	1,000	2,000	-8,500	-10,500	-525.00%
Total, Credit Programs	18,311	36,000	-169,159	-205,159	-569.89%
Total, Energy Programs	13,320,628	14,467,492	10,057,934	-4,409,558	-30.48%
Federal Salaries and Expenses	410,000	434,699	454,000	19,301	4.44%
Weapons Activities	11,100,000	12,457,097	15,602,000	3,144,903	25.25%
Defense Nuclear Nonproliferation	1,930,000	2,164,400	2,031,000	-133,400	-6.16%
Naval Reactors*	1,788,618	1,648,396	1,684,000	35,604	2.16%
Total, National Nuclear Security Administration	15,228,618	16,704,592	19,771,000	3,066,408	18.36%
Defense Environmental Cleanup	6,024,000	6,255,000	4,983,608	-1,271,392	-20.33%
Nuclear Energy	146,090	153,408	137,800	-15,608	-10.17%
Other Defense Programs	860,292	906,000	1,054,727	148,727	16.42%
Total, Environmental and Other Defense Activities	7,030,382	7,314,408	6,176,135	-1,138,273	-15.56%
Total, Atomic Energy Defense Activities	22,259,000	24,019,000	25,947,135	1,928,135	8.03%
Southwestern Power Administration	10,400	10,400	10,400	0	0.00%
Western Area Power Administration	89,372	89,196	89,372	176	0.20%
Falcon and Amistad Operating and Maintenance Fund	228	228	228	0	0.00%
Colorado River Basins Power Marketing Fund	0	-42,800	-21,400	21,400	-50.00%
Total, Power Marketing Administrations	100,000	57,024	78,600	21,576	37.84%
Federal Energy Regulatory Commission	0	-16,000	0	16,000	-100.00%
Total, Energy and Water Development and Related Agencies	35,656,628	38,527,516	36,083,669	-2,443,847	-6.34%
Excess Fees and Recoveries, FERC	-16,000	0	-9,000	-9,000	0.00%
Title XVII Loan Guarantee Program Section 1703 Negative Credit Subsidy Receipt	-107,000	-15,000	-49,000	-34,000	226.67%
Sale of Northeast Home Heating Oil Reserve	0	0	-75,000	-75,000	0.00%
Sale of Oil from Strategic Petroleum Reserve**	0	0	-589,000	-589,000	0.00%
Total, Funding by Appropriation	35,533,628	38,512,516	35,361,669	-3,150,847	-8.18%
DOE Budget Function	35,533,628	38,512,516	35,361,669	-3,150,847	-8.18%
NNSA Defense (050) Total	15,228,618	16,704,592	19,771,000	3,066,408	18.36%
Non-NNSA Defense (050) Total	7,030,382	7,314,408	6,176,135	-1,138,273	-15.56%
Defense (050)	22,259,000	24,019,000	25,947,135	1,928,135	8.03%
Science (250)	6,585,000	7,000,000	5,837,806	-1,162,194	-16.60%
Energy (270)	6,689,628	7,493,516	3,576,728	-3,916,788	-52.27%
Non-Defense (Non-050)	13,274,628	14,493,516	9,414,534	-5,078,982	-35.04%

* Funding does not reflect statutory transfer of funds from Naval Reactors to Nuclear Energy for maintenance and operation of the Advanced Test Reactor (\$85.5M in FY19; \$88.5M in FY 2020).

**Includes a \$50M sale from the Northeast Gasoline Supply Reserve.

DEPARTMENT OF ENERGY

Funding by Organization FY 2021

(Dollars in Thousands)

Department of Energy Budget by Organization	FY 2019 Enacted	FY 2020 Enacted	FY 2021 Request	FY 2021 Re FY 2020 Er	equest vs. nacted
				\$	%
Under Secretary for Nuclear Security and National N	uclear Securi	ty Administ	ration		
Weapons Activities	11,100,000	12,457,097	15,602,000	3,144,903	25.25%
Defense Nuclear Nonproliferation	1,930,000	2,164,400	2,031,000	-133,400	-6.16%
Naval Reactors*	1,788,618	1,648,396	1,684,000	35,604	2.16%
Federal Salaries and Expenses	410,000	434,699	454,000	19,301	4.44%
Total, Under Secretary for Nuclear Security and National Nuclear Security	15,228,618	16,704,592	19,771,000	3,066,408	18.36%
Under Secretary of Energy					
Energy Programs					
Energy Efficiency and Renewable Energy	2,379,000	2,777,277	719,563	-2,057,714	-74.09%
Office of Electricity	156,000	190,000	195,045	5,045	2.66%
Power Marketing Administrations	100,000	57,024	78,600	21,576	37.84%
Cybersecurity, Energy Security, and Emergency Response	120,000	156,000	184,621	28,621	18.35%
Petroleum Reserves	265,000	229,000	200,087	-28,913	-12.63%
Fossil Energy Research and Development	740,000	750,000	730,601	-19,399	-2.59%
Nuclear Energy*	1,326,090	1,493,408	1,357,431	-135,977	-9.10%
Office of Indian Energy Policy and Programs	18,000	22,000	8,005	-13,995	-63.61%
Office of Policy	2,510	7,000	7,631	631	9.01%
Project Management Oversight and Assessment	15,005	12,596	15,577	2,981	23.67%
Environment, Health, Safety, and Security	202,839	207,839	209,688	1,849	0.89%
Credit Programs					
Title 17 Innovative Technology Loan Guarantee Program	12,311	29,000	-160,659	-189,659	-654.00%
Tribal Energy Loan Guarantee Program	1,000	2,000	-8,500	-10,500	-525.00%
Advanced Technology Vehicles Manufacturing Loan Program	5,000	5,000	0	-5,000	-100.00%
Other Energy Programs					
Advanced Research Projects Agency - Energy	366,000	425,000	-310,744	-735,744	-173.12%
Energy Information Administration	125,000	126,800	128,710	1,910	1.51%
Under Secretary of Energy					
Science	6,585,000	7,000,000	5,837,806	-1,162,194	-16.60%
Environmental Management	7,175,129	7,455,200	6,065,672	-1,389,528	
Legacy Management Programs	158,877	162,029	316,993	154,964	95.64%
Office of Technology Transitions	8,505	14,080	12,639	-1,441	-10.23%
Departmental Administration (Direct Reports)					
Chief Information Officer	131,624	140,200	134,778	-5,422	-3.87%
Management	55,385	54,358	57,258	2,900	5.34%
Chief Human Capital Officer	26,125	24,316	26,191	1,875	7.71%
Economic Impact and Diversity	10,169	10,169	9,931	-263	-2.34%
Office Of The Secretary	5,395	5,119	5,582	463	9.04%
Chief Financial Officer	48,912	52,000	53,591	1,591	3.06%

(Continued on next page)
(Continued from previous page)

Department of Energy Budget by Organization	FY 2019 Enacted	FY 2020 Enacted	FY 2021 Request	FY 2021 Re FY 2020 En	equest vs. lacted
				\$	%
Congressional and Intergovernmental Affairs	4,200	4,395	5,616	1,221	27.78%
Public Affairs	6,594	4,000	5,954	1,954	48.85%
General Counsel	33,075	32,575	35,111	2,536	7.79%
International Affairs	22,878	26,825	0	-26,825	-100.00%
Artificial Intelligence Technology Office	0	2,500	0	-2,500	-100.00%
Office of Small & Disadvantaged Business Utilization	3,170	3,337	3,402	65	1.95%
Strategic Partnership Projects and Revenues	-56,000	-53,378	-53,378	0	0.00%
Other Defense Activities (Direct Reports)		·			
Office of Enterprise Assessments	76,770	78,779	81,584	2,805	3.56%
Specialized Security Activities	266,378	273,409	258,411	-14,998	-5.49%
Hearings and Appeals	3,739	4,852	4,262	-590	-12.16%
Other Departmental Offices					
Artificial Intelligence Technology Office	0	0	4,912	4,912	0.00%
International Affairs	0	0	32,959	32,959	0.00%
Inspector General	51,330	54,215	57,739	3,524	6.50%
Federal Energy Regulatory Commission	-16,000	-16,000	-9,000	7,000	43.80%
Sale of Northeast Gas Reserves	0	0	-75,000	-75,000	0.00%
Sale of Oil from Strategic Petroleum Reserve	0	0	-589,000	-589,000	0.00%
Title XVII Loan Guar. Prog Section 1703 Negative Credit Subsidy Receipt	-107,000	-15,000	-49,000	-34,000	226.67%
Total, Funding by Organization	35,533,628	38,512,516	35,361,669	-3,150,847	-8.18%

* Funding does not reflect statutory transfer of funds from Naval Reactors to Nuclear Energy for maintenance and operation of the Advanced Test Reactor (\$85.5M in FY19; \$88.5M in FY 2020)

Federal Workforce

This section provides data on DOE's federal employee workforce by program and by site, and information on union membership.

DOE's Federal Human Capital Management programs and policies aim to create a Departmentwide high-performance culture and attract, motivate, and retain a highly skilled and diverse workforce capable of meeting the organizational challenges well into the 21st Century.

The Department employs a highly technical and specialized workforce to accomplish its various scientific and technological missions. There is an increasing competition within the American working population for individuals with the requisite knowledge, skills, and competencies that the Department needs. As a result, recruitment and retention of critical staff is becoming increasingly problematic. As such, the Department continues to explore the use of corporate recruitment and retention strategies to retain our high performing employees and personnel in mission critical occupational series; especially through the use of recruitment, retention, relocation, and student loan incentives.

Throughout this section, tables are used to provide the on board count of federal employees by Headquarters office and field sites; pie charts are used to display federal workforce information on gender, race, education, occupational series, age, and scientific and technical occupations; and graphs are used to display some retirement projections. Finally, the last section provides information on union representation at DOE.

Federal Employee Staffing Levels

The following table displays the number of DOE employees on board at the end of FY 2020. The data is displayed by reporting organization, referred to as Program Secretarial Offices (PSO).

Staffing Analysis Tables

As depicted in the following five tables, DOE had a total of 13,137 federal employees onboard as of the end of FY 2020, excluding FERC.

(Table 1)

Department of Energy	
Departmental Staff and Support Offices	2,044
Under Secretary for Energy	1,975
Power Marketing Administrations (PMAs)	4,514
Under Secretary of Science	2,076
Under Secretary for Nuclear Security	2,528
DOE TOTAL	13,137
FERC*	1,462
TOTAL	14,599

*Note: FERC was created as an independent regulatory agency through the Department of Energy Organization Act of 1977. In performance of this function, the employees of FERC are not responsible or subject to the supervision, management, or direction of any office or employee of any part of the Department of Energy. The management and execution of resources are maintained separately by each organization. As such, FERC employees are not included in any representation of the DOE workforce. (Table 2)

Departm	ental Staff and Support Offices	
HQ	Secretary Of Energy	22
HQ	General Counsel	176
HQ	Inspector General	277
HQ	Congressional & Intergovernmental Affairs	29
HQ	Hearings and Appeals	16
HQ	Public Affairs	19
HQ	Economic Impact and Diversity	31
HQ/Field	Chief Information Officer	106
HQ	Advanced Research Projects Agency-Energy (ARPA-E)	52
HQ	Strategic Planning and Policy	5
HQ	Intelligence and Counterintelligence	193
HQ	Secretary of Energy Advisory Board	6
HQ	Enterprise Assessments	81
HQ	Small & Disadvantaged Business Utilization	13
HQ	U.S. Energy Information Administration	321
HQ	International Affairs	80
HQ	Chief Financial Officer	196
HQ	Chief Human Capital Officer	194
HQ	Management	227
	Sub-Total SSO-	2,044

(Table 3)

Under Sec	retary for Energy	
HQ	Indian Energy Policy And Programs	7
HQ	Loan Programs	89
HQ	Arctic Energy	0
HQ	Energy Efficiency And Renewable Energy	416
Field	Golden Field Office	127
HQ	Nuclear Energy	114
Field	Idaho Operations Office	171
Field	NE Oak Ridge Site Office	3
HQ	Fossil Energy	132
Field	National Energy Technology Laboratory	480
Field	Strategic Petroleum Reserve	88
HQ	Office of Electricity	65
PMA	Bonneville Power Administration	2,843
PMA	Southeastern Power Administration	39
PMA	Southwestern Power Administration	168
PMA	Western Area Power Administration	1,464
HQ	Environment, Health, Safety & Security	235
HQ	Project Management Oversight & Assessments	26
HQ	Cybersecurity, Energy Security & Emergency Response	22
	Sub-Total USE	6,489

(Table 4)

Under Sec	retary for Science	
HQ	Legacy Management	69
HQ	Office of Science	452
Field	Consolidated Service Center	192
Field	Ames Site Office	4
Field	Argonne Site Office	22
Field	Bay Area Site Office	26
Field	Brookhaven Site Office	23
Field	Fermi Site Office	20
Field	Pacific Northwest Site Office	31
Field	Princeton Site Office	10
Field	Thomas Jefferson Site Office	10
Field	ORNL Site Office	38
HQ	Technology Transitions	15
HQ	Artificial Intelligence & Technology	3
HQ	Planning & Management Oversight	2
HQ	Environmental Management	232
Field	Richland Operations Office	336
Field	Savannah River Operations Office	224
Field	Consolidated Business Center	173
Field	Carlsbad Field Office	45
Field	Environmental Management Los Alamos Field Office	25
Field	Carlsbad Field Office	45
Field	Portsmouth & Paducah Project Office	51
	Sub-Total USS	2,076

(Table 5)

Under Secretary for Nuclear Security			
HQ	NNSA – Office of Administrator	40	
Field	Emergency Operations	46	
HQ	Def Nuclear Security	83	
HQ	Counter-Terrorism	56	
HQ	External Affairs	19	
HQ	General Counsel	39	
HQ	Acquisition and Project Mgt.	171	
HQ	Management and Budget	255	
HQ	Info Mgt. and Chief Information	34	
HQ	Safety, Infrastructure and Operations	105	
HQ	Deputy Admin for DP	753	
Field	NNSA Production Office	127	
Field	Sandia Site Office	85	
Field	Kansas City Site Office	37	
Field	Los Alamos Site Office	88	
Field	Nevada Site Office	77	
Field	Livermore Site Office	76	
Field	Savannah River Site Office	39	
HQ	Deputy Admin for NN	170	
HQ	DA for Naval Reactors	143	
Field	NR Lab Field Office	85	
	Sub-Total for NNSA	2,528	

Federal Employee Demographics and Skills

Gender and Race

The charts below show the diversity and gender make-up of DOE's federal workforce in FY 2020. The gender profile in FY 2020 indicates that 64% of the workforce is male and 36% female. The race/nation of origin profile shows that 74% of the DOE workforce self-identifies as being white. These percentages have largely been stable over the past decade.



Education

The chart below indicates a highly educated DOE workforce with most (~70%) of DOE employees having earned a Bachelor's Degree or higher. This is not unexpected in a science and technology agency.



(as of September 2020)

Occupational Mix

The chart below displays the occupational makeup of DOE's federal workforce. The slices are groupings of different categories of occupations, called Occupational Series (OS). The three largest occupational series include: scientific and technical (35%); administration (20%); and business (including procurement 12%).



Scientific and Technical Workforce Breakdown

As indicated in the chart above, DOE's scientific and technical workforce makes up 35% of DOE's total workforce. A breakdown of this workforce is shown in the chart below.

The scientific and technical workforce is defined by the following categories: Engineering; Physical Science; Safety and Occupational Health Management; Safety Technicians; Environmental Protection Specialists; Fire Protection and Fire Prevention Specialists; Industrial Hygienists; Environmental Health Technicians; Quality Assurance Specialists; and all Excepted Service Employees (Pay Plan EK) hired under the National Defense Authorization Act.

The chart below shows that General Engineers, Electrical Engineers, and Nuclear Engineers together make up roughly half of DOE's federal scientific and technical workforce. Several other engineering series have small populations (miscellaneous, civil, electronic, and safety), and when combined with general, electrical, and nuclear engineers, the engineering category makes up roughly two thirds of the DOE scientific and technical workforce.



Federal Employee Staffing Retirement

Age

DOE's federal workforce is aging. The chart below displays the current age distribution of DOE's federal workforce. Over the last five years, DOE's average age has increased to just over 49 due to steady increases in the population of employees ages 40-49, 50-59, and 60-69.



Retirement Eligibility

The Department's retirement eligibility forecast, coupled with the aging workforce, presents a significant human capital challenge. The chart below shows the percentage of the present population that will be eligible to retire over the next four years. This is simply an eligibility chart, not a prediction of what will happen. However, this chart indicates that over one-third (33%) of the current federal employee population will be eligible to retire by the end of 2024.



Retirement Projections

Based on historical data that assesses when employees actually retire, the Department has determined that, on average, employees retire about 3.5 years after they have become eligible. This analysis has implications for DOE's projected retirement losses. The chart below shows a projection of 9 percent of the workforce being likely to retire, as opposed to the 18 percent that is eligible to leave in FY 2020. This value grows to a projection of 20 percent of the retirement eligible population actually separating from the workforce by the end of FY 2024 (as opposed the 33 percent that is eligible to leave that year).



(with more than 3.5 years of Retirement Deferment)

Federal Employee Unions

Overview

Bargaining unit employees are employees of the Agency not excluded by statute (e.g., managers, supervisors, or confidential employees), who are entitled to representation by a recognized labor organization and are covered by a collective bargaining agreement. Bargaining unit employees may elect to pay dues or not pay dues. About 6,300 DOE employees, located at numerous sites Department-wide, are included in bargaining units.

The Collective Bargaining Agreement (CBA) is the written document incorporating the agreed-to conditions of employment affecting bargaining unit employees. Conditions of employment subject to bargaining include, but are not limited to, personnel policies, practices, and matters such as hours of work, leave administration, performance management, awards, merit promotions, hours of work, and discipline.

The union has an obligation to represent all bargaining unit employees whether they pay dues or not. Representation includes collective bargaining, negotiated grievances, formal meetings, responses to proposed disciplinary actions, and third party representation.

The union has a right to be present and invited to comment or speak during formal meetings with bargaining unit employees. Generally, a meeting is considered to be formal when it is held with a supervisor or higher level manager; has a scheduled time and place; has an established agenda; is mandatory; may have a note taker; and discusses changes in personnel policies and procedures, and other conditions of employment. It does not include an operational staff meeting.

Bargaining unit employees are entitled to representation during investigatory meetings or interviews. Known as *Weingarten Rights*, the employee may request union representation during any examination by an Agency representative in connection with an investigation if the employee reasonably believes that the examination may result in disciplinary action against the employee. In accordance with the CBA, DOE HQ bargaining unit employees who may be subject to discipline as a result of the investigation will be apprised of their *Weingarten Rights* at the beginning of the investigatory interview.

Department of Energy Headquarters, Labor Relations

The National Treasury Employees Union (NTEU) is the most visible union due to its location at headquarters. However, the American Federation of Government Employees (AFGE) is the largest union within the Department; AFGE is located at most of DOE's field sites. NTEU has had bargaining recognition with DOE Headquarters (HQ) since 1979. Anthony "Tony" Reardon is the current National President of NTEU. William Li is the NTEU national representative for the NTEU HQ Chapters. There are two NTEU Chapters: Chapter 213 (covers bargaining unit employees in Washington D.C.) and Chapter 228 (covers bargaining unit employees in Germantown, MD).

Below is a list of all federal labor unions within DOE.

- Bonneville Power Administration
 - Columbia Power Trades Council (CPTC)
 - Laborers International Union of North America (LIUNA), Local 335 (Vancouver, WA)
 - American Federation of Government Employees (AFGE), Local 928 (Portland, OR)
- Headquarters, Department of Energy
 - NTEU, Local 213 (Washington, DC)
 - NTEU, Local 228 (Germantown, MD)
- Idaho Operations Office
 - International Federation of Professional and Technical Engineers (IFPTE), Local 94 (Idaho Falls, ID)
- National Energy Technology Laboratory
 - American Federation of Government Employees (AFGE), Local 1995 (Morgantown, WV)
 - American Federation of Government Employees (AFGE), Local 1916 (Pittsburgh, PA)
 - American Federation of Government Employees (AFGE), Local 1104 (Albany, OR)
- Oak Ridge Office
 - Office of Professional Employees International Union (OPEIU), Local 2001 (Oak Ridge, TN)
- Office of Energy Efficiency and Renewable Energy (EERE)
 - American Federation of Government Employees (AFGE), Local 1194 (Golden, CO)

- Richland Operations Office
 - American Federation of Government Employees (AFGE), Local 788 (Professional and Non-Professional)
- Southwestern Power Administration
 - International Brotherhood of Electrical Workers (IBEW), Local 1002 (Tulsa, OK)
- Western Area Power Administration
 - American Federation of Government Employees (AFGE), Locals 3824 (Loveland, CO) & Local 3807 (Watertown, SD)
 - International Brotherhood of Electrical Workers (IBEW-GCC-1), Locals 640 (Phoenix, AZ), 1245 (Folsom, CA), 1759 (Loveland, CO), 1959 (Sioux Falls, SD), & 2159 (Montrose, CO)

Department of Energy Accomplishments

Since the beginning of this Administration, the Department of Energy (DOE) has made significant progress across its entire mission space, having:

- Established U.S. Energy Dominance for the first time, America became the world's number one producer of oil and natural gas;
- Led substantial increases in exports of U.S. Liquefied Natural Gas (LNG) by nearly five-fold and issued 20 long-term authorizations for LNG exports to non-free trade agreement countries since January 2017 the U.S now exports LNG to 38 countries on 5 continents;
- Increased oil production at the Alaska Field Lab project by more than 700 barrels per day over the first 20 months of polymer injection, which more than doubles the previous production;
- Established 15 resource basin-specific field labs since January 2017, aimed at maximizing resource recovery with a goal to double well productivity in a safe and environmentally prudent manner;
- Published the Small-Scale LNG Rule to expedite approval for small-scale natural gas exports;
- **Published the 2050 LNG Policy Statement** to allow companies to export LNG through 2050 as an alternative to our original 20-year authorizations;
- Stabilized oil markets during the COVID-19 pandemic by facilitating discussions among the world's leading oil producers through DOE's leadership in the International Energy Agency and G20;
- Used the Strategic Petroleum Reserve, for the first time, as a temporary storage option for U.S. small and mid-sized crude oil producers to help stabilize oil markets following the demand destruction caused by COVID-19;

- Launched the Science-informed Machine Learning to Accelerate Real Time (SMART) Decisions in Subsurface Applications Initiative, bringing together seven DOE national laboratories, industry, and academia to apply artificial intelligence and machine learning to carbon storage and oil and natural gas applications;
- Founded the National Virtual Biotechnology Laboratory to provide interdisciplinary and multi-lab support to the national COVID-19 response;
- **Co-led the COVID-19 High Performance Computing Consortium,** a unique public-private effort, bringing together federal government, industry, and academic leaders to volunteer free compute time and resources to halt the spread of COVID-19;
- Launched the COVID-19 Technical Assistance Program, an initiative to allow National Lab experts to provide free, targeted assistance to American innovators in the fight against COVID-19;
- Launched the Lab Partnering Service COVID-19 portal, offering users a curated access point to National Lab research, facilities, and intellectual property that could prove useful in the fight against COVID-19;
- Launched the Coal FIRST (Flexible, Innovative, Resilient, Small and Transformative) Initiative to develop the power plant of the future, which can produce electricity and hydrogen from coal, biomass, and waste, with zero or even negative CO2 emissions;
- Continued to promote 21st Century Coal by advancing research and development in the conversion of coal to high-value carbon products like building materials and manufactured products, which can help sustain coal community jobs;
- Implemented the Nuclear Fuel Working Group's Strategy to Restore American Nuclear Energy Leadership;
- Supported the First Nuclear Power Plant (Vogtle) to be built in the U.S. in Nearly 30 Years by providing an additional \$3.7 billion in loan guarantees;
- Established the National Reactor Innovation Center (NRIC) to provide a platform for private sector technology developers to assess the

performance of their nuclear reactor concepts through testing and demonstration;

- Launched the Advanced Reactor Demonstration Program to competitively-select two advanced reactor projects to result in fully functional advanced nuclear reactors within seven years;
- Successfully returned electric power to communities affected by multiple catastrophic hurricanes and typhoons;
- Developed the North American Energy Resilience Model (NAERM) to understand risks to electricity infrastructure and identify needed investments to improve system resilience across the U.S., Canada, and Mexico;
- Established the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) to improve the cybersecurity and resilience of the Nation's energy critical infrastructure;
- Delivered on the President's Cyber Workforce Executive Order through the Department of Energy CyberForce Competition, with over 100 colleges and universities competing across 10 National Labs to grow capabilities in industrial control system cybersecurity;
- Strengthened Protections for the Nation's Electric Grid against Foreign Adversaries by implementing Executive Order 13920, Securing the United States Bulk-Power System, which the President signed on May 1, 2020;
- Established the Cyber Testing for Resilience of the Industrial Control Systems (CyTRICS) program to secure the Nation's Energy Supply Chain and support the Bulk Power System Executive Order;
- Oversaw the expansion of renewable power, including a doubling of solar production from 2016 through 2019 and a 32 percent increase in wind production, making the U.S. the world's second largest producer of both wind and solar;
- Launched the American-Made Challenges, by investing more than \$40 million in 16 different American-Made prizes and competitions to advance energy innovation and American manufacturing;

- Launched the Energy Storage Grand Challenge, a comprehensive strategy to position the U.S. for global leadership in the energy storage technologies of the future;
- Launched the American-Made Solar Prize, a competition designed to revitalize solar manufacturing in the United States, leading to four rounds that will result in \$12 million in prizes;
- Created the Energy-Water Desalination Hub as part of the White House Water Security Grand Challenge, announcing nearly \$100 million for the National Alliance for Water Innovation to address water security issues in the United States;
- Launched the American-Made Solar Desalination Prize, a \$9 million prize competition designed to accelerate the development of low-cost desalination systems that use solar-thermal power to produce clean water from salt water;
- Funded the development of the first renewable jet fuel used on a commercial flight from Orlando to London Gatwick;
- Initiated the Plastics Innovation Challenge which launched a comprehensive program to design new highly recyclable or biodegradable plastics, develop novel methods for deconstructing and upcycling existing plastic waste, and address plastic waste;
- Rolled back unnecessary regulations supporting a presidential priority by refocusing energy conservation standards to increase consumer choice and save over \$300 million for the American people;
- Protected consumer lighting choices by preventing more stringent regulations on common incandescent lightbulbs that would have essentially regulated those products out of existence, denying families the ability to make their own lighting choices;
- Initiated the Sustainability in Manufacturing Partnership to help drive manufacturing productivity improvements resulting in partners saving over \$6 billion in energy costs;
- Reduced the price of batteries by more than 80% over 10 years, culminating in 2019, from just over \$1,000 per kilowatt-hour to \$185 per kilowatt-hour for the useable energy of a full battery pack;

- Established the ReCell Battery Recycling R&D Center and launched the Lithium-Ion Battery Recycling Prize to develop technologies to profitably capture 90% of all lithium-based battery technologies in the United States and recover 90% of the key materials from the collected batteries;
- Reduced the cost of electrolyzers, which produce hydrogen from water and electricity, by 80% and automotive fuel cell costs by 60% in the past decade, while quadrupling their durability to over 120,000 miles;
- Completed the first science-based high-level radioactive waste (HLW) interpretation shipment, removing 8 gallons of recycle wastewater from the Defense Waste Processing Facility at the Savanah River Site for treatment and disposal, a model for new pathways to address tank waste and expedite cleanup of DOE sites across the country;
- Approved commencement of operations at the Savannah River Salt Waste Processing Facility, which will allow DOE to address the bulk of the remaining tank waste within a decade;
- Transferred 70 sites to the Office of Legacy Management (LM) across the Nevada Test and Training Range, including the Tonopah Test Range, the first transfer of active Environmental Management Sites to long-term LM stewardship since 2012;
- Completed "Vision 2020" at Oak Ridge's East Tennessee Technology Park, the first time a uranium enrichment complex has been fully deactivated and decommissioned, and completed four years ahead of schedule, saving taxpayers \$500 million;
- Reached agreement with the state of California to allow active cleanup to resume at the Energy Technology Engineering Center (ETEC) site after more than a decade. Nine out of an initial set of 10 buildings are down, and by the end of the year the final building will be demolished;
- Won 106 R&D 100 Awards for exceptional new products and processes that were developed and introduced into the marketplace, pushing the DOE total to over 900;
- Established DOE's first ever Chief Commercialization Officer, who is tasked with bridging the gap between our 17 National Labs and commercialization in the private sector;

- Celebrated the 2020 Nobel Prize in Chemistry win by a DOE Lab Researcher (Dr. Jennifer Doudna) who was originally funded by DOE's Lawerence Berkeley National Laboratory for her foundational work in understanding the structure of RNA, which led to her co-invention of the gene editing technology known as CRISPR;
- Celebrated two DOE-supported researchers winning the 2019 Nobel Prize in Chemistry (Dr. M. Stanley Whittingham and Dr. John Goodenough) for their foundational work in the development of lithium-ion batteries;
- Established the Artificial Intelligence and Technology Office to serve as the central point for the coordination and development of broad and extensive artificial intelligence (AI) capabilities for the Department and its National Laboratories;
- **Improved Veteran's Health** through a partnership with the U.S. Department of Veterans Affairs to leverage next-generation AI and supercomputing technologies;
- Maintained Global Leadership in Supercomputing by building and operating two of the world's fastest supercomputers at DOE National Laboratories;
- Launched the Quantum Internet to evolve from today's limited local quantum network experiments and revolutionize how information is transmitted in the future;
- Selected the first Quantum Information Science (QIS) Research Centers to provide training and collaboration opportunities for the next generation of QIS scientists and engineers;
- Supported the exploration of the Universe in Partnership with NASA by providing the power source and the SuperCam detector for the Mars Perseverance Rover, and winning a Gears of Government award for developing an electrical power source to support long-duration crewed missions on the Moon, Mars and destinations beyond;
- Established the DOE-NASA Joint Executive Committee to ensure alignment and collaboration in the furtherance of the Administration's national space goals of landing the first woman and next man on the surface of the moon by 2024, establishing a sustainable presence on the moon by 2028, and ultimately putting the first human boots on the surface of Mars;

- Supported American's Innovative Small Business by providing \$1.1 billion in funding through DOE's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants across 49 States;
- **Funded Energy Frontier Research Centers** by providing over \$445 million to support 64 Centers in diverse energy and science related fields;
- Launched the Pathfinder Program with U.S. Department of Defense and U.S. Department of Homeland Security to better prevent and protect against attacks on Defense Critical Energy Infrastructure;
- Increased private sector follow-on-funding for DOE's ARPA-E projects by 100% to \$3.6 billion and nearly doubled the number of filed patents stemming from ARPA-E funded research to 385, since 2017;
- Engaged over 1,800 partners in research agreements through the DOE National Laboratories, bringing in \$337,924,445 in funding and earning \$21,084,539 in licensing income in FY2018 to propel American innovation forward;
- Launched the Innovation Network for Fusion Energy (INFUSE) program as the first public-private partnership for accelerating fusion as a future energy source;
- Increased Global Nuclear Security by removing or confirming disposition of significant quantities of highly enriched uranium (HEU), bringing the program's lifetime total to more than 7,215 kilograms of highly enriched uranium (HEU) and plutonium downblended or eliminated from nearly 50 partner countries — enough material for more than 320 nuclear weapons;
- **Completed Flight Tests** and other key milestones for nuclear warhead modernization programs in cooperation with the U.S. Department of Defense;
- Completed the W76-1 Life Extension Program under budget and ahead of schedule, strengthening U.S. safety and security by extending the warhead's service life from 20 years to 60 years;
- **Developed Five Developmental Plutonium Pits** in support of a strategic effort to recapitalize production of a key component of nuclear weapons;
- Made Significant Progress on Nuclear Weapons Infrastructure Initiatives that will enable the use of strategic materials including uranium,

plutonium, lithium, tritium, and high explosives to maintain the nuclear deterrent;

- Issued four cooperative agreement awards to produce Molybdenum-99, a medical isotope used in over 400,000 medical procedures each day, including the diagnosis of heart disease and cancer, without the use of highly enriched uranium;
- Enhanced the Federal Bureau of Investigation's (FBI) regional capabilities to disrupt weapons of mass destruction (WMD) attacks by providing advanced equipment and training for the "Capability Forward" initiative, through which fourteen major U.S. cities will receive new advanced capabilities by FY2022;
- Replaced fixed-wing Aerial Measuring System (AMS) aircraft, used to provide rapid wide-area assessments of releases of radioactive materials in the environment;
- Met milestones for the Columbia-class ballistic missile submarine, including contracts for reactor plant heavy equipment including the lead ship reactor core;
- Placed the U.S. Navy's 150th spent fuel canister into dry storage at the Naval Reactors Facility at Idaho National Laboratory;
- Launched the Partnership for Transatlantic Energy Cooperation (P-TEC) with partner countries from Central and Eastern Europe to push back against Russian energy-based malign influence;
- Completed a Deal with Australia to lease space and store U.S. crude oil in the U.S. Strategic Petroleum Reserve for the first time since Congress provided DOE with this authority;
- Fostered the Development of the Eastern Mediterranean Gas Forum bringing together Israel, the Palestinian authority, Egypt, Jordan, and other regional partners to facilitate natural gas trade and economic growth; and
- Launched the U.S.-India Strategic Energy Partnership to enhance energy security, expand energy and innovation linkages, bolster our strategic alignment, and facilitate increased industry and stakeholder engagement in the energy sector.

FY 2019 **Labs at a Glance**

The Department of Energy's 17 National Laboratories tackle the critical scientific challenges of our time and possess unique instruments and facilities, many of which are found nowhere else in the world. They address large scale, complex research and development challenges with a multidisciplinary approach that places an emphasis on translating basic science to innovation.

Ames Laboratory At a Glance



Ames Laboratory is a world-class institution dedicated to creating materials, inspiring minds to solve problems, and addressing global challenges. For more than 70 years, Ames Laboratory has been a leader in the discovery, synthesis, analysis, and application of new materials, novel chemistries, and transformational analytical tools. The Laboratory conducts fundamental and applied research that helps the world to better understand the nature of the building blocks that make up our universe, and translates that knowledge into new and unique materials, processes, and technologies that advance the nation's economic competitiveness and enhance national security. Ames Laboratory's location on the campus of its contractor, Iowa State University, has instilled a culture of interdisciplinary science and innovation. Invention of lead-free solder, a hybrid catalyst that more efficiently converts crops to biofuel, and caloric materials for improved air conditioning and refrigeration are just a few examples of Ames Laboratory's materials that are impacting our world.



FY 2019 Lab Operating Costs: \$53.99M FY 2019 DOE/NNSA Costs: \$53.23M FY 2019 SPP (Non-DOE/Non-DHS) Costs: \$0.76M FY 2019 SPP as % Total Lab Operating Costs: 1.4% FY 2019 DHS Costs: \$0.0M

Facts

Location: Ames, IA Year Founded: 1947 Director: Dr. Adam Schwartz Type: Single-program Laboratory Contractor: Iowa State University of Science and Technology Site Office: Ames Site Office Website: www.ameslab.gov

Physical Assets

10 acres and 13 buildings 340,968 GSF in buildings Replacement Plant Value: \$105M

Human Capital

303 Full Time Equivalent Employees
47 Joint Faculty
38 Postdoctoral Researchers
98 Graduate Students
88 Undergraduate Students
104 Visiting Scientists

Core Capabilities

Applied Materials Science and Engineering Chemical and Molecular Science Condensed Matter Physics and Materials Science

Mission Unique Facilities

Critical Materials Institute Materials Preparation Center Sensitive Instrument Facility Powder Synthesis & Development Facility Dynamic Nuclear Polarization NMR

www.ameslab.gov



Argonne National Laboratory At a Glance

U.S. DEPARTMENT OF

Argonne National Laboratory accelerates science and technology to drive US prosperity and security. The Laboratory conducts research that spans the spectrum from basic science to engineering solutions that change the world for the better. Argonne's scientists and engineers are recognized nationally and internationally for leadership in creating new knowledge through pivotal discoveries in chemistry; materials; nuclear and particle physics; and life, climate, and earth system sciences. In addition, Argonne scientists are known for driving advances in computation and analysis to solve the most challenging problems and for shaping the nation's future through engineering of advanced technological systems. We build on our discoveries and innovations to improve energy production, storage, and distribution; protect critical infrastructure; and strengthen national security.

ANL also designs, builds and operates scientific user facilities large national research facilities that would be too expensive for a single company or university to run. These facilities are relied on by thousands of researchers from universities and industry aeronautics to batteries and pharmaceuticals.

FY 2019 Costs by Funding Source



Cost Breakdown by Major Sponsor Type

Department of Energy	\$727 million		
Department of Homeland Security	\$24 million		
Strategic Partnership Projects (non-DOE/non-DHS) \$87 million			
Strategic Partnership Projects + DHS	13% of Argonne total		

*Excludes expenditures of monies received from other DOE contractors and through joint appointments of research staff

Argonne National Laboratory Core Capabilities

- Accelerator Science and Technology
- Advanced Computer Science, Visualization, and Data
- Applied Materials Science and Engineering
- Applied Mathematics
- Biological and Bioprocess Engineering
- Chemical and Molecular Science
- Chemical Engineering
- Climate Change Sciences and Atmospheric Science
- Computational Science

- Condensed Matter Physics and Materials Science
- Cyber And Information Sciences
- Decision Science and Analysis
- Large-Scale User Facilities and Advanced Instrumentation
- Nuclear and Radio Chemistry
- Nuclear Engineering
- Nuclear Physics
- Particle Physics
- Systems Engineering and Integration

Facts

Location: Lemont, Illinois, near Chicago Type: Multiprogram Laboratory Director: Dr. Paul Kearns Contractor: UChicago Argonne LLC Responsible Site Office: Argonne Site Office Website: www.anl.gov

Physical Assets

1,517 acres
154 buildings
\$3.9 billion replacement plant value
5.1 million gross sq. ft. in buildings
0.3 million gross sq. ft. in leased facilities
0.02 million gross sq. ft. in 16 excess facilities

Human Capital

3,448 full-time equivalent employees379 joint faculty317 postdoctoral researchers 297 undergraduate students224 graduate students8,035 facility users809 visiting scientists

Mission Unique Facilities

- Advanced Photon Source (APS)
- Argonne Leadership Computing Facility (ALCF)
- Argonne Tandem-Linac Accelerator System (ATLAS)
- Atmospheric Radiation Measurement Climate Research Facility's Southern Great Plains (ARM-SGP)
- Center for Nanoscale Materials (CNM)



Brookhaven National Laboratory At a Glance



Brookhaven National Laboratory delivers discovery science and transformative technology to power and secure the nation's future. Primarily supported by the U.S. Department of Energy's (DOE) Office of Science, Brookhaven Lab is a multidisciplinary laboratory with seven Nobel Prize-winning discoveries, 36 R&D 100 Awards, and more than 70 years of pioneering research.

Brookhaven Lab's 2,500-plus staff members lead and support diverse research teams from Brookhaven and other national labs, academia, and industry, by designing, building, and operating major scientific user facilities. These teams and researchers address DOE's mission to ensure the nation's security and prosperity by tackling its energy, environmental, and nuclear challenges, in part by using these facilities.

Brookhaven's current initiatives are energy and data science; nuclear science and particle physics; accelerator science and technology; quantitative plant science; and quantum information science.

FY 19 Funding by Source (\$M)



Lab Operating Costs: \$587.5 DOE Costs: \$528.9 SPP (Non-DOE/Non-DHS) Costs: \$57.4 DHS Costs: \$1.2 SPP/DHS as % Total Lab Operating Costs: 10.0%

Core Capabilities

Accelerator Science and Technology Advanced Computer Science, Visualization & Data Applied Materials Science and Engineering Biological System Science Chemical and Molecular Science Chemical Engineering Climate Change Sciences and Atmospheric Science Condensed Matter Physics and Materials Science Large-Scale User Facilities/R&D Facilities/Advanced Instrumentation Nuclear & Radio Chemistry Nuclear Physics Particle Physics Systems Engineering and Integration Computational Science Applied Mathematics

www.bnl.gov

Brookhaven's programs also help prevent the spread of nuclear weapons, protect astronauts on future space missions, and produce medical isotopes to diagnose and treat disease.

In fiscal year 2018, Brookhaven attracted 5,374 facility users and guest researchers from all 50 states, and countries around the world. In NY State alone, the Laboratory's presence added approximately 4,800 jobs and increased economic output by \$637 million.

In addition to its world-leading science programs, Brookhaven Lab offers robust STEM education and workforce development programs that draw more than 30,000 students and educators annually.

Brookhaven Lab is managed for the Office of Science by Brookhaven Science Associates, a partnership between Stony Brook University and Battelle, and six universities: Columbia, Cornell, Harvard, Massachusetts Institute of Technology, Princeton, and Yale.

Facts

Location: Upton, New York Type: Multi-program Laboratory Director: Dr. Doon Gibbs Contractor: Brookhaven Science Associates Responsible Site Of fice: Brookhaven Site Office Website: http://www.bnl.gov

Physical Assets

5322 acres and 314 buildings 4.83M GSF in buildings Replacement Plant Value: \$5.8 B 159,912 GSF in 27 Excess Facilities 0 GSF in Leased Facilities

Human Capital

2421 Full Time Equivalent Employees (FTEs) 139 Joint faculty 159 Postdoctoral Researchers 286 Undergraduate Students 200 Graduate Students 3555 Facility Users 1523 Visiting Scientists

Mission Unique Facilities

Accelerator Test Facility Center for Functional Nanomaterials National Synchrotron Light Source II Relativistic Heavy Ion Collider



Fermi National Accelerator Laboratory At a Glance



Fermilab is America's particle physics and accelerator laboratory. Fermilab's vast complex of particle accelerators powers research into the fundamental nature of the universe. The flagship Deep Underground Neutrino Experiment, supported by the Long-Baseline Neutrino Facility, is the first international mega-science project based at a DOE National Laboratory. PIP-II is the first U.S. particle accelerator project with major contributions from international partners. Fermilab integrates U.S. researchers into the global particle physics enterprise through its experiments and programs. The laboratory's scientific R&D advances accelerator, detector, computing and quantum technology for use in science and society.

FY 19 Funding by Source (\$M)



FY 2019 Lab operating costs: \$491.64M FY 2019 DOE costs: \$490.12M FY 2019 SPP costs (non-DOE/ non-DHS): \$1.51M FY 2019 SPP as % total lab operating costs: 0.3% *BES number reflects funding of \$15.537M provided by SLAC for LCLS-II work

Core Capabilities

Accelerator Science and Technology Advanced Computer Science, Visualization, and Data Large Scale User Facilities/Advanced Instrumentation Particle Physics

Mission Unique Facilities

Fermilab Accelerator Complex

Facts

Location: Batavia, Illinois (40 miles west of Chicago) Type: Single-program Laboratory Year Founded: 1967 Director: Dr. Nigel Lockyer Contractor: Fermi Research Alliance, LLC Responsible Site Office: Fermi Site Office Website: https://www.fnal.gov

Physical Assets

6,800 acres and 365 buildings 2.4 million GSF in buildings Replacement plant value: \$2.44B 28,913 GSF in 10 excess facilities 22,155 GSF in leased facilities

Human Capital

1,810 full-time equivalent employees (FTEs)
22 joint faculty
95 postdoctoral researchers
3,725 facility users
27 visiting scientists
65 undergraduate students
30 graduate students

Major Partnerships

Deep Underground Neutrino Experiment World's flagship neutrino experiment with more than 1,000 scientists from over 30 countries

PIP-II particle accelerator

215-meter-long particle accelerator to be constructed at Fermilab with major international contributions

LCLS-II X-ray Laser

Design and construction of superconducting cryomodules needed for the LCLS-II X-ray laser at DOE's SLAC laboratory

Quantum Science and Technology

Apply expertise and knowledge in quantum systems in collaboration with industry and other research institutions



www.fnal.gov

Idaho National Laboratory At a Glance

U.S. DEPARTMENT OF

INL serves as the U.S. leader for advanced nuclear energy research and development, and is home to an unparalleled combination of nuclear energy test-bed facilities, including those that focus on fuel development and fabrication, steady-state and transient irradiation, and macro- and microscale post-irradiation examination.

INL's applied science and engineering discipline and problemsolving approach helps the Defense and National and Homeland Security departments, as well as industry partners, solve significant national security challenges in critical infrastructure protection, cybersecurity, and nuclear nonproliferation. Scientists and engineers are also exploring solutions to grand challenges in energy technologies and improving the water and energy efficiency of industrial manufacturing processes. Under direction of DOE-NE, INL is leading the Gateway for Accelerated Innovation in Nuclear (GAIN) initiative to provide the nuclear community with access to the technical, regulatory and financial expertise necessary to move innovative nuclear energy technologies, such as small modular reactors, toward commercialization while ensuring the continued safe, reliable and economical operation of the existing nuclear fleet.

Battelle Energy Alliance, LLC (BEA) manages and operates INL for DOE. BEA is an alliance of Battelle Memorial Institute, BWX Technologies, Amentum, EPRI, a consortium of National Universities, and a collaboration of Idaho Public Universities.

Responsible Site Office: Idaho Operations Office (DOE-ID)

2.3 million gross square footage (GSF) in owned operating buildings

\$5.6 billion in Replacement Plant Value (all DOE owned assets)

FY 2019 Spending by Source (\$M)



FY 2019 Lab Operating Cost: **\$1,349M** Total DOE/NNSA Costs: **\$980M** SPP (Non-DOE/Non-DHS): **\$300M** CRADA: **\$9M** Total DHS Costs: **\$61M**

Core Capabilities

- Advanced Computer Science, Visualization, and Data
- Applied Materials Science and Engineering
- Biological and Bioprocess
 Engineering
- Chemical Engineering
- Chemical and Molecular Science*
- Condensed Matter Physics and Materials Science*
- Cyber and Information Sciences
- Decision Science
- *Emerging capabilities

- Environmental Subsurface Science and Analysis
- Large Scale User Facilities and Advanced Instrumentation

Facts

Location: Idaho Falls, Idaho **Type:** Multiprogram Laboratory **Director:** Dr. Mark Peters

Physical Assets

Human Capital

36 joint appointments68 postdoctoral researchers

20 high school interns265 undergraduate interns

200 graduate interns

12 visiting scientists

691 facility users

Contractor: Battelle Energy Alliance

569,180 acres and **540** real property assets (DOE owned assets that are operating or standby)

9,609 GSF in operational standby buildings

20,363 GSF in three excess facilities **1** million GSF in leased facilities

4,888 full-time equivalent employees

- Mechanical Design
- and EngineeringNuclear Engineering
- Nuclear and Radiochemistry
- Power Systems and Electrical
- Power Systems and Electrical Engineering
- Systems Engineering and Integration

Mission Unique Facilities

- Advanced Test Reactor
- Transient Reactor Test Facility
- Hot Fuel Examination Facility
- Irradiated Materials Characterization Laboratory
- Fuel Manufacturing Facility
- Experimental Fuels Facility
- Space and Security Power Systems Facility
- Critical Infrastructure Test Range Complex
- Biomass Feedstock National
 User Facility
- Wireless Security Institute
- Cybercore Integration

Center



www.inl.gov Idaho National Laboratory

Lawrence Berkeley National Laboratory At a Glance

U.S. DEPARTMENT OF

Berkeley Lab creates useful new materials, advances the frontiers of computing, develops sustainable energy and environmental solutions, and probes the mysteries of life, matter, and the universe. The Lab's strengths in materials; chemistry; physics; biology; earth and environmental science; mathematics; and computing are enhanced by a deep integration of basic and applied science; advanced instrumentation; large-scale

FY 19 Funding by Source (\$M) Dept. of Homeland Security, \$1 Nat'l Nuclear Security Other DOE, \$7 trategic Partnership dministration, \$10 Projects, \$106 Office of Electricity, \$7 SC - Advanced Scientifi Nuclear Energy, \$5 Computing Research, \$152 Fossil Energy, \$13 Env. Mgmt., \$12 -/ Energy Efficiency and Renewable Energy, \$96 nmental Researc Other DOE SC, \$37 SC Basic Energy 1ces, \$204 SC - Nuclear Physics \$26 SC - Fusion Energy Sciences, \$1

FY19 Lab operating costs: \$907.07M FY19 DOE/NNSA costs: \$800M FY19 SPP (non-DOE/non-DHS) costs: \$105.68M FY19 SPP as % total Lab operating costs: 11.7% FY19 Total DHS costs: \$1.40M FY19 Added \$9.077 for LCLS-II

Core Capabilities

Accelerator Science and Technology Advanced Computer Science, Visualization, and Data Applied Materials Science and Engineering Applied Mathematics **Biological and Bioprocess** Engineering **Biological Systems Science** Chemical Engineering Chemical and Molecular Science Climate Change Science and Atmospheric Science Computational Science Condensed Matter Physics and Materials Science

Cyber and Information Sciences Decision Science and Analysis Earth Systems Science Environmental Subsurface Science Large Scale User Facilities/ Advanced Instrumentation Mechanical Design and Engineering Nuclear Physics Nuclear and Radio Chemistry Particle Physics Power Systems and Electrical Engineering Systems Engineering and Integration

Facts

with 13 Nobel Prizes.

Location: Berkeley, California Type: Multi-program laboratory Year Founded: 1931 Director: Dr. Michael Witherell Contractor: University of California Responsible Field Office: Bay Area Site Office

team science; and collaboration with the national scientific

community. Our five national user facilities provide more

than 12,000 researchers each year with capabilities in high-

performance computing and data science; materials synthesis

and characterization; and genomic science. Founded in 1931,

Berkeley Lab's research and its scientists have been recognized

Physical Assets

202 acres and 97 buildings and 21 trailers 1.7M GSF in DOE owned and operated buildings Replacement plant value: \$1.49B 315,471 GSF in contractor leased facilities

Human Capital

3,398 full-time equivalent employees (FTEs)
1,699 scientists and engineers
245 joint faculty
513 postdoctoral researchers
332 graduate students
159 undergraduates
13,990 facility users
1,611 visiting scientists and engineers

Mission Unique Facilities

Advanced Light Source The Molecular Foundry National Energy Research Scientific Computing Center (NERSC) Energy Sciences Network (ESnet) Joint BioEnergy Institute (JBEI) Joint Genome Institute (JGI) Advanced Biofuels Process Demonstration Unit FLEXLAB* (Integrated Building and Grid Technologies Testbed) BELLA (Berkeley Lab Laser Accelerator) 88-inch Cyclotron

BERKELEY LAB

www.lbl.gov

Lawrence Livermore National Laboratory At a Glance

U.S. DEPARTMENT OF ENERGY

Science and technology on a mission - This is the hallmark of Lawrence Livermore National Laboratory. In service to the Department of Energy/National Nuclear Security Administration and other federal agencies, LLNL develops and applies worldclass science and technology (S&T) to ensure the safety, security and reliability of the nation's nuclear deterrent. LLNL also applies S&T to confront dangers ranging from nuclear proliferation and terrorism to energy storages and climate change that threaten national security and global stability. Using a multidisciplinary approach that encompasses all disciplines of science and engineering, and utilizes unmatched facilities, LLNL pushes the boundaries to provide breakthroughs for counter-terrorism and nonproliferation; defense and intelligence; and energy and environmental security. LLNL was founded in 1952; Lawrence Livermore National Security, LLC has managed the Lab since 2007.



Core Capabilities

Advanced Materials and Manufacturing High-Energy-Density Science High-Performance Computing, Simulation, and Data Science Lasers and Optical Science and Technology Nuclear, Chemical, and Isotopic Science and Technology All-Source Intelligence Analysis Nuclear Weapons Design and Engineering Bioscience and Bioengineering Earth and Atmospheric Sciences

Facts

Location: Livermore, California Type: Multidisciplinary national security laboratory Year Founded: 1952 Director: Dr. William H. Goldstein Contractor: Lawrence Livermore National Security, LLC (LLNS) Responsible Site Office: Livermore Field Office Website: www.llnl.gov

Physical Assets

7,700 acres (owned) and 517 buildings/trailers 6.4 million gross square footage (GSF) in active buildings 565,009 GSF in 76 non-operational buildings 24,443 GSF in leased facilities Replacement plant value: \$20.2 billion

Human Capital

6,932 Full Time Equivalent Employees (FTEs)
18 joint faculty
253 postdoctoral researchers
184 undergraduate interns
138 graduate students
1,300 facility users
449 visiting scientists

Mission Unique Facilities

National Ignition Facility Livermore Computing Complex National Atmospheric Release Advisory Center High-Explosives Applications Facility Contained Firing Facility Forensic Science Center Center for Micro and Nanotechnology Center for Bioengineering Jupiter Laser Facility Center for Accelerator Mass Spectrometry Advanced Manufacturing Laboratory

> Lawrence Livermore National Laboratory

www.llnl.gov

Los Alamos National Laboratory At a Glance



Los Alamos National Laboratory applies innovative science, technology, and engineering to help solve the nation's toughest challenges, protect the nation, and promote world stability. Our work ensures the safety, security, and effectiveness of the U.S. nuclear deterrent and reduces emerging national security and global threats.

Meeting our mission requires a multidisciplinary approach that extends to nuclear nonproliferation, counterproliferation, energy and infrastructure security, and technology to counter chemical, biological,

FY 19 Funding by Source (\$M)



FY19 NNSA costs: \$2,081M FY19 DOE costs: \$280M FY19 SPP (non-DOE/non-DHS) costs: \$229M FY19 DHS costs: \$9M FY19 SPP as % total lab operating costs: 9%

Core Capabilities

Accelerators and Electrodynamics Biosciences Chemical Science Computer and Computational Science Computational Physics and Applied Math Earth and Space Sciences High Energy Density Plasma and Fluids Information and Knowledge Sciences Materials Nuclear Engineering and Technology Nuclear and Particle Physics, Astrophysics, and Cosmology Science of Signatures Weapons Science and Engineering radiological, and explosive threats. We rely on talented employees, unique capabilities, and almost 80 years of experience to develop innovative solutions to these challenges.

Our strategy focuses on simultaneous excellence in four strategic areas: nuclear security; mission-focused science, technology, and engineering; mission operations; and community relations. By balancing these areas, our Laboratory will deliver on our national security mission long into the future.

Facts

Location: Los Alamos, New Mexico Type: Multi-program laboratory Year Founded: 1943 Director: Dr. Thomas Mason Contractor: Triad National Security, LLC Responsible Site Office: Los Alamos Field Office

Physical Assets

24,612 acres 896 buildings 8.24 million GSF in buildings Replacement plant value: \$39.1B 208,677 GSF in 66 excess facilities 362,894 GSF in leased facilities

Human Capital

9,831 full-time equivalent employees 460 postdoctoral researchers 847 undergraduate students 604 graduate students 995 facility users 855 visiting scientists

Mission Unique Facilities

Dual-Axis Radiographic Hydrodynamic Test Facility Plutonium Science & Manufacturing Facility Los Alamos Neutron Science Center: Isotope Production Facility, Proton Radiography (pRad) Facility, Ultra Cold Neutron Facility, Weapons Neutron Research Facility Metropolis Center for Modeling & Simulation Center for Integrated Nanotechnologies Electron Microscopy Lab National High Magnetic Field Laboratory SIGMA Complex for Materials Manufacturing & Machining Center for Explosives Science

www.lanl.gov



National Energy Technology Laboratory At a Glance



The mission of the National Energy Technology Laboratory (NETL) is to discover, integrate, and mature technology solutions to enhance the nation's energy foundation and protect the environment for future generations. NETL's advanced technology development enables production of the clean, reliable and affordable energy needed to increase domestic manufacturing; investment in improving our nation's energy infrastructure; improvement of electrical grid reliability and resilience; expansion of domestic energy production; education of America's future scientists and engineers; workforce revitalization; and support of U.S. energy and national security goals. As the only government-owned, government-operated laboratory in the U.S. Department of Energy (DOE) complex, NETL and its predecessor laboratories have supported DOE goals by maintaining nationally recognized technical competencies and collaborating with partners in industry, academia, and other national and international research organizations to nurture emerging technologies. NETL and its predecessor laboratories implement missiondriven programs and perform objective technical and economic analyses to inform technology readiness and decision-making.

FY 19 Funding by Source (\$M)



FY 2019 Total NETL Costs: \$767M FY 2019 Lab Operating Costs: \$302.9M FY 2019 DOE Costs: \$765.6M FY 2019 SPP/DHS Costs: \$5.4M FY 2019 SPP/DHS as percentage of Total Lab Operating Costs: 0.46% SPP Costs (non-DOE/ non-DHS): \$1.4M FY 2019 Active Research (DOE and Performer Shares): \$6.9B

Core Capabilities

Applied Materials Science and Engineering Systems Engineering and Integration Chemical Engineering Environmental Subsurface Science Decision Science and Analysis Computational Science

Mission Unique Facilities

Pittsburgh

Carbon Capture Materials Synthesis Lab Subsurface Experimental Lab Center for Data Analytics & Machine Learning Biogeochemistry & Water Lab

Facts

Location: Pittsburgh, Pennsylvania; Morgantown, West Virginia; Albany, Oregon; Sugar Land, Texas; Anchorage, Alaska Director: Dr. Brian Anderson Year Founded: 1910 FY 2019 Total Active Research Projects: 1,069 Total FY 2019 Award Value: \$625 M+ Total FY 2019 Executed Awards: 210 Emerging Capabilities: Chemical and Molecular Science; Cyber and Information Sciences

Physical Assets

\$593.75 M Replacement Value 1,126,777 Gross Square Footage (GSF) in Buildings 13,662 GSF in seven Excess Facilities 3,392 GSF in 7 Excess Facilities 13,225 GSF in Leased Facilities 237 Acres and 108 Buildings

Human Capital

1,712 Full-Time Equivalent (FTE) Employees108 Joint Faculty121 Post-Doctoral Researchers115 Graduate Students54 Undergraduate Students

Albany

Severe Environment Corrosion Erosion Research Facility Magnetohydrodynamics (MHD) Lab Metals Fabrication Lab/ Metals Melting Facility

Morgantown

Center for High Performance Computing (Joule 2.0 Supercomputer) Reaction Analysis & Chemical Transformation (ReACT) Facility Solid Oxide Fuel Cell (SOFC) Manufacturing & Test Lab Center for Advanced Imaging & Characterization



www.netl.doe.gov

National Renewable Energy Laboratory At a Glance



NREL is the U.S. DOE's primary national laboratory for renewable energy and energy efficiency research and development. NREL delivers impactful scientific discoveries, innovations, and insights that transform clean energy technologies, systems, and markets. The lab's research focuses on engineering of energy efficiency, sustainable transportation, and renewable power technologies and provides the knowledge to integrate and optimize energy systems. NREL's mission space delivers foundational knowledge; technology and systems innovations; and analytic insights to catalyze a transformation to a renewable and sustainable energy future.

FY 19 Funding by Source (\$M)



FY 2019 Lab Operating Costs: \$491.8M FY 2019 DOE Costs: \$420.2M FY 2019 SPP (Non-DOE/Non-DHS) Costs: \$71.0M FY 2019 DHS Costs: \$0.6M FY 2019 SPP as % Total Lab Operating Costs: 14.5%

Core Capabilities

Computer Science and Analysis

- · Advanced Computer Science, Visualization, and Data
- · Decision Science and Analysis

Innovation and Application

- · Biological and Bioprocess Engineering
- \cdot Chemical Engineering
- \cdot Mechanical Design and Engineering
- · Power Systems and Electrical Engineering

Foundational Knowledge

- · Applied Materials Science and Engineering
- · Biological Systems Science
- · Chemical and Molecular Science

System Integration

- \cdot Systems Engineering and Integration
- · Large-Scale User Facilities

Facts

Location: Golden, Colorado Type: Single-program laboratory Year Founded: 1977 Director: Dr. Martin Keller Contractor: Alliance for Sustainable Energy, LLC Responsible Site Office: Golden Field Office

Physical Assets

630 acres, 58 buildings, and four trailers (owned) 1,082,068, GSF in buildings/trailers (owned) Replacement plant value: \$503,332,504 169,949 GSF in leased facilities (five buildings, whole or partial)

Human Capital

2,265 full and part-time employees 27 joint appointments 189 postdoctoral researchers 79 undergraduate students 85 graduate students 39 facility users 2 visiting scientists

Mission Unique Facilities

Battery Thermal and Life Test Facility Controllable Grid Interface Test System Distributed Energy Resources Test Facility Energy Systems Integration Facility Field Test Laboratory Building High-Flux Solar Furnace Hydrogen Infrastructure Testing and Research Facility Integrated Biorefinery Research Facility Outdoor Test Facility Renewable Fuels and Lubricants Laboratory Science and Technology Facility Solar Energy Research Facility Thermal Test Facility Thermochemical Process Development Unit Thermochemical Users Facility Vehicle Testing and Integration Facility Wind Dynamometer Test Facilities Wind Structural Testing Laboratory Wind Turbine Field Test Sites www.nrel.gov Transforming ENERGY

Oak Ridge National Laboratory At a Glance



ORNL is a multiprogram Office of Science laboratory whose mission is to deliver scientific discoveries and technical breakthroughs that accelerate the development and deployment of solutions in clean energy and global security, creating economic opportunity for the Nation. Established in 1943 as part of the Manhattan Project, ORNL pioneered plutonium production and separation, then focused on nuclear energy and later expanded to other energy sources and their impacts. Today, ORNL manages one of the Nation's most comprehensive materials programs; two of the world's most powerful neutron science facilities, the Spallation Neutron Source and the High Flux Isotope Reactor; unique resources for nuclear science and technology; leadershipclass computers including Summit, the world's most powerful and smartest scientific supercomputer; and a diverse set of programs linked by an urgent focus on clean energy and global security.

FY 19 Funding by Source (\$M)



FY 2019 DOE/NNSA Costs: \$1,607.8M FY 2019 SPP (Non-DOE/DHS) Costs: \$203.4M FY 2019 SPP/DHS as % Total Lab Operating Costs: 11.9% FY 2019 Total DHS Costs: \$13.5M

Core Capabilities

Accelerator Science and Technology Advanced Computer Science, Visualization, and Data Applied Materials Science and Engineering Applied Mathematics **Biological and Bioprocess** Engineering **Biological Systems Science Chemical Engineering** Chemical and Molecular Science Climate Change Science and Atmospheric Science Computational Science Condensed Matter Physics and Materials Science

Cyber and Information Sciences Decision Science and Analysis Earth Systems Science and Engineering Environmental Subsurface Science Large Scale User Facilities/ Advanced Instrumentation Mechanical Design and Engineering Nuclear Engineering Nuclear Physics Nuclear and Radio Chemistry Plasma and Fusion Energy Science Power Systems and Electrical Engineering Systems Engineering and Integration

Facts

Location: Oak Ridge, Tennessee Type: Multiprogram laboratory Year founded: 1943 Director: Dr. Thomas Zacharia Contractor: UT-Battelle, LLC Responsible Field Office: ORNL Site Office

Physical Assets

4,421 acres and 272 buildings 4.85M GSF in active operational buildings Replacement Plant Value: \$7.3B 1.4M GSF in 63 excess facilities 1.1M GSF in leased facilities

Human Capital

4,856 full-time equivalent (FTE) employees 194 joint faculty 323 postdoctoral researchers 556 undergraduate students 532 graduate students 2,928 facility users 1,691 visiting scientists

Mission Unique Facilities

Building Technologies Research and Integration Center Carbon Fiber Technology Facility Center for Nanophase Materials Sciences Center for Structural Molecular Biology Grid Research, Integration and Deployment Center High Flux Isotope Reactor Manufacturing Demonstration Facility National Transportation Research Center Oak Ridge Leadership Computing Facility Spallation Neutron Source



www.ornl.gov

Pacific Northwest National Laboratory At a Glance



PNNL advances the frontiers of knowledge, taking on some of the world's greatest science and technology challenges. Distinctive strengths in chemistry, earth sciences, and data analytics are the heart of its science mission, laying a foundation for innovations that improve America's energy resiliency and enhance our national security.

FY 19 Funding by Source (\$M)



FY 2019 Total Lab Operating Costs: \$938.3M FY 2019 Total DOE/NNSA Costs: \$708.7M FY 2019 SPP (Non-DOE/Non-DHS) Costs: \$200M FY 2019 SPP % of Total Laboratory Operating Costs: 21.3% FY 2019 Total DHS Costs: \$66.9M FY 2019 EM-Related Costs:* \$37.3M * refected in the total Lab Operating Costs

Core Capabilities

Advanced Computer Science, Visualization and Data Applied Materials Science and Engineering Applied Mathematics Biological and Bioprocess Engineering Biological Systems Science Chemical and Molecular Science Chemical Engineering Climate Change Sciences and Atmospheric Science Computational Science Condensed Matter Physics and Materials Science Cyber and Information Sciences Decision Science and Analysis Earth System Science and Engineering Environmental Subsurface Science Nuclear and Radiochemistry Nuclear Engineering Power Systems and Electrical Engineering Systems Engineering and Integration User Facilities and Advanced Instrumentation

www.pnnl.gov

PNNL is a national lab with Pacific Northwest roots and global reach. Whether unlocking the mysteries of the Earth system, helping modernize the U.S. electric power grid, or safeguarding ports around the world from nuclear smuggling, PNNL accepts great challenges for one purpose: to create a world that is safer, cleaner, more prosperous, and more secure.

Facts

Location: Richland, Washington Type: Multiprogram laboratory Director: Dr. Steven Ashby Contract Operator: Battelle Memorial Institute Responsible Site Office: Pacific Northwest Site Office Website: http://www.pnnl.gov

Physical Assets

549 acres DOE; 232 acres Battelle (including 117 in Sequim, Washington) 76 total buildings and trailers of which 35 are DOE-owned 1,180,712 gross square feet (gsf) of DOE-owned, active operating buildings (35) with 23 infrastructure assets [other structures and facilities (OSFs)] Replacement plant value (RPV): \$934,315,000 (DOE buildings and OSFs, and leased buildings) 968,580 gsf in 30 leased buildings or third-party agreements 166,477 gsf in 11 Battelle buildings and 21 OSFs 2,315,769 gsf total buildings **Human Capital**

4,301 Full-Time Equivalents (FTEs); Headcount ~4,700
150 Joint Appointments
287 Postdoctoral Researchers
398 Undergraduate Students
414 Graduate Students
1,557 Facility Users
71 Visiting Scientists

Mission Unique Facilities

Atmospheric Radiation Measurement User Facility Applied Process Engineering Laboratory Bioproducts, Sciences, and Engineering Laboratory Environmental Molecular Sciences Laboratory Marine Sciences Laboratory Radiochemical Processing Laboratory Electricity Infrastructure Operations Center



Princeton Plasma Physics Laboratory At a Glance



The U.S. Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL) is a collaborative, national center for fusion energy research. PPPL has two coupled missions: *PPPL develops the scientific understanding of plasmas from nano- to astrophysical-scale and develops the scientific knowledge and advanced engineering to enable fusion to power the U.S. and the world.* As a core part of Princeton University's culture, PPPL educates and inspires future generations to serve the national interest. PPPL's five core capabilities reflect its expertise and the role it plays in the DOE missions:

Core Capabilities

- Plasma and Fusion Energy Sciences
- Large-Scale User Facilities/Advanced Instrumentation
- Mechanical Design and Engineering
- Power Systems and Electrical Engineering
- Systems Engineering and Integration

FY 19 Funding by Source (\$M)



FY 2019 Total Lab Operating Costs: \$97.28M FY 2019 Total DOE Costs: \$96.11M FY 2019 SPP Costs: \$1.17M FY 2019 SPP % of Total Laboratory Operating Costs: 1.2% PPPL has been managed by Princeton University, a worldclass teaching and research university, since 1951. For more than seven decades, PPPL has been a world leader in magnetic confinement experiments, plasma science, fusion science, and engineering. PPPL is partnering in the ITER Project to prepare for U.S. participation in the first burning plasma. As the only DOE national laboratory dedicated to research in Fusion Energy Sciences, PPPL aspires to be the nation's premier design center for the realization and construction of future fusion concepts. The Laboratory contributes to the economic health and competitiveness of the U.S. by serving as a national leader in plasma theory and computation; plasma science; and technological innovation. Indeed, PPPL aims to drive the next wave of innovation in plasma technologies to maintain U.S. leadership in this critical area. PPPL is the leading institution exploring the science of magnetic fusion energy. At the end of FY 2018, PPPL's workforce was composed of 38 percent technical staff and 62 percent operations staff.

Facts

Location: Princeton, NJ Type: Single-program Laboratory Director: Dr. Steven Cowley Contract Operator: Princeton University Responsible Field Office: Princeton Site Office Website: www.pppl.gov

Physical Assets

90.7 acres and 30 buildings 758k GSF in Active Operational Buildings Replacement Plant Value: \$744.1M

Human Capital

531 Full-Time Equivalent Employees
7 Joint Faculty
36 Postdoctoral Researchers
45 Graduate Students
318 Facility Users
28 Visiting Scientists

Mission Unique Facilities

National Spherical Torus Experiment-Upgrade Lithium Tokamak Experiment Laboratory for Plasma Nanosynthesis Magnetic Reconnection Experiment Facility for Laboratory Reconnection Experiment



www.pppl.gov

SLAC National Accelerator Laboratory At a Glance



Managed by Stanford University and located in Silicon Valley, SLAC is a vibrant multi-program laboratory whose mission is to explore how the universe works at the biggest, smallest, and fastest scales and invent powerful tools used by scientists around the globe. Since its founding in 1962, SLAC has made revolutionary discoveries that have established the laboratory's leadership in high energy physics. Today, SLAC is the worldleading laboratory in X-ray and ultrafast science due in large part to its X-ray user facilities: the Stanford Synchrotron Radiation Lightsource (SSRL) and the Linac Coherent Light Source (LCLS). Through diverse research programs in materials, chemical, biological, and energy sciences; high energy density science; cosmology; particle physics; bioimaging; and technology development, SLAC helps solve real-world problems and advances the interests of the nation.

FY 19 Funding by Source (\$M)



Lab Operating Costs: \$541.5M DOE Costs: \$518.1M SPP (Non-DOE/Non-DHS) Costs: \$23.0M DHS Costs: \$0.4M SPP/DHS as percent Total Lab Operating Costs: 4.0%

Facts

Location: Menlo Park, California Type: Multi-program Laboratory Year Founded: 1962 Director: Dr. Chi-Chang Kao Contractor: Stanford University Responsible Site Office: Bay Area Site Office

Physical Assets

426.3 acres and 150 buildings 1.8M GSF in buildings Replacement Plant Value: \$3.1B 1,170 GSF in 1 excess facility 0 GSF in leased facilities

Human Capital

1,620 Full Time Equivalent Employees (FTEs)22 Joint Faculty227 Postdoctoral Researchers121 Undergraduate Students241 Graduate Students2,608 Facility Users22 Visiting Scientists

Core Capabilities

Large-Scale User Facilities/Advanced Instrumentation Condensed Matter Physics and Materials Science Chemical and Molecular Science Accelerator Science and Technology Plasma and Fusion Energy Science Particle Physics Emerging Core Capability in Advanced Computer Science, Visualization, and Data

Mission Unique Facilities

Linac Coherent Light Source (LCLS) Ultrafast Electron Diffraction facility Stanford Synchrotron Radiation Lightsource (SSRL) Stanford-SLAC facility for cryo-electron microscopy Facility for Advanced Accelerator Experimental Tests (FACET) Leading the DOE contributions to the construction and operation of the Large Synoptic Survey Telescope (LSST) Leading the joint DOE-NSF construction of the next-generation dark matter experiment SuperCDMS-SNOLAB

www.slac.stanford.edu



Sandia National Laboratories At a Glance



Sandia grew out of the effort to develop the first atomic bombs. Today, maintaining the U.S. nuclear stockpile is a major part of Sandia's work as a multimission national security engineering laboratory. Sandia develops advanced technologies to ensure global peace. Its role has evolved to address the complex threats facing the United States through research and development in the following areas:

- Nuclear Deterrence Supporting U.S. deterrence policy by ensuring the nation's nuclear stockpile is safe, secure, and effective
- Global Security Protecting nuclear assets and materials, and addressing nuclear emergency response and nonproliferation worldwide



FY 2019 Labs operating costs: \$3,594M FY 2019 NNSA operating costs: \$2,230M FY 2019 DOE operating costs: \$247M FY 2019 DHS costs: \$45M FY 2019 SPP Costs: \$1,155M FY 2019 SPP as % of total Labs operating costs: 32.1%

FY 19 Funding by Source (\$M)

- National Security Programs Supplying new capabilities to U.S. defense and national security communities
- Energy & Homeland Security Ensuring the stable supply of energy and resources, and protection of infrastructure
- Advanced Science & Technology Integrating multidisciplinary efforts to advance the science of the possible for Sandia's missions

Sandia's science, technology, and engineering foundations enable its unique mission. The Laboratories' highly specialized research staff is at the forefront of innovation, collaborating with universities and industry and performing multidisciplinary science and engineering research programs with significant impact on U.S. security.

Facts

Location: Albuquerque, NM; Livermore, CA; Tonopah, NV; Amarillo, TX; Carlsbad, NM; Kauai, HI Type: Multidisciplinary national security laboratory

Year Founded: 1949

Director: Dr. James S. Peery

Contractor: National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc. **Responsible Site Office:** Sandia Field Office **Website:** www.sandia.gov

Physical Assets

196,192 acres and 1,001 buildings/trailers (all sites) 7,695,261 GSF in buildings and trailers Replacement plant value: \$16,397,460,863 42,063 GSF in 28 excess facilities 375,289 GSF in leased facilities

Human Capital

12,178 full-time employees251 postdoctoral researchers501 undergraduate students429 graduate students

Core Capabilities

Cyber technology High-reliability engineering Micro and nano devices and systems Modeling & simulation and experiment Natural and engineered materials Pathfinder engineered systems Radiation-hardened, trusted microelectronics development/production Systems engineering Safety, risk, and vulnerability analysis Sensors and sensing systems

Mission Unique Facilities

Z Machine Combustion Research Facility Microsystems Engineering, Sciences and Applications (MESA) complex



www.sandia.gov

Savannah River National Laboratory At a Glance



From the beginning, SRNL has put science to work to protect our nation. When it was established in the early 1950s, SRNL's primary focus was the startup and operation of the Savannah River Site (SRS), including its five reactors, to produce tritium and plutonium, basic materials for the United States nuclear weapons used to maintain the balance of power during the Cold War. solutions to nuclear materials management, national security, environmental stewardship, and energy security challenges. Building upon its pioneering work at SRS, SRNL now performs cutting edge scientific research and technology development in various fields to protect United States interests here and around the world.

Today, SRNL protects our nation by supporting multiple United States federal agencies in providing practical, cost-effective

FY 19 Funding



\$261 million FY 2019 overall Program Budget
4% Secure Energy Manufacturing
41% National Security
29% Nuclear Materials Management
26% Environmental Stewardship

Facts

Location: Aiken, SC Type: Multidiscipline Year Founded: 1951 Director: Dr. Vahid Majidi Contractor: Savannah River Nuclear Solutions Responsible Site Office: Savannah River Site

Physical Assets

SRNL Main Technical Area ~ 39 Acres
Replacement Plant Value ~ \$2.0B
Nuclear Hazard Category II and III Facilities
13 Nuclear Facilities with over 200,000 sq. ft. of radiologically controlled laboratory and process space, with 155 laboratories and 326 offices
Total Buildings, Trailers & Other Structures and Facilities ~ 829,800 sq. ft.
Leased facilities - 58,850 sq. ft.

Human Capital

1,000 employees – more than 500 Engineers and Scientists — more than 200 Ph.Ds. — 6 Postdocs — 50 student interns

Core Capabilities

Environmental Remediation and Risk Reduction Tritium Processing, Storage and Transfer Systems Nuclear Materials Processing and Disposition Nuclear Materials Detection, Characterization and Assessment

Mission Unique Facilities

Shielded Cells Facility Ultra-Low-Level Underground Counting Facility Outfall Constructed Wetland Cell Facility Radiological Testbed Facilities FBI Radiological Evidence Examination Facility Atmospheric Technology Center



www.srnl.doe.gov

OPERATED BY SAVANNAH RIVER NUCLEAR SOLUTIONS

Thomas Jefferson National Accelerator Facility At a Glance



TJNAF is the preeminent Laboratory in precision studies of the fundamental nature of confined states of quarks and gluons, including the protons and neutrons that make up the mass of the visible universe. The Laboratory is home to the Continuous Electron Beam Accelerator Facility, the first largescale application of superconducting radiofrequency technology. TJNAF's expertise is enabling an ever-increasing array of applications in the international scientific community, from high-power lasers to advanced particle accelerators.

FY 18 Funding by Source (\$M)



BES costs (\$24.8M) reflect LCLS-II & LCLS-II HE work for SLAC

Lab operating costs: \$159.9M DOE costs: \$158.1M SPP costs (non-DOE/ non-DHS): \$1.8M DHS costs: \$0M

Facts

Location: Newport News, Virginia Type: Program-dedicated, Single-purpose Laboratory Year Founded: 1984 Director: Dr. Stuart Henderson Contractor: Jefferson Science Associates, LLC Responsible Site Office: Thomas Jefferson Site Office

Physical Assets

169 acres and 69 buildings 882,900 GSF in buildings Replacement plant value: \$509M 0 GSF in excess facilities 66,289 GSF in leased facilities

Human Capital

714 full-time equivalent employees (FTEs)
24 joint faculty
30 postdoctoral researchers
33 undergraduate students
40 graduate students
1,691 facility users
1,552 visiting scientists

Core Capabilities

Accelerator Science and Technology Large Scale User Facilities/ Advanced Instrumentation Nuclear Physics

Mission Unique Facilities

Continuous Electron Beam Accelerator Facility

www.jlab.org



THE NATIONAL LABORATORY DIRECTORS' COUNCIL

OCTOBER 15, 2020

DOE CORPORATE OVERVIEW | *NLDC Overview and Value*
The National Laboratory Directors' Council (NLDC)

The National Laboratory Directors' Council (NLDC) is a self-organized, self-governing body composed of the Laboratory Directors from the seventeen DOE National Laboratories (Table 1). The NLDC advances the effectiveness of the DOE National Laboratory Complex in addressing national needs and provides an interface to DOE on issues and concerns of common interest. The NLDC also provides a forum for presenting the Secretary and DOE senior management with consensus views on matters that affect the laboratories and their ability to contribute to the DOE mission. With its standing working groups, it represents the most senior operational and scientific leadership at the Laboratories and is thus a key mechanism for coordinating across the DOE laboratory complex on matters ranging from scientific directions to operational issues and requirements. In short, in DOE's diverse federated environment, the NLDC is a critical resource available to the Department's senior leadership to inform DOE strategy and policy.

1. Governance

A subset of NLDC members comprise an Executive Committee (EC) that organizes and coordinates the activities of the NLDC. The EC is comprised of four members who collectively represent DOE Mission areas: Science (SC), Energy (E), Nuclear Security (NS), and Environment (EM). The EC members are elected by the full membership to serve two-year terms. Energy and Environment are staggered with Science and Nuclear Security so that each year, two representatives are elected to the Committee. The full NLDC also elects one EC member to serve as Chair for a two-year term. The NLDC has a Secretariat who manages meetings and operations for the NLDC.

2. DOE Interactions

The NLDC holds four strategic retreats per year, two of which include face-to-face meetings with the Secretary in Washington, DC. Attendees may also include the Deputy Secretary, the Under Secretaries or their representatives and other functionaries (e.g., the General Counsel, CFO or Assistant Secretaries) depending on the agenda. The NLDC Secretariat works with DOE on the agendas and briefing materials. Meetings cover a broad range of topics from scientific strategies to operational issues. Over the past year, topics have included COVID-19 and increasing national laboratory response to future crises, technical horizon scanning, and diversity, equity and inclusion. The NLDC, working with DOE, is responsible for educating various stakeholders through events such as the periodic Lab Days on the Hill. The NLDC also sponsors The Oppenheimer Science and Energy Leadership Program (OSELP) intended to prepare the next generation of scientific leaders. The NLDC has also helped to identify

and change policies that impact efficient operations at the Labs and review proposed policy changes through its representation in the Laboratory Operations Board, Cyber Security Council and the DOE Directives Review Board.

Overall, the value of the NLDC lies in its ability to provide guidance on how to integrate across the programs at DOE in order to allow the enterprise to be more than the sum of its parts.

3. Working Groups

To provide insights on specific issues and impacts, and to help work with the various DOE offices on policy implementation, the NLDC has eleven standing Working Groups that represent the spectrum of issues including research, operations, information technology, finance, legal, communications, federal relations, human capital, STEM and environmental health and safety. Similar to the NLDC, an Executive Committee that is representative of the seventeen Laboratories typically governs each working group with annual elections; the current leadership for each is summarized in Table 2. While the formal interface with DOE is through the NLDC, each working group has routine interactions with DOE counterparts to facilitate discussions and issues resolution. Additionally, two CROs and two COOs serve on the DOE Lab Operations Board which reports to the Secretary's Office of Strategic Planning and Policy.

a. The Chief Research Officers group (NLCRO) advises the NLDC on scientific and programmatic issues, serving as a forum for communication and providing leadership for major scientific activities related to the strategic direction for the laboratories. In the past year, the CRO group and their representatives facilitated the organization of national laboratory capabilities and resources to enable rapid and coordinated responses to addressing the COVID-19 pandemic, served on the Space Coordination Group to provide critical input necessary to advance the nation's future space capabilities and played a pivotal role in the development of the 2020 NLDC Future Science & Technology Opportunities report. The group has also contributed key input to the State of the National Laboratories report, DOE's Laboratories of the Future Initiative and provided feedback to DOE and the other NL working groups on strategic science and technology issues. Their primary interfaces in DOE are the principal deputies in the various research program offices.

b. The Chief Operations Officers group (NLCOO) advises the NLDC on issues and improvement opportunities related to the management and operation of the National Laboratory infrastructure. The NLCOO evaluates resource impacts of administrative and regulatory requirements to facilitate productive and cost-effective utilization of the DOE laboratory system; promotes practices based upon performance-based management; and shares best practices and lessons learned. The group has meet biweekly through the COVID-19 pandemic to coordinate planning and response activities across the lab complex including research and operations curtailment implementation plans, shared emerging COVID safety protocols (both preventive and in response to confirmed cases), and share best practices and lessons learned for conventional and COVID safety. In response to the pandemic, they led the formation of three working groups around systematic and safe resumption of lab operations and research, bio-screening strategy and family equity issues. They also provide key input to DOE, the NLDC, and other NL working groups on strategic operational issues affecting the lab complex.

c. The Chief Information Officers group (NLCIO) advises the NLDC on issues related to computing, information management and cybersecurity. They provide a

forum for communication and coordination of the major activities in information technology, scientific computing, and cybersecurity throughout the National Laboratories. The NLCIO group shared best practices on planning and rapidly shifting to an all-remote work environment to address the COVID-19 pandemic. The NLCIO meets regularly with the DOE CIO, the NNSA CIO, and DOE-SC IT leadership to provide advice on benefits and impacts of Federal policy initiatives. They are closely aligned with the DOE Cyber Council and other councils to advise the Secretary, Undersecretaries and CIO on Department-wide IT Strategy and Policy. d. The Chief Financial Officers group (NLCFO) advises the NLDC on business, financial and procurement issues and provides an interface to DOE-CFO and DOE-MA organizations in these areas. The Council also serves as a forum for information exchange, best practice sharing, consensus building, and coordination of major initiatives impacting the DOE contractor community in the business, financial and procurement arena. During the past year, the NLCFOs collaborated with DOE-CFO and MA to respond to a number of material and significant challenges presented by the COVID-19 global pandemic. This included developing the appropriate policies for tracking costs as well as ensuring adequate funding strategies were in place. In the regular order of business, the NLCFOs provide guidance and impact analysis on changes to financial and acquisition DOE Orders, Directives, and the CFO's Financial Management Handbook. The community collaborates on the Institutional Cost Report (ICR), a key financial report across the Lab system, providing insight and benchmarking into the cost of doing business.

e. The Chief Communications Officers working group (NLCCO) advises the National Laboratory Directors Council (NLDC) and interacts with Department of Energy communications and public affairs offices on relevant matters across the National Laboratory System (NLS). NLCCO functions include information exchange; consensus building; promotion of best practices and policies; coordination; counsel; and execution of communications-related activities identified by the NLDC, DOE, or NLCCO members for promotion of the scientific missions and value of the NLS. In the past year, the CCO group and their representatives led the communications programs highlighting ways the NLS is addressing the COVID-19 pandemic, and in partnership with the Office of Technology Transitions (OTT), led the facilitation of DOE's InnovationXLab series to expand the commercial impact of the substantial investment in the National Lab innovation portfolio.

f. The General Counsel group (NLGC) advises the NLDC on legal issues serving as a forum for communication and coordination of the major legal issues potentially impacting activities at the laboratories. In the past year, the GC group has meet regularly to share information and best practices around COVID-related issues. The group also invites subject matter experts from other legal areas (such as Employee and Labor Relations) to facilitate the sharing of information and knowledge across the complex. Their primary interface in DOE is with the DOE General Counsel or his representatives, along with the NNSA General Counsel and his representatives.

g. The Environment, Safety and Health Directors

group (NLESHD) proactively advises the NLDC on ES&H issues that are common across the DOE Laboratory complex. The group reviews events and shares lessons learned, identifies best practices, recommends policy and regulatory interpretation and provides assistance in evaluating unique hazards and conditions as required. The group serves as a forum to identify the best subject matter experts across the complex on high priority ES&H topics so they can assist as the need arises.

h. The Chief Human Resources Officers group

(NLCHRO) determines areas of mutual interest to the Labs, opportunities or critical complex wide issues that would benefit HR leadership and leverage strategic advantage of National Laboratories and by extension, to the benefit of DOE. The purpose of the group is to optimize their collective effectiveness in human capital and talent management across the complex and provide support to the NLDC and DOE in governance and on critical outcomes which will result in more consistent and efficient performance of human resources. Accomplishments include development and execution of recruiting strategies to showcase the National Laboratory Systems as a preferred employer, a joint effort to increase the diversity of staff across all National Laboratories and create an inclusive working environment for all employees.

i. The National Laboratory Technology Transfer (*NLTT*) provides counsel to the NLDC on technology transfer related matters of interest to the Laboratory Directors. The NLTT undertakes studies and activities as proposed and agreed to by the NLDC. Conclusions and recommendations are are submitted to the NLDC for approval or further guidance. In addition, the NLTT provides an interface to the DOE on department-wide efforts to increase the transition of technologies from the laboratory into commercial practice. Over the past year, the NLTT played a key role in the InnovationXLab Summit series, designed to expand the commercial impact of the investment in the national laboratories. NLTT also engaged with the department on technology transfer regulatory reform, contributing to the design and implementation of the Master Scope of Work which markedly increases the efficiency of partnership agreements. NLTT frequently works in close collaboration with the NLCRO on new and improved approaches to public-private partnerships that foster research as well as the subsequent transfer of the resulting technology to US industry.

j. The Federal Relations (NLFR) meets on an as-needed basis to share information and best practices on issues of mutual interest. Additionally, the NLFR supports the NLDC in execution of Lab Day congressional engagement and messaging. In connection with every national lab day, the NLFR has planned, hosted, and executed ancillary educational staff briefings, one on one meetings, and meet and greets with Members of Congress. These activities have included meetings for teams of Lab Directors with over eighty Members of Congress or staff representing thirty-seven states in connection with Lab day activities.

k. The Laboratory Education Directors' Executive Council (NLED) was established in September 2020 to coordinate cross-complex STEM education activities that advance STEM outreach, K-12, university and workforce development programming related to the DOE lab missions with the goal of achieving inclusion, equity and diversity within the laboratory complex. The NLED established a working group in response to a recommendation by the Secretary of Energy Advisory Board around the development of a portal for lab educational resources.

TABLE 1: LABORATORIES AND DIRECTORS (AS OF OCTOBER 2020)

DOE LABORATORY CONTRACTOR	DIRECTOR EMAIL	NLDC ROLE
Ames Laboratory lowa State University of Science & Technology	Adam Schwartz ajschwartz@ameslab.gov	NLDC Executive Committee (SC)
Argonne National Laboratory (ANL) UChicago Argonne, LLC	Paul Kearns pkearns@anl.gov	NLDC Executive Committee (SC), Chair
Brookhaven National Laboratory (BNL) Brookhaven Science Associates	Doon Gibbs gibbs@bnl.gov	
Lawrence Berkeley National Laboratory (LBNL) University of California	Michael Witherell mswitherell@lbl.gov	
Fermi National Accelerator Laboratory (FNAL) Fermi Research Alliance, LLC	Nigel Lockyer lockyer@fnal.gov	
Idaho National Laboratory (INL) Battelle Energy Alliance, LLC	Mark Peters mark.peters@inl.gov	
Los Alamos National Laboratory (LANL) Triad National Security, LLC	Thom Mason masont@lanl.gov	NLDC Executive Committee (NNSA)
Lawrence Livermore National Laboratory (LLNL) Lawrence Livermore National Security, LLC	William (Bill) Goldstein goldstein3@llnl.gov	
National Energy Technology Laboratory (NETL) Government-owned, government-operated	Brian Anderson brian.anderson@netl.doe.gov	
National Renewable Energy Laboratory (NREL) Alliance for Sustainable Energy, LLC	Martin Keller martin.keller@nrel.gov	NLDC Executive Committee (ENERGY)
Oak Ridge National Laboratory (ORNL) UT-Battelle, LLC	Thomas Zacharia zachariat@ornl.gov	
Pacific Northwest National Laboratory (PNNL) Battelle Memorial Institute	Steven Ashby sfashby@pnnl.gov	
Princeton Plasma Physics Laboratory (PPPL) Princeton University	Steve Cowley scowley@pppl.gov	
Sandia National Laboratories (SNL) National Technology and Engineering Solutions of Sandia, LLC	James Peery jspeery@sandia.gov	
Savannah River National Laboratory (SRNL) Savannah River Nuclear Solutions, LLC	Vahid Majidi vahid.majidi@srnl.doe.gov	
SLAC National Accelerator Laboratory Stanford University	Chi-Chang Kao ckao@slac.stanford.edu	
Thomas Jefferson National Accelerator Facility (TJNAF) Jefferson Science Associates, LLC	Stuart Henderson stuart@jlab.org	
NLDC Secretariat	Julie Wulf-Knoerzer wulf@anl.gov	NLDC Executive Committee Liaison

WORKING GROUP	DIRECTOR	WORKING GROUP	DIRECTOR
Chief Research Officer (NLCRO)	Michelle Buchanan buchananmv@ornl.gov	General Counsel (NLGC)	Will Elias, Chair wselias@sandia.gov
	Ralph James ralph.james@srnl.doe.gov	Chief Communications Officer (NLCCO)	Lauren Hansen, Chair Ihansen@jlab.org
	John Sarrao, Chair-Elect sarrao@lanl.gov	_ • •	Frederick Bermudez fbermud@sandia.gov
	Horst Simon hdsimon@lbl.gov	_	Pete Genzer genzer@bnl.gov
	Marianne Walck, Ex Officio Chair marianne.walck@inl.gov	_	David Keim keimdm@ornl.gov
Chief Operations Officer (NLCOO)	Michael Brandt, Chair mtbrandt@lbl.gov	_	Melinda Lee melinda.lee@slac.stanford.edu
	Sharon Marra sharon.marra@srnl.doe.gov	_	Lynda Seaver seaver1@llnl.gov
	Mike Schlender mike.schlender@pnnl.gov	Environment Safety and Health Director	John Powell, Chair powellje@ornl.gov
Chief Information	Tom Schlagel, Chair	(NLESHD)	
	Thomas Harper	Chief Human Resources Officer (NLCHRO)	Mark Holubar, Chair mark.holubar@inl.gov
	thomas.harper@pnnl.gov	Technology Transfer	Lee Cheatham, Chair
	Robert Hillier robert.hillier@inl.gov	(NLTT)	lee.cheatham@pnnl.gov
	Carol Jones	_	rankin8@llnl.gov
	Andy Kowalski	_	Jason Stolworthy jason.stolworthy@inl.gov
	Kowaiski@jiab.org	 Federal Relations (NLFR) 	Sarah Higgins, Chair shiggins@anl.gov
	Stephen Warren swwarren@lanl.gov	_	Josh Shiode, Vice Chair josh.shiode@pnnl.gov
Chief Financial Officer (NLCFO)	Owen Barwell, Chair owen.barwell@nrel.gov	 Education Directors (NLED) 	Meridith Bruozas, Interim Chair mbruozas@anl.gov
	Scott Branham branhams@ornl.gov	-	
	Suzanne Hansen suzanned@slac.stanford.edu	_	
	Tim Knewitz.	_	

TABLE 2: NLDC WORKING GROUP EXECUTIVE COMMITTEES (AS OF OCTOBER 2020)

tknewitz@anl.gov

VALUE OF THE DOE NATIONAL LABORATORIES¹

NATIONAL LABORATORY DIRECTORS' COUNCIL² OCTOBER 15, 2020

DOE CORPORATE OVERVIEW | *NLDC Overview and Value*

Introduction

The U.S. Department of Energy (DOE) National Laboratories (see table 1) are the crown jewels of the nation's research and development (R&D) ecosystem. Forged during the Manhattan Project of World War II to counter the existential threat facing our country and allies, these initial research sites next pursued the peacetime uses of nuclear power, expanding into the National Laboratory complex we have today that continues to provide rapid advances in science and technology (S&T) aligned to pressing national and world-impacting needs. The seventeen National Laboratories function as an interdependent system with an exceptional set of distinctive capabilities, world-leading staff, and state-ofthe art facilities and instrumentation. Together, they have produced a wealth of scientific discoveries and technology innovations in support of DOE's overarching mission of advancing the national, energy, and economic security of the United States,³ garnering 118 Nobel Prizes and discovering 22 elements on the periodic table along the way. The National Laboratories steward vital scientific and engineering capabilities that are essential to our nation's continued science and technology leadership. Their global impacts include discovering and developing new materials and chemistry to advance energy technologies; advancing the field for synchrotrons, light and neutron sources, particle physics, and materials; helping to map the human genome; and developing passive remediation methods to clean contaminated groundwater while saving energy, time, and billions of dollars. In addition to mission support, these world-leading institutions stand ready to deliver rapid-response S&T to help address natural and man-made threats and disasters, including Fukushima, Deepwater Horizon, Hurricane Katrina, Superstorm Sandy, Puerto Rico earthquake, Ukrainian grid cyber-attack, and now Sars-CoV-2/COVID-19 — just as they have done for more than seven decades.

The National Laboratories design, build, and operate unique scientific instrumentation and facilities to serve tens of thousands of scientists and engineers from academia and industry who are collaborating to solve the most pressing and complex problems of our time. These facilities, which are found nowhere else in the world, support open scientific research as well as classified work. Researchers continually advance the laboratories' state-ofthe-art capabilities through the development, deployment, and application of next-generation scientific tools and technologies. These capabilities enable researchers to make fundamental scientific discoveries, support our nation's energy future, and ensure national security. In addition, these capabilities are critical to industry in its development of new materials, improved manufacturing processes, and advanced product testing.

The National Laboratories promote innovation that advances U.S. economic competitiveness and contributes to our future prosperity. They partner with the private sector, especially industry, to integrate fundamental and applied pre-competitive research for the broad benefit of the economy. They contribute materially to U.S. economic prosperity by making key scientific discoveries, demonstrating the utility of these discoveries in early prototypes, and working with industry to move these technologies rapidly into the marketplace, thus creating high-paying jobs. The prowess of the National Laboratories is evidenced by their proven track record in technology transfer and commercialization. In short, the Labs have become key partners in many sectors to U.S. industry.

At the core of the National Laboratories is a first-rate workforce of research scientists, engineers, and support personnel who are entrusted to serve the American people. The National Laboratories embrace the responsibility to steward their people, and as such, they also play a critical role in the nation's science, technology, engineering, and mathematics (STEM) ecosystem. Indeed, as the largest funder of the physical sciences in the United States, steward of the nation's most powerful supercomputers, and with critical mission needs such as securing the nuclear weapons stockpile and developing new and sustainable energy and environmental solutions, the DOE has a vested need to develop talent. Separately and together, the National Laboratories invest in growing the nation's S&T workforce with on-the-job training to undergraduates, graduates, and postdoctoral researchers. Building a talent pipeline has proven to be an invaluable investment that sets the National Laboratories apart from other Federally Funded Research and Development Centers (FFRDCs), and is part of how these laboratories are able to maintain their innovative edge. In addition, DOE directly funds college programs, and individual National Laboratories fund K-12 STEM activities, many with a focus on schools in their local communities.

PART I: Mission and Impact

Today's system of National Laboratories has evolved in response to changing national priorities and needs. Nevertheless, the National Laboratories "remain among the most important institutions in American science and technology."⁴ In 2018, Energy Secretary Dan Brouillette (then Deputy Secretary) stated, "Together, the national laboratories are greater than the sum of their parts, creating a world-class scientific complex of unparalleled capability."

DELIVERING SCIENTIFIC DISCOVERY AND INNOVATION

The scale and scope of the National Laboratories enable them to launch "big picture" multidisciplinary investments in large-scale and complex problems, with an emphasis on translating basic science to innovation. They collaborate extensively with universities and industry to develop and deploy scientific and technological solutions that meet national needs. While they emphasize long-term contributions, the National Laboratories are also capable of responding with agility to emerging crises. Specifically, these laboratories:

- Conduct research of the highest caliber in physical, chemical, biological, materials, and computational and information sciences that advances our understanding of the world around us;
- Further U.S. energy independence and leadership in clean energy technologies to ensure the ready availability of clean, reliable, and affordable energy;
- Enhance global, national, and homeland security by ensuring the safety and reliability of the U.S. nuclear deterrent, helping to prevent the proliferation of weapons of mass destruction, and securing the nation's borders; and
- Design, build, and operate distinctive scientific facilities and instrumentation, and make these resources available to the broader research community.

Discoveries and innovations from the National Laboratories have contributed to numerous achievements and improvements related to quality of life, economic competitiveness, and national security. Examples span a wide range of fields:

Fundamental science. National Laboratory researchers have answered fundamental questions about the laws of nature and the cosmos, with discoveries that include the detection of the neutrino, 22 new elements in the periodic table, and the accelerating expansion of the universe.

As a result, National Laboratory scientists have won the Nobel Prize 118 times. National Laboratory scientists also publish more than 14,000 papers each year, with 456 designated as "highly cited" since 2019 according to the Web of Science Core Collection.

Sustainable energy. National Laboratories have led the way in the creation of technologies for sustainable energy production and conservation. They have led or contributed to the development of nuclear power, biofuels, thin-film batteries, wind energy technologies, geothermal energy, photovoltaics, electric vehicles, and more efficient windows and appliances that have yielded more than \$388B in economic returns on a \$12B investment.⁵

Supercomputers. National Laboratories drove the creation and evolution of supercomputing and its application to myriad problems. From the Univacs of the 1950s to the petascale supercomputers in operation today at DOE's Leadership Computing Facilities to emerging exascale and quantum computers, the National Laboratories have helped to maintain U.S. leadership in high-performance computing.

Radioisotopes. National Laboratories initiated large-scale isotope production in the 1940s and continue to provide leadership in nuclear medicine and in isotope development for fundamental science, medical applications, threat reduction, homeland security, industrial applications, and environmental science.

Accelerators. The National Laboratory system boasts a suite of particle accelerators used to study the origins of our universe, investigate the subatomic structure of the world around us, and advance research in medicine, environmental clean-up, and more. In addition, National Laboratory scientists are developing new compact laser plasma accelerators that in the future could transform accelerator-based science of all types and their underlying technologies, including high-repetition-rate lasers.

Biology. National Laboratories bring substantial strength in bioenergy production, carbon biosequestration, environmental contaminants processing, and computational and experimental platforms to generate and test hypotheses. Their approaches include new genomic technologies, computational and data science, advanced bioimaging, and new sensing technologies. This research creates a foundation for targeted manipulations of growth rates, biomass accumulation, resistance to stresses, and the accumulation of desired feedstocks for biofuels and bioproducts in fundamental biology to bioprocessing and bioengineering to address DOE mission needs. **Materials.** The National Laboratories are creating a new generation of materials (including biological and bio-inspired materials) to underpin advances in energy generation, storage, transmission, efficiency, and security. Creating such materials requires a level of comprehension of the relationships between structure and function, and across many spatial and time scales, which is not yet fully supported by our understanding of the physical world. The National Laboratories have the expertise and unique facilities to be world leaders in this endeavor.

OPERATING UNIQUE SCIENTIFIC FACILITIES

The scientific facilities at the National Laboratories are operated as a resource for the broader national research community. Many are designated as "national user facilities" and made available at no charge to researchers doing nonproprietary work. In 2019, these facilities served about 40,000 users from academia, industry, and government laboratories, including users from all fifty states and the District of Columbia. Thus, much of the funding provided to the National Laboratories for the operation of these facilities supports research conducted by users who are not DOE or National Laboratory employees, the majority from universities.

The capabilities across the National Laboratory system include advanced light sources, neutron sources, particle accelerators, supercomputers, high-power laser systems, biological characterization tools, high-resolution electron microscopy and imaging techniques, nanoscience laboratories, and test beds for new carbon-free energy concepts, additive manufacturing, energy storage, and energy efficiency in buildings.

These capabilities are housed in highly specialized facilities and run by highly trained technical staffs. Supporting both open scientific research and classified work, they continually advance the state-of-the-art, including through incorporation of artificial intelligence and machine learning techniques. No companies or universities in the United States or abroad have the resources to design, construct, and operate facilities on this scale or to maintain the large, scientifically diverse research staff needed to support them.

SERVING THE NATIONAL INTEREST

While most of their work is supported by DOE, the National Laboratories represent a national resource for the entire federal government. Their roles in ensuring the safety, security, and reliability of the U.S. nuclear arsenal have provided them with unique capabilities for protecting the nation against high-consequence threats through the effective use of science, technology, and systems solutions. As a result, the National Laboratories have wellestablished roles in providing R&D support to agencies such as the Department of Homeland Security, the Department of Defense, and the Intelligence Community. The National Laboratories also work with the State Department and the International Atomic Energy Agency on nonproliferation, civilian nuclear power R&D, nuclear waste recycling, and scientific diplomacy.

The National Laboratories also bring their resources to bear on other problems of national importance. Their nuclear capabilities and infrastructure support the deep space missions of the National Aeronautics and Space Administration (NASA). Their expertise in developing and operating leading-edge computational resources has also helped support other federal agencies, including the National Science Foundation, the National Oceanic and Atmospheric Administration, and other agencies. Capabilities developed to support DOE's missions in bioenergy, climate, and the environment are applied to the needs of NASA, the National Institutes of Health, the U.S. Environmental Protection Agency, and the Food and Drug Administration. In each case, the federal agency leveraged the National Laboratories' unique expertise and capabilities rather than duplicating them at great expense.

Finally, the National Laboratories constitute a readily available technical response capability. Many of the agencies listed above have called upon the National Laboratories during national and international emergencies, such that DOE scientists and engineers played key roles in responding to the terrorist attacks on 9/11/2001, the 2009 Christmas Day airline bomb attempt, the BP Deepwater Horizon oil spill in 2010, and the nuclear accident at Fukushima in 2011. More recently, the 17 National Laboratories came together to form the National Virtual Biotechnology Laboratory in 2020, leveraging their deep expertise to address the challenges of the COVID-19 pandemic in areas such as supply chain shortages, the modeling of disease spread and community response, development of new testing protocols, and identification of potential drug candidates. In each of the events outlined above, when the U.S. Government needed immediate impartial technical advice, it turned to the National Laboratories, and these labs responded with technical staff on the ground within 24 hours. State and local governments also rely on National Laboratory scientists for technical advice, for example, to inform regulatory policies.

MOVING INNOVATION TO THE MARKETPLACE

The National Laboratories deploy capabilities, experts, and intellectual assets to companies, entrepreneurs, and other organizations through their Technology Transfer (T2) missions, helping overcome complex technical challenges, create cutting-edge products and services, achieve greater national security, increase our U.S. global competitiveness, and create cleaner environments to live in. T2 mechanisms include user facility agreements, the licensing of intellectual property (IP), Cooperative R&D Agreements, Strategic Partnerships Projects, and Agreements to Commercialize Technology.

These mechanisms enable the National Laboratories to build on their history of successfully working with industry to transfer technology to the marketplace. In addition to winning 38 of this year's annual R&D 100 awards from *R&D Magazine*, in 2020, the National Laboratories won 8 of the 14 awards for excellence in technology transfer presented by the Federal Laboratory Consortium for Technology Transfer.

The National Laboratories also foster economic development at local, state, and regional levels. Activities include development of science and technology parks, venture capital and assistance networks, entrepreneurial leave programs, technical assistance programs, and participation in economic development organizations.

The innovative spirit and entrepreneurial enthusiasm within the National Laboratories is further evidenced by the large number of patents and licensing agreements that they execute each year. National Laboratory scientists

PART II: Stewardship and Management

The National Laboratories are stewarded by the U.S. Department of Energy on behalf of the nation. The underlying stewardship model, which dates to the Manhattan Project (and hence predates the DOE) has proven to be remarkably adaptable. One scholar cites this stewardship model as one of the contributing factors to the National Laboratories' ability to adapt over time to meet changing national needs, specifically with respect to their post-Cold War transition.⁷

IMPORTANCE OF THE GOVERNMENT-OWNED, CONTRACTOR-OPERATED MODEL

To put today's stewardship (and associated management) model in context, it is helpful to recall the early days of the Manhattan Project. Faced with the national imperative to develop an atomic bomb, the U.S. Government turned to academia and industry to quickly identify and organize the necessary scientific and engineering talent. Facilities were established at several locations, some near universities (to and engineers work closely with industry to ensure that these technology breakthroughs are commercialized. Over the decades, the laboratories have spun out thousands of technologies and hundreds of companies that have enhanced U.S. economic competitiveness and created high-quality jobs. Through partnerships with industry and knowledge sharing, the National Laboratories also enable and contribute to the creation and advancement of such industries as nuclear energy, semiconductors, medical imaging, and solar energy.

In summary, the National Laboratories are invaluable intellectual assets. They have repeatedly demonstrated the ability to anticipate national needs and have delivered high-quality solutions over more than seven decades. Collectively, the National Laboratories:

- Solve important problems in fundamental science, energy, and national security;
- Steward vital scientific and engineering capabilities that are essential to our nation's continued science and technology primacy in a rapidly changing world;
- Design, build, and operate unique scientific instrumentation and facilities that serve tens of thousands of scientists and engineers from academia and industry as they collaborate on solutions to pressing and complex problems; and
- Promote innovation that advances U.S. economic competitiveness and contributes to our future prosperity.

leverage talent) and others remote (for security purposes). Although the government originally intended to disband these efforts at the end of the war, it soon realized that the talent and resources it had amassed should be maintained in service of the nation. In the ensuing years, the number of National Laboratories increased, and it was necessary to put in place a more formal management structure. Over time, these facilities became Federally Funded R&D Centers (FFRDCs). They were owned by the government but managed by private contractors (typically academic, industrial, and/or not-for-profit entities).

This government-owned, contractor-operated (GOCO) management model affords maximum flexibility in the management and operation of the National Laboratories. It has held up remarkably well over time, as borne out by numerous studies.⁸ In particular, the widely acclaimed quality of the National Laboratories' science and technology is often attributed to the GOCO model. Sixteen of the seventeen DOE National Laboratories are government-owned and contractor-operated.⁹ In this model, the government competitively awards a management and operations (M&O) contract to the private sector entity, whether a university, not-for-profit research institute, for-profit company, or some combination thereof. This approach allows the DOE to tap the best management talent in the country to operate the National Laboratories. Table 1 includes M&O contractors for each of the National Laboratories.

All sixteen of the GOCO National Laboratories have been designated as FFRDCs, as are many other entities, including Lincoln Labs, the Jet Propulsion Laboratory, and the Institute for Defense Analyses. FFRDCs maintain capabilities (staff, facilities, and equipment) deemed critical by the federal government and to which it wants assured access. The FFRDC designation codifies a special relationship between the entity and the federal government. In particular, it allows the government to utilize the expertise and resources of the FFRDC in a way that would be inappropriate for non-FFRDCs, including the sharing of information, joint planning, and directed work.

The GOCO model represents a partnership between the government and private sector. The private sector contractor is expected to bring best practices, especially in personnel and research management, to the National Laboratories. This model is most effective when DOE specifies the mission and high-level objectives (the "what") and grants the contractor freedom to determine the best means and methods to achieve them (the "how"). The DOE evaluates contractor performance annually; and superior performance is incented through a variety of mechanisms, including contract term extensions and contract extensions.

The GOCO model affords the government several benefits, including the flexibility needed to manage scientific institutions that must be able to recruit and retain world-class technical talent and adapt quickly to changing national research priorities and S&T advances. The consistent recognition of the National Laboratories as world-leading research institutions, with records of sustained scientific excellence and mission contributions, has often been attributed to these benefits. Similar observations about the quality of GOCO-managed FFRDCs outside of DOE (e.g., Lincoln Labs and the Jet Propulsion Lab) further strengthens the case for the GOCO model.

STEWARDING A WORLD-CLASS SCIENTIFIC AND ENGINEERING WORKFORCE

The National Laboratories collectively employ a worldclass workforce of approximately 70,000 people, about half of whom are scientists and engineers, including a large number of PhD researchers. This uniquely talented, scientifically oriented workforce is dedicated to the service of the nation. These dedicated people, along with the unique scientific facilities and instrumentation they maintain and use, comprise an unparalleled intellectual asset that has consistently delivered innovative solutions to address some of the most complex problems for the American people.

Private sector personnel practices, including competitive pay and benefits, allow contractors to recruit and retain the best talent from around the world. The researchers who make up this workforce would otherwise work in academia or industry, thus depriving the nation of the talent needed to address significant S&T challenges. The quality of this workforce is further enhanced through a culture of performance accountability for managers and workers alike. For example, private sector practices employed by contractors regarding succession planning, incentive compensation, recognition, and employee performance management are particularly effective in encouraging collaborative and innovative outcomes. Other important workforce management practices are also maintained and addressed including retention, professional growth, career development, and individual performance management. At the same time, contractors promote a culture of "academic freedom" at the National Laboratories. This culture results in intellectual independence and autonomy that helps ensure that the government obtains unbiased technical advice.

The benefit of this contractor model for workforce management is the agility to reshape and refresh the National Laboratory workforce quickly in response to changing national priorities and fluctuating budgets. For example, the National Laboratories can respond to new opportunities or project terminations with aggressive hiring and/or targeted selective reductions in force. Additionally, private sector personnel practices facilitate flexible workforce acquisition and management including practices such as hiring bonuses, temporary employment arrangements, and work practices to accommodate individual needs. These private sector practices are more complicated and onerous to implement in the civil service. In short, the GOCO model efficiently deploys the right resources against the right priorities at the right time.

LEVERAGING PRIVATE-SECTOR BEST PRACTICES TO BENEFIT THE GOVERNMENT

Contractors who operate National Laboratories for DOE are selected for both their technical expertise and management excellence. As a group, they bring intellectual independence and a high degree of interdisciplinary capability needed to address complex scientific and technical challenges. They also exercise initiative and ingenuity in carrying out their work and have substantial autonomy to apply best private-sector management and business practices in their operations. Moreover, by employing several different contractors, DOE benefits from a diversity of approaches and competition of ideas.

Contractors can bring innovation and best practices from the private sector to day-to-day laboratory operations with greater ease than could the government. Federal practices are designed to evolve slowly over time to accommodate a broad range of interests. In this respect, the private sector is much more agile and creative. The use of alternative financing to modernize facilities and infrastructure is one example where the private sector was able to accomplish an objective with which the federal sector has struggled. Moreover, it was able to do so more quickly and at lesser expense. As a result, modern infrastructure to support federal needs was delivered sooner and at lower cost to the federal government.

National Laboratory contractors use governance practices, contractor oversight, and contractor assurance programs to give DOE confidence that the focus is on mission accomplishment and that appropriate performance standards are maintained. Contractor governance practices include structures that provide clear lines of authority and accountability, access to external expertise, and internal corporate staff and leaders for additional resources. The National Laboratories have defined and implemented transparent contractor assurance programs that enable the government to track and understand laboratory performance. Collaboratively, the National Laboratories and DOE are able to identify notable practices and needed improvements and, in this spirit of continuous improvement, drive efficiency in oversight activities and reduce the need for DOE oversight.

DELIVERING COST-EFFECTIVE R&D TO THE U.S. TAXPAYER

The National Laboratories strive to maximize research productivity, providing a natural incentive for effective and efficient management and operations. Funds conserved through reduced operating costs and management improvement initiatives enable increased research productivity and mission impact through the conduct of additional programmatic work and/or investment in new capabilities, including new staff.

DOE encourages efficiency through its performance evaluation plans. Specifically, DOE challenges National Laboratory management to develop innovative, novel, and cost-effective approaches to operations. An idea demonstrated at one laboratory is then suggested to others, ensuring the promulgation and adoption of best practices throughout the complex. Examples include: integrated management systems; electronic security measures in lieu of a larger protective force; and the leveraging of the corporate parent's buying power through discounts and negotiated agreements (such as travel discounts and software agreements).

The cost of doing business varies across the seventeen National Laboratories. In general, the smaller, singleprogram laboratories are slightly less expensive due to their simpler structure. Indirect costs are also difficult to compare since each contractor has its own system tailored to the unique characteristics of the laboratory being managed. Despite this diversity in business practices, there are some common attributes. Typically, the costs of benefits, space, utilities, and management are among those added to a researcher's salary. For most of DOE's National Laboratories, the price paid for these support activities is approximately two to three times the cost of a researcher's base salary.¹⁰ (This factor of 2–3 is called the "labor multiplier," and it provides a basis for comparing fully burdened labor costs.)

Comparing the cost of doing business at the National Laboratories with non-DOE laboratories is challenging because of their notable differences. For example, the National Laboratories have major scientific facilities that exist nowhere else in the world and a mission that often requires high-hazard and/or high-security operations. Nevertheless, there are some parallels and conclusions that can be drawn. Consider first not-for-profit research institutes,¹¹ which have missions and cost-allocation structures that are similar to those of the DOE laboratories. An analysis shows that the labor multiplier averages 3.5, which is substantially higher than the 2.8 average of the National Laboratories. This benchmark comparison demonstrates that the National Laboratories are cost effective when equivalent missions are considered.

Comparing the National Laboratories to universities is more difficult, but a similar conclusion is reached. Universities often lower their costs by employing students (as part of their education and training) and subsidizing faculty research time (by covering many fixed costs at the institutional level). Universities also charge substantially more overhead to non-labor costs than a DOE National Laboratory does,12 lowering the university's burdened labor rate but shifting more overhead cost to nonlabor. Further, universities generally allocate their time

in percentages over a month, meaning that ancillary activities (which are charged to overhead at the National Laboratories) are effectively direct-charged to the sponsor. If all of this is normalized to the practices at a National Laboratory, one finds that the cost of performing research at a university does not differ that much from a National Laboratory's cost.

In short, DOE's National Laboratory contractors maximize the availability of funding for scientific programs through the use of effective cost management strategies for laboratory operations. The normalized benchmarks suggest that the cost for research performed at these world-class facilities is comparable to, and in some cases lower than, the cost at other major research institutions.

the public good and support the global community, the National Laboratories' expertise keeps our nation at the forefront of science and technology. Now, as our country and the planet—face the multiple challenges of producing clean energy and water, mitigating and adapting to climate change, ensuring security, and enhancing human health, the National Laboratories offer the expertise, facilities, and capabilities that can assist us in finding urgently required solutions and in creating the new scientific knowledge essential for a sustainable future.

Summary

As Vannevar Bush wrote in his 1945 report, *Science: The Endless Frontier,* "Scientific progress is one essential key to our security as a nation, to our better health, to more jobs, to a higher standard of living, and to our cultural progress."¹³ Bush's report led to the modern-day U.S. Department of Energy, whose National Laboratories have been changing and improving the lives of millions of people for nearly 75 years. National Laboratory discoveries have spawned industries, saved lives, generated new products, fired the imagination, and helped to reveal the secrets of the universe. Rooted in the need to serve the public good and support the global community, the National Laboratories' expertise keeps our nation at the forefront of science and technology. Now, as our country and the planet—face the multiple challenges of producing clean energy and water, mitigating and adapting to climate change, ensuring security, and enhancing human health, the National Laboratories offer the expertise, facilities, and capabilities that can assist us in finding urgently required solutions and in creating the new scientific knowledge essential for a sustainable future.

ENDNOTES

- 1 The present white paper borrows heavily from several previous National Laboratory Directors' Council (NLDC) documents, especially "The Future of the DOE National Laboratories" (2008, 2012) and "The Value of the DOE National Laboratory System" (2011). The paper also borrows from the NLDC document, "Future Science and Technology Opportunities" (May 2020).
- 2 The NLDC consists of the directors of all seventeen DOE National Labs.
- 3 See, for example, "75 Breakthroughs by America's National Laboratories," available at www. energy.gov/downloads/75-breakthroughs-americas-national-laboratories.
- 4 Peter J. Westwick, 2003, *The National Labs: Science in an American System, 1947–1974,* Harvard University Press, Cambridge, MA, p. 299.
- U.S. DOE, Aggregate Economic Return on Investment in the U.S. DOE Office of Energy Efficiency and Renewable Energy, https://www.energy.gov/sites/prod/files/2017/11/ f46/Aggregate%20ROI%20impact%20for%20EERE%20RD%20-%2010-31-17%20 %28002%29%20-%2011-17%20%28optimized%29.pdf, 2017.
- 6 National Research Council, National Laboratories and Universities: Building New Ways to Work Together–Report of a Workshop, National Academies Press, Washington, D.C., 2005.
- 7 Peter J. Westwick, 2003, *The National Labs: Science in an American System, 1947–1974,* Harvard University Press, Cambridge, MA, p. 299.
- 8 These studies, which date to the early 1990s, generally affirm the value and benefits of the GOCO model but have raised concerns about the faithfulness of its implementation.
- 9 The sole exception is the National Energy Technology Laboratory, which is both governmentowned and government-operated.
- 10 See "Overhead at the DOE National Laboratories," prepared by the National Laboratory Chief Financial Officers (2012), for a detailed discussion of laboratory overhead and cost comparisons; available at www.nationallabs.org.
- 11 Not-for-profit research institutes include Battelle Memorial Institute, Midwest Research Institute, Research Triangle Institute, Southern Research Institute, Southwest Research Institute, and SRI International.
- 12 Universities are required by OMB Circular A-21 to use a Modified Total Direct Cost (MTDC) overhead base, which allocates substantial amounts of overhead to non-labor-related costs.
- 13 Vannevar Bush, 1945, Science The Endless Frontier: A Report to the President, by V. Bush, Director of the Office of Scientific Research and Development, July. United States Government Printing Office, Washington; available at https://www.nsf.gov/od/lpa/nsf50/ vbush1945.htm#summary.

Congressional and Intergovernmental Activities Overview

DOE activities fall within the jurisdiction of several congressional authorization committees and appropriations subcommittees. The Department's primary authorizing committees are: Senate Energy and Natural Resources; Senate Armed Services; House Science and Technology; House Armed Services; and the House Energy and Commerce. Each year the Secretary, Deputy Secretary, Under Secretaries, Assistant Secretaries, and other senior Departmental officials interact with congressional committees, starting with briefings and hearings on the President's Budget Request for the Department, and continuing with program and oversight hearings. Senior officials also interact with individual congressional members, and key staff on committees of jurisdiction and from States affected by DOE activities.

Within the Department, the Assistant Secretary for Congressional and Intergovernmental Affairs (CI) manages overall relations with Members of Congress and supports the Secretary as the chief strategic advisor on all congressional interactions. CI's Congressional Services and Information Team advances Departmental officials' interactions with congressional committees by managing written testimony as well as managing responses in writing to questions for the record (QFRs), which become part of the official hearing record. In preparation for hearings, CI also works with the Office of Public Affairs (PA) to develop oral testimony given before committees that discuss the Administration's proposed policies, budget, and other priorities.

Cl also facilitates the confirmation process of all DOE Senate confirmed officials and notifies Congressional members and State officials of DOE announcements, initiatives, proposals, and grants which may affect their respective jurisdictions across the full range of DOE's energy, national security, environmental, and science and technology missions; and assures any appropriate follow-up is provided. Further, Cl works with Departmental programs to ensure the Department provides a timely response to written inquiries from Congressional members and State elected officials.

The National Nuclear Security Administration (NNSA), in coordination with CI, also provides congressional liaison services for its programs. The Chief Financial Officer (CF), in coordination with CI, leads the Department's communication and coordination with the Energy and Water Development Appropriations Subcommittees, and CI coordinates with CF when engaging other appropriations subcommittees on an as needed basis.

Cl also manages the Department's intergovernmental and external affairs relationships, including governors of the states and territories; sovereign tribal nations; locally elected officials; community organizations; trade associations; educational institutions; and stakeholder groups with interests in DOE activities. The Department has a physical presence in 30 states and many of these engagements focus on the 12 states where multiple ongoing DOE missions are executed. These efforts are also supported through a network of Program Office staff in Headquarters and field locations that maintain regular engagements with state and local elected officials; community organizations; and stakeholder groups with interests in DOE activities.

The following is a listing of the current congressional leadership, congressional committees of jurisdiction, and select intergovernmental organizations.

Congressional Leadership 116th Congress (2019-21)

Senate

- Republican Leadership
 - Majority Leader Mitch McConnell (KY)
 - Majority Whip John Thune (SD)
- Democratic Leadership
 - Minority Leader Chuck Schumer (NY)
 - Minority Whip Dick Durbin (IL)

House of Representatives

- Republican Leadership
 - Minority Leader Kevin McCarthy (CA)
 - Minority Whip Steve Scalise (LA)
- Democratic Leadership
 - Speaker Nancy Pelosi (CA)
 - Majority Leader Steny Hoyer (MD)
 - Majority Whip James Clyburn (SC)

Senate Congressional Committees of Jurisdiction

116th Congress (2019-20)

Appropriations

- Full Committee
 - Chairman: Richard Shelby (R-AL)
 - Ranking: Patrick Leahy (D-VT)
- Subcommittee: Energy & Water Development
 - Chairman: Lamar Alexander (R-TN)
 - Ranking: Dianne Feinstein (D-CA)

General Jurisdiction: Responsible for funding decisions and oversight of federal funds for all DOE programs, including NNSA.

Armed Services

- Full Committee
 - Chairman: Jim Inhofe (R-OK)
 - Ranking: Jack Reed (D-RI)
- Subcommittee: Strategic Forces
 - Chairman: Deb Fischer (R-NE)
 - Ranking: Martin Heinrich (D-NM)

General Jurisdiction: Authorizing of legislation and oversight of programs relating to nuclear weapons, nuclear non-proliferation, environmental management, and other defense or security related activities. DOE programs and offices include the National Nuclear Security Administration; Environmental Management; Legacy Management; Enterprise Assessments; and Environment, Health, Safety and Security.

Energy and Natural Resources

- Full Committee
 - Chairman: Lisa Murkowski (R-AK)
 - Ranking: Joe Manchin (D-WV)
- Subcommittee: Energy
 - Chairman: Bill Cassidy (R-LA)
 - Ranking: Martin Heinrich (D-NM)

General Jurisdiction: Authorizing of legislation and oversight of energy related research and development; DOE National Laboratories; government petroleum and fuel reserves; oil, gas and coal production and distribution; commercial nuclear and nuclear waste policy; energy emergency response; Federal energy conservation programs; climate change; energy development impacts on water resources; science; loan programs; and other national energy policy matters. Interest generally focuses on non-defense related matters, although jurisdiction may touch upon all matters under the purview of the Secretary of Energy.

Other subcommittees with jurisdiction include National Parks, and Water and Power.

Environment and Public Works

- Full Committee
 - Chairman: Ron Johnson (R-WI)
 - Ranking: Gary Peters (D-MI)
- Subcommittee: Investigations
 - Chairman: Rob Portman (R-OH)
 - Ranking: Tom Carper (D-DE)

General Jurisdiction: Oversight and investigation relating to all governmental agencies.

Other subcommittees with jurisdiction include Federal Spending Oversight and Emergency Management, and Regulatory Affairs and Federal Management.

Homeland Security and Governmental Affairs

- Full Committee
 - Chairman: Ron Johnson (R-WI)
 - Ranking: Gary Peters (D-MI)

• Subcommittee: Investigations

- Chairman: Rob Portman (R-OH)
- Ranking: Tom Carper (D-DE)

General Jurisdiction: Oversight and investigation relating to all governmental agencies.

Other subcommittees with jurisdiction include Federal Spending Oversight and Emergency Management, and Regulatory Affairs and Federal Management.

Other Senate Committees with DOE Interest

- Intelligence
- Foreign Relations
- Indian Affairs

House Congressional Committees of Jurisdiction

116th Congress (2019-20)

Appropriations

- Full Committee
 - Chairman: Nita Lowey (D-NY)
 - Ranking: Kay Granger (R-TX)
- Subcommittee: Energy & Water Development
 - Chairman: Marcy Kaptur (D-OH)
 - Ranking: Mike Simpson (R-ID)

General Jurisdiction: Responsible for funding decisions and oversight of federal funds for all DOE programs, including NNSA.

Armed Services

- Full Committee
 - Chairman: Adam Smith (D-WA)
 - Ranking: Mac Thornberry (R-TX)
- Subcommittee: Strategic Forces
 - Chairman: Jim Cooper (D-TN)
 - Ranking: Michael Turner (R-OH)

General Jurisdiction: Authorizing of legislation and oversight of programs relating to nuclear weapons, nuclear non-proliferation, environmental management, and other defense or security related activities. DOE programs and offices include the National Nuclear Security Administration; Environmental Management; Legacy Management; Enterprise Assessments; and Environment, Health, Safety and Security.

Energy and Commerce

- Full Committee
 - Chairman: Frank Pallone (D-NJ)
 - Ranking: Greg Walden (R-OR)
- Subcommittee: Energy
 - Chairman: Bobby Rush (D-IL)
 - Ranking: Fred Upton (R-MI)
- Subcommittee: Environment & Climate Change
 - Chairman: Paul Tonko (D-NY)
 - Ranking: John Shimkus (R-IL)
- Subcommittee: Oversight & Investigations
 - Chairman: Diana DeGette (D-CO)
 - Ranking: Brett Guthrie (R-KY)

General Jurisdiction: Authorizing of legislation and oversight of the general management of the Department of Energy and the activities of nondefense programs within the Department, national energy policy, conservation of energy resources, energy information generally, regulation of the domestic nuclear energy industry, and nuclear facilities.

Science, Space, and Technology

- Full Committee
 - Chairman: Eddie Bernice Johnson (D-TX)
 - Ranking: Frank Lucas(R-OK)
- Subcommittee: Investigations
 - Chairman: Lizzie Fletcher (D-TX)
 - Ranking: Randy Weber (R-TX)
- Subcommittee: Oversight
 - Chairman: Bill Foster (D-IL)
 - Ranking: Ralph Norman (R-SC)

General Jurisdiction: Authorizing of legislation and oversight of all energy research, development, and demonstration activities; DOE laboratories; commercial application of energy technologies; loan programs; and scientific issues related to environmental policy, including climate change. The Committee exercises expansive oversight jurisdiction. Other subcommittees with jurisdiction include Environment, and Research and Technology.

Oversight and Government Reform

- Full Committee
 - Chairman: Carolyn Maloney (D-NY)
 - Ranking: James Comer (R-KY)

General Jurisdiction: Oversight and investigation relating to all governmental agencies.

Natural Resources

- Full Committee
 - Chairman: Raul Grijalva (D-AZ)
 - Ranking: Rob Bishop (R-UT)
- Subcommittee: Energy & Mineral Resources
 - Chairman: Alan Lowenthal (D-CA)
 - Ranking: Paul Gosar (R-AZ)

General Jurisdiction: Authorizing of legislation and oversight of geothermal resources; conservation of U.S. uranium supply; rights of way over public lands for underground energy-related transportation; generation and marketing of electric power from federal water projects by power marketing authorities (PMAs); and Native American affairs.

Other subcommittees with jurisdiction include Water, Power &Oceans, and Oversight and Investigations.

Other Senate Committees with DOE Interest

- Intelligence
- Foreign Affairs
- Small Business

Intergovernmental Organizations

- "Big Seven"
 - National Governors Association (NGA)
 - U.S. Conference of Mayors (USCM)
 - National Conference of State Legislatures (NCSL)
 - Council of State Governments
 - National League of Cities (NLC)
 - National Association of Counties (NACo)

- International City/County Management Association
- Other Intergovernmental Organizations
 - Coalition of Northeastern Governors (CONEG)
 - Southern Governors Association
 - Western Governors Association (WGA)
 - National Congress of American Indians (NCAI)
- Energy Specific Intergovernmental Organizations
 - Energy Communities Alliance (ECA)
 - National Association of Regulatory Utility Commissioners (NARUC)
 - National Association of State Energy Officials (NASEO)
 - National Association of State Utility Consumer Advocates (NASUCA)
 - Southern States Energy Board (SSEB)

DOE Rulemaking

The Department of Energy (DOE) promulgates regulations essential to achieving its critical mission and to implementing major initiatives. Among other things, the Energy Policy and Conservation Act (EPCA) requires DOE to set appliance efficiency standards at levels that achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified for both consumer products and commercial equipment. These rulemakings are expected to save American consumers billions of dollars in energy costs. As demonstrated by the listing below, DOE has a demanding rulemaking schedule for the

appliance program. In addition, DOE has rulemaking proceedings that cover a wide range of additional subjects including: (1) Federal buildings; (2) health, safety and security; (3) procurement and financial assistance; (4) loan guarantees; (5) electricity transmission and the grid; (6) the environment; and (7) nuclear issues, such as ensuring the safe and secure operation of DOE nuclear facilities.

The listing below shows those rulemakings that are projected to have action taken by January 20, 2021, as well as those rules with projected action dates after January 20, 2021. All final actions that DOE has published since January, 2018, through October 1, 2020, are also included.

(through October 1, 2020)	ice January 1, 2018	
Name	Current Stage	Action Date
Inflation Adjustment of Civil Monetary Penalties	Final Rule	01/11/2018
Human Reliability Program (1992-AA44)	Final Rule	04/26/2018
Energy Conservation Standards for Ceiling Fan Light Kits (1904-AC87)	Final Rule	05/16/2018
Small-Scale Natural Gas Exports (1901-AB43)	Final Rule	07/25/2018
Test Procedures for Central Air Conditioners and Heat Pumps (1904-AD71)	Lifting of Administrative Stay	08/13/2018
Test Procedures for Integrated Light-Emitting Diode Lamps (1904-AD74)	Final Rule	09/21/2018
Eliminating End Use Reporting Provision in Authorizations for the Export of Liquefied Natural Gas	Policy Statement	12/19/2018
Nuclear Classification and Declassification (1992-AA49)	Final Rule	12/21/2018
Inflation Adjustment of Civil Monetary Penalties	Final Rule	12/26/2018
Energy Conservation Standards for Certain External Power Supplies (1904-AE23)	Final Rule	01/29/2019
Energy Conservation Standards for Residential Furnace Fans; Correction (1904-AC22)	Final Rule; Correcting Amendments	02/07/2019
Administrative Updates to Personnel References, Office of Electricity (1901-AB49)	Final Rule	02/21/2019
Test Procedures for Cooking Products and Test Procedures for Portable Air Conditioners (1904-AC71; 1904-AD22)	Final Rule; Correcting Amendments	02/21/2019
Energy Conservation Standards for Ceiling Fan Light Kits (1904-AC87)	Final Rule; Correcting Amendments	03/08/2019
SPR Standard Sales Provisions (1901-AB29)	Final Rule	03/12/2019
Cost Sharing: Energy Policy Act of 2005 (1991-AC13)	Final Rule	04/01/2019
Revisions to the DOE Contractor Employee Protection Program (1903-AA09)	Final Rule	08/02/2019
Inclusion of Early Stage Technology Demonstration in Authorized Technology Transfer Activities (1991-AC-14)	Final Rule; Technical Amendments	08/27/2019
Definition for General Service Lamps (1904-AE26)	Final Rule; Withdrawal of Final Rules Published on 01/19/17	09/05/2019
Revisions to the Office of Hearings and Appeals Procedural Regulations (1903- AA10)	Final Rule	10/30/2019

Department of Energy Rulemaking Documents Published Since January 1, 2018

(through October 1, 2020)		
Name	Current Stage	Action Date
Elemental Mercury Management and Storage Fees (1903-AA11)	Final Rule	12/23/2019
Energy Conservation Standards for General Service Incandescent Lamps (1904-AE76)	Final Rule	12/27/2019
Inflation Adjustment of Civil Monetary Penalties	Final Rule	01/08/2020
Energy Conservation Standards for Commercial Packaged Boilers (1904-AD01)	Final Rule	01/10/2020
Energy Conservation Standards for Air Compressors (1904-AC83)	Final Rule	01/10/2020
Energy Conservation Standards for Uninterruptible Power Supplies (1904-AD69)	Final Rule	01/10/2020
Energy Conservation Standards for Portable Air Conditioners (1904-AD02)	Final Rule	01/10/2020
Energy Conservation Standards (RINS 1904-AD01, 1904-AD02, 1904-AC83 and 1904-AD69)	Final Action; Implementation of Court Order	01/10/2020
Energy Conservation Standards for Uninterruptible Power Supplies; Correction (1904-AD69)	Final Rule; Correcting Amendments	01/21/2020
Administrative Updates to Personnel References (1901-AB50)	Final Rule	01/21/2020
Procedures for Use In New or Revised Energy Conservation Standards and Test Procedures for Consumer Products and Commercial/Industrial Equipment (1904-AD38)	Final Rule	02/14/2020
Critical Electric Infrastructure Information: New Administrative Procedures (1901-AB44)	Final Rule	03/16/2020
Test Procedures for Portable Air Conditioners; Correction (1904-AD22)	Final Rule; Correcting Amendments	03/16/2020
Materials Allocation and Priority Performance Under Contracts or Orders to Maximize Domestic Energy Supplies and Energy Priorities and Allocations System; Administrative Updates to Personnel References (1901-AB52)	Final Rule	05/27/2020
Financial Assistance Regulations-Deviation Authority (1991-AC15)	Final Rule	06/01/2020
Test Procedures for Cooking Products (1904-AE36)	Final Rule	08/18/2020
Procedures for Evaluating Statutory Factors for Use in New or Revised Energy Conservation Standards (1904-AE84)	Final Rule	08/19/2020
Extending Natural Gas Export Authorizations to Non-Free Trade Agreement Countries Through the Year 2050	Policy Statement	08/25/2020
Test Procedure for Fluorescent Lamp Ballasts (1904-AD67)	Final Rule	09/14/2020

Department of Energy Rulemakings with Action Expected after January 1, 2020 through January 20, 2021 (Based on Fall 2020 Government-wide Agenda of Federal Regulatory and De-Regulatory Actions)

Category	Name	Current Stage	Action Date
Energy Efficiency Appliance Rulemakings	Test Procedures for Traffic Signal Modules and Pedestrian Modules (1904-AC73)	RFI	11/00/2020
	Energy Conservation Standards for Residential Conventional Cooking Products (1904-AD15)	SNPRM	11/00/2020
	Energy Conservation Standards for Commercial Water Heating Equipment (1904-AD34)	SNPRM/ Proposed Determination	11/00/2020
	Test Procedure for Residential Clothes Dryers (1904-AD46)	Final Action	11/00/2020
	Energy Conservation Standards for Pool Heaters (1904-AD49)	NPRM/ Proposed Determination	11/00/2020

Department o (Based on Fal	of Energy Rulemakings with Action Expected after January 1, 2020 thr I 2020 Government-wide Agenda of Federal Regulatory and De-Regu	ough January 2 Ilatory Actions	2 0, 2021
Category	Name	Current Stage	Action Date
	Energy Conservation Standards for Fluorescent Lamp Ballast (1904-AD51)	Final Action	11/00/2020
	Test Procedures for Fluorescent Lamp Ballasts (1904-AD67)	Final Action	11/00/2020
	Test Procedures for Walk-In Coolers and Walk-In Freezers (1904-AD78)	RFI	11/00/2020
	Test Procedures for Walk-In Coolers and Walk-In Freezers (1904-AD78)	RFI	11/00/2020
	Energy Conservation Standards for Walk-In Coolers and Freezers (1904-AD79)	RFI	11/00/2020
	Test Procedures for Automatic Commercial Ice Makers (1904-AD81)	NPRM	11/00/2020
	Energy Conservation Standards for Commercial Refrigeration Equipment (1904-AD82)	RFI	11/00/2020
	Test Procedures for Commercial Refrigeration Equipment (1904-AD83)	RFI	11/00/2020
	Test Procedure for General Service Fluorescent Lamps, General Service Incandescent Lamps, and Incandescent Reflector Lamps (1904-AD85)	NPRM	11/00/2020
	Energy Conservation Standards for Commercial Unfired Hot Water Storage Tanks (1904-AD90)	ANPRM/ Proposed Determination	11/00/2020
	Test Procedures for Commercial Unitary Air Conditioning and Heating Equipment (1904-AD93)	NPRM/ Proposed Determination	11/00/2020
	Test Procedure for Dishwashers (1904-AD96)	NPRM/ Proposed Determination	11/00/2020
	Energy Conservation Standards for Consumer Clothes Washers (1904-AD98)	ANPRM/ Proposed Determination	11/00/2020
	Energy Conservation Standards for Consumer Clothes Dryers (1904-AD99)	ANPRM/ Proposed Determination	11/00/2020
	Energy Conservation Standards for Microwave Ovens (1904-AE00)	ANPRM/ Proposed Determination	11/00/2020
	Test Procedures for Microwave Ovens (1904-AE01)	Final Action	11/00/2020
	Test Procedures for Water Closets and Urinals (1904-AE03)	NPRM	11/00/2020
	Test Procedures for Furnace Fans (1904-AE15)	RFI	11/00/2020
	Test Procedure for Metal Halide Lamp Fixtures (1904-AE17)	NPRM	11/00/2020
	Test Procedure for Three-Phase Commercial Air-Cooled Air Conditioners and Heat Pumps Less Than 65,000 Btu/h (1904-AE06)	NPRM	11/00/2020
	Energy Conservation Standards for Water-Cooled and Evaporatively-Cooled Commercial Package Air Conditioners (1904-AE07)	ANPRM/ Proposed Determination	11/00/2020
	Test Procedures for Small Electric Motors and Other Electric Motors (1904-AE18)	Final Action	11/00/2020
	Test Procedures for Distribution Transformers (1904-AE19)	RFI#2	11/00/2020
	Test Procedure Interim Waiver Process (1904-AE24)	Final Action	11/00/2020
	Amendments to the Test Procedure Waiver Process for Consumer Products and Commercial and Industrial Equipment (1904-AE25)	NPRM	11/00/2020
	Test Procedures for Direct Heating Equipment (1904-AE30)	NPRM	11/00/2020
	Test Procedures for Direct Heating Equipment (1904-AE31)	ANPRM/ Proposed Determination	11/00/2020
	Energy Conservation Standards for Residential Dishwashers (1904-AE32)	RFI	11/00/2020

Department o (Based on Fal	of Energy Rulemakings with Action Expected after January 1, 2020 thre I 2020 Government-wide Agenda of Federal Regulatory and De-Regu	ough January 2 latory Actions	20, 2021)
Category	Name	Current Stage	Action Date
	Establishment of a New Product Class for Residential Dishwashers (1904-AE35)	Final Action	11/00/2020
	Test Procedures for Consumer Warm Air Furnaces (1904-AE37)	NPRM	11/00/2020
	Test Procedure and Labeling Requirements for Dedicated-Purpose Pool Pump Motors (1904-AE38)	NPRM	11/00/2020
	Energy Conservation Standards for Residential Furnaces and Commercial Water Heaters, Response to Petition for Rulemaking and Notice of Proposed Interpretive Rule (1904-AE39)	NPRM	11/00/2020
	Test Procedures for Variable Refrigerant Flow Multi-Split Air Conditioners and Heat Pumps (1904-AE43)	NPRM	11/00/2020
	Test Procedures for Computer Room Air Conditioners (1904-AE45)	NPRM	11/00/2020
	Test Procedures for Dedicated Outdoor Air Systems (1904-AE46)	NPRM	11/00/2020
	Energy Conservation Standards for Automatic Commercial Ice Makers (1904-AE47)	RFI	11/00/2020
	Energy Conservation Standards for Battery Chargers (1904-AE50)	RFI	11/00/2020
	Test Procedure for Ceiling Fan Light Kits (1904-AE51)	RFI	11/00/2020
	Energy Conservation Standards for Ceiling Fan Light Kits (1904-AE52)	RFI	11/00/2020
	Test Procedures for Commercial and Industrial Pumps (1904-AE53)	RFI; Early Assessment Review	11/00/2020
	Energy Conservation Standards for Commercial and Industrial Pumps (1904-AE54)	RFI; Early Assessment Review	11/00/2020
	Test Procedure for Dehumidifiers (1904-AE60)	RFI	11/00/2020
	Energy Conservation Standards for Dehumidifiers (1904-AE61)	RFI	11/00/2020
	Energy Conservation Standards for Furnace Fans (1904-AE64)	RFI	11/00/2020
	Energy Conservation Standards for Furnace Fans (1904-AE65)	RFI	11/00/2020
	Energy Conservation Standards for Packaged Terminal Air Conditioners/Heat Pumps (1904-AE66)	RFI	11/00/2020
	Test Procedures for Refrigerated Beverage Vending Machines (1904-AE67)	RFI	11/00/2020
	Energy Conservation Standards for Refrigerated Beverage Vending Machines (1904-AE73)	Response to Petition for Rulemaking	11/00/2020
	Test Procedures for Showerheads and Faucets (1904-AE75)	RFI	11/00/2020
	Response to Petition for Rulemaking: Test Procedure for Commercial and Industrial Fans (1904-AE88)	NPRM	11/00/2020
	Coverage Determination and Energy Conservation Standards for Commercial and Industrial Fans (1904-AE89)	Final Action	11/00/2020
	Certification and Compliance for Ceiling Fan Light Kits (1904-AE90)	NPRM	11/00/2020
	Test Procedures for Pool Heaters (1904-AE91)	RFI	11/00/2020
	Energy Conservation Standards for Ceiling Fans (1904-AE99)	RFI; Early Assessment Review	11/00/2020
	Energy Conservation Standards for Miscellaneous Residential Refrigeration (1904-AF00)	RFI; Early Assessment Review	11/00/2020
	Energy Conservation Standards for Certain Categories of Commercial Air Conditioning and Heating Equipment ASHRAE 90.1-2019 (1904-AF01)	NODA	11/00/2020
	Test Procedure for Walk-in Coolers and Walk-in Freezers (1904-AF02)	NPRM	11/00/2020

Department (Based on Fal	of Energy Rulemakings with Action Expected after January 1, 2020 through January 20, 2021 all 2020 Government-wide Agenda of Federal Regulatory and De-Regulatory Actions)		
Category	Name	Current Stage	Action Date
	Test Procedure for Portable Air Conditioners (1904-AF03)	RFI; Early Assessment Review	11/00/2020
	Test Procedure for Light Emitting Diode Lamps (1904-AF10)	RFI; Early Assessment Review	11/00/2020
	Energy Conservation Standards for General Service Lamps (1904-AD09)	SNPRM	12/00/2020
	Energy Conservation Standards for Consumer Refrigerators, Refrigerator-Freezers, and Freezers (1904-AD80)	ANPRM/ Proposed Determination	12/00/2020
	Test Procedure for Single-Package Vertical Air Conditioners and Heat Pumps (1904-AD94)	NPRM	12/00/2020
	Energy Conservation Standards for Variable Refrigerant Flow Multi-Split Air Conditioners and Heat Pumps (1904-AE42)	NPRM	12/00/2020
	Showerhead Definition Rule (1904-AE85)	Final Action	12/00/2020
	Product Class Rule for Short-Cycle Clothes Washers and Clothes Dryers (1904-AE86)	Final Action	12/00/2020
	Certification and Compliance of White Goods (1904-AD26)	NPRM	01/00/2021
	Test Procedure for Ceiling Fans (1904-AD88)	SNPRM/Final Action	01/00/2021
Other Energy Efficiency Rulemakings	Energy Efficiency Standards for New Federal Commercial and Multi-Family High- Rise Residential Buildings Baseline Standards Update (1904-AE44)	Final Action	11/00/2020
	Clarifying Amendments to the Error Correction Rule (1904-AE87)	NPRM	11/00/2020
	Energy Efficiency Standards for Manufactured Housing (1904-AC11)	Supplemental NPRM	12/00/2020
Health, Safety, and Security Rulemakings	Workplace Substance Abuse Programs at DOE Sites (1992-AA53)	NPRM	11/00/2020
	Nuclear Safety Management (1992-AA57)	Final Action	11/00/2020
	Title 10 Code of Federal Regulations Part 1017, Identification and Protection of Unclassified Controlled Nuclear Information (1992-AA58)	NPRM	12/00/2020
National Nuclear Security Administration	Assistance to Foreign Atomic Energy Activities: Civil Penalties (1994-AA05)	Final Action	12/00/2020
Other	Update of DOE's NEPA's Regulations: Natural Gas Categorical Exclusion (1990- AA49)	Final Action	11/00/2020
	Procedures for the Issuance of Guidance Documents (1990-AA50)	Final Action	11/00/2020
	Executive Order 13920 "Securing the United States Bulk-Power System" (1901-AB53)	NPRM	11/00/2020
	Financial Assistance Regulations-Deviation Authority (1991-AC15)	Final Action	11/00/2020
	Amendments to the Regulation Governing Testimony of Agency Employees and Production of Agency Records and Information (1990-AA47)	NPRM	12/00/2020
	Revisions to DOE's NEPA Regulations (1990-AA48)	NPRM	12/00/2020

Notes: (1) The term "NPRM" means Notice of Proposed Rulemaking; (2) The term "SNPRM" means Supplemental Notice of Proposed Rulemaking; (3) The term "ANPRM" means Advanced Notice of Proposed Rulemaking; (4) The term RFI means Request for Information; (5) The term "NODA' means Notice of Data Availability.

Rulemakings (Based on Fall,	with Action After January 20, 2021 2020 Government-wide Agenda of Federal Regulatory and De-Regulator	y Actions)	
Category	Name	Current Stage	Action Date
Energy Efficiency Appliance Rulemakings	Test Procedures for Dedicated-Purpose Pool Pumps (1904-AE96)	RFI; Early Assessment Review	01/00/2021
	Test Procedure for Compact Fluorescent Lamps (1904-AF07)	RFI; Early Assessment Review	01/00/2021
	Energy Conservation Standards for Small Electric Motors & Other Electric Motors (1904-AD29)	Final Action	02/00/2021
	Test Procedure for External Power Supplies (1904-AD86)	Final Action	02/00/2021
	Energy Conservation Standards for Consumer Water Heaters (1904-AD91)	ANPRM/ Proposed Determination	02/00/2021
	Energy Conservation Standards for Distribution Transformers (1904-AE12)	ANPRM/ Proposed Determination	02/00/2021
	Energy Conservation Standards for Consumer Boilers (1904-AE82)	RFI; Early Assessment Review	02/00/2021
	Test Procedures for Illuminated Exit Signs (1904-AC72)	NPRM	03/00/2021
	Test Procedures for Consumer Refrigerators, Refrigerator-Freezers, and Freezers (1904-AD84)	Final Action	03/00/2021
	Certification and Compliance for Various Heating and Cooling Consumer Products and Industrial Equipment (1904-AE10)	NPRM	03/00/2021
	Energy Conservation Standards for General Service Fluorescent Lamps and Incandescent Reflector Lamps (1904-AE40)	ANPRM	03/00/2021
	Test Procedures for Electric Motors (1904-AE62)	NPRM	03/00/2021
	Test Procedure for Certain Categories of General Service Lamps (1904-AF09)	RFI; Early Assessment Review	03/00/2021
	Test Procedures for Water-Source Commercial Heat Pumps (1904-AE05)	NPRM	04/00/2021
	Test Procedures for Commercial Pre-Rinse Spray Valves (1904-AE55)	NPRM	04/00/2021
	Enforcement Program for Consumer Products and Commercial and Industrial Equipment (1904-AE34)	Final Action	04/00/2021
	Energy Conservation Standards for Commercial Air-Cooled Unitary Air Conditioners and Heat Pumps, and Commercial Warm Air Furnaces (1904-AE59)	ANPRM/ Proposed Determination	04/00/2021
	Energy Conservation Standards for Five Exempt Lamp Types (1904-AE93)	NODA	04/00/2021
	Test Procedure for Commercial Water Heaters (1904-AF06)	RFI	04/00/2021
	Certification and Compliance for Water Products (1904-AE09)	NPRM	05/00/2021
	Test Procedure for Uninterruptible Power Supplies (1904-AF11)	RFI; Early Assessment Review	05/00/2021
	Test Procedure for Battery Chargers (1904-AE49)	NPRM	05/00/2021
	Test Procedures for Commercial Warm Air Furnaces (1904-AE57)	NPRM	05/00/2021
	Test Procedure for Consumer Water Heaters and Residential-Duty Commercial Water Heaters (1904-AE77)	NPRM	05/00/2021
	Test Procedure for Commercial Packaged Boilers (1904-AF05)	RFI; Early Assessment Review	05/00/2021

Rulemakings (Based on Fall,	with Action After January 20, 2021 2020 Government-wide Agenda of Federal Regulatory and De-Regulator	y Actions)	
Category	Name	Current Stage	Action Date
	Test Procedure for Air Compressors (1904-AF08)	RFI; Early Assessment Review	05/00/2021
	Energy Conservation Standards for Residential Non-Weatherized Gas Furnaces and Mobile Home Gas Furnaces (1904-AD20)	SNPRM	06/00/2021
	Test Procedure for Room Air Conditioners (1904-AD47)	Final Action	06/002021
	Test Procedure for Consumer Clothes Washers (1904-AD95)	NPRM	06/00/2021
	Certification and Compliance for Lighting and Electronics (1904-AE08)	NPRM	06/00/2021
	Energy Conservation Standards for Commercial Pre-Rinse Spray Valves (1904-AE56)	ANPRM	06/00/2021
	Energy Conservation Standards for Electric Motors (1904-AE63)	ANPRM	06/00/2021
	Test Procedure for Consumer Boilers (1904-AE83)	NPRM	06/00/2021
	Energy Conservation Standards for External Power Supplies (1904-AD87)	ANPRM	07/00/2021
	Test Procedures for Dedicated-Purpose Pool Pumps (1904-AE95)	RFI; Early Assessment Review	08/00/2021
	Energy Conservation Standards for Dedicated-Purpose Pool Pumps (1904-AE97)	RFI; Early Assessment Review	08/00/2021
	Energy Conservation Standards for Metal Halide Lamp Fixtures (1904-AD79)	Final Action	09/00/2021
	Energy Conservation Standards for General Service Fluorescent Lamps and Incandescent Reflector Lamps (1904-AE41)	ANPRM/ Proposed Determination	09/00/2021
	Energy Conservation Standards for Dedicated Outdoor Air Systems (1904-AD92)	NPRM	10/00/2021
	Energy Conservation Standards for Room Air Conditioners (1904-AD97)	ANPRM/ Proposed Determination	11/00/2021
	Energy Conservation Standards for Single Package Vertical Air Conditioners and Heat Pumps (1904-AE78)	ANPRM/ Proposed Determination	11/00/2021
	Energy Conservation Standards for Water-Sourced Commercial Heat Pumps (1904-AE74)	ANPRM	03/00/2022
	Energy Conservation Standards for Refrigerated Beverage Vending Machines (1904-AE68)	ANPRM/ Proposed Determination	04/00/2022
	Test Procedure for Televisions (1904-AD70)	NPRM	Undetermined
	Modifying the Energy Conservation Program to Implement a Market-Based Approach (1904-AE11)	Next Action Undetermined	Undetermined
Other	Assistance to Foreign Atomic Energy Activities (1904-AA04)	NPRM	02/00/2021
	Energy Savings Performance Contract Procedures and Methods (1904-AC49)	NPRM	02/00/2021
	Export of Previously Imported Liquefied Natural Gas (1901-AB51)	NPRM	03/00/2021
	Convention on Supplementary Compensation for Nuclear Damage Contingent Cost Allocation (1990-AA39)	SNPRM	09/00/2021
	Human Reliability Program (1992-AA44)	NPRM (Phase 2)	10/00/2021
	Safeguarding of Restricted Data and Formerly Restricted Data by Federal Employees and Contractors (1992-AA48)	NPRM	10/00/2021
	Procedures for the Export of Electricity (1901-AB35)	NPRM	10/00/2021

Rulemakings (Based on Fall,	with Action After January 20, 2021 2020 Government-wide Agenda of Federal Regulatory and De-Regulator	ry Actions)	
Category	Name	Current Stage	Action Date
	Procedures for Permitting Electricity Transmission Facilities at International Boundaries (1901-AB47)	NPRM	10/00/2021
	Energy Efficiency Standards for the Design and Construction of New Federal Low-Rise Residential Buildings (1904-AF04)	Final Action	10/00/2021
	Elemental Mercury Management and Storage Fees (1903-AA12)	NPRM	11/00/2021
	Rescission of Obsolete Property Management Regulations (1991-AB73)	Final Action	11/00/2021
	Chronic Beryllium Disease Prevention Program (1992-AA39)	Final Action	12/00/2021
	Workplace Substance Abuse Programs at DOE Sites (1992-AA53)	NPRM	Undetermined
	Procedures for Determining Eligibility for Access to Classified Matter or Special Nuclear Material (1992-AA59)	NPRM	Undetermined
	Fossil Fuel-Generated Energy Consumption Reduction for New Federal Buildings and Major Renovations of Federal Buildings (1904-AB96)	Next Action Undetermined	Undetermined
	Sustainable Design Standards for New Federal Buildings and Major Renovations (1904-AD62)	Next Action Undetermined	Undetermined

Notes: (1) The term "NPRM" means Notice of Proposed Rulemaking; (2) The term "SNPRM" means Supplemental Notice of Proposed Rulemaking; (3) The term "ANPRM" means Advanced Notice of Proposed Rulemaking; (4) The term "RFI" means Request for Information; (5) The term "NODA" means Notice of Data Availability.

Pending Litigation

The Office of General Counsel provides comprehensive legal services to the Secretary, Deputy Secretary, and all Departmental elements, representing the Department as counsel before Federal, State, and other governmental agencies and courts. The following provides a summary list of significant matters currently in litigation involving the Department that are likely to continue into the next Presidential term.

1. State of Washington Consent Decree Negotiations

In State of Washington v. Brouillette and U.S. Department of Energy (E.D. Wash.), the parties are engaged in mediation regarding a September 4, 2019, letter from DOE informing the State there is a "serious risk" that certain milestones in the amended consent decree may not be met. This case involves an ongoing 2010 consent decree governing the construction and initial operations of the Waste Treatment Plant ("WTP") at the Hanford Site and the retrieval of mixed waste from 19 single-shell storage tanks at the site, which was entered into to resolve a complaint by the State of Washington against DOE under the Resource Conservation and Recovery Act ("RCRA") related to missed milestones under the Tri-Party Agreement ("TPA") that more broadly governs environmental remediation at the Hanford Site.

2. Washington State Workers' Compensation Act Challenge

United States v. State of Washington (9th Cir) is a case in which we continue to work with the Department of Justice in challenging the constitutionality of a Washington State workers' compensation law that is targeted exclusively at Hanford, and which we assert violates the doctrine of intergovernmental immunity under the Supremacy Clause because it discriminates against the Federal Government and those with whom it deals, and directly regulates the Federal Government.

3. Piketon Litigation

A series of four putative class action lawsuits have been filed, principally against several current and former DOE contractors at the Portsmouth Site for alleged property damage and, in some cases, personal injury, due to purported contamination from radioactive and hazardous materials. The fourth case in this series of lawsuits adds claims against individuals, including two former DOE officials in their individual capacities.

4. Los Alamos Hazardous Waste Case

Nuclear Watch New Mexico v. U.S. Department of Energy & Los Alamos National Security, LLC (D.N.M.), is an action in which the plaintiff Nuclear Watch New Mexico filed a complaint under the citizen suit provisions of the Resource Conservation and Recovery Act ("RCRA"), alleging that DOE and Los Alamos National Security, LLC ("LANS"), the operator of Los Alamos National Laboratory have failed to comply with various deadlines required by a 2005 Compliance Order on Consent entered into with the New Mexico state regulator. The district court has granted the Government's motion to dismiss the plaintiff's claims seeking declaratory and injunctive relief, but denied the motion to dismiss as to those claims seeking monetary penalties for alleged past violations.

5. Spent Nuclear Fuel Litigation

In accordance with the Nuclear Waste Policy Act, the Department entered into more than 68 Standard Contracts with utilities in which, in return for payment of fees into the Nuclear Waste Fund, the Department agreed to begin disposal of Spent Nuclear Fuel (SNF) by January 31, 1998. Because the Department has no facility available to receive SNF under the NWPA, it has been unable to begin disposal of the utilities' SNF as required by the contracts. A significant amount of litigation claiming damages for partial breach of contract ensued, and continues, as a result of this delay.

6. USEC Pension Case

<u>United States Enrichment Corporation v. United</u> <u>States (Fed. Cl.). In this action, USEC filed a</u> complaint alleging breach of contract for the failure to reimburse pension and postretirement benefits costs that USEC incurred performing work for DOE in the amount of \$42,805,965 (\$35.7 M for pensions and \$7.1 M for PRBs).

7. General Service Incandescent Lamp (GSIL) and General Service Lamp (GSL) litigation

This case concerns the definitions of general service incandescent lamp (GSIL) and general service lamp (GSL) under the Energy Policy and Conservation Act (EPCA). Congress defined the terms in the statute and expressly excluded from their scope a number of specialty lighting applications and bulb shapes. On January 19, 2017, DOE issued two rules amending the definitions of these terms to expand the scope of lamps considered to be GSLs. On September 5, 2019, DOE published a withdrawal of the two 2017 regulations, which reverted the definitions of GSL and GSIL back to their statutory definitions, and in which DOE further explained that the 45 lumen-per-watt backstop has not been triggered. Lawsuits were filed challenging DOE's 2019 withdrawal rule. Those lawsuits are pending before the U.S. Court of Appeals for the Second Circuit.

8. Process Rule litigation

On February 14, 2020, DOE published a final rule in the Federal Register to modernize the so-called "Process Rule", the methodology and interpretations DOE applies in its administration of the Appliance Standards Program. The revised Process Rule was designed to increase transparency and consistency, with highlights including: setting a "significant energy savings" threshold, making the Process Rule provisions binding on DOE, establishing an early assessment process, and extending its scope to commercial equipment and test procedures. A number of state attorneys general and public interest groups filed Petitions for Review with the U.S. Court of Appeals for the Ninth Circuit on April 14, 2020, challenging the Process Rule final rule, and three industry trade associations subsequently filed a motion to intervene in support of the Department on May 14, 2020 (see Case No. 20-71068).

9. Boiler energy conservation standards litigation

On March 9 and 10, 2020, three parties filed suit in different Federal circuit courts of appeal challenging a final rule published by DOE on January 10, 2020, amending energy conservation standards applicable to commercial packaged boilers. The three suits were consolidated into one proceeding currently pending in the U.S. Court of Appeals for the D.C. Circuit. The challenges alleged both statutory issues, concerning the applicability of a statutory "clear and convincing evidence" standard to DOE's decision in this rulemaking, and record issues, alleging failings in DOE's analysis in support of the rule.





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Cybersecurity

The Department of Energy (DOE) has statutory, sector-specific, scientific, and national security missions that contribute to advancing our Nation's cybersecurity. DOE is responsible for its own enterprise cybersecurity as well as supporting the sector's efforts to strengthen cybersecurity.

Cyber Threat

Cyber threats to the energy sector are growing in number and sophistication. The Intelligence Community's 2019 Worldwide Threat Assessment stated: "China, Russia, Iran, and North Korea increasingly use cyber operations to threaten both minds and machines in an expanding number of ways-to steal information, to influence our citizens, or to disrupt critical infrastructure. China has the ability to launch cyber-attacks that cause localized, temporary disruptive effects on critical infrastructure—such as disruption of a natural gas pipeline for days to weeks—in the United States. Russia has the ability to execute cyber-attacks in the United States that generate localized, temporary disruptive effects on critical infrastructure—such as disrupting an electrical distribution network for at least a few hours-similar to those demonstrated in Ukraine in 2015 and 2016. Moscow is mapping our critical infrastructure with the long-term goal of being able to cause substantial damage."

In recognition of the emerging cyber threat from China, Russia, Iran and North Korea, and the increasing importance of cybersecurity for the energy sector, DOE created the Office of Cybersecurity, Energy Security and Emergency Response (CESER) in 2018. The creation of CESER fulfilled a dual purpose: to work with industry to increase cybersecurity protections across multiple energy subsectors and interdependent sectors of critical infrastructure, and to coordinate the cybersecurity mission among multiple stakeholders within the department. DOE's enterprise-wide approach to cybersecurity is guided by the 2018-2020 DOE Cyber Strategy and corresponding implementation plan. DOE is the only statutorilydefined sector-specific agency for cybersecurity and the Secretary has authority to issue an order to protect or restore the reliability of critical electric infrastructure or of defense critical electric infrastructure during an attack on the grid.

Energy Sector Cybersecurity

As the sector specific agency for the energy sector, CESER leverages deep technical expertise in its work with industry – which owns and operates 80 percent of the Nation's power infrastructure - to counter cyber threats to critical energy infrastructure. DOE also is an owner and operator of critical energy infrastructure and manages cyber threats that affect the transmission and marketing of Federal hydropower by our four Power Marketing Administrations. Additionally, CESER directly invests in collaborative cybersecurity research and development projects with industry, universities, and DOE's Labs to support energy systems cybersecurity for control systems and operational technology. CESER hosts and supports numerous cyber exercises involving multiple energy sector stakeholders, as well as several innovative assessment programs that evaluate cyber risk and maturity and test whole-of-Nation responses to cyber incidents.

Issue(s)

Cybersecurity Mission Growth

In August, CESER completed a new plan to strategically evolve the cybersecurity mission at DOE, to include building new capabilities to perform cyber discovery and pursuit functions; cyber threat intelligence sharing and situational awareness; cyber modeling and simulation; and fostering cyber protections for emerging technologies in energy sector systems. All of these functions will be undertaken in collaboration with the DOE Offices of Electricity, Chief Information Officer, and Intelligence and Counterintelligence, in support of DOE-operated utilities such as the Power Management Authorities, and in partnership with external stakeholders in industry and all levels of government.

New Cybersecurity Engagement with Industry

Pursuant to direction in Section 5726 of the FY2020 National Defense Authorization Act, CESER launched a 2-year pilot Securing Energy Infrastructure Executive Task Force (SEIETF) to partner with digital component manufacturers and asset owners to address cybersecurity in sector supply chains. The SEIETF convenes a broad set of stakeholders from across government, industry, academia, and the DOE Labs to: 1) evaluate technology and standards to isolate and defend critical industrial control systems (ICS) from cybersecurity vulnerabilities and exploits; 2) develop a national cyber-informed engineering strategy to isolate and defend critical ICS from cybersecurity vulnerabilities and exploits; and 3) identify new classes of security vulnerabilities of critical ICS.

Supply Chain Risk Management

CESER manages DOE's premier cyber vulnerability testing program for industrial control system (ICS) digital components: the Cyber Testing for Resilient ICS (CyTRICS) program. CyTRICS partners across stakeholders to identify high priority operational technology (OT) components, perform expert testing, share information about vulnerabilities in the digital supply chain, and inform improvements in component design and manufacturing. The program leverages best-in-class test facilities and analytic capabilities at four DOE Labs and strategic partnerships with key stakeholders including technology developers; manufacturers; asset owners and operators; and interagency partners.

Energy Sector Pathfinder Program

The Energy Sector Pathfinder is led by DOE and the Department of Homeland Security (DHS), and is supported by the Department of Defense (DoD) and FBI. The overall purpose of the Pathfinder is to coordinate among government and critical industry partners in the energy sector to pilot cybersecurity projects, collect best practices and lessons learned, and identify opportunities for scaling up findings.

Federal partners signed an MOU launching the program in February 2020. Pursuant to the MOU, the Pathfinder focuses on three core objectives: 1) Advance Threat-Information Sharing and Analysis; 2) Improve Energy Sector-Specific Knowledge Within the U.S. Government; and 3) Develop Joint Operational Preparedness and Response Procedures.

Cyber Threat Information Sharing

The energy sector has housed the premier cyber threat intelligence platform for over a decade. This program, known as the Cybersecurity Risk Information Sharing Program (CRISP), is a publicprivate partnership, co-funded by DOE and industry and managed by the Electricity Information Sharing and Analysis Center (E-ISAC). CRISP collaborates with energy sector partners to facilitate the timely bi-directional sharing of unclassified and classified threat information and to develop situational awareness tools that enhance the sector's ability to identify, prioritize, and coordinate the protection of critical infrastructure and key resources. CRISP leverages advanced sensors and threat analysis techniques developed by DOE along with DOE's expertise as part of the nation's Intelligence Community to better inform the energy sector of the high-level cyber risks. Current CRISP participants provide power to over 75 percent of the total number of continental U.S. electricity subsector customers.

Status

Cybersecurity Mission Growth

CESER's plan is reflected in DOE's FY2022 budget request. Internally, the implementation of new cybersecurity functions began ramping up at the beginning of FY2021. Cybersecurity will feature prominently in the new DOE Integrated Security Center (DISC) located in Denver. DISC will, among other functions, provide secure space for a team of cybersecurity analysts to develop and provide critical information to the sector and to coordinate with DOE's Office of Intelligence and Counterintelligence. Initial cybersecurity personnel are targeted for on boarding in Denver in the 3rd Quarter of FY2021.

New Cybersecurity Engagement with Industry

The SEIETF launched in October 2020 and is chartered as a three-tiered structure that includes senior technology policy leaders, senior technical leaders, and joint project teams comprised of technical experts. The SEIETF will deliver an interim report to Congress in mid-December and final progress report in Mid-June 2021, and is scheduled to complete the three deliverables noted above in June 2022.

Supply Chain Risk Management

CyTRICS completed proof-of-concept testing in 2018 and developed multi-Lab program processes in 2019. During FY2020, CESER began signing agreements with major manufacturers and asset owners to provide digital components for testing. CyTRICS will complete a full pilot test of program processes in the fall of 2020. Concurrent with pilot testing, CESER is gathering input from industry stakeholders on key CyTRICS processes including test operations, reporting formats, design requirements for the results repository, advanced analytics, and a coordinated vulnerability disclosure process. Through the program pilot and industry input, CESER will refine and finalize CyTRICS program processes and move to initial operating capability in early 2021.

CyTRICS cyber vulnerability testing will support testing needs under the Bulk Power Executive Order (E.O. 13920), as well as testing needs for other energy subsectors including oil and natural gas, renewables; and hydroelectrics. CyTRICS will leverage the new Securing Energy Infrastructure Executive Task Force for technical feedback on the program, and will brief findings to CESER's existing sector engagement forums to ensure transparency and coordination with industry partners.

Energy Sector Pathfinder Program

Initial work to identify and coordinate existing federal stakeholder cyber activities in the energy sector was completed in FY2020. Proposals for new pilot projects will be submitted for federal leadership consensus in the first quarter of FY2021, and will be subsequently presented to critical energy sector companies for participation. New pilots are anticipated to begin in the 3rd quarter of FY2021.

Cyber Threat Information Sharing

CRISP is extending its footprint of participants to include utilities that support Defense Critical Energy Infrastructure facilities. The "+ 30 Initiative" provides funding for critical electric sector companies to participate for a period of three years, working together with the E-ISAC and Pacific Northwest National Laboratory. Additionally, CRISP is launching pilot efforts in FY2021 to extend participation to select entities in the oil and natural gas sector, and to collect and integrate operational technology data into its current information technology data holdings.

Energy Sector All-Hazards Emergency Response

The Department of Energy (DOE) is the coordinating agency for Emergency Support Function (ESF) #12, under the National Response Framework, and the Sector Specific Agency (SSA) for the energy sector, pursuant to Presidential Policy Directive (PPD) 21, PPD 41, Executive Order 13636, and the FAST Act. Within DOE, these responsibilities are managed by the Infrastructure Security and Energy **Restoration (ISER) division of the Office** of Cybersecurity, Energy Security, and **Emergency Response (CESER), which** supports preparedness and response efforts in the energy sector across federal, state, local, territorial, and tribal governments, private industry, trade associations, and non-governmental organizations.

Summary

During an incident requiring a coordinated federal response, CESER activates the Energy Response Organization (ERO) to manage ESF #12 activities, including deployment of DOE ESF #12 responders and sector engagement. As the lead for ESF #12, CESER works with Energy Sector partners to:

Assess the impacts of a disaster on local and regional energy infrastructure.

Provide situational awareness updates to Federal, state, and private sector partners.

Facilitate legal and regulatory waivers to accelerate restoration of damaged energy systems.

Provide technical expertise on energy damage assessment, restoration, and logistical assistance.

To fulfill DOE's ESF #12 responsibilities, CESER trains and manages a cadre of volunteer ESF #12 responders, from DOE sites across the Nation. Upon activation of ESF #12 by the Federal Emergency Management Agency (FEMA) or at the request from a State, DOE deploys responders to the FEMA National Response Coordination Center, FEMA Regional Response Coordination Centers, and/ or FEMA Joint Field Offices and State Emergency Operations Centers. Each FEMA Region is represented by an ESF #12 Regional Coordinator, who maintains regular contact and supports planning efforts with regional and State counterparts. Additionally, a subset of ESF #12 responders are part of the ESF #12 Catastrophic Incident Response Team (CIRT) to respond to catastrophic incidents and remote locations. CIRT members are experienced responders, mainly from the Power Marketing Administrations, who can be deployed when DOE needs to provide indepth expertise to support damage assessments and restoration planning. For incidents that do not require a full coordinated Federal response, DOE supports and coordinates with industry as the sector-specific agency (SSA).

Energy Sector Cyber Incident Response Coordination

CESER also coordinates DOE's response to cyber incidents impacting or potentially impacting the Energy Sector. Per PPD 41 and the National Cyber Incident Response Plan (NCIRP), there are four key lines of effort during a coordinated federal cyber response:

Threat Response led by the Federal Bureau of Investigation (FBI)

Asset Response led by the Department of Homeland Security (DHS)

Intelligence Support led by the Office of the Director of National Intelligence (ODNI)

SSA Coordination

For an Energy Sector cyber incident that requires a coordinated response, CESER will activate the DOE Cyber Crisis Action Team (Cyber CAT), with support from the Office of Electricity (OE); Office of Intelligence and Counterintelligence (IN); and the Office of the Chief Information Officer (OCIO). The Cyber CAT also coordinates with the interagency partners, including a Unified Command Group
convened per PPD-41. CESER serves as DOE's representative to the Cyber Response Group.

Sector Specific Agency

As the SSA for the Energy Sector, DOE executes responsibilities through a system outlined in the National Infrastructure Protection Plan (NIPP), which facilitates interaction and cooperation between government and industry partners. Under the NIPP, each of the 16 critical infrastructure sectors has a Government Coordinating Council (GCC), consisting of government entities with responsibilities for the sector, and a Sector Coordinating Council (SCC)—a self-organized and self-governed group comprised of sector industry representatives and their designated trade associations. The Electricity Subsector Coordinating Council (ESCC) and Oil and Natural Gas Subsector Coordinating Council (ONGSCC) provide a mechanism for industrygovernment coordination during emergency response based on steady state relationships, joint response preparation activities, and critical infrastructure security and resilience coordination and planning.

DOE Emergency and Incident Management Council

The DOE Emergency and Incident Management Council (EIMC), serves as the principal forum for DOE senior leadership to provide strategic guidance and priorities for all-hazards incident coordination and unity of effort across DOE. The EIMC is chaired by the Deputy Secretary of Energy. Primary members of the EIMC include principals from each office in the DOE Emergency Management Enterprise, including components of the National Nuclear Security Administration. Advisory members of the EIMC are included as needed and are comprised of the relevant support offices.

DOE Primary Mission Essential Function #3

DOE is responsible for three Primary Mission Essential Functions (PMEFs) in support of the eight National Essential Functions (NEFs). DOE PMEF #3 is to "continuously monitor and manage the National Energy Infrastructure and execute incident management responsibilities under the National Response Framework, to include responding to energy infrastructure disruptions, to ensure rapid recovery of energy supplies." DOE PMEF #3 is supported by six DOE Mission Essential Functions (MEFs) managed by CESER, OE, the Office of Fossil Energy (FE), and the Energy Information Administration (EIA), in coordination with IN and other DOE offices, as well as interagency and industry partners, as appropriate. The Office of Electricity is the lead for PMEF#3.

In response to COVID-19, DOE PMEF #3 established a unified Incident Command Structure (ICS) to ensure coordinated actions across the supporting offices, and to ensure unity of effort during DOE incident response. Role in Executing the "Sector-Specific Agency" Responsibilities for Energy Infrastructure Protection and Coordination with Government and Industry

The U.S. Department of Energy (DOE) is designated as the sector specific agency (SSA) for strengthening and securing critical infrastructure against both physical and cyber threats in the energy sector under Presidential Policy Directive (PPD) 21. The Office of Cybersecurity, Energy Security, and Emergency Response (CESER) manages these responsibilities, building trusted partnerships with relevant Federal agencies, states and local governments, and the private sector.

Summary

Energy infrastructure serves as the backbone of the nation's economy, security, and health. Any disruption or destruction to these vital assets, systems, or networks can have a debilitating effect on national security. The U.S. Department of Energy (DOE) is designated as the sector-specific agency (SSA) for strengthening and securing the Energy Sector against both physical and cyber threats under <u>Presidential Policy Directive (PPD)</u> 21. The Office of Cybersecurity, Energy Security, and Emergency Response (CESER) manages these responsibilities, building trusted partnerships with relevant Federal agencies; states and local governments; and the private sector. By harmonizing collective defense, resilience, and response across industry and government, CESER advances a national unity of effort towards a secure, functioning, and resilient Energy Sector.

lssue(s)

The Energy Sector is comprised of geographically dispersed electricity, oil, and natural gas assets and the transmission infrastructure, pipelines, and other systems and networks that connect them. Without a stable energy supply, the Nation's collective health and welfare are threatened, and the U.S. economy cannot function. More than 80 percent of the country's energy infrastructure is owned by the private sector, supplying fuels to the transportation industry; electricity to households and businesses; and other sources of energy that are integral to growth and production across the nation. An integrated risk-management approach and close collaboration between multiple levels of government and the private sector will enable national security.

Background

In February 2013, President Obama signed <u>Presidential Policy Directive (PPD) 21</u>, outlining a national effort to strengthen and secure critical infrastructure against physical and cyber threats. Under PPD-21, DOE is designated as the SSA for the <u>Energy Sector</u> along with SSAs designated for each of the other <u>15 critical infrastructure</u> <u>sectors</u>. CESER implements the responsibilities which include serving as the Federal interface for the sector; identifying vulnerabilities and encouraging risk management; facilitating threat information sharing, potential protective measures, and promising practices; executing incident management; and providing sector-specific critical infrastructure information on an annual basis.

DOE and other SSAs execute their responsibilities through the <u>National Infrastructure Protection Plan</u> (<u>NIPP</u>), which facilitates interaction and cooperation between government and industry. Each of the 16 sectors has a Government Coordinating Council (GCC) and a Sector Coordinating Council (SCC) to collaborate across government and private sector owners and operators for critical infrastructure security and resilience coordination and planning, as well as a range of sector-specific activities and issues.

The CESER Assistant Secretary chairs the <u>Energy</u> <u>Government Coordinating Council (EGCC)</u>, and the Director of the U.S. Department of Homeland Security (DHS) Cybersecurity and Infrastructure Security Agency (CISA) serves as the co-chair. The EGCC includes representatives from several federal agencies; the Federal Power Marketing Administrations (PMAs); state energy and regulatory associations; and the Canadian government.

The Energy Sector has two subsector councils: the Electricity Subsector Coordinating Council (ESCC) and the Oil & Natural Gas Subsector Coordinating Council (ONG SCC), which each meet jointly with the EGCC two to three times per year at DOE. The SCCs inform and engage with CESER on energy and cyber security programs on a regular basis. The joint meetings occur under rules established by the Secretary of Homeland Security in 2006 for the Critical Infrastructure Partnership Advisory Council (CIPAC), which exempt them from the Federal Advisory Committee Act (FACA). The joint council meetings usually include a SECRET classified briefing. CESER manages the nomination and processing of clearances for energy sector owners and operators under the Private Sector Clearance Program.

Status

DOE and its sector partners are currently engaged in a number of initiatives designed to increase the resilience of the Nation's energy infrastructure. These initiatives include the following:

COVID-19 Recovery and Return-to-Work Guidance

In addition to coordinating response efforts, CESER engaged in drafting recovery and return-to-work guidance with the subsectors. The "Oil and Natural Gas Responsible Recovery Compendium" and the "ESCC Resource Guide – Assessing and Mitigating the Novel Coronavirus (COVID-19)" were updated as the COVID situation evolved and both have been lauded as a resource for other critical infrastructure sectors. DOE supported the DHS essential critical infrastructure workers (ECIW) guidance, as well, with letters to the Governors.

NDAA Section 5726 Securing Energy Infrastructure (SEI) Task Force

Three representatives from the ESCC were selected to participate on an executive task force that is based on the Section 5726 of the National Defense Authorization Act (NDAA) for Fiscal Year 2020 requirement that the Secretary of Energy establish a working group to advise a two year pilot program to identify new classes of security vulnerabilities and evaluate technology and standards to isolate and defend industrial control systems within energy infrastructure from security vulnerabilities and exploits.

Bulk Power System Executive Order (BPS EO) Task Force

Under the BPS EO, a Task Force on Federal Energy Infrastructure Procurement Policies will coordinate Federal Government procurement of energy infrastructure and the sharing of risk information and risk management practices. The new task force will be chaired by the Deputy Secretary of Energy and will consult with the energy industry through the ESCC and the ONG SCC to develop recommendations that it will pass on to the Federal Acquisition Regulation Council.

National Infrastructure Protection Plan (NIPP) Refresh

Two representatives from both the ESCC and the ONG SCC are engaged in the NIPP refresh, which will focus on removing obsolete information, refining existing language, and adding new information and policy references since publication.

Section 9 Data Call from DHS

In 2013, DOE contributed to the DHS-maintained list of critical infrastructure entities that meet the criteria specified by Section 9 of Executive Order (EO) 13636, *Improving Critical Infrastructure Cybersecurity*, where a "cybersecurity incident could reasonably result in catastrophic regional or national effects on public health or safety, economic security, or national security." DHS released a data call in August for SSAs to confirm the existing energy sector companies and propose new companies, if needed. DOE responded in October. The Section 9 list is used by DHS and other Federal agencies to provide the entities with threat intelligence and support.

ESCC Grid Security Emergency Working Group

Section 61003 of the FAST Act defined a "grid security emergency" and authorized the Secretary of Energy to order emergency measures following a Presidential declaration of a grid security emergency (GSE). A GSE could result from a physical attack, a cyber-attack, an electromagnetic pulse (EMP), or a geomagnetic storm event. The ESCC established a group to work with CESER in planning for and issuance of GSE orders.

ESCC Wildfire Coordination

The ESCC, CESER, and the Office of Electricity (OE) hosted a meeting on wildfires in May 2020 to discuss land management, technology and information sharing, and restoration and recovery.

ESCC Coordination with States

Representatives from the ESCC, the federal government, National Governors Association, National Association of State Energy Officials, and National Association of Regulatory Utility Commissions have formed a working group to discuss how the electric power sector, state officials, federal partners, and regulators can align resources and priorities, unify their message, and enhance overall awareness of incident management and resilience planning.

Major Decisions/Events

ESCC-EGCC Meetings in 2021

The ESCC is focused on Spring 2021 for the next Joint Meeting. The Deputy Secretary of Energy typically provides opening remarks. The agenda will be developed in the March timeframe and typically includes presentations from CESER, OE, DHS CISA, and the Federal Energy Regulatory Commission, along with updates from the ESCC co-chairs.

ONG SCC-EGCC Meeting

The ONG SCC is assessing dates in 2021 for three Joint Meetings with the EGCC in March, July, and October.

"Sector-Specific Agency" Responsibilities with State, Local, Tribal, and Territory Governments and Efforts to Advance Their Energy Security, Cybersecurity, and Emergency Response Capabilities

The Office of Cybersecurity, Energy Security and Emergency Response (CESER) engages daily at an operational, technical, and policy level with partners from across the energy and cybersecurity sectors, and state, local, tribal, and territory (SLTT) governments under the Sector Specific Agency (SSA) role codified by the 2013 Fixing America's Surface Transportation (FAST) Act and Presidential Policy Directive 21.

Summary

CESER engages daily at an operational, technical, and policy level to enhance cybersecurity with partners from across the Energy Sector, and state, local, tribal, and territory (SLTT) governments under the Sector Specific Agency (SSA) role under <u>Presidential Policy Directive (PPD) 21 and the</u> <u>FAST Act.</u> Through this engagement, CESER builds energy security capabilities, enables information sharing, and enhances cybersecurity knowledge at the SLTT level to sustain and improve the nation's energy security and resilience. These efforts and partnerships help to advance a national unity of effort that will strengthen and maintain a secure, functioning, and resilient Energy Sector.

SLTT governments play a critical role in energy security planning and emergency response. These governments have operational, tactical, and policy development roles and responsibilities that can have a wide-reaching impact beyond the Energy Sector. Supporting SLTT advancement results in a more secure and resilient Energy Sector that is able to better prevent, mitigate, withstand, respond, and recover from disruptions. CESER encourages energy security planning that is risk-based, operationallyfocused, and cross-jurisdictional, and seeks to build SLTT capacity to serve national security interests for cybersecurity, energy security, and emergency response.

CESER supports Governors and their energy advisors; state energy office directors and staff; public utility commissioners and staff; state legislators and their staff; emergency managers; and public power owners and operators through cooperative agreements with their representative groups-National Governor's Association (NGA), National Association of State Energy Officers (NASEO), National Association of Regulatory Utility Commissioners (NARUC), National Conference of State Legislature (NCSL), National Electrical Manufacturer's Association (NEMA), and American Public Power Association (APPA)—and also through direct engagement with state governments. CESER enhances SLTT preparedness and response efforts through a suite of analytical tools, training, workshops, and exercises. These resources and technical assistance advance SLTT energy security planning, risk awareness, policy and investment decisions, and mitigation strategies. CESER engages regularly with the SLTT associations through monthly calls, daily interactions on project activities, and participation in national/regional conferences, webinars, calls, and training workshops.

Issue(s)

SLTT energy officials face a myriad of challenges including limited resources, high staff turnover, tight budgets, and gaps in energy knowledge. Decisions regarding how to secure and invest in our Nation's energy infrastructure are often complex and cross jurisdictional. There is a need to maintain continual foundational energy education for new officials to build upon and to develop advanced resources for experienced officials to utilize. With threats to the energy sector increasing and evolving, it is imperative that SLTT officials stay well-informed and coordinate with DOE and other Energy Sector partners. To address these needs, CESER is actively creating resources and activities that are user friendly, tailorable, replicable, and scalable.

Background

CESER's work with states is informed and authorized by several directives and legislation. Presidential Policy Directive (PPD) 21 identifies CESER as the SSA for energy, as well as the lead agency for Emergency Support Function (ESF) #12. The National Security Presidential Directive 51 and Homeland Security Directive 20 provide guidance for State, local, territorial, and tribal governments in order to ensure a comprehensive and integrated national continuity program that will enhance the credibility of our national security posture and enable a more rapid and effective response to and recovery from a national emergency. Finally, Presidential Policy Directive 41 (PPD-41) sets forth principles governing the Federal Government's response to any cyber incident. Under the PPD-41 framework, the Department of Energy (DOE) works in collaboration with other agencies and private sector organizations, including the designated Federal lead agencies for coordinating the response to significant cyber incidents.

DOE executes its SSA responsibilities through a framework outlined in the <u>National Infrastructure</u> <u>Protection Plan</u> (NIPP), which facilitates governmentindustry cooperation. Under the NIPP, each of the 16 sectors has a Government Coordinating Council (GCC) and a Sector Coordinating Council (SCC). The Councils serve as the principal points of collaboration for critical infrastructure security and resilience coordination and planning. CESER oversees the <u>Energy Government Coordinating</u> <u>Council (EGCC)</u> which includes representatives from state energy and regulatory associations

Status

Below are a few examples of initiatives that CESER and its SLTT partners are currently engaged in to increase the resilience of the Nation's energy infrastructure.

COVID-19 Response and Recovery

CESER participated in multiple COVID-19 calls and webinars with Governors and their advisors; state legislators; state and local energy officials; and tribal leaders. CESER has also participated in NASEO's COVID-19 calls with State Energy Office officials since late March.

National Defense Authorization Act (NDAA) Section 5726 Securing Energy Infrastructure Task Force (SEITF)

The SEITF will convene stakeholders to:

- evaluate technology and standards to isolate and defend critical industrial control systems (ICS) from cybersecurity vulnerabilities and exploits;
- develop a national cyber-informed engineering strategy to isolate and defend critical ICS from cybersecurity vulnerabilities and exploits; and
- identify new classes of security vulnerabilities of critical ICS.

NDAA Section 5726 requires participation of a State or regional energy agency.

NARUC Task Force on Emergency Preparedness, Recovery, and Resiliency

In response to recent extreme weather and COVID-19, NARUC launched a Presidential Resilience Task Force focused on protecting the reliability of our vulnerable energy systems and creating a more resilient infrastructure to enable the nation to better respond to future large-scale and catastrophic events. Membership includes a diverse private and public sector group, including CESER's Deputy Assistant Secretary.

State and Regional Energy Risk Profiles

CESER developed risk profiles that examine the relative magnitude of risks at a regional and state level, highlighting energy infrastructure trends and impacts. The profiles present both natural and man-made hazards with the potential to disrupt electric, petroleum, and natural gas infrastructure. The profiles are used by states to inform decisions about investments, resilience, and hardening strategies and asset management. CESER, in collaboration with Argonne National Laboratory, is currently updating these profiles.

SLTT Online Energy Security Training

CESER is seeking to institutionalize the fundamentals of energy assurance planning through an online training platform. The platform will address a training gap for new and existing energy officials and allow supplemental exercises, workshops, and resources to address more advanced and dynamic issues in the energy sector. The nation's security and resilience posture will improve with an educated and knowledgeable cadre of state energy officials who are prepared to mitigate and respond to energy disruptions, regardless of the threat.

State Emergency Response Training

CESER, in partnership with our commercial training provider HAMMER, is expanding their federal Emergency Support Function (ESF-12) training to State ESF-12 responders for the first time in FY 2021. This integration will enhance Federal and State ESF-12 coordination and response capabilities to ensure Federal, Regional, and State preparedness for events affecting the energy systems.

In addition to these initiatives, CESER's SLTT Program is currently preparing a variety of other resources and activities—ranging from cybersecurity training to threat briefings and preparedness exercises—for FY 2021.

Major Decisions/Events

State Association Conferences

The state member associations—NASEO, NARUC and NGA—typically hold annual meetings in D.C. in February that include DOE leadership. While these events will likely be virtual in 2021, CESER anticipates invitations will be extended for participation in energy security-focused panels and keynotes. Other major conferences and regional events are held in the spring, summer, and fall in various locations.

Advanced Research on Integrated Energy Systems (ARIES)

ARIES is a research platform that addresses the fundamental challenges of integrated energy systems at scale including technologies of variable physical sizes, securely controlling large numbers of interconnected devices, and integrating diverse energy technologies.

Summary

Advanced Research on Integrated Energy Systems (ARIES) is a research platform at the National Renewable Energy Laboratory (NREL) that can match the complexity of the modern energy system and conduct integrated research to support the development of groundbreaking new energy technologies. ARIES represents a substantial scaleup in experimentation capability from existing research platforms, allowing for research at the 20-MW level. The scale of the platform is amplified by a virtual emulation environment powered by NREL's 8-petaflop supercomputer.

ARIES will make it possible to understand the impact and get the most value from the millions of new devices—such as electric vehicles, renewable generation, hydrogen, energy storage, and grid-interactive efficient buildings—that are being connected to the grid daily. The scale of the platform will also make it possible to consider opportunities and risks with the growing interdependencies between the power system and other infrastructure like natural gas, transportation, water, and telecommunications.

ARIES unites research capabilities at multiple scales and across sectors to create a platform for understanding the full impact of energy systems integration. ARIES addresses the risks and opportunities of widescale integration across five research areas: energy storage, power electronics, hybrid energy systems, future electric infrastructure, and cybersecurity.

Energy Storage

ARIES connects multiple individual energy storage applications with a system-level perspective. The coupling of at-scale storage technologies—such as batteries + thermal, or batteries + hydrogen will support essential steps toward validating energy system models and controls. As storage technologies graduate from the laboratory to the multi-megawatt level, ARIES will help systems stay ahead of performance and interfacing challenges associated with scaling.

Power Electronics

The continued growth in power electronics is creating a new paradigm in power system operation. ARIES helps address the fundamental differences between power electronic-based equipment and traditional devices and the limits that must be overcome to enable higher levels of renewable generation. By integrating new power electronic technologies and system architectures, ARIES will support a future grid with resilient and flexible operation.

Hybrid Energy Systems

With future energy systems expected to incorporate millions of distributed energy assets, the ARIES research platform is uniquely able to reproduce the diverse time scales, physical scales, and technologies of these hybrid energy systems. ARIES introduces a near-real-world environment with high-fidelity, physics-based, real-time models that facilitate the connection between hundreds of real hardware devices and tens of millions of simulated devices. This research area will advance the foundational science for real-time optimization and control of large-scale energy systems.

Future Energy Infrastructure

ARIES supports the innovation necessary for nextgeneration energy infrastructure solutions. The future energy infrastructure research area involves transmission and delivery networks on a variety of advanced fuel types and infrastructures, which undergird the power, transportation, buildings, and industrial sectors. ARIES will enable testing on grid designs that span from the level of microgrids up to high-voltage direct current transmission grids. Testing will also include management and control systems that optimally integrate power delivery for diverse fuel and technology types.

Cybersecurity

ARIES helps close the system-level security gaps that emerge from distinct hardware and software becoming integrated. The ARIES platform involves visualization, monitoring, and data processing for ARIES research assets and the connections between them. By creating a digital twin of clusters of research hardware, ARIES has the ability to simulate and detect attacks on communications and control systems that are still evolving, with an effect of reducing overall vulnerabilities in energy systems.

Issue(s)

The pace of innovation is occurring faster than the pace of grid modernization. Providing the energy industry with a place to conduct research and development on integrated energy systems at real-world scale and innovate new methods to monitor and control the growing number of diverse technologies that will interact with the grid is essential.

ARIES will enable the development of advanced energy solutions from generation, storage, and efficient, dynamic loads to serve as a foundation for the future bi-directional grid network, and their potential benefits are captured and valued. ARIES will provide data and results to simulate, validate, and enable integrative solutions for the transformational grid.

ARIES capabilities will support integration research that addresses the physical size and the growing number of interconnected devices as well as integration at the interface between the bulk and distribution power levels. ARIES will integrate emulation (e.g., representing dynamic building loads) with actual experimental hardware and use controllable grid interface equipment to inject faults and anomalies to test how equipment responds

Status

Building off seven years of successful research and development at the Energy System Integration Facility (ESIF), the Office of Energy Efficiency and Renewable Energy (EERE) is in the process of finalizing a research and development plan for ARIES based on feedback from a Request for Information (RFI) posted in February 2020. Secretary Dan Brouillette officially announced the opening of ARIES in August 2020, and NREL and EERE followed up on the announcement by holding an industry workshop in September 2020. More than 330 industry representatives participated in that workshop. Based on feedback from the kickoff meeting, NREL plans to hold a meeting specifically addressing energy storage.

Milestone(s)

- ARIES Request for Information: This was sent out to stakeholders for comment in February 2020.
- ARIES Kickoff: Secretary Brouillette announced the kickoff of ARIES in August 2020.
- ARIES Industry Workshop: Over 330 stakeholders attended the first ARIES industry workshop in September 2020.
- Finalizing an ARIES R&D plan: This is planned for completion in October 2020.

Background

ARIES is a new initiative that will leverage capabilities at NREL's Energy Systems Integration Facility (ESIF)¹, the Integrated Energy Systems at Scale (IESS) capabilities at the Flatirons Campus,² and a virtual emulation environment, matching those not physically existing as such but made by software to appear to do so. This will support hardware-in-the-loop (HIL) experimentation with up to millions of virtual power grid and cyber infrastructure devices.

ARIES aims to build on the capabilities at the ESIF by linking ESIF research assets to those at NREL's Flatirons Campus. Research at the ESIF can go up to 2 MW, which covers distribution-level testing.

¹ NREL's South Table Mountain Campus in Golden, Colorado, is home to the Energy Systems Integration Facility (ESIF). The ESIF is a state-of-the-art research facility which provides a unique contained and controlled platform on which partners and users can identify and resolve the technical, operational, and financial risks of integrating emerging energy technologies into today's environment.

² NREL's recently renamed Flatirons Campus is located near Boulder, Colorado. The campus is also home to the National Wind Technology Center (NWTC) that provides unique capabilities that support experiments, innovation and technology validation that advances U.S. leadership in wind technology.

NREL is developing its Flatirons Campus to allow for research at the 20 MW scale and beyond, representing the interface between the distribution and bulk-power levels.

Technologies to be investigated through partnerships between DOE, NREL, and industry will include storage technologies with new battery chemistries; innovative thermal storage systems such as phase-change materials; innovative electrolyzer and hydrogen storage technologies; extreme fast charging of multiple vehicles simultaneously; new medium voltage power electronics with wide band gap semiconductors; and a whole host of other emerging technologies that will need to be validated at-scale.

Using a 100 Gbps fiber optic link as its backbone, researchers can leverage capabilities at the Flatirons Campus and ESIF, including high-performance computing. This communications link will make it possible to explore breakthrough solutions for optimizing the integration of renewables, buildings, energy storage, and transportation—helping to modernize our energy systems and ensure a secure and resilient grid. A virtual emulation environment between the two campus sites will virtually connect with other research laboratories and industry to enable further leverage of research and capabilities. Network connectivity and fiber-optic connections will further enable data transfer from field experiments and provide data communications and dynamic closed-loop experimentation among the IESS component systems, ESIF, and other National Laboratories to enable experiments involving local and remote hardware, with machine-learning being an integral piece.

Appliance Standards

DOE continually strives to meet its legal obligations under the Appliance Standards Program, while ensuring that meaningful improvements are proposed and published through a robust public process.

Summary

DOE is authorized by the Energy Policy and Conservation Act (EPCA), as amended, to establish energy conservation standards that are both technologically feasible and economically justified for U.S. consumers. DOE has a statutory obligation to promulgate and enforce energy conservation standards and test procedures through a public rulemaking process. The Program is comprised of interrelated efforts:

- Development of test procedures that manufacturers must follow to measure a product's energy efficiency and/or energy use for purposes of assessing the product's eligibility for sale in the U.S. where standards are in place, and for making representations regarding the energy use of the product. Establishment of the national minimum energy efficiency requirements based on the prescribed test procedures which, by law, must result in a significant conservation of energy and be set at the maximum level of energy efficiency that is technically feasible and economically justified.
- Enforcement of the energy conservation standards, whereby DOE can assess civil penalties against manufacturers and private labelers that sold noncompliant products.¹
- Support for the Federal Trade Commission's (FTC's) EnergyGuide labeling program with test procedure calculations, which translates to transparent market information and consistency when manufacturers file ratings for each appliance with the FTC.
- Test procedure development and some testing and verification for the ENERGY STAR program, in coordination with EPA.

The elements of the Program also entail working with a broad range of stakeholders to successfully engage market players, including manufacturers, states, utilities, energy efficiency advocates, and others in each rulemaking. The rulemaking process provides opportunities for stakeholder review and comment, and the Program has established the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) as a means of facilitating stakeholder engagement by allowing for negotiated rulemakings under the guidelines set forth in the Federal Advisory Committee Act.

Issue(s)

Since 1989, in more than 60 rulemakings subject to statutory deadlines, the Department has issued the required rule on time as required by the statute only six times. During that same time period, the Department has had, on average, nearly 15 outstanding deadlines each year. Over the 32 years starting in 1989 through 2020, only four years had fewer than five outstanding deadlines, and three of those years were 1989-1991. In calendar year 2020, DOE is at about the annual average for outstanding deadlines.

DOE is subject to two kinds of statutory deadlines. The first are those in which Congress sets an initial standard in law and directs the Department to review that standard, usually three to five years after the statutory standard is enacted. Second, DOE is required by statute to consider whether to amend the existing standards for a given product at least once every six years. The EPCA also generally requires a three to five-year compliance lead time after DOE publishes a final rule setting a new standard under this six-year lookback requirement.

The standards rulemaking process requires that data be collected and analyzed to determine whether a new standard is justified and, if so, what that standard might be. Typically, there are no new data available until the market has adjusted to the previous rulemaking. Given the statutorily prescribed three to five-year lead-time period before compliance with a new standard is required, market adjustment to the previous standard generally does not happen until many years after issuance of the last rulemaking. The problem is that the data gathering and analysis required for DOE to consider whether new standards

¹ Enforcement information is located at <u>http://energy.gov/gc/enforcement</u>, including information about every case closed with a penalty or a finding of noncompliance as well as important resources for manufacturers and importers.

are justified, as well as the public participation requirements specified in EPCA for the promulgation of a rule that DOE has found are invaluable to the standards development process, simply cannot fit within a statutory timeframe for rulemaking that requires a decision to be made before the data are available. As a result, the Department struggles to meet statutory deadlines so long as the law requires that decision in six years or less, as historical precedent shows.

Nevertheless, DOE is conscious of the requirements and continually strives to responsibly undertake the required rulemakings, while ensuring that meaningful improvements are proposed and published through a robust public process. The Department dedicates substantial resources to this goal.

Status

While DOE has historically been hampered by the conflict between the statute and the data gathering and public process necessary to make decisions, DOE is striving to meet its legal obligations under the Appliance Standards Program and has made substantial progress to address missed deadlines. In fact, recently DOE's progress on energy conservation standards has accelerated:

- Since December 2018, DOE has completed 9 final rules pertaining to energy conservation standards, including standards for commercial air compressors, commercial packaged boilers, external power supplies, general service incandescent lamps, general service lamps, portable air conditioners, process improvement rule, procedures for evaluating statutory factors for use in new or revised energy conservation standard, and uninterruptible power supplies.
- Since December 2018, DOE has completed 2 final rules pertaining to energy conservation test procedures, including cooking tops and fluorescent lamp ballasts.
- Furthermore, DOE has ongoing efforts to meet energy conservation standards obligations for 50 additional products.

Milestone(s)

To address the timing problem (to the extent possible within the existing law), DOE issued a final rule that would streamline and modernize its process for setting energy efficiency standards and test procedures. The so-called "Process Rule" improves the internal framework used by DOE's Office of Energy Efficiency and Renewable Energy for establishing new energy efficiency regulations, with the goal of increasing transparency, accountability, and certainty for stakeholders. The Process Rule updates the agency's methodology for setting energy efficiency standards and test procedures for residential appliances and commercial equipment. Among other things, the changes include:

- Establishing a threshold for "significant" energy savings at 0.3 quads of site energy over 30 years or, if less than that amount, a 10 percent improvement over existing standards. Congress requires DOE to regulate only where doing so would save significant energy, but this term is not currently defined by Congress. DOE established the 0.3 guads threshold after conducting an analysis which found that over the last three decades, 60% of standards were projected to save 0.3 guads or more over 30 years, and those 60% of standards accounted for 96% of total energy savings. The other 40% of standards, projected to save less than 0.3 guads, accounted for just 4% of total energy savings. Establishing a threshold of significant energy savings at 0.3 guads or, if less than that amount, a 10 percent improvement will allow DOE to focus on standards projected to provide by far the largest return on investment for the American people.
- Requiring that DOE establish final test procedures 180 days before proposing a new energy conservation standard rulemaking. In public comments, stakeholders expressed concern when DOE regulates the efficiency of products before specifying how energy use will be measured via test procedure. This provision ensures that all parties involved in a standards rulemaking will know the engineering basis upon which the standards decision will be made.
- Clarifying that DOE will codify private sector consensus standards for test procedures, as described in the original Process Rule. When DOErecognized, consensus-based bodies comprised of industry, advocates, and other stakeholders reach consensus on a test procedure that meets statutory requirements, the Process Rule requires DOE to adopt that consensus procedure as the DOE test procedure. This change provides enhanced certainty to stakeholders and allows manufacturers to test their products at lower cost than when DOE takes time to create an agencyspecific testing metric.

Critical Minerals

Addressing challenges with critical mineral supply chains is essential to the energy, economic, and national security of the United States. DOE is engaged across the enterprise in R&D and international collaborations.

Summary

Critical materials are used in many products important to the U.S. economy and national security. The assured supply of critical materials and the resiliency of their supply chains are essential to the economic prosperity and national defense of the United States. Of the 35 mineral commodities identified as critical on the list¹ published in the Federal Register by the Secretary of the Interior, the United States lacks domestic production for 14,² and is more than 50% import-reliant for 31.³ This dependence puts supply chains and U.S. companies and material users at increased risk.

On December 20, 2017, President Donald J. Trump issued Executive Order (EO) 13817, A *Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals*, which identified actions to reduce our Nation's reliance on imports, preserve our leadership in technological innovation, support job creation, and improve national security and the balance of trade. The Department of Commerce was directed to submit a report on critical minerals to the President once the Department of the Interior had published a list of critical minerals. The Department of Commerce published this report on June 4, 2019. ⁴ On September 30, 2020, President Trump issued EO 13953 on Addressing the Threat to the Domestic Supply Chain from Reliance on Critical Minerals from Foreign Adversaries. This directed agencies to examine potential authorities and prepare agencyspecific plans to improve the mining, processing and manufacturing of critical minerals.

DOE is the agency authorized by Congress to work R&D around mining, processing, and manufacturing of critical minerals (as well as other minerals). When the United States Bureau of Mines was closed in 1996, Congress transferred to DOE the research on the extraction, processing, use, and disposal of mineral substances, and functions pertaining to mineral reclamation industries and the development of methods for the disposal, control, prevention, and reclamation of mineral waste products. See Pub. L. No. 104-134, 110 Stat. 1321-167 (1996).

The Department of Energy (DOE) is engaged in achieving the goals in the Executive Orders through a crosscut of our entire enterprise. DOE's strategy for addressing critical materials has three pillars: diversify supply, develop substitutes, and improve reuse and recycling. The Department was a key agency in the development of the Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals and serves as the co-chair of the National Science & Technology Council (NSTC) Critical Minerals Subcommittee. DOE has forged a strong working relationship with other agencies (Department of Defense, Department of the Interior, Department of Commerce, Department of State) as well as with Canada, Australia, the European Union, and Japan.

¹ Aluminum (bauxite), antimony, arsenic, barite, beryllium, bismuth, cesium, chromium, cobalt, fluorspar, gallium, germanium, graphite (natural), hafnium, helium, indium, lithium, magnesium, manganese, niobium, platinum group metals, potash, the rare earth elements group, rhenium, rubidium, scandium, strontium, tantalum, tellurium, tin, titanium, tungsten, uranium, vanadium, and zirconium

² U.S. Geological Survey, "Mineral Commodity Summaries 2018," 2018, https://doi.org/10.3133/70194932

³ U.S. Department of the Interior, "Final List of Critical Minerals 2018," 83 Fed. Reg. 23295; 2018, <u>https://www.federalregister.gov/</u> documents/2018/05/18/2018-10667/final-list-of-critical-minerals-2018

⁴ U.S. Department of Commerce. https://www.commerce.gov/news/reports/2019/06/federal-strategy-ensure-secure-and-reliablesupplies-critical-minerals

lssue(s)

The United States is more than 50% import-reliant on foreign sources for 31 of the 35 minerals deemed critical by the Department of the Interior. The United States not only lacks the mining for many of these materials, we also lack downstream domestic processing and manufacturing capabilities for critical materials like neodymium for magnets. Ores and other raw materials mined or produced in the United States have to be exported for further processing into more value-added products. This makes the United States vulnerable to supply disruption. Without investing in downstream supply chain activities like processing and manufacturing in parallel with increased domestic production, we simply shift the risk down the supply chain.

For example, rare earth elements are essential for the manufacturing of high strength magnets used in electric vehicle motors and offshore wind turbine generators. Lithium and cobalt are vital to the manufacturing of lithium-ion batteries used for electric vehicles and grid energy storage.

In order to develop a sustainable and robust supply chain here in the United States, we have to innovate to reduce the costs of the materials and reduce the environmental impacts of production. We also have to develop cost-effective substitutes and improve the recycling and reuse of critical materials.

Status

In support of Executive Order 13817, multiple DOE offices are addressing key parts of the critical minerals supply chain.⁵ For example, the Office of Fossil Energy (FE) is focused on diversifying supply, with the goal of producing market-ready rare earth elements from primarily coal resources. Research and development (R&D) includes resource characterization, extraction and separation, process and systems modeling and techno-economic analysis. For FY 2020, FE is soliciting pre-feasibility studies for the development of systems that can produce one to three tons per day of mixed rare earth oxides or rare earth salts (REOs/RESs). The FY 2020 solicitation builds on previously completed small-scale (bench-pilot) projects. The FY 2020 work focuses on researching processes for scale-up, optimization, and efficiency improvements for Rare Earth Elements (REEs) and critical materials recovery from coal refuse, acid mine drainage, and fly ash. FE has conducted 20 early stage R&D projects looking at transformational methods to identify, extract, recover and process critical minerals.⁶

The Office of Energy Efficiency and Renewable Energy also funds substantial R&D into critical minerals. In FY 2020, EERE has a variety of efforts related to critical minerals and rare earth elements: Critical Materials Institute (CMI); ReCell Lithium Battery Recycling R&D Center at Argonne National Laboratory; Lithium-Ion Battery Recycling Prize; Commercialization of Electric Vehicle Batteries; and recovering critical minerals from geothermal brines and seawater.

CMI is an Energy Innovation Hub, funded by the Advanced Manufacturing Office (AMO) and led by Ames Laboratory, that leverages decades of these DOE investments. CMI brings together facilities and complementary expertise located at 18 U.S. corporations, 13 universities, and four DOE national laboratories (Ames Laboratory, Idaho National Laboratory, Lawrence Livermore National Laboratory, and Oak Ridge National Laboratory).

CMI, with its partners, focuses on R&D towards DOE's three pillars: diversifying supply, developing substitutes, and recycling. CMI's efforts have largely been on rare earth elements (for magnets and lighting) and lithium. New efforts on cobalt, graphite, indium, and gallium are also underway. As of October 2020, CMI has issued 137 invention disclosures, received 19 patents, created three open-source software packages, and won four R&D awards.⁷ It has licensed 10 technologies to U.S. companies.

⁵ The Department of the Interior and Related Agencies Appropriations Act of 1996 generally supports DOE research and development activities related to extraction, separation, and processing technologies. When the United States Bureau of Mines (BoM) was closed in 1996, Congress transferred certain BoM functions to DOE including research of the extraction, processing, use and disposal of mineral substances, and functions pertaining to mineral reclamation industries and the development of methods for the disposal, control, prevention, and reclamation of mineral waste products. See Pub. L. No. 104-134, 110 Stat. 1321-167 (1996).

⁶ U.S. Department of Energy, National Energy Technology Laboratory, Office of Fossil Energy, "Feasibility of Recovering Rare Earth Elements", <u>https://www.netl.doe.gov/coal/rare-earth-elements</u>

⁷ Critical Materials Institute. (n.d.). About CMI. Retrieved October 19, 2020, from <u>https://www.ameslab.gov/cmi/about-critical-</u> materials-institute

In FY 2020, AMO released a \$30M Funding Opportunity Announcement for research and development that focuses on field validation and demonstration, as well as next-generation extraction, separation, and processing technologies for critical materials. Selections are expected in late 2020.

EERE's Vehicle Technologies Office (VTO) has established the ReCell Lithium Battery Recycling R&D Center at Argonne National Laboratory to develop innovative, efficient recycling technologies for current and future battery chemistries. ReCell funds R&D across four research areas: design for recycling; recovery of other materials; direct recycling or cathode-to-cathode recovery; and modeling and analysis (including reintroduction of recycled materials).

In January 2019, the Department (through EERE's VTO and AMO) announced the launch of a Lithium-Ion Battery Recycling Prize to incentivize American entrepreneurs to create cost-effective, disruptive solutions to collect, sort, store, and transport 90% of spent or discarded lithium-ion batteries for eventual recycling. Phase I winners have been announced with Phase II winners expected to be announced in November 2020.⁸

EERE's VTO is pursuing several R&D paths to mitigate the potential issues associated with the supply of cobalt including: (1) funding R&D to reduce cobalt content in the battery cathode to less than 5% by weight in the mid-term by increasing nickel content or substituting manganese, aluminum, or other earth abundant metals; and (2) funding high risk research completely eliminating the need for cobalt in the long term, such as lithium sulfur, solid state, and lithium metal battery technology.

Long-term investments by the Office of Science (SC) set the stage for applied R&D. Current Basic Energy Sciences critical materials research includes advancing the understanding of the role of rare earth materials and other critical materials in determining the properties of materials at length scales ranging from electronic interaction distances to atomic and microstructural scales. A key aspect of basic research in this field is identifying methodologies to reduce or replace rare earth elements in materials used in electronic and magnetic applications as well as alternatives to elements such as lithium and cobalt in batteries and platinum in catalytic reactions. In FY 2021, SC plans to increase R&D to advance the understanding of rare earth elements and other critical materials at atomic and microstructure scales; develop synthesis approaches and materials discovery; and research the chemistry of rare earth elements.

Milestone(s)

As a result of the report published by the Department of Commerce, A Federal Strategy to Ensure Secure and Reliable Supplies of Critical *Minerals,* the National Science & Technology Council (NSTC) Critical Minerals Subcommittee (CMS) requested DOE to take the lead for coordinating interagency activities to advance transformational research, development, and deployment across critical minerals supply chains, including development of an R&D roadmap to identify key needs. DOE also has a key role in other aspects of the Federal Strategy, including to increase international exchanges with partner nations; enable commodity specific mitigation strategies; and encourage the use of secondary and unconventional sources of critical materials. In EO 13953, DOE is responsible for:

- Within 30 days of the date of the order, developing and publishing guidance clarifying the extent to which projects that support domestic supply chains for minerals are eligible for loan guarantees pursuant to Title XVII of the Energy Policy Act of 2005, as amended; and funding awards and loans pursuant to the Advanced Technology Vehicles Manufacturing (ATVM) incentive program established by section 136 of the Energy Independence and Security Act of 2007, as amended.
- Within 30 days of the date of the order, reviewing its regulations (including any preambles thereto) interpreting Title XVII and the ATVM statute, including the regulations published at 81 Fed. Reg. 90,699 (Dec. 15, 2016) and 73 Fed. Reg. 66,721 (Nov. 12, 2008); and identifying all such regulations that may warrant revision or reconsideration in order to expand and protect the domestic supply chain for minerals (including the development of new supply chains and the

⁸ Battery Prize Rules and Scoring Criteria. (2020, March 25). "Important Dates". <u>https://americanmadechallenges.org/</u> <u>batteryrecycling/battery-recycling-prize-rules-and-scoring-criteria.pdf</u>

processing, remediation, and reuse of materials already in interstate commerce or otherwise available domestically).

- Within 90 days of the date of the order, proposing for notice and comment a rule or rules to revise or reconsider any such regulations for this purpose, as appropriate and consistent with applicable law.
- Examining available DOE authorities and identifying any such authorities that could be used to accelerate and encourage the development and reuse of historic coal waste areas, materials on historic mining sites, and abandoned mining sites for the recovery of critical minerals.

Energy Efficiency and Renewable Energy Staffing

The Office of Energy Efficiency and Renewable Energy (EERE) has prioritized hiring, with an effort to staff EERE to 675 Full-Time Equivalents. EERE recognizes qualified and sufficient staff is necessary to efficiently and effectively execute the mission.

Summary

EERE and DOE's Office of the Chief Human Capital Officer (HC) have developed a strategy to increase recruiting and hiring capabilities, allowing EERE to bring on new talent. Over the past three years, EERE's attrition rate (~10%) has outpaced the hiring rate, resulting in a reduced workforce, totaling 589 at the end of September 2020.

Concern around EERE's ability to efficiently execute increasing enacted budgets was also raised by Congress, leading to the following language being included in the FY 2020 appropriations report: "The Department is directed to report to the Committees on Appropriations of both Houses of Congress not later than 30 days after enactment of this Act with a plan for reaching a staffing level of 675 to 700 full-time equivalents (FTEs) by the end of fiscal year 2020".

As a result, EERE developed a staffing plan with the goal of reaching 675 FTEs. The plan identifies a full mapping of positions for each technology and operations office (e.g., Solar, Buildings, Vehicles, etc.), including a plan on how each position will be backfilled upon vacancy. The staffing plan accounts for a total of 715¹ positions, allowing EERE to manage to a minimum of 675 employees on board, at all times (accounting for attrition and time-tohire, and assuming 35 positions in some stage of the recruitment process at all times). This increase in positions will provide for a more balanced workload across staff and address employee concerns about overload.

Issue(s)

As with many government agencies, it is challenging for EERE to recruit and retain the best staff. The federal hiring process is extensive with more than 100 steps. The average time-to-hire for EERE positions completed in FY 2020 was 158 days from the start of the HC process to the date an employee was on-boarded. The internal approval process for the position was in addition to that timeline.

HC has developed more than 100 standardized position descriptions (PDs) and created continuous open announcements to accelerate the hiring efforts for technical staff in scientific and engineering positions. EERE was one of the first offices within DOE to make use of the governmentwide STEM direct hiring authority.

EERE's staffing plan was recently approved, providing a plan for a total of 715² positions across EERE. The plan identifies a full mapping of positions for each technology and operations office, including a plan on how each position will be backfilled upon vacancy. The approval of this plan significantly streamlines the internal approval timeline, as backfill plans for any new vacancies have already been identified and approved. The final approved staffing plan balances grade distribution, supports career pathways and succession planning, and builds technical and project management capacity while ensuring an appropriate level of operational expertise across a variety of disciplines.

Status

EERE leadership is committed to ensuring sufficient staff to execute the mission and is actively working with HC to ensure that program offices are fully staffed. In FY 2020, the office on-boarded 82 new employees, and ended the fiscal year with an onboard count of 589³ and an estimated FTE level of

¹ The plan includes a total of 648 EERE positions, 44 reimbursable NETL FTEs directly supporting EERE and 25 'Other' positions in Human Capital and General Counsel providing services to EERE.

² The plan includes a total of 648 EERE positions, 44 reimbursable NETL FTEs directly supporting EERE and 25 'Other' positions in Human Capital and General Counsel providing services to EERE.

³ OBC includes 38 FTEs at NETL, which EERE funds through a reimbursable agreement. A portion of the 40 FTEs are directly billed to

561⁴. Table 1 identifies the number of new hires per quarter and illustrates the significant increase in the rate of hiring and on-boarding of new staff as the year progressed.

New External Hires On-boarded – FY 2020						
Q1	Q2	Q3	Q4			
13	15	21	33			

Table 1. Number of new external hires on-boarded in FY 2020.

EERE currently has 127 positions in the recruitment process, and given the increased rate of hiring, the collaborative efforts of EERE and HC are estimated to reach an on-board count of 675 by third quarter, FY 2021. Table 2 provides a snapshot of the status of each technical office recruitment efforts, highlighting both the current staffing levels (on board count) and the approved staffing actions for the technical offices. NETL staff that directly support a technical office are shown as part of the office total.

Background

EERE's previous position target was established at 671, to support an FTE level of 625. The position target assumes EERE's historical attrition rate of 10% and a six to eight month estimation of time from a position becoming vacant to on-boarding a backfill for the position. In order to revise the plan in support of maintaining a 675 FTE level, additional positions were allocated with a greater emphasis on addressing workload concerns in the EERE technology offices.

To determine the office-by-office allocation, EERE reviewed the 2019 position targets, the new FY 2020 enacted budget and an assessment of skill gaps. Additionally, in order to account for operational and administrative functions, EERE aimed to maintain a ratio of appropriations to FTEs (\$K/FTE) based on the size of the office. For a larger office, the \$K/FTE range targeted was \$7-8.5M/FTE versus a range of \$5-7M/FTE for smaller offices.



Table 2. Number of current staff (or incumbents) and approved vacancies by (*technical) office.

EERE Operations (including the Golden Field Office) has an additional 308 positions, 56 of which are currently in the hiring process. The remaining 25 positions are for General Counsel and Human Capital FTEs who provide services to EERE.

Milestone(s)

There are no specific intermittent milestones to report.

Once the targets were established, each EERE office developed a detailed staffing plan to estimate staffing needs with a one to two year outlook. Each office was asked to identify the current grade and position series for each of their vacant positions, as well as the recruitment plan for each of their encumbered positions should they become vacant. These plans were consolidated into the EERE staffing plan which was reviewed and approved by HC, the Under Secretary of Energy, and the Secretary.

EERE payroll and the remainder are indirectly billed, and are not included in EERE's payroll codes. EERE provides PD funds directly to NETL to cover indirectly funded employees, travel, training and other related expenses, consistent with the reimbursable agreement. Final FTE count for FY 2020 will be calculated when final payroll has been processed. Value shown is an estimate, but final number should be within 1 or 2 FTEs.

Energy Storage Grand Challenge (ESGC)

The mission of the ESGC is to lead globally in energy storage innovation, manufacturing, and utilization.

Summary

The Department of Energy's (DOE) Energy Storage Grand Challenge (ESGC) is a comprehensive program to accelerate the development, commercialization, and utilization of nextgeneration energy storage technologies and build American global leadership in energy storage. Launched by Secretary Dan Brouillette in January 2020, the ESGC is a cross-cutting effort managed by DOE's Research Technology Investment Committee (RTIC), which is chaired by the Secretary. The RTIC established an Energy Storage Subcommittee to manage the ESGC, and that subcommittee is co-chaired by the Office of Energy Efficiency and Renewable Energy (EERE) and the Office of Electricity (OE). The effort involves 8 DOE offices [EERE, OE, Advanced Research Projects Agency-Energy (ARPA-E), Fossil Energy (FE), Nuclear Energy (NE), Loan Programs Office (LPO), Office of Technology Transitions (OTT), and Science (SC)] and has a Fiscal Year (FY) 2020 budget of \$345 million.

Issue(s)

International competition remains fierce in the race to dominate market share in a suite of energy storage technologies for a variety of applications. As the market for energy storage products and services grows domestically and worldwide, U.S. reliance on foreign supplies of raw materials, components, and finished manufactured products creates a national security concern. The key issue is how to plan and coordinate efforts across the Department—as well as with other Federal agencies, states, utilities, industry, and other stakeholders—to achieve the ESGC goal and strengthen U.S. national security and economic competitiveness.

Status

In July 2020, DOE published a Draft Roadmap to guide Departmental efforts on activities that can help achieve the 2030 ESGC mission. DOE is updating the Draft Roadmap based on responses from the public to a Request for Information (RFI), which closed on August 31, 2020. DOE is considering over 2,800 responses from the RFI as it makes edits and updates. DOE is also developing an Energy Storage Market and Cost Projections Report to inform ESGC strategy and assess progress toward ESGC goals. Both the final Roadmap and the market report are scheduled for release in Fall 2020. In September 2020, DOE released a lab call to select a lead ESGC Lab Coordinator. Supported by multiple DOE program offices, the Lab Coordinator will track and coordinate efforts across DOE's lab complex. A core team representing each of the five ESGC "tracks" (see Background) from offices across the Department meets weekly to coordinate ESGC actions.

Milestone(s)

January 2020

Secretary Brouillette announced the ESGC.

Spring 2020

DOE conducted a series of stakeholder outreach sessions.

July 2020

DOE released the Energy Storage Grand Challenge Draft Roadmap and Request for Information.

Fall 2020

DOE updates Draft Roadmap based on stakeholder input. DOE will release a final Roadmap, as well as an Energy Storage Market and Cost Projections Report.

Winter 2021

DOE offices will finalize and begin executing work plans consistent with Roadmap conclusions.

Continuous

DOE releases funding opportunity announcements and supports National Lab research and analysis to advance ESGC objectives. DOE provides updates to the RTIC and receives guidance.

Background

In FY 2017-2020, DOE invested approximately \$1.6 billion into energy storage research and development, an average of \$400 million per year. Nonetheless, the Department has never had a comprehensive strategy to address energy storage. After stakeholder consultations, DOE developed a Draft Roadmap that includes five tracks:

The Technology Development Track will align DOE's ongoing and future energy storage research and development (R&D) around user-centric use cases and long-term leadership.

The Manufacturing and Supply Chain Track will develop technologies, approaches, and strategies for U.S. manufacturing that support and strengthen U.S. leadership in innovation and continued at-scale manufacturing.

The Technology Transition Track will work to ensure that DOE's R&D transitions to domestic markets through field validation, demonstration projects, public private partnerships, bankable business model development, and the dissemination of high-quality market data.

The Policy and Valuation Track will provide data, tools, and analysis to support policy decisions and maximize the value of energy storage.

The Workforce Development Track will educate the workforce, who can then research, develop, design, manufacture, and operate energy storage systems.

A system of inter-related metrics across the tracks will be used to establish targets and continuously assess progress. Cost target ranges linked to potential market demand have been developed for each of six use cases. Use case-driven technical performance metrics will help guide R&D activities. Manufacturing metrics and targets link production cost and performance to meet emerging market demand, supporting a commercially competitive energy storage revolution in the U.S. These goals are encapsulated in a "50 by 30" goal: that by 2030, storage technologies should cost-effectively serve 50 percent of the target markets identified in the ESGC use cases.

Hydrogen Program

Hydrogen is part of a comprehensive energy portfolio that can enable energy security and resiliency and provide economic value and environmental benefits for diverse applications across multiple sectors. The DOE Hydrogen Program is addressing key challenges in core technical and institutional areas including cost, durability, reliability, and performance, hydrogen infrastructure, and other non-technical barriers such as codes, standards, and workforce development. EERE's Hydrogen and Fuel Cell Technologies Office (HFTO) coordinates Hydrogen Program activities across EERE, FE, NE, OE, SC, and ARPA-E.

Summary

Hydrogen, as a versatile energy carrier and chemical feedstock, offers advantages that unite all of our nation's energy resources—renewables, nuclear, and fossil fuels—and enables innovations in energy production, storage, end-uses, and integration across transportation, industry, and power generation sectors.



Figure 1. Conceptual H2@Scale energy system

The mission of the DOE Hydrogen Program is to research, develop, and validate transformational hydrogen and related technologies to enable adoption across multiple applications and sectors. H2@Scale,¹ a DOE initiative launched by HFTO in 2016, provides an overarching vision for how hydrogen can enable energy pathways across applications and sectors in an increasingly interconnected energy system. The H2@Scale concept, shown in Figure 1, is based on hydrogen's potential to meet existing and emerging market demands across multiple sectors. It envisions how innovations to produce, store, transport, and utilize hydrogen can help realize that potential and achieve scale to drive revenue opportunities and reduce costs. Hydrogen's versatility as both a chemical feedstock and an energy carrier can serve end-uses in various markets such as transportation applications (e.g., in heavy duty trucks and other vehicles; as a feedstock for synthetic fuels; and to upgrade petroleum and bio-fuels); industrial feedstock (e.g., in steel and cement manufacturing); heat in industrial systems and buildings; power generation (for large-scale power, off-grid distributed power, and back-up or emergency power); and energy storage.

Issue(s)

There are a wide range of applications where the use of hydrogen has the potential for significant future global demand. Industry has projected a potential \$2.5 trillion global market for hydrogen technologies by 2050,² and investments are ramping up in many countries (e.g. \$9 billion in Germany, \$7 billion in France, and similar plans in Korea, Japan, and more). To sustain U.S. leadership and widespread commercialization, hydrogen technologies must be competitive in terms of cost, performance and reliability. Hydrogen production as well as delivery/infrastructure and storage are required, and conversion technologies like fuel cells and turbines must be competitive and durable. More Research, Development, and Demonstration (RD&D) is also required in systems development and integration, such as integrating renewables into the grid through hydrogen energy storage. Nontechnical barriers need to be addressed, such as developing and harmonizing codes and standards; fostering best practices for safety; and developing

¹ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Hydrogen and Fuel Cell Technologies Office. 2020. "H2@Scale," https://www.energy.gov/eere/fuelcells/h2-scale.

² Hydrogen Council. November 2017. "Hydrogen Scaling Up. A Sustainable Pathway for the Global Energy Transition." <u>https://</u> hydrogencouncil.com/wp-content/uploads/2017/11/Hydrogen-scaling-up-Hydrogen-Council.pdf.

a robust supply chain and workforce. A strong, cohesive and well-coordinated effort that leverages activities across DOE offices and other agencies, as well as states and the private sector, is essential to move forward and address the emerging threats from foreign competition. This cohesive, cross-office effort through the Hydrogen Program—coordinated by HFTO and with strong engagement by FE, NE, OE, SC, and ARPA-E—should continue to be strengthened to address the key challenges.

Status

Today, approximately 10 million metric tons of hydrogen are produced in the U.S. each year, about 1/7th of the global supply, mostly from natural gas. Demand is primarily for ammonia production and oil refining; but analyses indicate the potential for 2 to 4x greater demand for hydrogen in various sectors, particularly for transportation, metals refining, and biofuels. The integration of hydrogen production technologies with utility-scale power generation plants is also a concept recently receiving increased interest, due to its potential to improve profitability of these plants while supporting grid resiliency.³

Annual shipments of fuel cells have increased 15fold since 2015, now at over 1 GW,⁴ and there are thousands of fuel cells across the U.S. for stationary backup power, vehicles, and niche markets such as forklifts at major company warehouses. Much of this progress was enabled by DOE. For example, HFTO funding has led to over 1,100 U.S.-issued patents, 30 commercial technologies⁵ in the market (ranging from components like catalysts and membranes to complete systems such as electrolyzers), and reduced transportation cost by 60% and quadrupled durability in the last 15 years.

Milestone(s)

The Program supports target-driven RD&D efforts that will provide the basis for the near-, mid-, and long-term production, delivery, storage, and use of hydrogen derived from diverse domestic energy sources supporting a wide variety of applications, with varying timeframes for commercial adoption. One of the mechanisms used is to fund consortia led by national labs with industry and university partners to address quantitative metrics, such as H2NEW and the Million Mile Fuel Cell Truck Consortium launched by HFTO. Key targets include the following: reduce the cost of heavy duty fuel cells by >2X to \$80/kW; improve durability by >5X to 25,000 hours by 2030; reduce the cost of electrolyzers by ~3 to 5X to \$300/kW to enable \$2/kg hydrogen cost; double energy density for onboard hydrogen storage to 1.7 kWh/l; and reduce the cost of hydrogen storage tank cost by > 40% to \$9/ kWh by 2030. Each office, such as FE and NE, have metrics related to their feedstocks, and depending on the end-use application, the goal is \$1/kg or \$2/ kg hydrogen production cost to be competitive with today's hydrogen from natural gas.

Background

The United States has been at the forefront of hydrogen and fuel cell R&D, from its inception in the space program, to enabling commercialization in transportation, stationary power, and portablepower applications. For the last 15 years, DOE has coordinated hydrogen and related efforts through the DOE Hydrogen Program as shown in Figure 2. HFTO coordinates activities among the DOE offices and meets monthly at a technical level to evaluate progress and strengthen activities. Each office focuses its RD&D activities on their respective energy sources, feedstocks, and target applications. All of these activities are coordinated to achieve a cohesive and strategically managed effort. As a recent example, EERE has been working closely with FE to define a matrix of roles and responsibilities, including, for example, EERE's focus on watersplitting, renewable integration, and distributedscale storage and utilization; and FE's focus on leveraging fossil resources for hydrogen production and on large-scale utilization, such as combustion.

³ A relevant example is a wind farm or nuclear power plant that produces hydrogen from surplus electricity (via electrolysis) and then either sells or uses the hydrogen for other purposes, or reconverts it to electricity (via a fuel cell or turbine) at times of higher demand.

⁴ E4 tech. December 2019. "The Fuel Cell Industry Review 2019.".

^{5 &}quot;Progress in Hydrogen and Fuel Cells". (2020 June). Retrieved from <u>https://www.energy.gov/sites/prod/files/2020/10/f79/hfto-progress-fact-sheet-june-2020-2.pdf</u>





HFTO has also served since 2018 as the elected Chair of the *International Partnership for Hydrogen and Fuel Cells in the Economy* (IPHE), which includes 20 countries and the European Commission. IPHE is one of the primary mechanisms through which the HFTO coordinates and collaborates with other new and emerging partnerships such as the *Clean Energy* and *Hydrogen Energy Ministerials*.

Authorizations for the Hydrogen Program in Energy Policy Act of 2005 cover multiple areas, including the following in Title VIII of the U.S. Code:

Sec. 805 (a) IN GENERAL.—The Secretary, in consultation with other Federal agencies and the private sector, shall conduct a research and development program on technologies relating to the production, purification, distribution, storage, and use of hydrogen energy, fuel cells, and related infrastructure.

(b) GOAL.—The goal of the program shall be to demonstrate and commercialize the use of hydrogen for transportation (in light duty vehicles and heavy-duty vehicles), utility, industrial, commercial, and residential applications. Plastic Innovation Challenge (PIC) and Proposed Energy Materials and Processing at Scale (EMAPS) Facility

DOE launched the Plastic Innovation Challenge (PIC) in 2019 with the goal to develop new technology to allow plastics to be upcycled into higher value products and to be more economically recycled by design. This effort has the potential to deliver both energy savings and environmental benefits.

DOE has proposed a new Energy Materials and Processing at Scale (EMAPS) Facility at the National Renewable Energy Laboratory (NREL) which will integrate and grow our ability to address the scaleup of new materials, including those being developed through the PIC.

Summary

The U.S. is faced with a challenge: can we overcome the vast challenges related to plastic waste, and can we make domestic processing of plastic waste economically attractive and energy efficient? Can we reimagine the overall approach to plastics production and recycling? The <u>Plastics Innovation</u> <u>Challenge</u>, supported by the U.S. Department of Energy (DOE), seeks to develop new and improved plastic materials, and to invest strategically in technologies that will make domestic processing of plastic waste economically viable and energy efficient. These solutions could then also be applied internationally to the global problem of plastic waste. The <u>Plastics Innovation Challenge</u>, launched in 2019, seeks to position the United States as the world leader in advanced plastic recycling and upcycling technologies. Plastics have become an integral part of modern life and provide tremendous benefits—from safer food and medical equipment, to lighter vehicles and improved energy efficiency. Unfortunately, the vast majority of plastics are never recycled, and a portion ends up in the environment. The challenge is vast.

Consistent with DOE's mission, the Plastics Innovation Challenge emphasizes novel technology development that can tackle plastic waste issues while reducing energy consumption for chemical production, environmental waste problems, and that can make U.S. manufacturing more competitive. Ultimately, the Plastics Innovation Challenge will result in a paradigm shift in which plastic waste is used as a resource to power the economy.

The Plastic Innovation Challenge has five goals:

- 1. **Develop** collection and sorting technologies to prevent plastics from entering landfills, waterways, and the environment or facilitate its removal.
- 2. Create new chemical and biological pathways to deconstruct plastics efficiently into useful chemical intermediates.
- **3.** Advance the scientific and technological foundations that will underpin new technologies for upcycling chemical intermediates from plastics into higher value products.
- **4. Design** new plastics that have the properties of today's plastics, are easily upcycled, and can be manufactured at scale domestically.
- **5. Support** a domestic plastics supply chain by helping companies scale and deploy new technologies in domestic and global markets.

Current technology limitations, spanning from basic science to manufacturing, underpin each of the Plastics Innovation Challenge goals. DOE is uniquely suited to overcome these challenges, due to National Laboratory capabilities in polymer deconstruction and redesign; chemical and biological catalysis; pilot scale facilities; and technoeconomic and life cycle analyses. Industry and academic research partnerships, sponsored through competitive funding opportunities issued by DOE, also support the ability to develop innovative solutions to reimagine plastic materials and plastic waste. The scope of the plastics problem as well as DOE's Plastics Innovation Challenge approach are described below.

lssue(s)

Plastics are used in a vast array of applications, from food and beverage packaging to vehicle components to medical equipment. More than 300 million tons of plastic is produced each year to meet these needs, with half going to single use applications.¹ Plastics provide clear benefits to convenience, safety, and energy efficiency. However, only 14% of the 78 million tons of plastic packaging produced each year is collected for recycling (and only 2% of that collected material is recycled into the sameor similar-quality applications). Of the remaining plastic packaging produced, 14% is incinerated or processed for energy, 40% ends up in landfills and 32% is leaked into the environment, where plastic causes detrimental effects to the environment,² human health,³ and the economy. ⁴

Current recycling strategies often do not allow for cost-effective recycling of commonly used plastics. But new and novel upcycling of plastics could transform a plastic feedstock into a more valuable product than its original use, representing an opportunity to provide a real economic incentive for plastic recycling while leading to environmental benefits.

Status

As part of the Plastics Innovation Challenge, extensive intradepartmental coordination has been ongoing amongst the Office of Energy Efficiency and Renewable Energy (EERE); the Office of Science (SC); the Advanced Research Projects Agency– Energy (ARPA-E); and the Office of Fossil Energy (FE). Together, the participating offices have developed a strategy to invest in R&D at all technology readiness levels (TRL) in order to fully support the Plastics Innovation Challenge. These investments are described below by TRL and broken down by DOE office:

• TRL 1-2

SC supported fundamental science research to enable plastic degradation and upcycling in FY 2020. The primary effort was the selection of two new Energy Frontier Research Centers (EFRCs). Selections were the Center for Plastics Innovation (\$11.65 million) and the Institute for Cooperative Upcycling of Plastics (\$12.8 million). SC has future work planned; Revolutionizing Polymer Upcycling, elucidating the chemical and biological pathways for transforming polymers and synthesizing high-value chemicals or new polymers.

• TRL 2-4

In FY 2020, the Bioenergy Technologies Office (BETO) and Advanced Manufacturing Office (AMO) partnered to co-fund investments to create polymers that are recyclable-by-design, develop efficient deconstruction pathways for plastics and to establish methods to "upcycle" waste plastic to higher value products. ARPA-E has also piloted a new program for plastics conversion to fuels. Investments include:

- Bio-Optimized Technologies to Keep Thermoplastics out of Landfills and the Environment (BOTTLE) Funding Opportunity Announcement (FOA) (\$25 million)
- Small Business Innovation Research (SBIR) Phase 1 Novel Utilization Strategies for Ocean Plastic Waste (\$1 million)
- Seed BOTTLE Consortium at National Labs (\$2 million)
- REUSE Initiative to develop new technologies to convert plastic waste into fuels (\$4 million)
- TRL 2-5

BETO has invested in SBIR and FOA topics to develop waste plastic as a feedstock for products and to develop bio-based polymers since 2019. Efforts include:

• 2019 SBIR Phase 1 Release 2 *Reimagining Plastic Degradation for Upcycling* (\$2.2M)

¹ Ritchie H and Moser M. (2018). Plastic Pollution. Our World in Data. https://ourworldindata.org/plastic-pollution

² Ellen MacArthur Foundation. (2017). The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action. Cowes, United Kingdom: Ellen MacArthur Foundation.

³ Beaumont NJ et al. (2019). Global ecological, social, and economic impacts of marine plastic. Marine Pollution Bulletin; 142:189-195.

⁴ UNEP. (2014). Valuing Plastic Waste: The business case for measuring, managing, and disclosing plastic use in the consumer goods industry.

- 2019 FOA Topic *Plastics in the Circular Carbon Economy* (~\$10 million)
- 2020 FOA Topic *Urban and Suburban Wastes* (~\$10 million)
- 2020 SBIR Phase 2 *Reshaping Plastic Design and Degradation for the Bioeconomy* (\$3.3million)

• TRL 3-7

Reducing EMbodied-energy And Decreasing Emissions (REMADE), a Manufacturing USA Institute, launched in 2017 with a \$70M investment from the AMO over 5 years. Research funded by the REMADE Institute improves energy efficiency by enabling and increasing the use of many recycled materials, including plastics.

The Plastics Innovation Challenge partner offices have identified a core set of metrics to be reached in order to enable transformative implementation of the Plastics Innovation Challenge goals:

• Scope

Technologies developed to address *recycling for* >90% of plastic polymers

Energy

Recycling technologies provide ≥50% energy savings relative to virgin material production

Carbon

Recycling technologies provide ≥75% carbon utilization from waste plastics

Economics

Recycling technologies provide $\ge 2x$ economic incentive above price of reclaimed materials

Proposed Energy Materials and Processing at Scale (EMAPS) Facility:

Like many other energy challenges, solutions to the plastic waste problem are likely to be multifaceted and could involve integrated solutions that combine chemical, thermal, and biological methods. The research, development, and deployment of potential solutions is accelerated when multidisciplinary teams are able to work closely together with access to scale-up facilities. While there are DOE facilities that can scale-up certain processes, the scale-up of new plastic synthesis, and deconstruction and upcycling of waste plastics are not existing capabilities. Furthermore, many DOE facilities are not structured to facilitate the type of interdisciplinary work needed to solve major challenges related to novel energy technology development (e.g. membranes in electrolyzers/fuel cells, polymers in photovoltaics, and processing of novel inorganic-organic hybrid materials such as metal-organic perovskites for solar cells, lighting, etc.).

To address the process integration capability gap, DOE proposes to create an Energy Materials and Processing at Scale (EMAPS) research capability to co-locate and integrate critical scientific and engineering disciplines and capabilities to address and enable novel and hybrid processing for electrolyzers, batteries, structural wind turbine components, and advanced solar cell manufacturing. This multi-disciplined approach will attract a consortia of experts from strategically aligned institutions to tackle critical challenges in rapidly scaling materials, innovations and technologies needed to provide the crucial elements for addressing end-of-life and accelerating them from the lab to markets.

Milestone(s)

The critical decision milestones and schedule for establishment of the EMAPS facility are listed below.

CD-0, Approve Mission Need	12/16/2019			
CD-1, Approve Alternative Selection and Cost Range	04/2022			
CD-2, Approve Performance Baseline	02/2023			
CD-3, Approve Start of Construction/Execution	02/2023			
CD-4, Approve Project Completion	12/2024			

Final Energy Security and Infrastructure Modernization Sale

The Energy Security and Infrastructure Modernization Fund supports the Strategic Petroleum Reserves modernization.

Summary

Congress established the Energy Security and Infrastructure Modernization (ESIM) Fund to support modernization of the Strategic Petroleum Reserve (SPR). The Bipartisan Budget Act of 2015, Section 404(e), as amended by Section 14002 of the Coronavirus Aid, Relief, and Economic Security (CARES) Act, authorized appropriations (and drawdowns and sales under subsection (c) in an equal amount) for carrying out subsection (d)(2)(B), \$2 billion for the period encompassing fiscal years 2017 through 2022.

The Department responded by creating the Life Extension 2 (LE2) project to modernize the SPR. Congress subsequently approved selling ~\$1.4 billion of SPR crude oil to fund the LE2. To date, three crude oil sales (2017, 2018, and 2019) have been conducted, raising \$971 million for deposit into the ESIM Fund. A final \$450 million sale will bring the ESIM Fund balance to \$1.4 billion.

lssue(s)

The Office of Petroleum Reserves (OPR) must raise the final \$450 million for the ESIM Fund by FY 2022 and commence the LE2 project.

Status

In February 2020, OPR announced the final Congressionally-mandated sale of crude oil to fund the LE2 project. However, in March 2020, due to the COVID-19-driven collapse of crude oil prices, the sale was postponed. Section 14002 of the CARES Act extended the time for DOE to hold the sale to FY 2022.

Major Decisions

The Department is authorized to conduct the final ESIM sale by the end of FY22 under the CARES Act. Important decisions on the timing of the sale will need to be made. The posting of a Notice of Sale will be required 1 month prior to making any awards.

International Meetings, Agreements, and Commitments

The Office of Fossil Energy (FE) plays a leadership role internationally to advance U.S. strategic energy interests, including developing a low-carbon economy (hydrogen and CCUS), reducing U.S. critical minerals vulnerabilities, and supporting global energy market stability (LNG and oil).

The Office of Clean Coal and Carbon Management

The Office of Clean Coal and Carbon Management (CCCM) engages with foreign governments, research organizations, and other stakeholders, through both bilateral and multilateral agreements, including research, development, and demonstration (RD&D) cooperation. These international collaborations are designed to ensure coordination, avoid duplication of effort, enhance information accessibility, and address intellectual property issues. Such connections also provide insights on global R&D and technology innovations; deepen understanding of the unique challenges facing clean coal and carbon management in a diversity of countries; and create opportunities to increase awareness of the office's R&D efforts and successes.

CCCM leads policy-focused and technical Carbon Capture, Utilization, and Storage (CCUS) work under numerous multilateral fora:

- Clean Energy Ministerial (CEM): CEM CCUS Initiative
- International Energy Agency (IEA): IEA Working Party on Fossil Energy (WPFE)
- IEA Technology Collaboration Programs: IEA Greenhouse Gas R&D Programme and IEA Clean Coal Centre

- Carbon Sequestration Leadership Forum (CSLF)
- Asia-Pacific Economic Cooperation (APEC): Expert Group on Clean Fossil Energy (EGCFE)
- Accelerating CCS Technologies (ACT) Initiative

CCCM co-leads bilateral relationships to leverage and accelerate DOE's R&D efforts and advance U.S. policy interests. Examples include:

- **Norway:** Memorandum of Understanding (MOU) on energy RD&D; work focused on capture, storage, and enhanced oil recovery (EOR); collaboration at Test Centre Mongstad (TCM).
- **Saudi Arabia:** MOU on CCUS and clean fossil fuels.
- **United Kingdom:** MOU and implementing agreement on fossil energy and energy technology.
- **China:** Historic efforts have been focused on advanced coal technologies and CCUS. Forward progress and collaboration are to be determined.
- India: U.S.-India Strategic Economic Dialogue (SEP): Power & Energy Efficiency Pillar; Partnership on Clean Energy Research-Demonstration (PACE-R).
- Japan: Memorandum of Cooperation on CCUS; U.S.-Japan Strategic Energy Partnership (JUSEP); U.S.-Japan Energy Cooperation Working Group (ECWG) under the U.S.-Japan Economic Dialogue.

The office also engages with Canada and Mexico through the North American Energy Ministers Trilateral (NAEMT).

The Office of Oil & Gas

The Office of Oil & Gas (O&G) leads technical engagements with numerous countries on oil and gas topics including technologies for unconventional and offshore oil and gas production, natural gas market and infrastructure development, including small scale LNG, methane emissions quantification and mitigation, and more. Examples include:

- **U.S.-China Oil and Gas Industry Forum:** Annual industry-led conference with China's National Energy Administration, now in its 20th year.
- U.S.-India Strategic Energy Partnership: Industry-led Gas Task Force addresses India's natural gas market development.

- **U.S.-Brazil Energy Forum:** Technical engagements with Brazil focused on offshore, unconventional, and natural gas markets.
- Africa LNG Handbook Initiative: Workshops for African countries developing natural gas and markets.
- **Small Scale LNG:** Engagement in Caribbean, Central America, and Eastern Europe.
- Many additional technical engagements on irregular bases with other countries.

O&G also has Memoranda of Cooperation on gas hydrate development with India, Japan, and South Korea.

The Office of Petroleum Reserves

The Office of Petroleum Reserves (OPR)

engages with foreign governments through bilateral agreements and international meetings for technological and managerial best practices exchanges, and participates in:

- Annual Coordinating Meeting of Entity Stockholders (ACOMES) along with 27 other oil stockpiling nations. ACOMES is held biannually to exchange technical information, share experiences, and discuss changes in environmental regulations, legislation, and other issues affecting the maintenance and operations of oil reserves.
- Bi-annual meetings of the International Energy Agency (IEA) Standing Group on Emergency Questions and Standing Group on the Oil Market along with 29 other members of the IEA.

OPR has increased its international engagement posture with various foreign governments for the purpose of bi-lateral information exchange. The following highlights OPR's recent international engagements:

- Major player in the Department's recent Memorandum of Understanding with the Ministry of Petroleum and Natural Gas (MoPNG) of India for cooperation in the following areas:
 - Cooperate in areas of safety, technology development, and management of strategic petroleum reserves.
 - Conduct bilateral site visits to the strategic petroleum reserves of the U.S. and India.

- Hold symposia to exchange scientific and technical information.
- Facilitate engagement with U.S. companies, as appropriate, on opportunities to participate in India's Strategic Petroleum Reserve program.
- Meets annually with the Japan Oil, Gas and Metals National Corporation (JOGMEC) for bilateral discussions on the technical and managerial operations of our reserves.
- Major entity in the Department's crude oil storage lease agreement with the Government of Australia which allows for the storage of Australian owned crude oil in the SPR.

Critical Upcoming Decisions (FY21 Q1 and Q2)

None.

Minerals Sustainability

DOE's new Division of Minerals Sustainability is advancing minerals R&D that will reduce America's severe dependency on foreign critical minerals supply chains and enable a U.S. energy transition. The division may be elevated to a Deputy Assistant Secretary's office level to recognize the importance of these activities.

Summary

The recently established Division of Minerals Sustainability brings a sharper DOE focus on minerals issues, which are essential to supporting a new energy transition and recapturing the critical minerals (CM) supply chain. Under this Division, FY 2021 is the launch year for regional innovation centers. The Division's programs are also funding bench-scale and engineering design work related to discovery, extraction, and processing.

Upcoming Decisions

In order to increase the stature and effectiveness of the program, the Division was planned to be elevated to an Office level and led by a Deputy Assistant Secretary for Minerals Sustainability

Issue(s)

Meeting Exponential Demand

By 2050 the demand for CM and other minerals will grow by 450%.

Ensuring National and Economic Security

- Defense, high-tech, and manufacturing industries are at risk due to their dependency on imports and fewer supply chains for CM and ores.
- As U.S.-based supply chains have contracted in the face of, often subsidized, foreign competition, U.S. industry has lost expertise in advanced mineral processing and extractive

metallurgy technologies that produce CM and ores in an efficient and environmentally appropriate manner.

 The loss of expertise in the United States has further strengthened foreign competition and resulted in environmental damage and justice issues in developing countries.

Enabling a 21st Century Energy Transition

- Expanded market penetration of electric vehicles (EVs), renewable energy, power electronics, grid technologies, and conventional generation will create an exponential growth in U.S. demand for minerals.
- A 21st century energy transition is estimated to require 3 billion tons of CM and metals requiring hundreds of billions of tons of raw materials extraction and processing activities.
- It will be necessary to deploy advanced energy technology for electricity generation (renewables, power electronics, grid technologies, and conventional generation) and to support the transportation sectors.

Recycling and Reuse Insufficient (World Bank Report 2020, Bloomberg)

- Example Without new sources, EV batteries demand for CM will outpace supply, cause regional supply shortages and escalation in price.
- Example of Scale
 - 1 million EVs in the United States vs. 18 million in the United States by 2030 (Bloomberg).
 - 5 million EVs globally in 2019 vs. 120 million expected in 2030 (McKinsey).
 - By 2022 lithium prices projected to soar 42% as the market bottoms out (Bloomberg).

Unchecked Foreign Sourcing Contributes to Human and Environmental Abuses

- The United States is dependent on CM and metals from other countries, many with human rights violations and inadequate environmental standards.
- Example Cobalt sourced primarily from Congo through contracts with China.

The United States is the only industrial country in the developed world without an applied Research & Development (R&D) program for sustainable minerals and ore discovery, extraction, and processing. Creating an Office of Minerals Sustainability and continuing program expansion would rectify this deficiency and address the national need.

R&D Goals

Major advances in technology and computing over the last 20 years have been driving the industry to use advanced technologies for resource recovery, such as drones and robotic drilling; use of precise micro drilling to improve recovery and reduce risks; self-driving machines and ore carriers; improved sensors to enable real time data analytics during operations; and autonomous mining technologies that can support more efficient mining and recovery of resources previously considered unrecoverable. Selected, early R&D goals include:

Assess the regional difference in resource availability in on-shore and off-shore mineral resources and opportunities for the recovery and processing of raw materials.

Develop new technologies for assessment of recoverable resources (drones, real time sensing and analytics, and micro drilling technologies) on and off shore.

Develop advanced mineral extraction technologies to maximize production of mineral feedstocks that advance U.S. competitiveness in energy generation and other industrial sectors.

Develop novel autonomous mining and extraction technologies to enable recovery of CM that are currently not recoverable.

Develop advanced technologies to extract CM feedstocks from abandoned mining residuals while maximizing environmental controls.

Advance mineral processing technologies to enable commercial production while minimizing land disturbance and maximize environmental stewardship.

DOE's Statutory Authorization

As part of its effort to balance the Federal budget, on June 27, 1995, the Appropriations Committee of the U.S. House of Representatives advanced a bill abolishing the U.S. Bureau of Mines (USBM). On April 26, 1996, Congress transferred to, and vested in, the Secretary of Energy three USBM authorities, including "the functions pertaining to the conduct of inquiries, technological investigations[,] and research concerning the extraction, processing, use[,] and disposal of mineral substances" Pub. L. 104-134, 110 Stat. 1321-167 (Apr. 26, 1996). At that time, the small agency had fewer than 1,900 employees and a proposed budget of \$132 million for fiscal year 1996. Consequently, the USBM went through its "orderly closure" in May 1996.

Annual Appropriations Acts from 1996 through 2020 have included the following language in the Fossil Energy Research and Development section, exhibiting Congress' long-held understanding of the Office of Fossil Energy's prominent role at the DOE in conducting R&D concerning mineral extraction, processing, use, and disposal:

"including . . . for conducting inquiries, technological investigations and research concerning the extraction, processing, use, and disposal of mineral substances without objectionable social and environmental costs (30 U.S.C. 3, 1602, and 1603)."

With a renewed national interest in critical minerals and facing a 21st century energy transition, DOE is accelerating its effort in these areas. Strategic Petroleum Reserve (SPR) Mission, Upcoming Congressional Sales, and Funding Issues

The SPR is a critical national energy and economic security asset for crude oil supply interruptions or surplus and fulfills U.S. obligations under the International Energy Program.

Summary

The SPR protects the U.S. economy from severe petroleum supply interruptions through the acquisition, storage, distribution, and management of emergency petroleum stocks and carries out U.S. obligations under the International Energy Program. The SPR was created in 1975 pursuant to the Energy Policy and Conservation Act following an oil embargo by the Organization of Arab Petroleum Exporting Countries from October 1973 to March 1974. In FY20, DOE entered into a crude oil storage lease agreement with the Government of Australia, which allows for the storage of Australian owned crude oil in the SPR.

The SPR is funded by two accounts: The SPR Account and the SPR Petroleum Account. The SPR Account funds the program's operational readiness, drawdown capabilities, and management. The SPR Petroleum Account funds activities related to the acquisition, transportation, and injection of petroleum products into the SPR; test sales of petroleum products; and drawdown, sale, and delivery of petroleum products from the SPR.

Over the next several years, the SPR must simultaneously and safely maintain operational readiness and drawdown capabilities, execute a major life extension project (known as LE2), and conduct Congressionally-mandated sales, including Energy Security & Infrastructure Modernization (ESIM) sales, without spilling a drop of oil. The COVID-19 pandemic caused a demand (rather than supply) interruption that created a supply surplus and ushered in a new national need (e.g., to prevent U.S. crude oil producers from having to shut in production) for the SPR that resulted in an emergency storage exchange program and a crude oil purchase.

During COVID-19, small to mid-sized U.S. crude oil producers temporarily stored crude oil in the SPR, which was returned once market conditions improved. In exchange, these companies left behind a percentage of the oil stored (known as "premium barrels") to compensate the U.S. Government for the use of the SPR. This expanded use of the SPR mission amplifies SPR's economic and energy security value.

Congress mandated several sales of SPR crude oil as an offset to various laws requiring additional funding during FY17-FY28 (see table below). These sales will reduce the SPR inventory from nearly 700 million barrels to about 400 million barrels. DOE proposed to disestablish the Northeast Gasoline Supply Reserve (NGSR) in the FY21 budget. As proposed, DOE would draw down and sell one million barrels of refined petroleum product from the NGSR during FY21, with \$19 million of the proceeds from the sale to be deposited into the SPR Petroleum Account for Congressionally-mandated crude oil sale logistical/transportation costs. Any proceeds in excess of \$19 million collected from the sale shall be deposited into the general fund of the Treasury during FY21 and dedicated to deficit reduction. Congress rejected previous proposals to disestablish the NGSR.

The NGSR was administratively established in 2014 as part of the SPR to ease regional shortages resulting from sudden/unexpected supply interruptions. The NGSR consists of 1 million barrels of gasoline blendstock stored in leased commercial storage terminals located in Maine, Massachusetts, and New Jersey. It represents less than one day of gasoline consumption in the Northeast, and it has never been used for its intended purpose and is not cost efficient or operationally effective.

Congressionally-Mandated SPR Sales

Drawdown Legislation	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
Bipartisan Budget Act 2015 (Public Law 114-74 Section 404) ESIM Sale	6.3	4.7	4.2		TBD								15.2+TBD
Bipartisan Budget Act 2015 (Public Law 114-74 Section 403)		5	5	5	5	8	10	10	10				58
Fixing America's Surface Transportation Act (Public Law 114-94)							16	25	25				66
21st Century Cures Act (Public Law 114-255)	9.9	9.2	6										25.1
Tax Cuts and Jobs Act of 2017 (Public Law 115-97)											7		7
Bipartisan Budget Act of 2018 (Public Law 115-123)							30)		35	35		100
Consolidated Appropriations Act, 2018 (Public Law 115-141)				4.9	5.1								10
America's Water Infrastructure Act of 2018 (Public Law 115-270)												5	5
Total Annual Drawdown Volume	16.2	18.9	15.2	9.9	10.1+TBD	15.5	33.5	42.5	42.5	38.5	38.5	5	286.3+TBD

TBD: ESIM sales in FY21 will be determined by revenue targets placed in the eventual FY21 appropriation bill.

For purposes of calculating an annual volume, volumes across multiple years are split evenly across those years. In practice, actual sales may not end up being split evenly.

Projected SPR inventory by the beginning of 2029 is about 400 MMB

In FY20, the SPR conducted two Congressionallymandated, non-emergency oil sales raising ~\$567M for deposit into the U.S. Treasury. Due to the negative effects of COVID-19, the SPR executed an Emergency Storage Exchange Program that provided storage for 21.1 million barrels of U.S. produced crude oil from U.S. producers with 1.2 million barrels to remain in SPR as "premium barrels" (~\$50M present value). The SPR also executed a crude oil purchase of 124 thousand barrels (\$5M) sourced from small/midsize U.S. oil producers to test market conditions and SPR purchase processes.

Status

 The number and volume of sales over this 12-year period is unlike anything the SPR has previously experienced. Congressionallymandated sales and demand disruption create an added strain on the infrastructure during execution of the LE2 project. The FY21 House Mark provides \$195M without support to disestablish NGSR. If the Mark prevails, an additional \$20M is required above the request to maintain the NGSR annual lease; otherwise, SPR maintenance programs will be cut during a time maintenance is crucial to ensure requisite infrastructure to safely meet requirements.

- Congress allowed for a delay to the final ESIM sale (marked as TBD in the top row of the sales chart), but did not delay any other sales, so unless Congress delays the FY21 mandated sale of 10.1 million barrels, that sale will proceed in spring 2021.
- The FY21 Budget Request did not include a request for direct appropriation for the SPR Petroleum Account; instead, DOE proposed the sale of the NGSR's one-million barrels of refined petroleum product (gasoline blendstock) and requested authorization to deposit sale proceeds into the SPR Petroleum Account up to \$19 million. The House Mark provided \$7.5M in the SPR Petroleum Account. To support ~30 million barrel drawdown capability during a supply interruption, SPR historically attempts to maintain ~\$15M in the SPR Petroleum Account; readiness to support a ~30 million barrel fill action would require an additional \$6M. Due to execution of FY20 unplanned activities in response to the COVID-19 demand destruction, the SPR Petroleum Account resources for emergency drawdown/fill are estimated to be \$8.5M which supports ~17 million barrel emergency drawdown. A larger drawdown would require additional funds. The following table reflects FY20 SPR Petroleum Account balances and FY21 requirements based on the House Mark.

Title	- debit / + credit (\$M)	Running Total (\$M)
FY20 Balances		\$24.4
FY21 Mandatory Sales	-\$7.6	\$16.8
ESIM Sale	-\$7.7	\$9.1
Storage Exch. Returns	-\$8.1	\$1
House Mark	\$7.5	\$8.5

- Hurricane Laura damaged the West Hackberry site. The initial damage assessment cost range was \$25M \$95M. Congress requested to be kept apprised of estimates as they evolve.
- The additional supply surplus mission has not been formalized. A requirements study and a configuration study were in Departmental coordination prior to the new fill mission's identification as a possible Departmental need (not yet formalized). To account for supply surplus use, the requirements and configuration studies are being updated to reflect impacts of the new mission.

Major Decisions

Decisions on whether to seek Congressional relief on the timing of mandated sales, delay the ESIM sale and related LE2 project, formalize an SPR storage mission during demand disruption, and seek Hurricane damage relief are required in FY21.

Milestone(s)

The major milestones for the SPR program are to execute the FY21 mandated oil sale of 10.1 million barrels and the sale to raise \$450 million for the ESIM fund by FY22.

United States Nuclear Fuel Working Group (NFWG)

The April 2020 NFWG strategy for *Restoring America's Competitive Nuclear Advantage* recognizes that it is in the Nation's national security interests to preserve the assets and investments of the entire U.S. civil nuclear energy enterprise and to revitalize the sector to regain U.S. global nuclear leadership. The Strategy lays out a series of priority policies and identifies specific recommendations to reinvigorate the domestic nuclear fuel supply industry, accelerate advanced nuclear technology development, and create pathways for American nuclear exports.

Summary

The NFWG Strategy¹ is a holistic approach to address the challenge of restoring America's competitive nuclear advantage, with four strategic priorities:

- 1. **Provide Immediate Action** to Support U.S. Mining and Restore the Viability of the Entire Front-End of the Nuclear Fuel Cycle.
- 2. Revitalize and Strengthen the Front-End of the Nuclear-Fuel Cycle and Domestic Nuclear Industry.
- 3. Lead the World in Technology and Standards.
- 4. Empower U.S. Export Competitiveness.

These priorities cascade to 18 vetted, supporting recommendation measures, with corresponding implementation activities for each to be led by the appropriate Federal Departments and Agencies. The Strategy provides recommendations that, if fully implemented, will revitalize the domestic nuclear energy industry and reestablish America as the global leader in nuclear technology innovation. In turn, the United States will regain its influence to continue to ensure strong safety, security, and nonproliferation standards for the international nuclear regime, and will be well positioned for future commercial opportunities for large light water reactors, as well as small modular reactors and advanced reactors.

Importantly, the strategy recognizes that a strong nuclear energy industry supports both U.S. commercial and defense needs that the success of the uranium mining industry and of U.S. nuclear technology exports are inextricably linked.

lssue(s)

Pending Appropriations for the FY 2021 Proposed Uranium Reserve

Preventing the near-term collapse of the domestic uranium mining and conversion industries is considered the most immediate concern. If Congressional appropriations are provided for FY 2021, DOE could support and strengthen the front end of the domestic nuclear fuel cycle by establishing a DOE Uranium Reserve and reestablishing active domestic conversion capabilities. By initiating a 10-year program to purchase uranium and conversion services for the Reserve, DOE would support the restart of near-term uranium production and conversion services for that domestic uranium, where the risk of losing these capabilities is most immediate. The Reserve would also provide assurance of availability of uranium in the event of a market disruption, such as intervention by a foreign state, which prevents nuclear utilities from acquiring uranium to refuel their reactors.

Interagency Coordination

Although DOE led the publication of the Strategy, restoring America's competitive nuclear advantage will require a complex, long-term interagency effort over the next 10 years. An interagency NFWG implementation plan would help to maintain alignment with the Strategy intent; incorporate new information; align resource requests and allocations; coordinate communications internally and externally; and inform adjustments, if needed. However, DOE does not have the authority to direct

^{1 &}lt;u>https://www.energy.gov/strategy-restore-american-nuclear-energy-leadership#:~:text=The%20Strategy%20to%20Restore%20</u> American%20Nuclear%20Energy%20Leadership,of%20the%20United%20States%20Nuclear%20Fuel%20Working%20Group.

how, when, or if other Departments and Agencies implement the Strategy.

Senior Administration Position

The Strategy recommends the designation of a senior Administration official within the Executive Branch who will be tasked with leading nuclear exports in partnership with the private sector and all relevant agencies. DOE envisions a central, coordinated office, led by the senior Administration official, to coordinate nuclear exports and implementation—including promotion of nonproliferation, safety, and security normsand assist emerging and expanding countries' development and deployment of their nuclear energy programs. The position placement within the Executive branch, whether the official will hold White House authorities, and the specific responsibilities of this position have yet to be determined.

Nuclear Industrial Base Advisory Committee

The Strategy recommends the establishment of a Nuclear Industry Base Advisory Committee charged with making recommendations on the confluence of public and private investment and nuclear supplier base challenges pertaining to the national security considerations provided in the Strategy. DOE envisions an industrial group, modeled after the Defense Industrial Board, who would incorporate supplier needs into their recommendations. It has not yet been determined whether this committee would be related to the existing Nuclear Energy Advisory Committee, who the membership would include, or whether this board would report to DOE, nor at what level it would report.

Advanced Nuclear Technology Innovation, Development, Demonstration, and Export

The Strategy recognizes that innovation in the nuclear technology sector is crucial to the future of U.S. national security. The U.S. currently has zero new nuclear plant builds outside the U.S. while Russia and China currently dominate the nuclear power plant global marketplace for new build nuclear power plants. The new builds currently underway will provide Russia and China with 100year nuclear technology relationships with many strategic members of the global community. The U.S. must export its innovative nuclear power technology to ensure that U.S. norms for operation, safety, security, and non-proliferation are adopted worldwide.

Status

At present, DOE has drafted the DOE Implementation Plan and a whole-of-government NFWG Implementation Plan, pending formal concurrence within the Department and comment from the interagency, respectively.

Subject to the availability of appropriations, the Strategy calls for DOE to lead the creation of a national Uranium Reserve to provide immediate relief to the U.S. mining and conversion industries. DOE also supports innovative nuclear energy technology, including managing research, development, and/or demonstration programs for advanced nuclear reactors, accident tolerant fuels, and high-assay low enriched uranium. DOE will support the development of small modular reactors and microreactors, the Versatile Test Reactor, and the National Reactor Innovation Center. DOE is also the lead for investigating methods that continue to increase efficiencies in the 10 CFR Part 810 nuclear export process, as well as providing statutorily mandated technical support to the Department of State for the negotiation of 123 agreements.

Other Federal Departments and Agencies have also begun to implement recommendations and activities identified in the Strategy, when consistent with existing appropriations and authorities, which have created visible signals of American commitment to this strategy. The first near-term action by the U.S. International Development Finance Corporation (DFC) was to reverse a legacy policy limitation on financing for nuclear energy projects in emerging markets². As America's development bank, DFC partners with private businesses to support investment in challenging frontier markets. By providing debt and equity financing; insurance; and technical assistance to projects that are unable to obtain sufficient support from private lenders, DFC helps mobilize additional private capital, resulting in projects that are financially viable and built to the highest standards. Together with the DOE's support of innovative reactor technology, this critical policy change will help restore America's global leadership in the civil nuclear sector, while increasing access to

2 <u>https://www.dfc.gov/media/press-releases/dfc-modernizes-nuclear-energy-policy</u>
a safe and sustainable source of clean energy in the developing world.

Another near-term action was the completion of a Memorandum of Understanding (MOU) between the U.S. Environmental Protection Agency (EPA) and the U.S. Nuclear Regulatory Commission (NRC), "Concerning the Regulation of Uranium in situ Recovery Activities," that entered into force on July 23, 2020. The MOU describes how the NRC and EPA will work with each other to accomplish their responsibilities under Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA) and supports the goal of re-establishing a robust domestic uranium industry. This MOU follows on to (but does not supersede) a 1992 MOU on general cooperation and, although not legally binding, is intended to support more timely, efficient regulation, and foster opportunities for communication and cooperation between the agencies.

DOE also established the Advanced Reactor Demonstration Program in FY 2020 with the publication of a competitive solicitation and a strong response from industry. This program will enable demonstration of up to two advanced reactor designs through partnerships with industry.

Consistent with the Strategy, the Department of Commerce recently announced a draft amendment to the Agreement Suspending the Antidumping Investigation on Uranium from the Russian Federation ("Russian Suspension Agreement") to extend the Agreement to 2040 and reduce U.S. reliance on Russian enriched uranium³.

Milestone(s)

See issues.

Major Decisions/Events

See issues.

Background

On July 12, 2019, President Donald J. Trump determined that "the United States uranium industry faces significant challenges in producing uranium domestically and that this is an issue of national security." The President directed "a fuller analysis of national security considerations with respect to the entire fuel supply chain."

The President created the NFWG to study the challenges facing the nuclear fuel supply chain in the United States, including identifying impediments to domestic industry competitiveness, exports, and technical development; strengths that could be enhanced to improve U.S. competitive advantage; and opportunities to reestablish American nuclear energy leadership.

The U.S. government, in consultation with stakeholders, identified a range of recommendations to revitalize and expand the U.S. nuclear enterprise, while maintaining American leadership in the nonproliferation arena.

A reliable supply of domestic uranium in the United States is critical for our national and energy security. The uranium industry has been decimated by reduced demand after the accident at the Fukushima Daiichi nuclear power plant and the low price of uranium in the international market place. State owned and influenced companies did not cut production in response to the reduced demand, over-supplying the international market and driving the price of uranium down to the point that it is unprofitable for U.S. domestic mining, milling, conversion, and enrichment companies to operate.

The United States needs to revitalize its nuclear industry enterprise and enable the sale and export of U.S. nuclear energy technology to compete with state sponsored and funded companies selling outdated technology and fuel at cut rate prices. The next decade is critical to the United States reestablishing its participation in the global nuclear energy marketplace. The alternative is that once the competition has sold and deployed non-U.S. technology and fuel, the U.S. will have missed the procurement and deployment opportunities afforded by the expansion of global energy systems and the U.S. will be functionally excluded from those markets for the next 80 to 100 years. It is imperative that the actions detailed in this implementation plan occur over the next decade to ensure the U.S. is the dominant influencer in the global nuclear energy marketplace.

³ https://www.commerce.gov/news/press-releases/2020/09/us-department-commerce-announces-draft-amendment-suspensionagreement

American Broadband Initiative

Access to broadband is essential to the economic success of Americans across the United States. Without modern broadband infrastructure, communities and businesses, particularly in rural areas, are being left behind in today's information-driven economy. The Department of Energy's Power Marketing Administrations aim to make federally-owned transmission assets available to expand telecommunications infrastructure across the United States.

Summary

The American Broadband Initiative (ABI) is the current Administration's signature strategy aimed at stimulating increased private investment in broadband infrastructure and services to address broadband connectivity gaps in America, particularly in rural areas. ABI recognizes federally owned assets such as tower facilities, buildings, and land could potentially be made available to lower the cost of broadband buildouts and encourage privatesector companies to expand telecommunications infrastructure. As part of this effort to identify types of federal assets or classes of assets that privatesector companies could use to expand broadband infrastructure in America, the Southwestern Power Administration (SWPA) and Western Area Power Administration (WAPA), in consultation with the Department of Energy's (DOE) Office of Electricity, completed feasibility assessments to determine if SWPA and WAPA's preexisting excess fiber, referred to as "dark fiber," can be leased to their existing customers and broadband service providers.

SWPA and WAPA are two of four federal Power Marketing Administrations (PMAs) that market and deliver wholesale federal hydropower to 33 states. The PMAs operate and maintain over 34,000 miles of high-voltage transmission line, which are used to deliver power from water projects and related hydropower generating facilities owned primarily by Bureau of Reclamation and U.S. Army Corps of Engineers. By law, the PMAs are required to set rates to cover costs including federal investments in dam and transmission infrastructure, plus interest, "at the lowest possible rates to consumers consistent with sound business principles." The other two PMAs (Bonneville Power Administration and Southeastern Power Administration) were outside the scope of this initiative.

SWPA and WAPA have been using fiber optic cable in their telecommunications for the past 20 years. Combined, they currently have an inventory of over 5,500 miles of dark fiber deployed on transmission lines, the majority of which is optical ground wire (OPGW). OPGW is the preferred type of fiber for overhead transmission lines as it is both strong and versatile; it combines the functions of grounding, a telecommunications pathway, and lightning protection all in one single package. Typically, OPGW contains glass optical fibers inside a metal tube structure that is then surrounded by layers of high-strength steel and aluminum wire. This cable has been installed primarily for PMA use in support of power operations, but SWPA and WAPA also have partnerships with other utilities that enable shared use of the cable for the utility partner's power operations use.

Issue(s)

A number of risks were identified in association with leasing available fiber capacity, including possible limitations on existing legal authority, right-of-way issues, cost, non-alignment with the PMAs' missions, security concerns, and lack of benefit to utility operations (or potential interference with those operations). Should SWPA and WAPA move forward with leasing available fiber capacity to third parties in order to provide rural communities with better access to broadband services, they must develop processes and procedures at the PMA level that outline how requests would be made, what entities would be allowed access, and what uses would be permitted. WAPA noted that its current process for fiber usage requests is handled regionally and is based on best practices, though it noted that it plans to move to a PMA-wide process.

The SWPA and WAPA assessments were submitted to DOE and assembled into a consolidated report in July 2020.¹

https://www.energy.gov/sites/prod/files/2020/07/f76/Fiber_Optics_Feasibility_Assessment_25JUNE2020.pdf

Status

Both SWPA and WAPA completed feasibility assessments in December of 2019 to determine if excess fiber could be leased to customers and broadband service providers. SWPA and WAPA reached different conclusions in their individual assessments. For instance, WAPA stated that, contingent upon full clarification of its existing legal authorities, current law may potentially allow preference power customers to lease available fiber capacity in order to carry broadband internet traffic. WAPA's preference power customers pay back capitalized costs, including those associated with fiber, through the collection of revenues from their ratepayers, and it is possible they may have preference in the commercial use of the fiber under current law. Following clarification, and/or confirmation of legal authorities, WAPA also could potentially lease fiber to commercial broadband providers, which would require significant investment in managing and tracking leased fiber, as well as consideration for capital investment recovery, which in either case would be paid for by the lessee. SWPA allowed for the possibility of leasing more than 100 miles of existing and available fiber capacity once various risk factors have been mitigated.

Background

SWPA

- SWPA identified preexisting available fiber capacity on its system and conducted a technical analysis for the feasibility of leasing that specific fiber.
- SWPA allowed for the possibility of leasing more than 100 miles of existing and available fiber capacity once various risk factors have been mitigated.

WAPA

- WAPA assessed the feasibility of leasing fiber in the abstract (more qualitatively).
- WAPA currently operates and maintains a fiber optic cable inventory consisting of about 5,500 route miles over its 15-state territory. Fiber optic strand counts are 24-fibers or less for 85 percent of WAPA's current inventory.
- WAPA may rely on existing statutory authority to construct, maintain, operate, and share fiber optic cable to perform DOE's power

marketing functions relating to electric power. New authority may be needed, but it may be possible for existing statutory authority could allow the use of fiber optic assets for third-party communications unrelated to the operational requirements associated with the marketing and transmitting of electric power if the third party lights the fiber. WAPA already has partnerships for utility use by customers. In addition, land rights pose a potential risk if WAPA fiber is used by third parties, especially for commercial broadband purposes. While some land rights provide for WAPA to string lines of others, it is uncertain whether that type of language would allow third-party use for commercial broadband purposes.

- If WAPA were to begin leasing its available fiber to third parties, all receipts from such agreements might have to be returned to the U.S. Department of Treasury, as provided by current law. Should WAPA decide to establish a third-party leasing program, additional staff would be required.
- Interfacing WAPA fiber with third parties would require special design of interface locations to ensure physical security and cybersecurity. Additionally, a GIS-based fiber management system would need to be implemented to track third-party usage across the WAPA's system.
- Introduction of additional third-party fiber customers would necessitate additional planning and coordination time, along with a more defined and universal procedure across WAPA for repairs during outage conditions, as well as routine maintenance. Should WAPA move forward with allowing its power customers to use its fiber to support rural communities with better access to broadband services, it would develop WAPA-wide processes and procedures to outline how requests would be made, what entities would be allowed to access the dark fiber and what uses would be allowed.
- WAPA conducted customer meetings during the summer of 2019 and the results were incorporated into the final assessment. One key outcome of these meetings was customers emphasized that WAPA should adhere to the "beneficiary pays" construct, which ensures the beneficiary of services is responsible for any related costs.

Executive Order 13920: Securing the United States Bulk-Power System

Executive Order 13920 declares a national security emergency due to the threat foreign adversaries pose to the U.S. Bulk-Power System and seeks to reduce the risk by prohibiting the procurement of specific components and equipment; pre-qualifying vendors and equipment; mitigating risks posed by components and equipment already on the system; and convening a task force on national security in Federal procurement. The Executive Order provides the Department with the authority to take actions to ensure the security of the BPS.

Summary

The bulk-power system (BPS) is the backbone of the United States (U.S.) electric grid, national security, and economy. Foreign adversaries continue to develop new ways to compromise the BPS, including undermining the supply chain of required critical components (per the 2019 Worldwide Threat Assessment and the 2020-2022 National Counterintelligence Strategy). To confront this increasingly sophisticated threat, President Trump signed Executive Order 13920, "Securing the United States Bulk-Power System," (the EO) on May 1, 2020, authorizing the Secretary of Energyworking with other Federal departments, agencies, and industry-to quickly and proactively protect the BPS. DOE's Office of Electricity (OE) is the office leading the implementation of the EO. Successful implementation will be critical to ensure equipment used on the BPS is secure, both now and into the future.

The authorities established in the EO comprise four "pillars:"

Pillar 1

Prohibition determinations for future procurements.

Pillar 2

Criteria for pre-qualified equipment and vendors.

Pillar 3

Mitigation of existing equipment and components already in the BPS.

Pillar 4

Creation of a Task Force on Federal Energy Infrastructure Procurement Policies Related to National Security.

Status

The Department is taking a thoughtful, deliberate, phased approach that includes input from all stakeholders when implementing the four pillars of the EO. There are numerous lines of effort under each of the four pillars. Some activities have specific timelines whereas others will be longer term engagements where the effort will be dependent on a variety of factors, e.g., funding, equipment testing, support and engagement from DOE Program Offices and industry.

To better inform implementation of the EO and understand existing supply chain risk management practices across the stakeholder community, the Department published a Request for Information (RFI) in the Federal Register (FR) on July 8, 2020, with a 30-day public comment period ending on August 7, 2020. In response to several comments from stakeholders, the Department extended the RFI public comment period by an additional two weeks, and the comment period closed on August 24, 2020.

The RFI responses will be utilized in the ongoing rulemaking effort.

DOE Leadership and Coordination

 Since the EO was signed, OE's Transmission Permitting and Technical Assistance Division (TPTA) holds weekly meetings with OE leadership to discuss the EO implementation and discuss key policy decisions.

- TPTA meets on a regular basis with the Office of General Counsel, including weekly rulemaking development meetings with the core rulemaking team.
- DOE leadership, including the Office of the Secretary, is also regularly briefed by OE leadership.
- Updated information on the EO implementation is routinely posted to OE's website: <u>https://www. energy.gov/oe/bulkpowersystemexecutiveorder</u>.
- The docket is being maintained on the Federal eRulemaking Portal: <u>https://www.regulations.gov/docketBrowser?rpp=25&po=0&D=DOE-HQ-2020-0028</u>.

Major Decisions/Events

- NOPR will be published in Federal Register with 30-day public comment period.
- The EO Federal Task Force will be convened.
- BPS EO Final Rule will be published in Federal Register.

Background

The EO declares threats by foreign adversaries to the BPS constitute a national emergency. The EO was issued pursuant to the President's authority under the Constitution and the laws of the U.S., including the International Emergency Economic Powers Act (50 U.S.C. 1701 et seq.) (IEEPA), the National Emergencies Act (50 U.S.C. 1601 et seq.), and section 301 of title 3, U.S. Code.

The BPS provides the electricity that supports the U.S. national defense, our vital emergency services, critical infrastructure, economy, and way of life. The Office of the Director of National Intelligence's (ODNI) National Counterintelligence and Security Center (NCSC) indicates near-peer foreign adversaries (e.g., China and Russia) possess highly advanced cyber programs and that both nations pose a major threat to the U.S. government, including, but not limited to, military, diplomatic, commercial, and critical infrastructure. The BPS is a target of these adversaries' asymmetric cyber and physical plans and operations. A successful attack on the BPS would present significant risks to the U.S. economy, and public health and safety and would render the U.S. less capable of acting in defense of itself and its allies. The Department of Defense's 2018 National Defense Strategy states the "homeland is no longer a sanctuary" and malicious cyber activity against personal, commercial, and government infrastructure is growing significantly.

According to ODNI's 2019 Worldwide Threat Assessment of the U.S. Intelligence Community,¹ near-peer foreign adversaries have the capability and integrated plans necessary to launch cyberattacks causing localized, disruptive effects on critical infrastructure—such as the disruption of a natural gas pipeline and electric infrastructure for days to weeks—in the U.S. These near-peer foreign adversaries continue to map U.S. critical infrastructure with the long-term goal of being able to cause substantial damage. According to the 2020-2022 National Counterintelligence *Strategy*² these foreign adversaries are employing innovative combinations of traditional spying, economic espionage, and supply chain and cyber operations to gain access to critical infrastructure. They are also attempting to access our Nation's key supply chains at multiple points—from concept to design, manufacture, integration, deployment, and maintenance—by, among other things, inserting malware into important information technology networks and communications systems.

The EO has four main pillars:

- 1. **Prohibit** any acquisition, importation, transfer, or installation of BPS electric equipment by any person or with respect to any property to which a foreign adversary or an associated national thereof has any interest that poses an undue risk to the BPS; the security or resiliency of U.S. critical infrastructure or the U.S. economy; or U.S. national security.
- 2. Authorize the Secretary to establish and publish criteria for recognizing particular equipment and vendors in the BPS electric equipment market as "pre-qualified" for future transactions, and to apply these criteria to establish and publish a list of pre-qualified equipment and vendors.

^{1 &}lt;u>https://www.dni.gov/files/ODNI/documents/2019-ATA-SFR---SSCI.pdf</u>

^{2 &}lt;u>https://www.dni.gov/index.php/ncsc-features/2741-the-national-counterintelligence-strategy-of-the-united-states-of-america-2020-2020</u>

- **3. Direct** the Secretary, in consultation with heads of other agencies, to identify existing BPS electric equipment in which a foreign adversary or associated national thereof has an interest that poses an undue risk to the BPS; the security or resiliency of U.S. critical infrastructure or the U.S. economy; or U.S. national security; and develop recommendations to identify, isolate, monitor, or replace this equipment as appropriate.
- 4. Establish a Task Force on Federal Energy Infrastructure Procurement Policies Related to National Security, which will focus on the coordination of Federal Government procurement of energy infrastructure; the sharing of risk information and risk management practices; and the development of recommendations for implementation to the Federal Acquisition Regulatory Council (FAR Council).

The EO directs DOE, in consultation with the heads of several other agencies, to issue regulations implementing the authorities the President delegated to the Secretary of Energy.

The BPS is defined in the EO as: (i) facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and (ii) electric energy from generation facilities needed to maintain transmission reliability. This definition includes transmission lines rated at 69,000 volts (69 kV) or more but does not include facilities used in the local distribution of electric energy.

The EO defines BPS electric equipment as items used in BPS substations, control rooms, or power generating stations, including reactors, capacitors, substation transformers, coupling capacitor potential devices [expressed in the E.O. as current coupling capacitors and coupling capacity voltage transformers], large generators, backup generators, substation voltage regulators, shunt capacitor equipment, automatic circuit reclosers, instrument transformers, protective relaying, metering equipment, high voltage circuit breakers, generation turbines, industrial control systems, distributed control systems, and safety instrumented systems. Items not included in the preceding list and that have broader application of use beyond the BPS are outside the scope.

Critical Electric Infrastructure Information (CEII) Protection

The protection of Critical Electric Infrastructure Information (CEII) encourages industry to share sensitive information with the Department of Energy and increases DOE's ability to execute responsibilities as the Sector-Specific Agency for Energy.

Summary

The Critical Electric Infrastructure Information (CEII) designation protects and secures critical information about the Nation's electric infrastructure as part of the Department of Energy's (DOE) commitment to improving energy security while ensuring a reliable and resilient flow of energy to America's communities and businesses. In the CEII final rule, DOE established administrative procedures for how the Department will designate, protect, and share CEII. The rule also provides procedures for DOE coordination with other Federal agency partners and industry to facilitate mutual understanding and information sharing as it may relate to CEII.

CEII is a category of controlled unclassified information about a system or asset of the bulkpower system, whether physical or virtual, that if destroyed or incapacitated would negatively affect the United States' national security; economic security; public health or safety; or any combination of such effects. A CEII designation exempts the information about physical and virtual assets of the bulk-power system from public release under the Freedom of Information Act (FOIA) and other laws requiring government disclosure of certain information or records. As a general principle, DOE will not designate information as CEII if it has been made publicly available previously by an owner or generator of the CEII.

Key Points

- The Fixing America's Surface Transportation (FAST) Act added Section 215A to the Federal Power Act, which authorizes both the Secretary of Energy and the Federal Energy Regulatory Commission (FERC) to designate information as CEII. DOE's CEII rule is contained in 10 C.F.R § 1004.13, and FERC's CEII rule is contained in 18 C.F.R. § 388.113.
- DOE's CEII rule supports and encourages information sharing between government and industry by ensuring the security of CEII. It also provides procedures for DOE coordination with other Federal agency partners (e.g., the Department of Homeland Security, FERC) to facilitate mutual understanding and implementation among Federal information classification programs as it may relate to CEII.
- CEII designation lasts for five years and can be renewed at the Department's discretion. The designation exempts data or information from disclosure under FOIA and other laws requiring government disclosure of certain information or records.
- DOE previously released a Notice of Proposed Rulemaking for the CEII designation on October 29, 2018, and received fourteen sets of comments over a 60-day comment period.
- The CEII final rule became effective on May 15, 2020.
- On April 14, 2020, Public Citizen and the Union of Concerned Scientists filed a petition for rehearing with DOE on five grounds related to: (1) DOE's statutory authority to issue the CEII Final Rule; (2) the CEII Final Rule's alleged inconsistency with the FOIA and Federal Records Act; (3) due process concerns with accessing CEII in the course of DOE proceedings; (4) DOE's justification for the CEII Final Rule under the Administrative Procedure Act (APA); and (5) DOE's alleged failure to provide notice and an opportunity to meaningfully comment during the rulemaking proceeding. The petitioner urged DOE to voluntarily withdraw or revise the CEII final rule to remedy their alleged injuries.
- On July 13, 2020, Secretary of Energy Dan Brouillette issued an order denying the rehearing request.

- On July 13, 2020, the Union of Concerned Scientists filed a petition for review of the Department's Order on Rehearing and CEII final rule in the U.S. Court of Appeals for the District of Columbia Circuit.
- The U.S. Department of Justice (DOJ) is arguing the case on behalf of DOE. OE, through GC-76, provided a certified index to the administrative record of the CEII final rule to DOJ, which was filed in the D.C. Circuit on August 31, 2020.
- On September 29, 2020, the court issued an initial briefing schedule:

November 9	Petitioner's Brief Due		
December 9	Respondent's Brief Due		
December 30	Petitioner's Response Brief Due		
January 31, 2021	Final Briefs Due		

- OE staff continue to work with GC staff and are awaiting the petitioner's brief in the aforementioned lawsuit.
- OE staff are currently working with the Office of the Chief Information Officer to develop an electronic tracking system that will track all CEII requests and designations.
- OE staff are working with DOE's Office of Management to begin the process of developing a Department-wide directive that will instruct all Department staff on how to identify, mark, and protect CEII.

Defense Critical Electric Infrastructure (DCEI)

The protection of Defense Critical Electric Infrastructure (DCEI) fulfills DOE statutory and executive authorities and enables the Department and its public and private sector partners to address energy sector threats to 1) national defense and security missions, and 2) the health and safety of American civilians.

Summary

National security threats against the U.S. energy sector continue to intensify. Our Intelligence Community reports that adversaries are conducting sustained and increasingly sophisticated campaigns against American government and civilian targets and warns to anticipate a debilitating event, or even the devastation of a multiple-threat scenario.

Of particular concern is the threat posed by determined adversaries with advanced cyber and physical hybrid warfare capabilities. For example, Chinese military tactics include "system destruction warfare" designed to cripple an adversary by exploiting vulnerabilities in physical and digital infrastructure. Their goal is to exploit situational awareness capabilities such as satellites, communication systems, and other parts of the military's "nervous system" that enable the "muscles" to project power and defend U.S. interests globally.

The U.S. Departments of Homeland Security (DHS) and State (DOS) have jointly identified lifeline functions and critical infrastructure sectors in the *Guide to Critical Infrastructure Security and Resilience* (2019). The Energy Lifeline is among the most critical due to its role in enabling all other life-sustaining critical infrastructure sectors to function. Due to the interconnectivity of the grid, a cyberattack targeting energy infrastructure could be detrimental to multiple lifelines. Energy not only powers our nation's military bases but it also provides an essential service to public health and safety by supplying power to civilian hospitals; prisons; cell towers; police and fire stations; water treatment facilities; gas station pumps; and other lifeline functions and critical infrastructure sectors.

Section 215A of the Federal Power Act (FPA) gives the Secretary of Energy the authority to designate critical defense facilities (CDFs) located in the 48 contiguous States and the District of Columbia that are critical to the defense of the U.S. and vulnerable to a disruption of electric supply provided to such facility by an external provider, and identify their associated electric infrastructure as defense critical electric infrastructure (DCEI). The Office of Electricity (OE) leads the Department of Energy's (DOE) efforts to mitigate all man-made and natural threats to the energy system. As such, the Secretary of Energy has delegated the authority to designate CDFs and identify their associated DCEI to the Assistant Secretary for Electricity.¹

DOE aims to energy-assure priority operational plans for critical defense and security missions by enabling consistently resilient power and fuel supply. Department of Defense (DoD) mission assurance, and by extension U.S. national security, is exposed to risk both "inside" and "outside" defense installations. DoD has the authority to execute risk management "inside the fence" by ensuring on-base energy resilience and emergency generation; whereas, DOE has the authority to manage risk "outside the fence" in partnership with the electric power industry and others. DOE's role is distinct from, complementary to, and in full support of the DoD mission – DOE refers to this role as *energy assurance for mission assurance*

Status

OE is developing activities and capabilities to enable a structured approach to leverage the strengths of DOE and its partners to stay ahead of intensifying threats to DCEI. Key steps OE is taking include:

Maintaining and periodically revising, as necessary, a CDF list on behalf of the Secretary of Energy and in consultation with other appropriate Federal agencies and informing the appropriate

¹ See Delegation Order No. 00-001.00H and Redelegation Order No. 00-002.10E.

owners, users, or operators of infrastructure that may be DCEI.

Differentiating DCEI from the broader energy system and identifying project approaches and funding/financing resources to **execute strategies and investments to harden and protect DCEI.**

Reviewing needs for scoping how DCEI is identified or defined across the energy system (generation, transmission and distribution) including special consideration of:

- Ongoing risk mitigation efforts within installations to support complementary or integrated energy assurance activities on both sides of the fence.
- The extent to which mission assurance may rely on natural gas pipelines and delivered fuels in addition to electric infrastructure.
- Specific components, equipment, and systems that may present higher risk and therefore should receive priority attention.
- Other civilian infrastructure needed for mission assurance that requires power to function (e.g., communications, transportation systems, and water and wastewater systems).

Establishing coordination and collaboration mechanisms with key stakeholders and partners, including:

- DOE's Offices of Cybersecurity, Energy Security, and Emergency Response (CESER); Energy Efficiency and Renewable Energy (EERE); Fossil Energy (FE) and others.
- CDF owners and operators; the utility industry and other DCEI owners and operators.
- Security partners including DHS, the intelligence and law enforcement communities
- Regional and federal energy reliability organizations including the North American Electric Reliability Corporation (NERC) and the Federal Energy Regulatory Commission (FERC).
- State and local governments, to include utility regulators and State, Local, Tribal and Territorial (SLTT) energy offices.
- Technical assistance providers such as DOE's national labs.

Conducting a comprehensive inventory of DOE

and partner capabilities that can be leveraged for DCEI program success including:

- Implementation of Executive Order 13920, "Securing the United States Bulk-Power System."
- Coordination with the Power Marketing Administrations (PMAs), which report to the Assistant Secretary for Electricity; and hydropower projects of the Bureau of Reclamation and the U.S. Army Corps of Engineers through:
 - Strengthening operational technology (OT) and industrial control systems (ICS) cybersecurity and resilience.
 - Pursuing mutually beneficial broadband infrastructure and energy technology investment and deployment opportunities for America's rural communities, including exploring the feasibility of providing broadband internet services using PMA preexisting excess fiber optics infrastructure.
- Development of black start, load shedding, grid restoration, and operation activities protecting or restoring the reliability of DCEI.
- Coordination of cybersecurity, critical infrastructure, and emergency response programs and activities led by CESER.
- Facilitation of technical support provided to federal agencies by EERE's Federal Energy Management Program.
- Development of the North American Energy Resilience Model (NAERM).
- Creation of other capabilities in the areas of research, development, and demonstrations; modeling, analysis and exercises; direct technical assistance; education and information sharing; and others.

Guiding and supporting the development of decision support tools uniquely suited to respond to unpredictable and high-consequence resilience events. OE recognizes the critical role Lawrence Berkeley Lab's Interruption Cost Estimate (ICE) Calculator plays in supporting grid reliability improvements based on customer value of lost load surveys. However, the lack of methods and approaches suitable for evaluating DCEI-related investment proposals remains a significant barrier to achieving energy assurance for mission assurance. In order to implement DCEI risk mitigation measures on the grid, electricity system decision makers and their stakeholders will need methods to assess the full costs of unpredictable, widespread, long-duration outages and the benefits of improvements that can help avoid disastrous economic and societal consequences should DCEI be left vulnerable to cyber-attacks and other hazards.

DOE Leadership and Coordination

DOE is well-positioned to lead the DCEI initiative as the Sector Specific Agency (SSA) for energy under the framework established by the Presidential Policy Directive 21 (PPD-21): Critical Infrastructure Security and Resilience. More specifically, DOE's DCEI-related authorities as established in the FPA enable the identification of DCEI for the purposes of protection, hardening, and enhancement. In addition, Sections 215A and 202(c) of the FPA authorize DOE to order grid restoration and operation activities to meet the needs of a "grid security emergency," including protecting or restoring "the reliability of critical electric infrastructure or of defense critical electric infrastructure." This authority, administered by OE for the Secretary of Energy, can support prioritizing and accelerating restoration of electricity service to CDFs and other critical assets in long duration outages that could last weeks or months. In such extended blackouts, emergency power generators and fuel resupply operations for on-base electric systems are at increasing risk. Sustaining and restoring electric service to these CDFs is therefore vital for national defense and security.

DOE has the mandate, expertise, and electric utility industry relationships to manage risk "outside the fence" of CDFs by leading efforts to harden energy supply paths for DCEI and other mission critical assets on the grid using an **energy assurance for mission assurance** framework.

Major Decisions/Events

The President's FY2021 budget request includes \$1.65 million to support foundational technical analysis for the initial year of DOE's DCEI program.

Grid Modernization Initiative

The electricity system we have today must evolve to meet the demands of the 21st century and beyond. The Grid Modernization Initiative (GMI) coordinates electric grid-related research and development (R&D) across the five **Department of Energy (DOE) applied** energy offices: Fossil Energy (FE); Nuclear Energy (NE); Electricity (OE); Energy Efficiency and Renewable Energy (EERE); and Cybersecurity, Energy Security, and **Emergency Response (CESER). Because** the technology mission of each of these Offices depends on a reliable, resilient, and secure electric grid, the GMI allows each Office to pursue grid-related R&D while minimizing duplicative effort. Over the past five years, GMI has provided for cross-cutting coordination on over \$330 million of DOE research investment: and worked with industry, regulators, policymakers, and other stakeholders to facilitate the widespread adoption of new technologies.

Summary

America's security, economy, and sustained global leadership depend on a reliable, secure, and resilient power grid. GMI works with public and private partners to develop the concepts, tools, and technologies needed to measure, analyze, predict, protect, and control the grid of the future. This requires focus on a fully integrated vision of the energy system from fuel to generation to delivery to load, including interdependent infrastructures (e.g., communications systems, natural gas pipelines). GMI's portfolio of work will help to better integrate all sources of electricity; improve the security of our nation's grid; solve challenges of energy storage and distributed generation; and provide a critical platform for U.S. competitiveness and innovation in a global energy economy.

Five key trends, below, are driving a transformation that challenges the capacity of the grid to provide the services the US needs, but also serve as an opportunity to transform our nation's grid into a platform for greater prosperity, growth, and innovation.

- 1. Changing mix of types and characteristics of electricity generation.
- 2. Growing demands for a more resilient and reliable grid, especially due to weather impacts.
- 3. Growing threat of cyber and physical attacks.
- 4. Opportunities for customers to provide grid services and participate in electricity markets.
- 5. Increased use of digital and communication technology in the control of power systems.

Status

Details on the existing research portfolio are available at the Grid Modernization Laboratory Consortium (GMLC) website.¹ Projects from the first two rounds² of funding are wrapping up, while the third round of projects are underway, completing their first year of research.³

DOE Leadership and Coordination

OE and EERE initially partnered to create the GMI to coordinate and leverage grid-related research efforts, and in 2018 the GMI collaboration began to include the other applied energy offices. These five offices and a steering committee drive activities under the GMI that complement individual investments and programs that each Office implements separately. In addition, the GMI coordinates their activities with DOE's Office of Science, Advanced Research Projects Agency–Energy, and the Artificial Intelligence and Technology Office.

The Grid Modernization Laboratory Consortium (GMLC) is a subset of GMI and was established as a strategic partnership between DOE and

¹ See, <u>https://gmlc.doe.gov/projects</u>

² See, https://www.energy.gov/grid-modernization-initiative-0/doe-grid-modernization-laboratory-consortium-gmlc-awards; https:// www.energy.gov/grid-modernization-initiative-0/resilient-distribution-systems-lab-call-awards

³ See, https://www.energy.gov/2019-grid-modernization-lab-call-awards

the National Laboratories to bring together leading experts, technologies, and resources to collaborate on the goal of modernizing the Nation's grid. The benefits of the GMLC include more efficient use of resources; shared networks; improving learning and preservation of knowledge; enhanced lab coordination and collaboration; and regional perspective and relationships with local stakeholders and industry. Externally, over 400 partners are involved in GMLC projects and peer reviews, representing State agencies, regional entities, utilities, suppliers, universities and others.

The GMI/GMLC has been very successful with broad U.S. Congressional support and has served as the model for other DOE crosscutting initiatives.



Structure of the Grid Modernization Initiative and Grid Modernization Laboratory Consortium

Background

The modernized grid will need to balance six attributes, and GMI tailors its efforts to incorporate them:

- 1. **Resilience.** The ability to recover quickly from any situation and sustain the operation of critical facilities and customers.
- **2. Reliability.** Improvement of power quality and fewer power outages.
- **3. Security.** Protection at every scale, from components to regions, and in our critical infrastructure.
- **4. Affordability.** Maintenance of reasonable costs to all stakeholders.
- 5. Flexibility. Ability to responds to the variability and uncertainty of conditions across a range of timescales, including a range of energy futures.
- 6. Environmental Sustainability. Facilitation of broader deployment of clean generation and efficient end-use technologies and reduces environmental impact of energy-related activities.

Grid Storage Launchpad Project

Grid energy storage is a central element in modernizing the power grid and unlocking a broad array of economic and societal benefits. Further adoption of grid energy storage will require the accelerated development and testing of new energy storage technologies that are more cost-effective, safe, and durable. On November 20, 2018, the Office of Electricity (OE) approved a Mission Need Statement (MNS) that identified the following significant battery research and development (R&D) capability gaps within the Department of Energy (DOE) complex:

- Capability for independent testing and validation of next generation energy storage materials, devices, and prototype systems under grid operating conditions.
- Characterization capabilities focused on technologies with grid applications capabilities.
- Integration of existing materials development capabilities and collaboration with industry and universities.

In August 2019, OE determined that a new facility at Pacific Northwest National Laboratory (PNNL) would optimally address these gaps.⁴

Summary

The Grid Storage Launchpad (GSL) Project will be a new, national grid-scale energy storage R&D facility that includes investments from the State of Washington, Battelle, and PNNL. Through independent testing and validation of grid energy storage technologies, the GSL will develop and promulgate rigorous grid performance standards and requirements that span the entire energy storage research and development (R&D) cycle, from basic materials synthesis to advanced prototyping. The GSL

4 Critical Decision 1

will focus on three outcomes to advance grid energy storage development:

Collaborate

By bringing together DOE, multidisciplinary researchers, and industry under one roof, the GSL will lower the barriers to innovation and deployment of grid-scale energy storage.

Validate

The facility will enable independent testing of next-generation grid energy storage materials and systems under realistic grid operating conditions.

Accelerate

From bench top to systems, the facility will de-risk and speed the development of new technologies by propagating rigorous performance requirements along all phases of R&D.

The facility will be approximately 85,000 gross square feet in size and will include approximately 35 laboratories and 150 workstations. The Total Project Cost of the Project is \$77 million. The Project is anticipated to be completed by Quarter 2 of Fiscal Year (FY) 2025, subject to appropriations.

Planning/Design Process

Before acquiring design and construction services, the GSL Project developed detailed performance specifications by touring and benchmarking six nationally-recognized battery testing facilities, including: DNV GL/New York Battery and Energy Storage Technology (NY-BEST); CAR Technologies; General Motors; FM Global; Underwriters Laboratory; and the Naval Surface Warfare Center, Crane Division.

Milestone(s)

As a line item acquisition, the project has been subject to several independent reviews, as noted below:

- Independent analysis of alternatives completed in June 2019;
- Energy Systems Acquisition Advisory Board (ESAAB); Critical Decision (CD) 1 readiness completed in August 2019;

- Head of Contracting Activity review of contracting package – May 2020; and
- Independent Project Review for Critical Decision 2/3 ESAAB - December 2020 (est.)

Formal DOE Process

The Project is subject to the requirements of DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets.¹ The Order establishes project management principles and processes with the goal of delivering projects within cost and schedule that are fully capable of meeting mission performance, safeguards & security, and environmental, safety, and health requirements. The project lifecycle is organized into project phases which are separated by Critical Decisions, which represent a project's readiness to proceed from one phase to the next.

Major Decisions/Events

The next Critical Decision for the GSL is a combined CD-2/3, the (2) Approval of the Performance Baseline and (3) Start of Construction. Planned for Quarter 2 of FY21, CD-2/3 will accommodate the GSL Project design-build acquisition strategy.

Budget History and Planned Funding Profile

Planned Funding Profile

Fiscal Year	FY2019(d)	FY2020(e)	FY2021	FY2022	FY2023	Total (\$M)
OPC ^(a)	\$1.0	\$0.0	\$0.0	\$0.0	\$1.0	\$2.0
TEC(b)	\$0.0	\$5.0	\$40.0	\$30.0	\$0.0	\$75.0
TPC(c)	\$1.0	\$5.0	\$40.0	\$30.0	\$1.0	\$77.0

a. Other Project Costs (OPC) includes Conceptual Design and Pre-Operations. For the GSL, OPC is funded through PNNL overhead.

b. TEC Construction includes preliminary and final designs, construction, project management, and other costs not captured in OPC.

c. TPC includes TEC Project Engineering and Design, TEC Construction, and OPC.
d. FY2019 and FY2020 numbers reflect actual amounts

FY2020 numbers reflect \$1m in appropriated funds and \$4m in reprogrammed funds e.

In addition to OE line item funding for the facility acquisition, PNNL and others are committing resources to leverage the DOE investment: \$15 million of Laboratory Directed Research and Development (LDRD) for catalysis research, \$8 million from the State of Washington for state-of-the-art research equipment, \$7 million from PNNL for general research equipment, and \$5 million from the Battelle Memorial Institute.

Available at, https://www.directives.doe.gov/directives-documents/400-series/0413.3-BOrder-b.

North American Energy Resilience Model

The North American Energy Resilience Model (NAERM) will provide nationalscale energy planning and real-time situational awareness capabilities based on rigorous and quantitative assessment. This effort develops a first-of-its-kind understanding of complex energy delivery interdependencies across multiple infrastructure sectors, while considering a range of large-scale emerging threats, both natural and man-made. By enhancing federal-level intelligence of the energy sector, NAERM can improve the Department of Energy's (DOE) response to energy sector incidents, sponsor strategic level exercises, and gain insight in the planning and operational factors required for a reliable and resilient energy future.

Summary

The reliability of the U.S. electric power system is critical to the Nation's economic vitality, security, and well-being. Today, that reliability is being challenged, as the infrastructure ages and as incidences of severe weather, coordinated cyber-physical attacks, and other threats to the system increase. The electric system must not only be reliable, but also resilient.²

Our Nation's bulk-power system will benefit from quantitative modeling tools that will fully integrate and analyze the interdependencies among energy infrastructure such as natural gas pipelines, pump stations, and river levels and flows. Investment in the tools, models, and expertise across infrastructure sectors provide insight gained from simulations and exercises which can enhance preparedness for natural and adversarial events. NAERM is a comprehensive resilience modeling system for North America's energy sector infrastructure, and is being developed from a collaboration between DOE, its National Laboratories, and industry. It is advancing capabilities to model, simulate, and assess the behavior of electric power systems, as well as associated dependencies on natural gas and other critical infrastructures. The modeling approach enables prediction of the impact of a range of large-scale, emerging threats; evaluation and identification of effective mitigation strategies; and coordinated planning, system restoration, and recovery (Figure1).

Status

DOE released its high-level strategy for NAERM in July 2019.³ The main phases of NAERM address:

- Phase 1: Long-term energy planning using static, offline data;
- Phase 2: National-level situational awareness using real-time streaming data for both infrastructure and threats; and
- Analytic and decision support capabilities to anticipate threats and mitigate their impacts (Figure 2).

In FY2020, NAERM research and development was divided into three sub-areas to expand model features and deliver initial NAERM platform capabilities. As such the NAERM team has thus far:

Real-Time Situational Awareness

Developed an initial tool for visualizing and analyzing layers of infrastructure data, forecasts of load and renewable resources, and graph-based interdependency analytics.

Infrastructure Modeling

Developed a modeling system to perform advanced co-simulation of energy-related infrastructure, leveraging the DOE/Grid Modernization Lab Consortium (GMLC) Hierarchical Engine for Large-scale Infrastructure Co-Simulation (HELICS) software. Capabilities include tools for performing visualization, multi-domain contingency analysis, and initial version for integrated Distributed Energy Resource models.

2 The term "resilience" means the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. -- Presidential Policy Directive 21 (Feb. 2013)

³ See https://www.energy.gov/sites/prod/files/2019/07/f65/NAERM_Report_public_version_072219_508.pdf

Software Architecture

Built a secure environment to host and orchestrate the development and deployment of the complex, multicomponent NAERM software system.





DOE Leadership and Coordination

While NAERM is managed by the Office of Electricity (OE), it is a Departmental level effort, drawing on the expertise and capabilities of multiple offices and National Laboratories (including Argonne, Idaho, Los Alamos, Lawrence Livermore, National Renewable Energy Lab, Oak Ridge, Pacific Northwest, and Sandia National Labs). This allows for the leveraging of DOE research investments under cross-cutting activities such as the Grid Modernization Initiative (GMI) and GMLC. A critical foundation for NAERM is understanding bulk-power system entity capabilities and gaining access to system models, operational data, and domain expertise. This requires extensive engagement with industry experts. The benefit back to these entities is expected to be assessing the resilience implications of energy planning decisions on associated infrastructure, such as the optimal placement of energy storage. NAERM will cultivate a real-time situational awareness and analysis capability for emergency events for optimal operations and recovery, so that Federal agencies can quickly and effectively prepare and respond. This includes providing recommendations in coordination with State and local governments, the Federal Emergency Management Agency (FEMA), and the National Guard. These capabilities will also be leveraged by DOE's National Nuclear Security Administration (NNSA), the Department of Defense (DoD), and the Department of Homeland Security (DHS) in support of their national security missions.

Major Decisions/Events

- OE leadership has previously discussed the value of NAERM with other Federal agencies and industry stakeholders. While no formal partnerships are in place, regional planning entities and other stakeholders have expressed interest in adapting modeling advancements for their individual use, e.g. analyzing multi-domain interdependencies. Determination must be made on next steps to formalize stakeholder agreements, particularly, how to effectively transfer core modeling advancements to industry.
- In September 2020, OE briefed the National Treasury Employees Union (NTEU) on OE's proposed reorganization including a description of how NAERM efforts would be embedded in its new program office. By October 23, 2020, OE will have met the NTEU obligation and will move to finalize the reorganization.

Recovery/Puerto Rico

DOE's enhanced recovery function in Puerto Rico is improving infrastructure resilience through proactive coordination and preparedness to bring prosperity back to the islands and secure critical systems against future disaster damage.

Summary

DOE's Office of Cybersecurity, Energy Security, and Emergency Response's (CESER) Division of Infrastructure Security and Emergency Response (ISER) identified an opportunity for an enhanced recovery support capability, particularly related to remote territories and islands, in the 2017 *Hurricane Season FEMA After-Action Review*. The *After-Action Review* specifically identifies the value of proactive coordination in the recovery phase as well as pre-recovery activities for improving national infrastructure resilience, and as a result, the Department's effectiveness in disaster response.

Enhanced DOE pre- and post-disaster recovery support capabilities are being brought to fruition through designating an Energy Systems Recovery Coordinator and dedicating technical assistance (TA) and research and development (R&D) programmatic resources. The Energy Systems Recovery Coordinator, located in the Office of Electricity (OE), serves as the responsible party and has a leadership role for coordinating all Departmental recovery activities and for representing DOE in interagency coordination frameworks. The Coordinator works collaboratively with program directors across the Department to identify and leverage existing work for recovery support, while establishing accountable means to reflect lessons learned back to those program managers. The Coordinator also ensures all senior leadership remain apprised of recovery-related work. Additionally, the Coordinator oversees recoveryrelated DOE and National Lab Mission Assignments from the Federal Emergency Management Agency (FEMA), while also developing Department-wide

financial recovery-related resource requests for disaster-specific supplemental appropriations.

Recognizing the state of urgency to address these critical challenges, a few key opportunities and anticipated outcomes stand out as DOE, under OE's leadership, enhances its recovery support capabilities:

Comprehensive Pre- and Post-Disaster Preparedness Support – Resilience in Recovery Phase

Coordinating pre- and post-disaster preparedness activities offers a unique opportunity to reduce current and future risk and contribute to a more resilient and secure Nation. Proactive and coordinated preparedness activities, such as assessing vulnerabilities in electrical infrastructure, identify and mitigate risks that might endanger or pose additional recovery challenges prior to the urgency and confusion that typically follows a disaster response. Coordinating pre-disaster preparedness work ensures that risk mitigation actions are taken during the recovery process, improving the resilience of infrastructure to future disasters and lowering the Federal restoration and recovery cost burden.

Existing DOE Programs Serve as Springboard for Enhanced Recovery Support Capabilities

Expanded, coordinated, and enhanced recovery support capabilities build on ready-made tools, techniques, and relationships developed across the DOE applied program offices [OE, CESER, Fossil Energy (FE), Nuclear Energy (NE), and Energy Efficiency and Renewable Energy (EERE)], including the State, Local, Tribal, and Territorial (SLTT) portfolio of preparedness support supported by ISER. These capabilities also draw on technical reports, training materials, playbooks, and relationships developed as a part of the Energy Transitions Initiative (ETI) and Grid Modernization Initiative (GMI) and serves as a springboard for DOE's disaster recovery support for localities and Federal partners. Additionally, an enhanced recovery support capability, supplemented by the deployment of advanced tools, analytic frameworks, and technologies in affected areas, provides a platform for collaborative engagement with partners across DOE's research and development offices to incorporate lessons learned into program planning, including ETI and GMI projects.

An Enhanced Recovery Support Capability – Clarifying DOE's Roles and Responsibilities for Interagency Coordination

The Energy Sector Recovery Support Function (RSF) role is the primary means for DOE to coordinate with interagency partners on matters of recovery support. Clarifying roles, distinguishing duties, and dedicating personnel to fulfill the responsibilities of the RSF provides consistency in inter- and intra-agency communications, allows for the accumulation of field experience; the development of long-term relationships with local and Federal partners; and an enhanced information conduit to the programmatic offices.

Status

The Department is currently engaged with recovery efforts in the Commonwealth of Puerto Rico and the United States Virgin Islands (USVI) with recovery support to the Commonwealth of the Northern Mariana Islands (CNMI) scheduled to commence in early FY2021.

In April 2020, DOE finalized an Interagency Reimbursable Work Agreement (IRWA) with FEMA to support DOE's role in the resilient recovery efforts from Hurricane Maria in Puerto Rico. The support provided will augment planning and operational activities as well as capacity building for public entities in Puerto Rico-e.g. Puerto Rico Electric Power Authority (PREPA), Energy Office, Vivienda, and Puerto Rico Energy Bureau (PREB)-to support the significant federal investments being made by FEMA and the Department of Housing and Urban Development (HUD) as part of the recovery of the Commonwealth. Additionally, DOE will provide subject matter expertise and assistance directly to FEMA and HUD as they implement public assistance and Community Development Block Grant-Disaster Recovery (CDBG-DR) funding.

To further improve coordination of energy sector recovery efforts in Puerto Rico, DOE co-leads an Energy Technical Coordination Team (TCT). The goal of the TCT is to collectively pursue the best recovery solutions and match to those solutions the resources of the Federal government, nongovernmental organizations, and private sector in a unified and collaborative manner.

Supported via the IRWA with FEMA, recovery efforts in the U.S. Virgin Islands are also ongoing since

2018. DOE and its national labs have been providing staff time, subject matter expertise, and technical assistance to interagency partners, the Territory, and the utility, the USVI Water and Power Authority. DOE is also working with FEMA to establish a USVI Energy TCT using a similar approach as to the one developed in Puerto Rico.

An IRWA has been signed for the CNMI, and work for this recovery effort will commence in 2021.

DOE Leadership and Coordination

While DOE—under its delegated authorities and responsibilities under Presidential Policy Directive 8: National Preparedness—has a long history of supporting communities both before and in the wake of disasters, the 2017 hurricane season and the devastation experienced in Puerto Rico and the U.S. Virgin Islands revealed the need for a more purposeful and coordinated approach to pre- and post-disaster recovery support across the Department. OE has therefore become a leader in coordinating DOE's intra- and interagency efforts.

The National Response Framework designates DOE as the Emergency Support Function-12 (ESF-12), the primary coordinator of Federal energy system restoration. The role ISER plays in supporting Federal disaster response through ESF-12 is regularly lauded by industry, Federal partners, and local constituents in affected areas. Staff from DOE's Power Marketing Administrations (PMA) make up a significant portion of the all-volunteer ESF-12 cadre. The PMAs have a long history of responding to some of the most severe hurricanes to make landfall in the continental United States and the U.S. Territories, including the devastating 2017 Atlantic season that brought Hurricanes Irma and Maria to the shores of Puerto Rico, the U.S. Virgin Islands, and several states in the southeast U.S.

The Energy Sector RSF role is the primary means for DOE to coordinate with interagency partners on matters of recovery support. OE, through the Energy Systems Recovery Coordinator, provides leadership for the RSF Leadership Group (RSFLG) Energy Sub-Group for PR and USVI recovery and ensures coordination across all responsible parties. Clarifying roles, distinguishing duties, and dedicating personnel to fulfill the responsibilities of the RSF provides consistency in inter- and intra-agency communications; allows for the accumulation of field experience; continues the development of long-term relationships with local and Federal partners; and enhances information conduits to the other DOE program offices.

OE is leveraging the interagency's coordinating frameworks that deploy resources cost-effectively and equitably in support of disaster recovery. FEMA Mission Assignments are funded requests to partner agencies for specific support to FEMA or to the communities it serves. Memorandums of Understanding and IRWAs are other common coordination mechanisms, most recently used to facilitate DOE's recovery support in the U.S. Virgin Islands. An enhanced recovery support capability will provide a structured approach for tapping into and leveraging these coordination frameworks to execute DOE's mission.

Outside of the formal Energy RSF format, DOE-OE is actively engaged with the Department of Interior's Office of Insular Affairs in coordinating support for the territories and insular areas on both pre- and post-recovery efforts. This longstanding Federal relationship, coupled with the existing relationships with stakeholders in these vulnerable communities has increased the ability to "hit the ground running" when assembling the resources needed to support recovery efforts.

Regional Resource Adequacy and Grid Reliability

Resource adequacy and grid reliability remain central topics of relevancy for the Bonneville Power Administration (BPA), especially given recent supply/demand issues precipitated by a series of hot weather events in the Western United States over the summer of 2020. These topics are all the more relevant given projected closures of certain generating facilities and reliance on renewable energy sources.

Background

During the summer of 2020, several severe hot weather events caused Western United States electricity demand to nearly exceed available generating capacity in certain hours. The Bonneville Power Administration (BPA) joins other regional utilities through the Northwest Power Pool¹ on an initiative to develop a program to ensure that the region maintains energy supply and demand parity in a very high percentage of likely conditions.

This is an issue of emerging concern in the region and to the entire Western Interconnection.² With coal plants retiring faster than previously anticipated, the Northwest faces a potential shortfall of several gigawatts of capacity to serve load. At the same time, the region is building new renewable, carbon-free generating resources. Such renewables can produce significant energy under the proper conditions, but they do not share the same long-term capacity attributes of the resources they are replacing (e.g., coal plants) to ensure resource adequacy. The Northwest Power Pool initiative proposes a regional program structure to define how much dispatchable capacity is needed and to allocate accountability for carrying that capacity. The program will also look at deliverability and for ways to take advantage of regional diversity to help participants meet obligations and be as efficient as possible with existing resources.

Issue(s)

Key issues for BPA and its customers include:

- Regulatory, legal, and jurisdictional concerns related to the unique status of BPA and public power.
- Valuation of and compensation for BPA's hydropower generation.
- Inclusion of transmission deliverability in the resource adequacy evaluation and fair compensation for the use of BPA's transmission system.
- Interaction with short-term energy markets, such as the Western Energy Imbalance Market.

Status

BPA has been participating in the current Northwest Power Pool initiative since the work began in the fall of 2019. The multi-phase initiative involves information gathering, design, and implementation. It is currently in the second phase, and participants are developing detailed design criteria.

¹ Resource adequacy and grid reliability remain central topics of relevancy for the Bonneville Power Administration (BPA), especially given recent supply/demand issues precipitated by a series of hot weather events in the Western United States over the summer of 2020. These topics are all the more relevant given projected closures of certain generating facilities and reliance on renewable energy sources.

² For more on the Western Interconnection, see <u>https://www.wecc.org/epubs/StateOfTheInterconnection/Pages/The-Western-Interconnection.aspx</u>.

Bonneville Power Administration and Western Area Power Administration Responses to Summer 2020 Western Wildfires

Wildfires occur in portions of the Pacific Northwest and the mid-Western states each year. Most of the territory in these states are grasslands, forests, mountains, deserts, and wetlands which are at high risk for wildfires and impact two of the four Power Marketing Administrations: **Bonneville Power Administration** (BPA) and the Western Area Power Administration (WAPA). Because both **BPA and WAPA have vast diverse** territories, each region has taken its own approach based on local circumstances to determine the best way to prevent wildfire ignition and damage to their power lines.

Summary

Recently, Western states—particularly California, Oregon, Washington, Colorado, and Arizona experienced major wildfires due to drought conditions, extreme heat, and extreme wind. Utilities in these states experienced major damage to their transmission lines which prevented the delivery of power to millions of people. These wildfires occurred in both Bonneville Power Administration (BPA) and Western Area Power Administration (WAPA) service areas. Transmission equipment in seven of BPA's 13 transmission maintenance districts were impacted by the fires. As fires raged, field crews from 10 BPA districts assessed, monitored, and worked with dispatch to de-energize and re-energize lines in response to the needs of customers and fire fighters. BPA also took one step that is not typical: it preemptively de-energized one line near Eugene, Oregon, in close coordination with a utility customer. Most utility preemptive shutoffs are aimed at lower-voltage distribution lines that may be near vegetation and trees. BPA's lines generally carry higher voltages and have greater clearance from brush and trees as a result, of aggressive vegetation management practices.

In total, BPA had 38 transmission lines out of service due to the fires. Some outages were due to the fire damage. Others were removed from service so fire fighters could work on or near BPA's rightsof-way, or so BPA crews could safely work on the transmission lines. BPA continues to work with two customers near Eugene that are still affected, both of which also have work to do on their systems.

The magnitude of several fires in Oregon and Washington states, and the speed with which they spread, led BPA to establish an incident management team to coordinate the agency's response to protect and maintain the region's power grid. BPA line crews were rapidly deployed to areas where BPA transmission and fiber facilities experienced service interruptions. BPA uses fiber optics attached to some of its transmission lines for operational communications, and, also leases unused fiber strands to third parties for their use. Damage to fiber near Wenatchee, Washington, impacted BPA operational data and BPA fiber customers.

Prior to this wildfire season, BPA released a comprehensive Wildfire Mitigation Plan that lays out how it will keep its transmission lines and other equipment from starting fires as well as how it will safely operate and communicate with first responders and others as wildfires both near its equipment or rights-of-way.

BPA officials remain in regular contact with customers, state emergency management officials, and other local entities. In addition, BPA is focused on its mission to meet the power needs of people in the Pacific Northwest, even as it prepares for more potential fire outbreaks. That preparation incudes continuing to act on its Wildfire Mitigation Plan, proactively managing the vegetation on its rights-ofway, and monitoring and maintaining equipment.

WAPA Actions

Each region has its own approach to mitigating wildfire risk based on the local environment and needs. WAPA and many other utilities have common practices within their vegetation management programs. They are:

- WAPA's crews observe and report any obvious issues during inspections on the lines of others to its dispatch centers who, in turn, notify their counterparts at other utilities.
- Utilize hand-held transmission line inspection tools with the ability to capture line and hardware condition, and danger tree and fire risk data.
- Establish fire management layers within its geographic information system (GIS), populated by wildfire management agencies databases, such as California Department of Forestry and Fire Protection (CALFIRE). These layers allow WAPA to be aware of current fire risk and active fires overlaid on our transmission system.
- Regular contact with the land management/ fire management agencies to coordinate and maintain relationships for effective interaction during emergency management scenarios.
- Integrate NIMS into broad training and exercise.
- Complete multiple line inspections every year, including aerial and ground.

WAPA Integrated Vegetation Management (IVM)

Our IVM program is highly effective and economical. IVM uses a two-stage approach.

- First, WAPA reclaims easement areas by clearing out tall-growing vegetation. This leaves only the low, natural vegetation in place.
- The following year herbicides are applied to keep vegetation growth low.
- The result is reduced ecological impact and savings compared to a one-time complete removal process. The goal of removing fast or tall-growing vegetation is to allow the fire

to pass right under the transmission line without impacting it. This is important because maintaining a reliable flow of electricity is critical for customers serving towns and cities in Arizona and Southern California, especially when there is a fire.

IVM focuses on:

- Annual aerial and ground patrols with high-resolution imagery.
- Ground patrols occur five times a year in northern California and twice a year in other regions.
- Contracting with independent third-party inspectors to identify, validate and review IVM work.
- Removing incompatible vegetation and leaving well-established low-lying plants instead of clearcutting. The remnants from cutting would be scattered to within 12 inches of the ground.
 - This limits fuel load while being environmentally conscious of the damage behind clear-cutting.
 - Wildfires are natural occurrences and are important for healthy ecosystems when under control. Precluding wildfire is not our goal. Keeping flames low and cool protects the lines and encourages healthy, smaller fires.
- Using herbicides on bare ground around the radius of the wood structures in our system.
- All of these options are more economical than high-tech solutions while being as effective, if not more effective, at mitigating the impact of wildfires on transmission lines.

WAPA Partnering with Forest Service in Rocky Mountain

WAPA's Rocky Mountain Region—which covers Colorado, Wyoming, and parts of Nebraska and Kansas—and its environment team partnered with the U.S. Forest Service to gain access and conduct machine clearing in rights of way on two national forests that had only been hand-cut for over a decade, leaving potentially dangerous fuel build up under the lines. Lack of mechanized clearing meant WAPA was unable to properly maintain its lines on these two forests. Through this partnership, WAPA was given permission to clear vegetation that had grown under and around its transmission lines. This growth increased the risk of fire and threatened the reliability of WAPA's system.

This effort garnered a Gears of Government award this year (2020) from the Executive Office of the President, recognizing the team's exceptional work to deliver key outcomes for the American people, specifically around mission results, customer service and accountable stewardship.

WAPA also provided emergency assistance to California local utilities during the wildfires. WAPA and the Bureau of Reclamation provided approximately 5,400 megawatt-hours of reserve hydropower between August 14 and 19, 2020. WAPA's Sierra Nevada region provided more than 3,300 MWh from 18 dams in the Central Valley Project in northern California, while the Colorado River Storage Project provided nearly 1,900 MWh from Glen Canyon Dam in Page, Arizona, and Morrow Point Dam in western Colorado. Desert Southwest provided more than 200 MWh from Hoover Dam on the border of Arizona and Nevada; Davis Dam in Arizona; and Parker Dam in California.

Hydroelectric dams are crucial sources of reserved energy in case of system emergencies. The large reservoirs, such as Lake Mead and Lake Powell, function as enormous batteries and can quickly dispatch a large amount of electricity on the grid with limited preparation. WAPA has plans in place with several utilities to provide emergency power from these and other dams in its 57 hydroelectric powerplant fleet.

In some cases, WAPA was able to offset this generation and continue to meet its customers' demand by increasing hydropower output from other dams to provide power to local areas. Also, WAPA did not de-energize any of its lines during the California energy emergency, keeping its transmission customers powered when many other communities were experiencing blackouts.

WAPA Key Lessons Learned

- Develop relationships with other organizations before you need them.
- Be up-to-speed on NIMS.

- Have excess inventory and MOUs on hand and be flexible with restoration.
- Have agreements ready to go for fire retardant services.
- Develop contacts to allow your crews to access restricted areas to perform critical work.
- Recognize fire department's leadership role in restoration; it requires significant coordination with them.
- Offer power line rights-of-way as fire breaks.
- Proactive vegetation management today will save lives and possibly lives in the future.

SN Wildfire Mitigation Plan

Following the devastating 2018 wildfire season, California passed Senate Bill 901, which required utilities to proactively work to mitigate the risk of wildfires started by power lines. Although WAPA is not subject to state regulation, in certain cases WAPA has chosen to voluntarily comply with state requirements.

WAPA developed a Wildfire Mitigation Plan in September 2019. It:

- Identifies specific steps we can take to minimize the probability that our facilities may be the origin of, or a contributing source to, the ignition of a wildfire.
- Defines a plan to establish and maintain consensus and communications among bulk transmission grid operators regarding whether WAPA's affected line(s) would be deenergized in response to a wildfire threat, and the communications and operations protocols that would be implemented to maintain grid resiliency.
- Outlines our expanded on-the-ground detailed inspections; vegetation/fuels inspections; potential risk and equipment failure detection technologies; and aerial inspection methods.

WAPA is also:

- Participating on an ad-hoc committee with the Transmission Agency of Northern California to review wildfire mitigation efforts.
- Compliant with California general orders and resource codes on vegetation management.

- Regularly coordinating with CALFIRE on fuel reduction projects, incident response teams, fire suppression efforts and educational events.
- Committing to disabling automatic reclosing on lines close to a wildfire and also de-energizing lines when necessary and notified by incident command for the safety of firefighting activities.

Conclusion

In conclusion, by identifying and proactively addressing wildfire risks, both BPA and WAPA will be able to better protect assets that may be affected by a catastrophic wildfire associated with their systems. Preventing wildfires is a team effort. BPA and WAPA constantly evaluate their vegetation management, asset management, and wildfire prevention plans with their customers, neighboring utilities, and other federal and state agencies to continuously improve their practices and procedures.

BPA and WAPA are committed to doing what is right and safe, including and especially when operating and maintaining the organization's transmission system.

Columbia River Treaty

The Columbia River Treaty (CRT) is a United States-Canada international energy and flood risk management (FRM) treaty. The United States Entity initiated the CRT Review in 2008 ahead of the first opportunity to trigger termination, with subsequent negotiations for the post-2024 future of the CRT between the Nations still underway.

Background

The Columbia River Treaty¹ is an international energy and flood risk management treaty. In exchange for Canada agreeing to construct three large storage dams in British Columbia, to operate those dams for FRM, and to optimize power generation, the United States agreed to pay Canada for 60 years of flood risk management protection and to provide Canada with half of the downstream hydropower benefits produced in the United States from the operation of the Canadian Treaty dams known as the "Canadian Entitlement."

The CRT was signed in 1961, and ratified by the United States Senate and initiated in 1964. In the United States, the CRT is implemented by the Administrator of the Bonneville Power Administration (BPA), as the chair of the United States Entity; ² and the U.S. Army Corps of Engineers (USACE) Northwest Division Engineer, as the member of the United States Entity.³ In Canada, the CRT is implemented by the British Columbia Hydro & Power Authority.⁴ Today, the CRT provides for coordinated power and FRM benefits, as well as other benefits, to both countries within the Columbia River Basin. $^{\scriptscriptstyle 5}$

The CRT has an unending term, with each country having a unilateral termination right that can be exercised on at least 10 years notice beginning September 2014. The United States Entity initiated the CRT Review in 2008 ahead of the first opportunity to trigger termination. Discussions with regional sovereigns and stakeholders were initiated in 2010 and concluded in December 2013 with a Regional Recommendation submitted to the U.S. State Department.

Summary

The United States Government reached consensus on a high-level position for negotiations of the post-2024 future of the Columbia River Treaty in June 2015, and received authorization to negotiate with Canada on the Columbia River Treaty in October 2016. Government Affairs Canada notified the U.S. Department of State in December 2017 of Canada's mandate to negotiate the Columbia River Treaty with the United States. Negotiations began in spring 2018 and continue to date. Both the U.S. Department of State and Canadian negotiators have discussed shared objectives and exchanged information on flood risk management, hydropower, and ecosystem considerations. The negotiation team of the United States consists of the U.S. Department of State; the United States Entity; the U.S. Department of the Interior (DOI) Office of Water and Science (and DOI's Bureau of Reclamation); and the National Marine Fisheries Service.

Currently, the Office of Electricity and BPA are engaged with USACE and DOI to calculate the overall value of the CRT to the United States Government per the direction of the Council of Economic Advisors and National Economic Council. The intent is to use this internal valuation effort to establish a single Federal position and advance the interests of the United States in the negotiations going forward.

¹ Treaty Between Canada and the United States of America Relating to Cooperative Development of the Water Resources of the Columbia River Basin, Can.-U.S., Jan. 17, 1961, 542 U.N.T.S. 244 (1964), <u>https://engage.gov.bc.ca/app/uploads/sites/6/2012/04/Columbia-River-Treaty-Protocol-and-Documents.pdf</u>.

^{2 &}quot;Entity" means an entity designated by either Canada or the United States of American under Article XIV of the Treaty and includes its lawful successor. Article I, 1(g) of the Columbia River Treaty.

³ *See* <u>https://www.state.gov/columbia-river-treaty/</u>.

⁴ See id.

⁵ The Columbia River drainage basin is the drainage basin of the Columbia River in the Pacific Northwest region of North America. The basin covers 258,000 square miles and includes parts of seven States and one Canadian province. *See <u>https://www.americanrivers.</u>org/river/columbia-river/.*

COVID-19 Response – Power Marketing Administrations

The pandemic of Coronavirus disease 2019 (COVID-19), caused by Severe Acute **Respiratory Syndrome Coronavirus** 2 (SARS-CoV-2), has played a defining role in 2020. With COVID-19 came new challenges to the energy sector, including the Department of Energy's (DOE) four **Power Marketing Administrations (PMAs):** Bonneville Power Administration (BPA), **Southeastern Power Administration** (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA). The PMAs have coordinated with both DOE's Office of Electricity (OE) and industry partners to ensure the successful and safe continuation of operation of their respective electric systems while operating within the COVID-19 environment.

Summary

BPA, SEPA, SWPA, and WAPA quickly responded to the national emergency¹ associated with the global COVID-19 pandemic of 2020, having coordinated with both DOE and electric utility industry partners, and in accordance with guidelines provided by the Centers for Disease Control and Prevention (CDC); the Office of Management and Budget (OMB); and the Office of Personnel Management (OPM).

The PMAs continue to actively participate in electric utility industry and Government working groups and task forces to adopt the best applicable processes and practices in dealing with COVID-19. Thus far, these processes and practices have allowed for continued reliable operation of the Nation's electric power system.

Major Actions Taken

Ensured business continuity by implementing COVID-19 safety precautions, such as CDC-approved cleaning procedures, social distancing, and the use of face coverings.

- Implemented home-to-work transportation for field workers, greatly reducing the risk of COVID-19 exposure from coworkers.
- Planned resiliency and continuity options around the sequestration of certain essential personnel (e.g., control center employees) at control centers or other facilities in order to decrease the risk of infection.

Established a maximum telework posture.

- Increased information systems functionality and security to maximize telework capabilities using remote access and collaboration tools for all telework-capable employees.
- Established new safety procedures for personnel who operate and maintain the transmission system—such as electric power transmission system dispatchers, maintenance employees, and hydro and transmission schedulers—and whose operation and maintenance of the transmission system required reporting to their normal worksites.
- Developed and instituted field crew safety procedures.
- Redesigned control centers to allow social distancing.

Activated the Incident Command System

(ICS),² which was enhanced by developing and implementing dashboards that automate the retrieval and presentation of COVID-19-related data.

Closely coordinated with OE to develop return to workplace (RTW) plans.

Regularly reported to employees current regional and service area COVID-19 statistics as indicators for decision on workforce status.

¹ Declared by the President on March 13, 2020. *See* <u>https://www.whitehouse.gov/presidential-actions/proclamation-declaring-national-emergency-concerning-novel-coronavirus-disease-COVID-19-outbreak/#:~:text=1601%20et%20seq.),%2C%20beginning%20 March%201%2C%202020.</u>

² For more on the ICS, see <u>https://www.ready.gov/business/implementation/incident</u>.

Implemented administrative leave approved by DOE for caregiving responsibilities, thus providing additional support for those employees who needed it.

Surveyed employee wellness periodically, following-up with virtual town hall meetings to address concerns and obtain additional feedback.

Broadly shared pandemic plans and RTW plans across industry.

Funding the Response

PMA funding that needs to be carried forward for any future pandemic response is listed below. This type of funding was categorized as nonreimbursable in the ratemaking process by the DOE Chief Financial Officer in consultation with OMB and Congressional staff. BPA did not request any funding from DOE for the listed assistance.

To enable telework capability for COVID-19 response, the PMAs received Coronavirus Aid Relief Economic Security (CARES) Act funding, which was provided to DOE departmental administrations and administered by the Chief Information Officer's office as follows:

- SEPA—\$50,000
- SWPA—\$550,000
- WAPA—\$2 million

To procure needed supplies, such as personal protective equipment (PPE), the PMAs combined supplies provided by DOE and the National Stockpile with additional PMA-purchased supplies from external vendors.

The PMAs fell under an OE-led ICS within the DOE hierarchy and received non-reimbursable PPE through:

- The Office of Cybersecurity, Energy Security, and Emergency Response (CESER);
- The Federal Emergency Management Agency (FEMA); and
- Surplus from other DOE organizations (e.g., other offices).

To set up recreational vehicles or other living arrangements for sheltering or sequestering mission essential employees at work if needed, the PMAs received funding from CESER.

OMB provided guidance for the use of CESER funds following two WAPA sequestration pilots in the Sierra Nevada region for its power system dispatchers April 27-May 1, 2020, and May 1-May 5, 2020.

Continuing and Upcoming Needs and Concerns

As the PMAs continue to assess work force posture and respective RTW plans, the following needs and concerns remain:

- The Secretary's authorization of home-to-work transportation usage expires March 26, 2021, and may require extension to maintain a safe work posture for those critical positions listed in the Secretary's existing authorization.
- Individual PMAs still need the ability during national emergencies to provide meals to sequestered employees, as the sequestration of mission-essential employees may still be necessary in the future.
- The PMAs could be impacted if wholesale power customers are unable to pay their bills due to "no shut-off" polices.
- Telework status will eventually change upon entry into new phases of crisis response and may require a change in management process.
- Management of social distancing by locality.

Purchase Power and Wheeling Scoring

The Power Marketing Administrations (PMAs) have long-term power marketing plans and power sale contracts with their customers. When the Federal hydropower generated is insufficient to fulfill contractual power commitments, the PMAs purchase power to fulfill their obligations. Without the Purchase Power and Wheeling (PPW) Program, the PMAs could not fulfill their contractual delivery requirements, placing the recovery of annual costs and repayment of the Federal investment at risk. Receipts for PPW are linked to expenditures for PPW in the budget and there is language and scoring to reflect that principle.

Summary

The Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA) have long-term contractual obligations with customers to market and deliver Federal power. The PPW program is critical to meeting the PMAs' mission to deliver power. If sufficient power is not generated from Federally-owned sources to fulfill the contractual obligations, generally due to drought conditions, the PMAs are required to purchase power to fulfill their obligations.

PPW Receipt authority was enacted in Fiscal Year (FY) 2001 to provide greater ability to meet the highly variable hydropower generation outputs and the purchase of replacement power when needed.¹ Receipt authority for offsetting collections in excess of amounts matched with cash remains unused and expires at the end of the fiscal year. Alternative financing of PPW supplements the receipt authority. No appropriations are requested or enacted for PPW, resulting in a zero net budget authority request. As PMA and generating agency requirements rely on power receipts, the PMAs have adopted a strategy to accumulate unobligated reserve balances for PPW programs as a way to strengthen their ability to deliver on contractual power commitments to customers during unanticipated adverse conditions. The accumulation of unobligated balances from receipts credited as offsetting collections to fund PPW provides the PMAs sufficient cash on hand to respond to current and future adverse conditions such as drought. This includes replenishment of unobligated balances to the levels defined in each PMA's respective risk mitigation strategy.

The PPW program is highly variable—it is affected by energy market conditions; generation and transmission system constraints; reservoir storage levels; drought conditions; and downstream flow restrictions. Flow restrictions result from many different events including icing; flooding; environmental activities; health and safety; recreation; irrigation; and navigation requirements. Adequate PPW authority is essential to meeting the variability in the program, including maintenance of reserves. Without PPW, the PMAs would be required to expend emergency funds payable in the same year with significant rate impacts to customers. PPW allows for a smoothing of rate impacts.

Due to disagreement on scoring of PPW in recent years, Congress has been limiting the PMAs' PPW funding levels. During the FY 2018 appropriations process, the PMAs were asked to provide more information concerning the accumulation of unobligated balances for PPW in the PMAs' accounts. Section 308 of the Consolidated Appropriations Act, 2018, required DOE to prepare and submit a report, in consultation with the Office of Management & Budget, on how SEPA, SWPA, and WAPA execute current receipt authority for PPW expenditures to the Committees on Appropriations of the House and Senate. The report explains the execution of the program and the importance of the reserve balance strategies for the PMAs. The final report² detailing PPW authority and expense recovery through the rate setting process was sent to Congress in September 2019.

¹ https://www.govinfo.gov/content/pkg/BUDGET-2001-BUD/pdf/BUDGET-2001-BUD.pdf

² https://www.wapa.gov/About/the-source/Documents/pma-ppw-expenditures-congress-report.pdf

Key Facts/Points

SEPA

- Actual PPW expenditures each year vary significantly and depend heavily upon water conditions. Hydropower unit outages are highest during severe drought conditions. SEPA's risk mitigation strategy is to carry unobligated balances sufficient to cover 90 days of expenses. This provides funding early in the new fiscal year and allows time for the collection of receipts necessary to match use-of receipt authority or potential Continuing Fund activation. SEPA recovers PPW expenses by passing actual costs incurred through to customers on a monthly basis.
- SEPA's FY 2020 receipt authority request was \$65.7 million and \$56 million was enacted.
- The FY 2021 receipt authority request is \$71.2 million. The House Mark is \$52 million, reflecting a reduction of \$19.2 million, or 27 percent. SEPA did not appeal the Mark following updated analysis of FY 2021 hydrological conditions, generation, contractual commitments, pricing, and program risk.

SWPA

- Actual PPW expenditures each year vary significantly, dependent upon water conditions and hydropower unit outages, and are highest during severe drought conditions. Drought conditions are largely unpredictable and can develop quickly (in a matter of months) in SWPA's region.
- To provide for efficient response to drought conditions, the unobligated balance strategy proactively builds up a balance of PPW funds within range of the estimated single-year severe drought PPW need of \$93 to \$95 million.
- Maintaining receipt authority for PPW in each fiscal year's appropriation language that is within range of the estimated single-year severe drought PPW needs allows SWPA to manage its unobligated PPW balances, permits SWPA to replenish the PPW funds balance (if expended), and enhances the ability to respond to a multiyear drought.
- SWPA's FY 2020 receipt authority request was \$83 million and \$43 million was enacted.

- SWPA's unobligated balance at the end of FY 2020 was \$88 million; still short of SWPA's unobligated balance strategy of \$93 to \$95 million.
- In FY 2021, SWPA requested \$70 million in receipt authority. SWPA has appealed the House Mark of \$15 million.

WAPA

- Actual PPW expenditures each year vary significantly, dependent upon water conditions. Hydropower unit outages are highest during severe drought conditions. WAPA plans for a level of adversity as experienced in FY 2014, and will develop risk mitigation for severe conditions, as in the FY 2001-2008 drought in the Pick-Sloan Missouri Basin. The budget request and rate process provide for a level of surety. Reserve strategies have been developed to mitigate the impacts of a severe long-term drought.
- WAPA's FY 2020 receipt authority request was \$258.9 million and \$227 million was enacted.
- At the end of FY 2020, WAPA reached the reserve strategy objective of \$393 million for the Construction, Operation and Maintenance account. This strategy was aligned upon with the preference power customers.
- The FY 2021 receipt authority request is \$227 million. WAPA has submitted an appeal of the \$172 million House Mark. The WAPA appeal is for \$192 million, based on current information on hydro conditions, generation, contractual commitments, pricing, and program risk.

Implications

- Alternative financing authorities are voluntary on the part of the customers. Over-reliance on alternative financing increases risk that PPW requirements may not be funded and that the PMAs may not be able to fulfill their contractual power delivery obligations.
- Continued limitations on PPW receipt authority leave the PMAs at risk of breaching contracts, service interruptions during time of drought, and customer vulnerability to higher priced purchase power and rate spikes.

Science and Security Policies

Department Leadership has developed a series of policy initiatives to reduce the risk posed by specific threats, including threats by certain foreign governments, to the U.S. research enterprise, including the DOE National Laboratories. These policies were set out through a series of three leadership memos, the first of which was issued in April 2018, the second in December 2018, and the third in January 2019. The policies are implemented through a series of DOE Orders.

The key goal of these policies is to address risks to research security and integrity while maintaining an open, collaborative, world-leading science enterprise. Throughout the development and implementation of these policies, DOE has been actively engaging with the interagency Joint Committee on the Research Environment (JCORE) led by the Office of Science and Technology Policy (OSTP).

To take action on these issues, DOE created the Federal Oversight Advisory Body (FOAB), which is comprised of representatives identified by the Office of the Under Secretary of Energy, Under Secretary for Science, and the Under Secretary for Nuclear Security. The FOAB assists in implementing these polices, and formulates new policies as needed. The FOAB is co-chaired by these three representatives and has representatives from program offices that include, but are not limited to, the Office of Intelligence and Counterintelligence; Office of International Affairs; and the Office of General Counsel.

Science and Security Policies

DOE has taken several concrete actions to mitigate the security risk at the national laboratories and throughout the DOE complex. These actions apply to international collaborations with countries of risk,¹ but allow continued and enhanced collaboration with countries that share U.S. core science values and principles.

Science and Technology Risk Matrix

The International Science & Technology Policy memo of December 2018 called for the establishment of a Science and Technology Risk Matrix. The purpose of the Matrix is to identify and put in place enhanced protections for critical and emerging research areas and technologies that are critical to U.S. economic and national security; global leadership; and competitiveness, and to mitigate against the detrimental exploitation of these research areas and technologies in ways that could harm the United States, and specifically the U.S. scientific enterprise.

The Matrix is comprised of emerging and critical research areas identified by the DOE science community that need protection from certain state-sponsored threat actors but are not otherwise protected by classified information and export controls. The Matrix places technologies into three color-coded risk categories – red, yellow, and green. Red is the most restrictive, and is limited in scope and narrowly defined. Collaboration with countries of risk in red technology areas requires specific approval by Departmental heads, granted through an exemption process. Yellow and green technology areas do not need to follow this exemption process prior to engagement.

The Chief Research Officers of the National Laboratory complex developed the Matrix by consensus at the request of DOE HQ. The Matrix is comprised of six initial emerging and critical research areas: Quantum Information Science, Artificial Intelligence/Machine Learning, High Performance Computing, Accelerator Science, Battery Technologies, and Biotechnology.

¹ Foreign Country of Risk. Any foreign country determined to be of risk, following consideration of, but not limited to, the Office of the Director of National Intelligence Worldwide Threat Assessment and The National Counterintelligence Strategy of the United States of America, by the Under Secretary for Science in consultation with the Under Secretary of Energy; the Under Secretary for Nuclear Security; and the Office of Intelligence and Counterintelligence. At this time, the countries of risk list is limited to China, Russia, Iran, and North Korea. Each of the policies detailed only applies to countries of risk.

The Science and Technology Risk Matrix was disseminated to the national laboratory complex and DOE program offices in December 2019 and will be updated, as needed, in coordination with the laboratories. It was implemented through a series of DOE Orders covering DOE sponsored foreign travel, agreements with national laboratories, and foreign national access to the national laboratories.²

DOE Order 486.1

Department of Energy Foreign Government Talent Recruitment Programs

In January 2019, DOE announced a policy prohibiting all DOE employees and contractors, including laboratory personnel, as well as DOE financial assistance recipients, from participating in foreign government talent recruitment programs sponsored by countries of risk. This policy for DOE employees and contractors, laboratory employees, and on-site research and development subcontractors was implemented in June 2019, but has not yet been implemented for financial assistance recipients as of October 2020.

The Order implementing this policy prohibits DOE employees and contractors from working in the DOE complex and participating in foreign government talent recruitment programs of countries of risk. Its goal is to mitigate against the unauthorized transfer of science and technical information to foreign government entities through their participation in foreign government talent recruitment programs of countries of risk.

DOE has been in close coordination with other science agencies under the leadership of OSTP on developing any new requirements for financial assistance to ensure there are no conflicting requirements for institutions created once implemented. Specifically, DOE is working to ensure that the Department's initiatives in these areas align with the recently issued <u>National Strategy</u> for Protecting Critical and Emerging Technologies (C&ET) and other proposed executive directives.

DOE Order 486.1A

Foreign Government Sponsored or Affiliated Activities

DOE expanded the scope of restricted activities³ for DOE employees and contractors (including laboratory employees and on-site research & development contractors) in September 2020. Restrictions on these activities do not strictly prohibit them, but employees and contractors must obtain an exemption in order to participate in these activities. This Order was implemented in October 2020.

Major Decisions/Events

Implementation of the foreign government talent recruitment program for FY 21 Financial Assistance Awards is pending and is expected to be completed calendar year 2020. Implementation of additional protection measures for financial assistance awards is pending.

² DOE Order 550.1 Chg 1, Official Travel; DOE Policy 485.1A, Foreign Engagements with DOE National Laboratories; DOE Order 481.1E Chg 1, Strategic Partnership Projects; DOE Order 483.1B Chg 2, DOE Cooperative Research and Development Agreements; and DOE Order 142.3A, Unclassified Foreign Visitors and Assignments Program.

³ https://www.whitehouse.gov/wp-content/uploads/2020/10/National-Strategy-for-CET.pdf

DOE Exascale Computing and the National Strategic Computing Initiative

DOE's Office of Science (SC) and National Nuclear Security Administration (NNSA) have partnered to establish the Exascale Computing Initiative (ECI) to deliver capable exascale computing for DOE science, technology, and national security mission needs. DOE is one of the Federal leads in the interagency National Strategic Computing Initiative (NSCI) focused on delivering exascale computing to advance U.S. economic competitiveness and national security.

Summary

It is critical to national security and economic competitiveness to maintain the Department of Energy's Exascale Computing Initiative. The July 2015 Executive Order 13702 established the National Strategic Computing Initiative (NSCI) and identified DOE as one of the lead agencies. The NSCI called upon the DOE Office of Science (SC) and DOE National Nuclear Security Administration (NNSA) to "execute a joint program focused on advanced simulation through a capable exascale computing program emphasizing sustained performance on relevant applications and analytic computing to support their missions."

 Over the past six decades, U.S. computing capabilities have been maintained through continuous research and the development and deployment of new computing systems with rapidly increasing performance on applications of major significance to government, industry, and academia. Maximizing the benefits of High Performance Computing (HPC) in the coming decades will require an effective national response to increasing demands for computing power; emerging technological challenges and opportunities; and growing economic dependency on and competition with other nations. This national response will require a cohesive, strategic effort within the Federal Government and a close collaboration between the public and private sectors.

 In 2016, DOE initiated research and development activities to deliver at least one exascale (10¹⁸ operations per second) computing capability in calendar year 2021 with two other DOE exascale systems delivered in the 2022-2023 timeframe. This activity, referred to as the ECI, is a partnership between the SC and the NNSA that addresses DOE's science and national security mission requirements.

Issue(s)

Early summer 2020, Japan overtook the U.S. on the Top500 list that identifies the world's most powerful high performance computers with the deployment of their 415 petaflop Fugaku system. "Flops" (floating-point operations per second) are the elementary unit of computational power: one flop corresponds to one calculation. One petaflop is one quadrillion (one thousand trillion or 10¹⁵) flops and one exaflop is one thousand petaflops (10¹⁸). Recognizing the importance of HPC to economic competitiveness, nations in Europe and Asia, particularly China, continue to invest in HPC. The Chinese strategy is increasingly to base their HPC systems on domestic technology, and China continues to lead the U.S. in the number of systems on the Top500 list. On the recent June 2020 TOP500 list, China has 226 systems vs. U.S.' 114 systems. By all significant measures - top ranked, total number of supercomputers in the TOP500, aggregate total computing power, and software capable of sustained performance - China now dominates the U.S. in supercomputing. In addition, China is investing heavily in its domestic production capabilities and future computing technologies, such as quantum computing, neuromorphic computing, and artificial intelligence (see definitions below). In addition, China has 3 exascale machines in the pipeline: a Sunway system in Jinangnan targeted for 2020, a NUDT system in Tianjin targeted for 2021, and a Sugon system in Shenzhen targeted for 2022. The Chinese have an advantage in that they are not held back by an installed base that needs backward compatibility and therefore, there is no need to "play it safe," leading to an open

ended design space ranging from the conventional to the exotic. However, in the past two years, there has been no announcements of new Chinese systems in the Top500.

Currently, within DOE SC and DOE NNSA, the total leadership computing capability (combined capability of existing DOE high-performance computers) is over 400 petaflops. In FY 2017, the SC R&D portion of the ECI was segregated into the Office of Science Exascale Computing Project (SC-ECP) in SC's Advanced Scientific Computing Research (ASCR) program. ECP provides the R&D necessary to effectively use exascale-capable systems while ECI is focused on the actual delivery of the exascale hardware. ASCR provides funds in ECI to support site preparations, non-recurring engineering investments and acceptance activities at the Argonne Leadership Computing Facility (ALCF) and the Oak Ridge Leadership Computing Facilities (OLCF). There are significant challenges associated with achieving this level of capacity due to the physical limits of existing computing technology and concomitant limitations in software design. Naive scaling of current high performance computing technologies would result in systems that are untenable in their energy consumption, data storage requirements, latency, and other factors. Unlike previous upgrades to DOE's Leadership Computing Capabilities, an exascale system capable of meeting critical national needs cannot be developed through incremental improvement of existing systems.

For NNSA, the execution of ECI resides with the Advanced Simulation and Computing (ASC) program mostly in the Advanced Technology Development and Mitigation (ATDM) subprogram. Starting in FY2021, the NNSA ECI activities will be transitioned to the other ASC subprograms (Integrated Codes, Physics and Engineering Models, and Verification & Validation subprograms) to transfer the nextgeneration exascale application technologies to production service. The Computational Systems and Software Environment (CSSE) subprogram is responsible for procuring the El Capitan system and investing in production-ready exascale computing technologies. A General Plant Project (GPP) funding in the Facility Operation and User Support (FOUS) subprogram will "extend" the power from the walls of Lawrence Livermore National Laboratory (LLNL) Building 453 to the El Capitan system.

In addition to its importance for U.S. competitiveness, HPC is also a critical component of the national security, energy, and science missions of the Department of Energy.

National Security Needs

Stockpile stewardship, which underpins confidence in the U.S. nuclear deterrent, has been successful over the last two decades, largely as a result of modeling and simulation tools used in the NNSA Annual Assessment process, as well as solving issues arising from Significant Finding Investigations (SFIs). In the coming decade, the importance and role of HPC at the exascale computing performance level in this area will intensify, and exascale-based modeling and simulation tools will be increasingly called upon to provide required confidence, using robust uncertainty quantification techniques, in lifetime extensions of warheads in the U.S. nuclear weapons stockpile. These tools also will have an increasing role in understanding evolving nuclear threats posed by adversaries, both state and nonstate, and in developing national policies to mitigate these threats.

Science

For nearly two decades, the department's Science programs have utilized HPC to accelerate progress in a wide array of disciplines. Recent requirementsgathering efforts across the SC program offices indicate an increasing need for advanced computing at the exascale. Examples include: discovery and characterization of next-generation materials; development of reliable earthquake warnings and risk assessment; development of accurate regional impact assessments of climate; systematic understanding and improvement of chemical processes; analysis of the extremely large datasets resulting from the next generation of particle physics experiments; and extraction of knowledge from systems-biology studies of the microbiome. Dramatic improvements in public health may result from the application of exascale capabilities to cancer research, precision medicine and understanding the human brain.

Energy

For the past six years, the Energy programs have formulated strategic plans that rely on advanced computing capabilities at the exascale. Examples include: design of high efficiency, low emission combustion engines and gas turbines; improving the reliability and adaptability of the Nation's power grid; increased efficiency and reduction in costs of turbine wind plants in complex terrains; and acceleration of the design and commercialization of next-generation small modular reactors. Advances in applied energy technologies also are dependent on next-generation simulations, notably wholedevice modeling in plasma-based fusion systems.

In 2015, the interagency National Strategic Computing Initiative (NSCI)¹ was established by Executive Order to maximize the benefits of HPC for U.S. economic competitiveness, scientific discovery, and national security, and to ensure a cohesive, strategic effort within the Federal Government. DOE is one of three lead Federal agencies for the NSCI to deliver capable exascale computing.

DOE established the ECI in the President's FY 2016 Budget Request. The DOE ECI will accelerate the development and deployment of DOE exascale computing systems and is DOE's contribution to the interagency NSCI. Within DOE, the NNSA Office of Advanced Simulation and Computing (ASC) and SC Office of Advanced Scientific Computing Research (ASCR) are the lead organizations and are partners in the ECI. In addition to the NNSA/ASC and SC/ ASCR investments, the Department's ECI also includes targeted scientific application development in SC's Office of Basic Energy Sciences and Office of Biological and Environmental Research.

In FY 2016, the ECI was split into the Exascale Computing Project (ECP) and other exascale related activities. The ECP, a multi-lab project with its project office at DOE's Oak Ridge National Laboratory, has as its sole focus the delivery of an ecosystem supporting DOE science, energy, and national security applications to run on at least two exascale machines. The ECP will follow the project management approach developed by DOE SC for large multi-lab projects such as the Linac Coherent Light Source and the Spallation Neutron Source². As such, the ECP will be executed within a tailored framework that follows DOE Order (O) 413.3B, Program and Project Management for the Acquisition of Capital Assets, and defines critical decision points, overall project management, and requirements for control of a baselined schedule

and cost. The first four years of ECP (FY 2016-2020) has focused on R&D directed at achieving system performance targets for parallelism, resilience, energy consumption, memory, and storage. The second phase, approximately the last four years of the ECP, will support production readiness of application and system software, and start of ECP operations. The other DOE ECI activities includes procurement of exascale computer systems, domain-specific software development in the Biological and Environmental Research and Basic Energy Sciences programs.

Milestone(s)

The DOE Acquisition Executive (Deputy Secretary) formally approved the Mission Need (Critical Decision 0) for the Exascale Computing Project (ECP) on July 28, 2016. Project milestones were finalized established when the project was baselined at Critical Decision 2 in February 2020.

In 2018, two DOE SC National Laboratories, Oak Ridge National Laboratory and Lawrence Berkley National Laboratory, were awarded the prestigious Gordon Bell Prize for work done on the Oak Ridge Leadership Computing Facility's (OLCF's) Summit supercomputer.³

In March 2019, DOE announced a contract with between Argonne National Laboratory and Intel to build an exascale system, called Aurora, in partnership with Cray (now HPE) and is expected to be deliver in the 2021-2022 timeframe. Aurora will be based on a future generation of Intel Xeon Scalable processor, Intel's Xe compute architecture, a future generation of Intel Optane Datacenter Persistent Memory, and Intel's One API software, all connected by Cray's Slingshot interconnect and the Shasta software stack.

In May 2019, DOE announced a contract between Oak Ridge National Laboratory and Cray (now HPE) to build an exascale system, called Frontier, in partnership with AMD and expected to be delivered in calendar year 2021. Frontier is based on Cray's Shasta architecture and Slingshot Interconnect and AMD EPYC CPU (central processing unit) and AMD Radeon Instinct GPU (graphic processing unit) technology.

¹ https://www.whitehouse.gov/the-press-office/2015/07/29/executive-order-creating-national-strategic-computing-initiative

^{2 &}lt;u>http://science.energy.gov/user-facilities/</u>

^{3 &}lt;u>https://www.olcf.ornl.gov/2018/11/20/2018-acm-gordon-bell-prize/</u>
In August 2019, DOE announced the award for the NNSA exascale system, named El Capitan, which will be delivered to LLNL starting early 2023. HPE will be the system integrator in partnership with AMD. Similar to Frontier, El Capitan will be powered by next-generation AMD EPYC Genoa CPUs and AMD Radeon Instinct GPUs, interconnected by Cray's Slingshot fabric, and using the AMD Radeon Open Compute platform (ROCm) and Cray Shasta software stacks.

In 2019, a team from ETH Zürich was awarded the prestigious Gordon Bell Prize for their work simulating quantum transport—or the transport of electric charge carriers through nanoscale materials—using the Oak Ridge Leadership Computing Facility's (OLCF's).⁴

When the Deputy Secretary approved Alternatives Analysis (Critical Decision 1) and the issuance of research and development contracts with competitively selected vendors (Critical Decision 3a) in January 2017, approval for Establishing the Project Baseline (Critical Decision 2) was delegated to the Under Secretary for Science. An independent review of ECP, in December 2019, recommended that the project was ready for approval of their project baseline. An Energy Systems Acquisition Advisory Board (ESAAB), convened in February 2020, approved ECP's project baseline.

Major Decisions/Events

Application and exascale software testing and scaling will be initiated on exascale testbeds during the first three months of 2021.

The first exascale system is to be delivered during calendar year 2021.

Background

Over the past decade, DOE has become aware that future-generation systems will require significant changes in how high performance computers are designed, developed and programmed. Although focused on overcoming the same challenges, industry responses will be aimed at near-term solutions, which are inadequate to advance DOE's scientific, engineering, and national defense missions. Addressing this national challenge requires a significant investment by the Federal government involving strong leadership from DOE headquarters, and close coordination by government, national laboratories, academia, and U.S. industry, including medium and small businesses.

Concurrent R&D investments in applications that will optimally exploit emerging, new exascale computing architectures is a critical component of the Department's effort in exascale computing. These "extreme-scale" applications, i.e., applications designed to exploit exascale computing, must also be representative of applications requirements for the full spectrum of computing, from terascale to exascale. These should include those that support nuclear weapons stockpile stewardship; scientific discovery; energy technology innovation; renewable electrical generation and distribution; nuclear reactor design and longevity; data assimilation and analysis; and climate modeling. SC and NNSA have already initiated R&D efforts in key extreme-scale mission applications.

Four key challenges, identified in previous reports must be addressed to realize productive, efficient, and economical exascale systems: ^(5, 6,7)

Parallelism

Parallelism (also termed "concurrency") is a computer architecture in which multiple processors simultaneously execute multiple, smaller calculations broken down from an overall larger, complex problem. Since around 2004, increases in computing performance have resulted primarily from increasing the number of core processors (cores) on a chip. The number of cores, and hence the parallelism, has been increasing exponentially ever since. The Fugaku computer (415 Petaflops) has over 7 million cores. Exascale computers will have parallelism a thousand-fold greater than petascale systems. Design and development of the hardware and software for exascale systems to effectively exploit this level of parallelism will require R&D followed by focused deployment. System management software and science

⁴ https://www.olcf.ornl.gov/2019/11/21/tiny-transistor-leads-to-big-win-for-eth-zurich-2019-acm-gordon-bell-prize-winner/

^{5 &}lt;u>http://science.energy.gov/~/media/ascr/ascac/pdf/reports/Exascale_subcommittee_report.pdf</u>

⁶ http://science.energy.gov/~/media/ascr/ascac/pdf/meetings/20140210/Top10reportFEB14.pdf

⁷ http://www.energy.gov/seab/downloads/report-task-force-next-generation-high-performance-computing

applications software for petascale systems, already difficult to develop, are not designed to work at such extreme parallelism. Increasing concurrency by a thousand fold will make software development much more difficult. To mitigate this complexity, a portion of the R&D investments will create tools that improve the programmability of exascale computers.

Memory and Storage

In past generations of computers, basic arithmetic operations (addition, multiplication, etc.) consumed the greatest amount of computer time required for a simulation. However, in the past decade, as central-processing-unit (CPU) microcircuits have increased in speed, moving data from the computer memory into the CPU now consumes the greatest amount of time. This issue has already surfaced in petascale systems, and it will become a critical issue in exascale systems. R&D is required to develop memory and storage architectures to provide timely access to and storage of information at anticipated computational rates.

Reliability

Exascale computers will contain significantly more electronic components than today's petascale systems. Furthermore, the individual circuit components are expected to have feature sizes of about 7 nanometers, which is at the physical limit of how small circuits can be made. The resilience of circuits becomes a serious issue at this size because of quantum effects and cosmic rays that can randomly flip data bits. Achieving system-level reliability will require R&D to enable the exascale ecosystem to adapt dynamically to a constant stream of transient and permanent failures of components. Applications must be designed to be resilient, in spite of system and device failures, to produce accurate results.

Energy Consumption

Current 10-20 petaflop computers consume approximately 10 megawatts (MW) of electrical power. Simple extrapolation to the exascale level yields power requirements of 500–1,000 MW; at a cost of \$1 million per MW-year, the operating cost of an exascale machine built on current technology would be prohibitive. Continuing discussions and partnerships with computer vendors have resulted in engineering improvements that have reduced the required power significantly.

Definitions

Artificial intelligence

Intelligence exhibited by machines, such as perceiving its environment and taking actions that maximize its chance of success at some goal.

Capable exascale computing

A supercomputer that can solve science problems 50 times faster (or more complex) than a 20-petaflop systems (e.g., Titan, Sequoia; is sufficiently resilient that user intervention due to hardware or system faults is on the order of a week on average; and has a software stack that meets the needs of a broad spectrum of scientific applications and workloads).

Gordon Bell Prize

Awarded each year by the Association for Computing Machinery (ACM) to recognize outstanding achievement in high-performance computing.

High Performance Computing (HPC)

Most generally refers to the practice of aggregating computing power in a way that delivers much higher performance than one could get out of a typical workstation or server in order to solve large problems in science, engineering, or business using applications that require high bandwidth, enhanced networking, and very high compute capabilities.

Megawatt

A unit for measuring power that is equivalent to one million watts. One megawatt is equivalent to the energy produced by 10 automobile engines.

Nanometer

A unit of measurement that is 10-9 meter, or one billionth of a meter.

Neuromorphic computing

The study of theoretical computing systems that attempt to mimic the computing abilities of the human brain to achieve faster, more energyefficient computation.

Petaflops

A measure of a computer's processing speed expressed as a thousand trillion floating-point operations per second.

Quantum computing

The study of theoretical computing systems that use quantum-mechanical phenomena to perform operations on data. Large-scale quantum computers would theoretically be able to solve certain classes of problems much more quickly than classical computers.

Scientific application

Simulating real-world phenomena using mathematics. The most well-known scientific applications are weather prediction models.

Uncertainty Quantification

The science of quantifying, characterizing, tracing, and managing uncertainties in experimental, computational and real-world systems.

DOE National Virtual Biotechnology Laboratory

DOE's Office of Science (SC) set up the National Virtual Biotechnology Laboratory (NVBL) in response to the COVID-19 pandemic. NVBL capitalizes on the world leading expertise, capabilities, and facilities at DOE national laboratory complex for tackling COVID-19 and creates an effective mechanism for the broader research community to work with the laboratories on combating the pandemic. For decades, DOE has wrestled with the biggest challenges in science, from high energy physics to genomics. In this time of need, NVBL has enabled major advances for combating the threats posed by COVID-19. The NVBL is a model for the future, helping to increase coordination across the national laboratories and leverage unique proficiencies and tools for common national needs.

Summary

The U.S. Department of Energy National Virtual Biotechnology Laboratory (NVBL) is a consortium of DOE National laboratories, each with core capabilities relevant to the threats posed by COVID-19. Funded by the Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020, the NVBL is taking advantage of DOE user facilities, including light and neutron sources; nanoscale science centers; sequencing and biocharacterization facilities; and high performance computer facilities, to address key challenges in responding to the COVID-19 threat. Examples include developing innovations in testing capabilities, identifying new targets for medical therapeutics, providing epidemiological and logistical support, and addressing supply chain bottlenecks by harnessing extensive additive

manufacturing capabilities. The NVBL collaborates extensively with researchers, both in academia and the private sector. In addition, the DOE user facilities are available to users in all sectors of the research community.

lssue(s)

The SARS-COV-2 Public Health Emergency called for unprecedented rapid research response. Facing a global pandemic, the DOE national laboratories are mobilizing on a national scale in ways similar to their origins in the Manhattan Project. That sprawling R&D apparatus developed during WWII, which would become the starting point for today's DOE national laboratory complex, was created to bring together our scientific and technical capabilities during a national crisis. With an extraordinary amount of bioscience and biotechnology expertise distributed across the 17 DOE laboratories, but with a need to focus research efforts against COVID-19 as one team, DOE and the laboratories launched the NVBL.

The NVBL framework provides DOE with a standing mechanism to i.) quickly assess R&D needs associated with a rapidly evolving situation; ii.) identify critical capabilities existing within the national laboratory system, DOE user facilities, and DOE's broader research enterprise; iii.) develop a multi-program and multi-institutional plan to deploy DOE's unique capabilities; and iv.) coordinate efforts with other Federal agencies, state and local representatives, and partners in industry.

Institutionalizing the NVBL framework within Office of Science (SC) programs will enable DOE to respond to future shifts in federal priorities or emerging opportunities, including future national crisis situations, in the broader S&T landscape

Status

Funded by CARES Act funding in March 2020, NVBL supports the following five research projects.

Epidemiological Modeling

To aid U.S. policymakers in responding to the COVID-19 pandemic, a team of researchers developed an integrated COVID-19 pandemic monitoring, modeling, and analysis capability. This project takes advantage of National Laboratory supercomputers—including the world's most powerful—along with significant National Laboratory capabilities in scalable data and computing; spatial demography and human dynamics research; and economic and risk modeling. Ultimately, this project's analysis framework, multiscale modeling system, and scalable COVID-19 data collection process will provide improved understanding of COVID-19 impacts and heightened situational awareness to government leaders.

Manufacturing

The rapid spread of COVID-19 has resulted in significant supply chain issues regarding critical medical supplies and equipment, especially personal protective equipment. Shortages in supplies such as N95 surgical masks and respirators, face shields, swabs, and ventilators put medical professionals at risk and delay an effective response to the ongoing crisis. This project will leverage advanced manufacturing capabilities at the National Laboratories, including additive manufacturing processes for metals, composites, and polymers, to facilitate accelerated production of these items. Manufacturing techniques will be integrated with materials modeling and characterization at DOE user facilities, including x-ray light and neutron sources; nanoscience centers; and computational facilities.

Molecular Design for Medical Therapeutics

The COVID-19 disease caused by the SARS-CoV-2 virus is a pressing global emergency for which there are no approved medical therapeutic interventions beyond palliative care. This project is applying a combined computational and experimental approach to accelerate scientific discovery for therapeutics targeting SARS-CoV-2. The efforts take advantage of the National Laboratory capabilities, including supercomputing and artificial intelligence; materials characterization at x-ray light and neutron sources; and nanoscience research.

COVID-19 Testing R&D

Until there is an effective vaccine for SARS-CoV-2, the virus that causes COVID-19, laboratory-based diagnostic tests are critical for protecting vulnerable populations, managing risk to all populations, supporting work strategies, and tracking the evolution of the virus and disease. Even with an effective vaccine, a new generation of tests will be required to monitor susceptibility, infection, and immunity. To address these challenges, the COVID-19 Testing R&D project is leveraging deep expertise at the National Laboratories in chemical analysis and biology to develop new approaches for improved diagnostic testing, including antigen and antibody testing.

Viral Fate and Transport

Significant capabilities across the National Laboratories related to contaminant fate and transport support the emergency response to COVID-19. Experimentation combined with physicsbased and data-driven modeling and simulation are being used to address the challenge of SARS-CoV-2 transport, transmission, and fate. This research will provide critical data and modeling results to influence the response to the current crisis and understand factors involved in emergence, circulation, and resurgence of pathogenic microbes.

Milestone(s)

The NVBL working group was established on March 9, 2020.

An Expert Panel meeting was held to solicit community input on March 19, 2020.

The CARES Act was signed on March 27, 2020, providing DOE \$99.5M for COVID-19 response.

NVBL projects initiated from April 2020 to June 2020, each with 3 – 6 months duration.

The NVBL 2020 Virtual Symposium was held on Wednesday, October 28, 2020, to highlight its accomplishments.

Background

DOE's rapid research response to COVID builds on the Department's participation in the National Biodefense Strategy (released September 2018). The Secretary of Energy is a member of the interagency Biodefense Steering Committee, which is responsible for the federal government's awareness of, preparation for, response to, and recovery from bioincidents. The Office of Science maintains a part-time representative at HHS to take part in the Biodefense Coordination Team, which carries out the policy requirements of the Strategy.

When the COVID-19 public health emergency was announced, the Secretary named the Director,

Office of Science (SC-1), to be responsible for DOE research response and the creation of the Coronavirus R&D Task Team (CRDTT), a cross-DOE team that met weekly until summer 2020. One of SC-1's first activities was to release a Dear Colleague Letter to the scientific community asking for avenues of research that should be prioritized, and that fall under DOE's broad purview and do not include human health research.

In addition to NVBL, DOE COVID rapid research response activities include the HPC Consortium coled by SC, the epidemiology/forecasting Tiger Team activities led by SC, the COVID Insights project led by AITO, and transportation modelling work led by EERE.

DOE Quantum Information Science and the National Quantum Initiative

The emerging fields of Quantum Information Science (QIS) – the ability to exploit intricate quantum mechanical phenomena to create fundamentally new ways of obtaining and processing information – are opening new vistas of science discovery and technology innovation. QIS is currently at the threshold of a revolution, creating opportunities and challenges for the Nation, as growing international interest and investments are starting a global guantum race, with implications for economic competitiveness and national security. How this revolution will develop, how great the opportunities for the U.S. science and technology sectors, and how rapidly the field will proceed, will hinge on a strategic and targeted U.S. initiative embodied in the National Quantum Initiative Act, in which DOE has a leadership role.

Summary

It is critical to United States' national security and economic competitiveness to establish and maintain global leadership in the emerging field of Quantum Information Science (QIS). This is the objective of the initiative mandated by the National Quantum Initiative (NQI) Act, Public Law 115-368, enacted on December 21, 2018. The U.S. faces fierce international competition in QIS; main players in this field include China, the EU, U.K., Canada, Australia, and the Netherlands.

DOE has a unique position to cover a wide range of QIS activities from early-stage research to securing communications – catalyzing research, development, and adoption of advanced QIS technologies and practices. Participating offices within DOE include the Office of Science (SC) and the National Nuclear Security Administration (NNSA). DOE's distinctive potential for vital contributions to the NQI is reflected in the unique capabilities and expertise that are resident in the DOE National Laboratory complex.

SC's QIS investments are focused on three key areas: early-stage core research within the SC programs, support for National QIS Research Centers, and plans to develop a quantum Internet that will connect the National QIS Research Centers and DOE laboratories. As the NQI Act recognized the interdisciplinary nature of the field, SC has emphasized collaboration and coordination of QIS activities across all the SC program offices, as well as with NNSA, DOE technology offices, other federal agencies, universities, and the commercial sector.

lssue(s)

The NQI Act established a National Quantum Coordination Office as well as a coordinated multiagency program to support research and training in QIS, encompassing activities at DOE, the National Institute of Standards and Technology (NIST), and the National Science Foundation (NSF). As the Nation's leading supporter of basic research in physical sciences, the support of the NQI is a high priority for SC/DOE.

Specifically, the NQI called for DOE to carry out a basic research program in QIS and to establish and operate up to five National QIS Research Centers to accelerate scientific breakthroughs in quantum information science and technology. These centers will promote basic research and early stage development to accelerate advancement of QIS, and advance mission needs in communication, materials and chemistry, devices and sensors, and quantum computers.

The NQI Act also called for the President to establish a National Quantum Initiative Advisory Committee (NQIAC). Under the NQI Act, NQIAC is to comprise members who are representative of industry, universities, and Federal laboratories and are qualified to provide advice and information on quantum information science and technology research, development, demonstrations, standards, education, technology transfer, commercial application, or national security and economic concerns. The President signed Executive Order (EO) 13885 establishing that the NQIAC be administered by DOE. Members of the NQIAC are appointed by the DOE Secretary, in consultation with the Director of the White House Office of Science and Technology Policy. NQIAC shall advise the Secretary and the Subcommittee on QIS (SCQIS) of the National Science and Technology Council (NSTC) and make recommendations to the Secretary to consider when reviewing and revising the NQI Program. DOE provides funding and administrative and technical support, as required. The SCQIS serves as the central interagency coordination across Executive Branch Agencies. DOE has close ties in QIS with other Agencies, including NSF, NIST, elements of the Department of Defense, and the Intelligence Community

Status

QIS within SC is a long-term effort and since the initiation of SC's investments in FY 2017, the approach taken is to include whole of SC and to invest in a wide scope in QIS. All six core science programs – Advanced Science for Computing Research (ASCR), Basic Energy Sciences (BES), Biological and Environmental Research (BER), Fusion Energy Sciences (FES), High Energy Physics (HEP), and Nuclear Physics (NP) – and the isotope program in SC are supporting research in QIS relevant to their missions but the investments of these standalone programs collectively make a significant impact on cross-cutting science areas: Fundamental Science, Quantum Computing, Quantum Communication, and Quantum Sensing.

DOE's support for science at the National labs has been, and continues to be, instrumental to progress in QIS. For example, high energy physics groups at Fermilab, SLAC, Lawrence Berkeley, and Argonne have been developing QIS technology for sensing and data analysis. User facilities like the Basic Energy Sciences-managed Nanoscale Science Research Centers are providing expertise in the development of new materials, instrumentation for QIS R&D, as well as offering opportunities for synergies across the labs and with researchers supported by other agencies. The Oak Ridge Leadership Computing facility is providing DOE QIS researchers access to current commercial quantum cloud computers through their Quantum Computing User Program.

As DOE continues to establish its leadership in QIS, the DOE National Laboratories remain strongly invested in future QIS advances via awarded and planned efforts. The Laboratories bring their extensive resources and expertise to the field and, in some cases, supplement DOE's investments with their internal initiatives.

Five of the DOE National Labs (Argonne, Brookhaven, Fermi, Lawrence Berkeley, and Oak Ridge) lead the National QIS Research Centers. These Centers constitute DOE's largest investment to date in QIS and cross the technical breadth of SC. They span a wide scope within QIS that includes communication, computing/emulation, devices/ sensors, materials/chemistry and foundries, and address all levels of the QIS science and technology innovation chain from fundamental science to devices, systems, prototypes, and applications. The Centers combine the talents of universities, national labs, other federal agencies, and the private sector in concerted efforts to support rapid progress and economic advancement.

Developing a quantum internet is an Administration and a DOE priority with a goal to help accelerate scientific discovery in all SC domains. Over the past decade, there have been intense international efforts to advance the science of quantum communication and realizing the vision of a future quantum internet. One driving force is the global recognition that quantum communication has inherent security, grounded in fundamental principles of quantum physics and unattainable by today's classical internet. Another driver is the accelerating development of peer quantum technologies, such as quantum computers that will simulate complex scientific processes inaccessible to current computational platforms, and quantum sensing that promises measurements of precision unobtainable today. Quantum networks are needed to connect quantum computers to classical computers, connect distributed quantum computers, integrate quantum sensing technology, and discover new science. Quantum communication research is in its infancy, and scientific advances are needed to develop and deploy this next-generation networking capability. In FY 2019, SC initiated a small research program to advance the field of quantum networking primarily focused on the development of quantum repeaters needed to support a terrestrial guantum internet. The Quantum Internet Blueprint recently

released by DOE portrays a plan for the Quantum Internet Project (QuIP) to develop a secure, reliable backbone initially connecting the National QIS Research Centers and ultimately the DOE National Laboratories.

DOE is active in NSTC Subcommittees focused on QIS. Dr. Steve Binkley (SC Principal Deputy Director) is co-chair of both the Subcommittee on QIS and Subcommittee on Economic and Security Implications and Quantum Science. Representatives from ASCR and HEP participate in NSTC QIS Sub-Committee's QNIWG (Quantum Network Interagency Working Group). Government activities and updates related to NQI are described in the National Quantum Coordination Office's web-site: https://www.quantum.gov/. An overview of all SC QIS activities is consolidated in one public website: https://science.osti.gov/Initiatives/QIS which also provides access to all SC sponsored workshop reports

Milestone(s)

In May 2019, SC released a request for information to solicit community input on the National QIS Research Centers. The feedback received on topical areas, collaboration, partnerships, and management was incorporated in the funding opportunity announcement issued on January 10, 2020. The selection of the five National QIS Research Centers was announced by Secretary Brouillette in a virtual event on August 26, 2020. The overall DOE program funding is up to \$625 million over 5 years.

In October 2019, Google announced quantum supremacy which resulted from the collaboration of researchers from ORNL, Google, NASA and a number of academic institutions. ORNL's Summit, the Nation's fastest supercomputer, was used in this demonstration to compete with Google's quantum computer Sycamore.

In February 2020, scientists from Argonne National Laboratory and the University of Chicago entangled photons across a 52-mile network in the Chicago suburbs, an important step in developing a national quantum internet. Located at Argonne, the loop is among the longest land-based quantum networks in the nation and is seen as a foundational building block in the development of a quantum internet. Experts in quantum hardware, quantum communications, and traditional and novel networking and infrastructure, along with experienced photon science and detection teams and materials scientists, came together in early February 2020 to develop a Blueprint for a Quantum Internet. The plan released in July 2020 is based on the experience and expertise of testbed networks established by ANL-FNAL-University of Chicago collaboration, and by BNL-Stony Brook University collaboration. Key steps for the future include forming Laboratory, academia and private sector collaborations for basic science, engineering, and technology development.

On August 28, 2020, the members of the NQIAC were announced. The NQIAC is co-chaired by Dr. Charles Tahan, OSTP Assistant Director for Quantum Information Science and Director of the National Quantum Coordination Office, and Dr. Kathryn Ann Moler, Dean of Research at Stanford University. The NQIAC held its inaugural meeting on October 27, 2020.

Major Decisions/Events

Pursuant to DOE O 413.3B, pending Critical Decision 0 approval, the next phase of DOE's Quantum Internet Project will require the Deputy Secretary as the Acquisition Executive to approve the Alternatives Analysis (Critical Decision 1) by the end of FY2022 and the issuance of research and development contracts with competitively selected vendors (Critical Decision 3a).

Background

In October 2014, an Interagency Working Group on QIS was created under the Subcommittee on Physical Sciences of the NSTC's Committee on Science to assess Federal programs in QIS, monitor the state of the field, provide a forum for interagency coordination and collaboration and engage in strategic planning of Federal QIS activities and investments. The Interagency Working Group was elevated to a standing Subcommittee of the NSTC in FY 2018, with the Principal Deputy Director of the Office of Science serving as a co-chair. Since 2014, the NSTC groups have produced a number of policy documents that address the Federal investment strategy:

- Advancing Quantum Information Science: National Challenges and Opportunities (2016)
- National Strategic Overview for Quantum Information Science (September 2018)

- A Strategic Vision for America's Quantum Networks (February 2020)
- Artificial intelligence & Quantum Information Science R&D Summary: Fiscal Years 2020-2021 (August 2020)
- Quantum Frontiers: Report on Community Input to the Nation's Strategy for Quantum Information Science (October 2020)

Starting in early 2014, SC's ASCR, HEP, BES, and NP program offices conducted a series of workshops and roundtable discussions to engage their communities in the development of a SC QIS strategy. FES conducted a similar roundtable in 2018. These community engagements led to investments beginning in FY 2017 by ASCR's launch of two QIS programs, one focused on quantum applications and algorithms and the second on quantum testbeds. Since FY2017, QIS has become a major initiative within DOE with programs of varying sizes being initiated by HEP, BES, BER, FES, and NP that support a wide scope of research in QIS.

Definitions

Quantum Information Science (QIS)

The study of the ways in which uniquely quantum phenomena such as superposition, entanglement, and squeezing can be harnessed to obtain, process, and transmit process in ways that cannot be achieved based on classical behavior.

Quantum computing

The study of theoretical computing systems that use quantum-mechanical phenomena to perform operations on data. Large-scale quantum computers would theoretically be able to solve certain problems much more quickly than classical computers.

ITER Project

ITER is a large-scale international fusion energy research facility to demonstrate the scientific and technical feasibility of fusion energy. The U.S. is one of seven member countries contributing hardware and funds to the ITER facility in France under a binding international agreement. Owing to the significant cost and concerns over project management, continued U.S. participation in the ITER project has been a matter of discussion for several years. Based on significant improvements in project management, the Secretary of Energy recommended to Congress in May 2016 that the U.S. should remain in ITER.

Summary

ITER is an international research and development (R&D) facility under construction in France by the U.S. and six other international member states. The seven signatories to the 2007 ITER Agreement are the United States, European Union (EU), China, India, Russia, Japan, and Korea.

ITER remains the best candidate today to demonstrate sustained burning plasma, a necessary step to demonstrating fusion energy power. ITER's design objectives are to produce at least 500 MW of fusion power for pulses lasting at least 400 seconds.

Congress authorized U.S. participation through the Energy Policy Act of 2005, and the internationally binding ITER Agreement was signed by the members in 2007. As the host party, the EU contributes 45.4% of the construction cost, with the six other partners each providing 9.09%.

Issue(s)

Since 2008, the U.S. contribution has risen from a range of \$1.45B to \$2.2B, to a current range of \$4.7B to \$6.5B, which includes ~\$1B in cost contingency. The planned First Plasma date has slipped from 2019 to no earlier than 2025. Schedule delays have been driven by the conventional construction of the tokamak building and the vacuum vessel's fabrication. Poor project management at the ITER Organization (IO) and poor IO/Member coordination also contributed to the delays of the Project. Recent management changes implemented at the IO since 2015, including a new Director-General, significantly improved project performance and led to stabilization of the cost and schedule estimates. In a report to Congress in May 2016, the Secretary of Energy recommended that the U.S. remain a Member of ITER. A subsequent report in 2019 by the National Academies of Sciences, Engineering, and Medicine recommended continued support of U.S. involvement in ITER.

ITER remains the best candidate to demonstrate a sustained burning plasma, the condition required to have the plasma release more energy from the fusion of light elements than it takes to produce, heat, and maintain the plasma. However, due to ITER's technical and organizational complexity, the project construction costs have increased, and the schedule has slipped substantially. In 2016, the ITER project schedule to achieve First Plasma was changed from November 2019 to a date no sooner than December 2025. A reassessment of the schedule due to COVID-19 is expected to result in a further delay to the baseline schedule. The U.S. estimated costs for the overall Project have increased from an initial estimate of \$1.45B to \$2.2B in 2008, to a current range of \$4.7B to \$6.5B. The original plan for ITER was to achieve thermonuclear burn by 2016. Presently, the estimated date for achieving thermonuclear burn is the mid to late 2030s.

In March 2015, a new Director-General of the ITER Organization, Dr. Bernard Bigot, was appointed. Since that time, substantial improvements in project management and performance have occurred. As of September 2020, the subproject to achieve the First Plasma milestone in late 2025 is over 70% complete. An analysis of COVID-19 impacts on the schedule are expected to be presented at the ITER Council (the seven member-country governance council overseeing the ITER Organization) meeting in mid-November 2020.

Status

Under Director General Bigot's direction, project management and execution has dramatically improved. The evidence of ITER management improvements includes a better organizational structure and the hiring of qualified people in key positions; good performance of the ITER project measured against the updated schedule and the defined milestones; and positive results from independent reviews of the ITER schedule and the overall management (e.g., the biannual Management Assessment review, the most recent of which was completed in 2020).

The U.S. ITER Project comprises in-kind hardware contributions (~80%), plus monetary contributions to support the ITER Organization functions and responsibilities. The U.S. ITER project has continued to meet its deliveries and key schedule milestones for hardware. As of August 2020, the U.S. contributions--including design, manufacturing, and hardware delivery to be installed for First Plasma--is 65% complete, with 38% of First Plasma scope delivered to the ITER site.

The U.S. ITER Project (i.e., the U.S. contribution) achieved Critical Decision-1 (Approve Alternative Selection and Cost Range) in January 2008. The U.S. ITER project achieved a Performance Baseline for First Plasma (Critical Decision-2) and approval for start/continuation of hardware fabrication (Critical Decision-3) in January 2017.

Milestone(s)

- In May 2016, the DOE Secretary submitted a report to Congress with his recommendation that the U.S. remain a Member of ITER through FY 2018.
- As required by Congress in the FY 2016 Appropriations Report language, DOE delivered a Status Report to Congress in February 2016 and an update in August 2016.
- DOE tasked The National Academies of Sciences, Engineering, and Medicine to re-evaluate the U. S. continued participation in ITER. The report from the Committee on a Strategic Plan for U.S. Burning Plasma Research, released in January 2019, recommended that the U.S. remain a Member of ITER.
- ITER partners celebrated the start of machine assembly on July 28, 2020. The first major assembly activities for the ITER tokamak involve joining vacuum vessel components with their corresponding toroidal field magnet coils produced by China, Europe, Japan, Korea, Russia, and the United States.

Major Decisions/Events

DOE will continually assess U.S. participation in ITER and provide periodic recommendations to Congress.

Major upcoming decisions and events include the following:

- In November 2020, an ITER Council Meeting will occur. The U.S. Head of Delegation is a DOE senior leader (typically SC-1).
- Future meetings of the ITER Council are scheduled for June and November 2021.
- The December 2025 milestone date for First Plasma is currently being assessed for potential COVID-19 delays.
- The post-First Plasma U.S. contributions to the ITER project have not yet been baselined.

Background

At the November 1985 Geneva Summit, a Reagan-Gorbachev initiative led to the ITER Conceptual Design Activities (CDA). These began in April 1988 and were completed in December 1990. They carried out jointly by the U.S., the European Union, Japan, and the USSR under IAEA auspices. On July 21, 1992, the European Union (EU), Japan, the Russian Federation, and the U.S. signed a six-year ITER Engineering Design Activities (EDA) Agreement. The U.S. completed its responsibilities under the EDA in 1998 but did not extend its participation, effectively withdrawing from ITER.

On January 30, 2003, President George W. Bush announced that the U.S. would join the ongoing ITER negotiations. From that time until the signing of the ITER Joint Implementation Agreement (Agreement) in November of 2006, the negotiators resolved several critical issues, including the siting of the ITER project in France; the management and financial responsibilities and allocation of material (in-kind) contributions; and the creation and staffing of an ITER Organization to manage ITER's construction and operations. The Agreement was signed in November 2006 and went into force on October 24, 2007. The Agreement was ratified as a treaty by the other partners after signature. The U.S. ratified it as a Congressional-Executive Agreement before signing it under the authority provided by the Energy Policy Act (EPAct) of 2005. DOE is the lead U.S. Government agency

responsible for the delivery of U.S. commitments to ITER construction. These commitments include roughly 80% in-kind hardware components (with associated R&D and other costs), as well as 20% monetary contributions to the ITER Organization to cover shared expenses such as personnel, assembly, commissioning, and agreed-on site infrastructure costs. After research operations commence, the DOE will contribute 13% of the monetary costs of running the ITER research facility, in addition to the costs of supporting U.S. researchers who are selected to perform experiments at the site.

DOE senior management has leadership responsibility for the Project. The Associate Director of the Office of Science for the Fusion Energy Sciences program office has responsibility for managing the U.S. project and provides input to strategic decision-making at higher Department levels.

The U.S. ITER Project Office (USIPO) at Oak Ridge National Laboratory is responsible for the delivery of U.S. components. The pace of deliveries is expected to ramp up significantly over the next three years to move toward the completion of U.S. First Plasma commitments.

Congress, particularly the Senate, had expressed serious concern over the management of the ITER Organization in the past, but is now apparently satisfied with the progress made under the leadership of Director-General Bigot. In FY 2020, Congress appropriated \$242 million for ITER (the President's Request was \$107M), including \$85M to make current and some past cash payments to the ITER Organization. Congress is aware that the elimination of U.S. cash payments in FY 2016 and 2017 and the provision of partial payments in FY 2018 and 2019 has impeded the ITER Organization's ability to execute on design, assembly, and installation of the ITER machine and facility.

DOE/NNSA Role in Nuclear Arms Control Negotiations and Implementation

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) supports the negotiation and implementation of nuclear arms control agreements.

Summary

The Department of Energy's National Nuclear Security Administration (DOE/NNSA) provides essential policy and technical support to the negotiation and implementation of nuclear arms control agreements. DOE/NNSA participates in the U.S. Government policy development process and in international negotiations for these agreements, ensuring DOE/NNSA interests and equities are represented and communicated. In addition, DOE/ NNSA develops and evaluates policy options and technical capabilities to enable current and future monitoring and verification initiatives, and works with other NNSA elements, U.S. Government agencies, and international partners toward this end. This work is led through the Deputy Administrator for Defense Nuclear Nonproliferation and the Office of Nonproliferation and Arms Control (NPAC), working closely with the Office of Defense Programs and the Office of Defense Nuclear Nonproliferation Research and Development.

lssue(s)

The New START Treaty expires on February 5, 2021, but may be extended up to an additional five years if both the United States and Russia agree. The United States has not made a decision regarding extension. Following three rounds of talks with the Russian Federation in Vienna, Austria, during the summer of 2020, the United States proposed a framework for a potential path forward on a follow on agreement to New START, which if agreed to, could facilitate an interim extension of the current agreement. The United States indicated that any extension is conditional upon: (1) serious engagement on a new agreement covering and accounting for all nuclear warheads; (2) China joining the United States and Russia in a future trilateral agreement; and (3) improvements to New START verification requirements regarding the number of inspections, the timing of inspection notifications, and the exchange of telemetric information. While the United States assesses that Russia is complying with the New START Treaty, it possesses large numbers of non-strategic nuclear weapons (NSNW) and is developing new kinds of strategic offensive nuclear weapons systems. Russian NSNW and some of their new kinds of strategic offensive arms are not subject to New START's limits and, therefore, pose an unconstrained threat to U.S. national security.

Status

Russia has publicly stated its interest in extending the New START Treaty but has rejected the most recent U.S. conditions. China has also called on the United States and Russia to extend New START while rejecting any calls to join talks for a trilateral nuclear arms control agreement. President Donald J. Trump has made clear that Russia and China must be brought into any future arms control agreement, and the Special Presidential Envoy for Arms Control, Marshall Billingslea, has been regularly conveying this message during the past six months.

Milestone(s)

The United States has not made a decision regarding New START extension, but has tied a decision to extend the Treaty to progress toward a new arms control agreement that includes accounting for, and potentially limiting, total numbers of all nuclear warheads. If the President decides to extend the current New START agreement, the U.S. process for extension can move quickly as Congressional approval is not required. Russia has indicated that its domestic process will take more time, as the State Duma must agree, though it is generally believed that this would happen quickly if President Vladimir Putin so decided. New START does not include a date by which the sides must reach agreement on extension, so agreement can be reached any time prior to the Treaty's expiration on February 5, 2021.

Background

DOE/NNSA has a long history of providing critical support to the negotiation and implementation of nuclear arms control agreements and developing and evaluating technical capabilities for arms control verification. DOE/NNSA remains active in the ongoing U.S. interagency arms control policy development process, and has been heavily involved during the past six months in supporting high-level talks between the United States and Russia on a new agreement covering all nuclear warheads.

DOE/NNSA arms control activities and responsibilities include the following:

New START Treaty

DOE/NNSA engages in policy development, negotiation, and implementation support, and compliance analysis for the New START Treaty. This includes representing DOE/NNSA in the U.S. interagency Backstopping Committee process and Verification and Compliance Analysis Working Group (VCAWG) and participating in the Treaty's two annual Bilateral Consultative Commission (BCC) meetings.

Trilateral Arms Control/New START Treaty Follow-on

DOE/NNSA engages in policy development, negotiation support, and development and analysis of monitoring and verification measures, particularly with regard to technical measures that may be deployed at nuclear weapon production facilities to account for total nuclear warhead stockpiles. DOE/NNSA has participated in nearly all meetings with Russia on a new agreement since negotiations led by U.S. Ambassador Marshall Billingslea began in June 2020.

Nuclear Explosive Testing Limitations

DOE/NNSA engages in policy development and technical implementation for the Comprehensive Nuclear-Test-Ban Treaty (CTBT), the Threshold Nuclear Test Ban Treaty (TTBT), and other nuclear explosion testing limitations. This includes representing DOE/NNSA in the U.S. Interagency Verification and Monitoring Task Force (VMTF) and providing technical support to maintain and enhance the effectiveness of the CTBT International Monitoring System (IMS) and CTBT International Data Centre (IDC). It also includes oversight of technical projects that contribute to U.S. and international nuclear explosion monitoring capability.

Open Skies Treaty

DOE/NNSA engages in policy development, implementation, and compliance analysis, and works to ensure DOE/NNSA equities are represented within the U.S. interagency. [Note: On May 22, 2020, the United States submitted notice of its decision to withdraw from the Treaty due to ongoing Russian violations, and effective November 22, 2020, the United States will no longer be a party. In a press statement on May 21, 2020, Secretary of State Pompeo said the United States may reconsider its withdrawal should Russia return to full compliance.]

Future Monitoring and Verification Initiatives

DOE/NNSA engages in development, evaluation, and exercising of technical capabilities to enable current and potential future nuclear warhead monitoring and verification initiatives that balance operational and security considerations across the NNSA Enterprise. This includes oversight of technical projects across the National Laboratories, Plants, and Sites and work with other NNSA and U.S. Government elements as well as international partners.

Columbia-Class Submarine

Naval Reactors Development of Life-of-Ship Reactor Core.

Summary

The OHIO-Class ballistic missile submarine (SSBN), which provides the sea-based leg of the nation's nuclear triad, is approaching the end of its useful life. As the most survivable leg of the triad, SSBNs play a critical role in the deterrence mission and will continue to do so for the foreseeable future. It is imperative that the Navy replace its capabilities to ensure continuous and credible sea-based strategic deterrence.

Issue(s)

Naval Reactors is developing a reactor plant with a life-of-ship core, which will serve in excess of 40 years, and electric drive propulsion for the COLUMBIA-Class. Work to support the COLUMBIA-Class submarine is tightly synchronized between Navy and DOE-funded propulsion plant work.

Status

The FY 2021 DOE budget request will continue supporting oversight of the lead ship propulsion plant components and safety analysis work required to support lead ship reactor testing. Navy began procuring long-lead material for the propulsion plant and manufacturing the life-of-ship reactor core in FY 2019.

Milestone(s)

To meet increased operational availability, stealth, and energy requirements for the COLUMBIA-Class submarine, ship construction starts in 2020.

Milestone	Date
Delivery of lead ship to the Navy	FY 2028
Strategic patrol of lead ship	FY 2031

Major Decisions/Events:

The President's FY 2021 DOE and Navy Budget requests fully support the project's requirements. Maintaining support is critical to meeting the schedule and supporting USSTRATCOM requirements.

Background

The current OHIO-Class fleet has already been extended from a service life of 30 years to its current life of 42 years. The OHIO-Class's service life cannot be extended further and will begin to retire in 2028 at a rate of one per year.

Emergency Operations and Continuity of Operations

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) maintains a wide range of capabilities in the core areas of crisis operations, continuity programs, and emergency management.

Summary

The Office of Emergency Operations (NA-40) is responsible for several critically important emergency management missions. DOE's National Nuclear Security Administration (NNSA) is charged with coordinating the Department's Emergency Management Enterprise for all-hazard response. The Office is currently focusing on one key mission area that will require transitional leadership attention and awareness.

Issue(s)

DOE has one (1) critically important ongoing emergency management mission focus:

Coronavirus (COVID-19)

NNSA's Office of Emergency Operations coordinated tracking and updates across the DOE/NNSA complex. NNSA's mission work has continued through the pandemic with minimal disruption. From nuclear weapons activities; to arms control and nonproliferation; to maintaining its support for naval nuclear propulsion, NNSA met critical timelines for program and major project deliverables while adhering to COVID health and safety requirements. NNSA is now conducting a detailed study of lessons learned during the pandemic for maximizing infrastructure and operational efficiency and effectiveness during future disruptive events.

Status

The Office of Emergency Operations continues to safeguard the health and safety of workers and the public; protect the environment; and enhance the security and resilience of the Department and the Nation by applying a whole-of-community approach to mitigate, prevent, prepare for, respond to, and recover from all-hazards emergencies.

Threat Assessment

Using a variety of open source and restricted distribution sources of information, emergency management specialists within NA-40 serve as subject matter experts at Biological Event Monitoring Team (BEMT) and Threat Working Group meetings. NA-40 provides critical analysis and data information into briefing up to 200 leaders and their staff for use in decision making related to the current COVID-19 emergency and the Department's and NNSA's response to the pandemic. In cooperation with public health and occupational medicine epidemiology experts, a weekly pandemic threat assessment is provided to the Threat Working Group and addresses risk from the virus to the DOE/NNSA complex. The focal point for threat assessment is the analysis and recommendation to senior leadership of emerging items of concern that may impact DOE/NNSA safe return to work in accordance with current policies, guidelines, and procedures. The NA-40 representative developed the National Capital Region (NCR) COVID-19 Phase Line Recovery Report to provide senior leadership with situational awareness regarding the attainment of return-to-work gating criteria. In total, NA-40 threat assessment products provide pandemic threat briefings for the 250+ members of the DOE Threat Working Group and DOE Threat Working Group Senior Executive Steering Committee. Additional topics include a weekly update on the effectiveness of vaccine development and of medical countermeasures, followed by a question and answer session to further address topics of specific interest or concern.

Safe Return to Work Analysis

NA-40 has continued developing and delivering the Weekly Reopening Reporting Criteria Stoplight Chart to DOE Leadership every Monday. The Stoplight Chart is based on the gating criteria outlined in the President's Opening Up America Again Guidelines, which provides a status assessment on COVID-19 symptoms, cases, hospitalizations, state directives, mass transit, and dependent care for DOE and NNSA Headquarters and select Labs, Plants, and Sites. The purpose of the Stoplight Chart is to help inform and support DOE and NNSA leadership in determining each site's phase transition decisions. To do so, the Stoplight Chart is presented to DOE and NNSA leadership every Tuesday at the Emergency and Incident Management Council (EIMC) meeting.

Lessons Learned

NA-40 leads the NNSA Recovery Team Working Group, which includes membership from NNSA HQ Offices and Field Element representation. The Working Group was formed to develop and implement the NNSA Phased Recovery and Re-Entry Plan and serve as a forum to raise awareness on common issues of concern related to the process at HQ and in the field at DOE/NNSA labs, plants, and sites. The Plan was developed by the Working Group and received final approval and signature by the NNSA Administrator on June 2, 2020. Once the Plan was signed and implemented throughout the Enterprise, the Working Group focused its efforts on sharing COVID-19 lessons learned from NNSA HQ and Field Offices and addressing medical, human resources, management and administration, and legal issues in light of the COVID-19 operational environment. The Working Group continues to meet every Friday to share COVID-19 Lessons Learned with NNSA HQ offices and field elements.

NA-40 is also working in close partnership with NA-50 to support the NA-2 directed COVID-19 Lessons Learned for Enduring Organizational Improvement initiative. Currently, NA-40 is developing a draft project plan for this initiative, which is scheduled to begin in October 2020. The purpose of this initiative is to systematically evaluate our pandemic lessons learned as an Enterprise—to include those identified by the Office of Enterprise Assessments and the Energy Facility Contractor's Group—and determine which lessons NNSA should apply during normal working conditions beyond the COVID-19 environment to enhance the efficiency, resiliency, and continuous improvement of the NNSA for the long term. As part of this initiative, four teams will be formed to evaluate the cross-cutting impacts to the NNSA mission, people, infrastructure, and governance and management framework. The top three lessons learned will be determined by

each of the four teams for their respective areas and submitted for approval for incorporation into NNSA's Annual Report to Congress in Spring 2021.

Senior Leadership Briefing (SLB)

NA-40 has taken the lead in generating and maintaining a very forward-leaning briefing document submitted to a large group of stakeholders to provide a high-level overview of DOE/NNSA actions, activities, and requirements in response to a situation or event requiring the engagement of the Emergency Response Organizations. Broken down into seven (7) Lines of Effort (LOE) that represent priority critical government and business functions (Safety and Security; Health and Medical; Energy; Communications; Transportation; HAZMAT; and Food/Water/Shelter) that are based upon the National Response Framework, the LOEs provide Senior Leadership with bottom line up front information needed to inform critical decisions in a format recognized across the interagency. Scalable and flexible, the SLB is tailored to each event to provide the Senior Leader information reflective of the requirements of the response and is currently being distributed each weekday in response to the current COVID-19 situation.

Milestone(s)

To ensure DOE/NNSA are best prepared to continue essential functions during the present COVID-19 pandemic, NNSA's Office of Emergency Operations will continue to complete the following critical tasks.

Milestone	Due Date
Develop and deliver the Weekly Reopening Reporting Criteria Stoplight Chart to DOE Office of Science	Every Monday
Conduct of Weekly NNSA Recovery Team Working Group meetings	Every Friday
DOE Headquarters COVID-19 status change from Phase 2 to Phase 3	TBD

Major Decisions and Events

Provide Introductory Leadership Briefings

As part of the transition process, briefings for the new DOE and NNSA leadership teams will be required to outline the Secretary's responsibilities in the event of a nuclear incident or major disaster impacting the nation's energy infrastructure.

Continue to Strengthen Emergency Management Processes and Procedures

NA-40 is addressing recent findings from the COVID-19 Lessons Learned, which recommend refinement of emergency management processes and procedures. DOE Order 151.1D, Comprehensive *Emergency Management System,* was revised on 11 August 2016 to standardize and enforce DOE's management and administration of the Emergency Management System complex wide. DOE Order 150.1X, Continuity Programs, is currently in the revision process. NA-40 is developing Emergency Relocation Group (ERG) and Devolution Emergency Response Group (DERG) training, scheduled for December 9, 2020. This training provides further opportunity to strengthen continuity preparedness through training of COVID-19 lessons learned and status of phased recovery for the Department's Continuity personnel.

Modernize the Consolidated Emergency Operations Center (CEOC). In line with the NNSA Strategic Vision (Mission Priority #5; Modernize the national security infrastructure), NNSA's NA-40 team aims to modify and update the 24/7/365 existing watch office space to create an improved operational capability that can assist in meeting our national security missions today and into the future. A sequenced infrastructure improvement process has been identified that will start in 2021 that will allow for upgrades to physical space and technological solutions in classified and watch operations spaces without loss of function in the process.

National Nuclear Security Administration NEPA

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) National Environmental Policy Act (NEPA) compliance is critical for NNSA activities, including Plutonium Pit Production.

Summary

NNSA must complete appropriate National Environmental Policy Act (NEPA) reviews and comply with NEPA requirements for all operational activities. Major activities such as procurements and construction cannot begin until NEPA reviews are complete. The NNSA Office of the General Counsel (NNSA GC) is responsible for ensuring that all programmatic and site-specific NEPA reviews are conducted in full compliance with the law. In addition, NNSA GC assists the Department of Justice when a party challenges NNSA's NEPA compliance in federal court. Consistent with the new regulations promulgated by the Council on Environmental Quality (CEQ), all new NEPA activities initiated after September of 2020 comply with the new CEQ regulations. NEPA actions which were initiated prior to the new regulations' effective date are being completed consistent with regulations in place at the time the action began.

lssue(s)

The timing and procedural accuracy of NNSA's NEPA actions is critical for continued timely NNSA operational activities. In particular, NEPA compliance will be vital in ensuring NNSA meets the statutory requirement to produce at least 80 pits a year by 2030 with at least 30 of these pits produced at the Los Alamos National Laboratory (LANL). NNSA plans to produce the remainder of the pits using the facility originally intended for the Mixed Oxide Fuel (MOX) Fabrication Facility Project at the Savanah River Site. Local and regional groups and politicians are particularly interested in the Pit Production NEPA process and environmental groups have promised litigation, which could delay implementation of the Plutonium Pit Strategy at both LANL and the Savannah River Site in South Carolina (SRS).

Status

NNSA's NEPA analyses at most sites is proceeding normally. NNSA's NEPA strategy for plutonium pit production is being executed on schedule, but environmental groups have promised litigation.

Milestone(s)

Completed

December 2019: Final Supplement Analysis (SA) of the Complex Transformation Supplemental Programmatic Environmental Impact Statement (CT SPEIS).

August 2020: Final SA for the Site-Wide Environmental Impact Statement (EIS) for Continued Operation of LANL.

September 2020: Amended Record of Decision (AROD) for the CT SPEIS for LANL pit production activities.

September 2020: AROD for the Site-Wide EIS for the Continued Operation of LANL.

September 25, 2020: Final EIS for Plutonium Pit Production at the SRS.

Anticipated

Expected no earlier than October 25, 2020: AROD for the CT SPEIS for SRS pit production activities as the second selected site.

Expected no earlier than October 25, 2020: ROD for the Plutonium Pit Production at SRS EIS.

Background

Plutonium pits are critical components of every nuclear weapon, with nearly all current stockpile pits having been produced from 1978–1989. Today, the United States' capability to produce plutonium pits is limited. To produce pits with enhanced safety features to meet NNSA and Department of Defense (DoD) requirements, mitigate against the risk of plutonium aging, and respond to changes in deterrent requirements driven by growing threats from peer competitors, the DoD requires NNSA to produce no fewer than 80 plutonium pits per year by 2030, and to sustain the capacity for future programs. This mission-need to produce 80 pits per year by 2030 is codified in statute. To achieve the nation's pit production requirement, NNSA proposed to repurpose a facility at SRS to produce plutonium pits while also maximizing pit production activities at LANL as the best way to manage the cost, schedule, and risk of such a vital undertaking.

In June 2019, NNSA publicly announced its approach to NEPA compliance for the expanded pit production mission. The plan was to first conduct a programmatic review to assist in decisions as to how to execute the pit mission and thereafter to conduct site-specific reviews. NNSA has completed almost all NEPA milestones for pit production, at this time only awaiting an AROD for Complex Transformation and a ROD associated with the Environmental Impact Statement for the Savannah River Site. Upon the completion of NEPA documentation process, environmental groups have promised to bring litigation against the Department, which would allege inadequate NEPA review. Neither project work nor litigation can be started until publication of the respective RODs and ARODs. Typically, construction work subject to the NEPA process is halted pending the outcome of any litigation and a judge may issue an injunction prohibiting execution of the work subject to the NEPA. However, in certain circumstances NNSA may proceed with construction during the litigation, but may have to take corrective actions depending on the outcome. NNSA is prepared to assist the Department of Justice in defending NNSA's NEPA compliance.

NNSA's NEPA strategy is to build upon and update previous analysis of the environmental effects of pit production. NNSA has previously evaluated the environmental effects of pit production levels far higher than the ones contemplated by the current program. The fact that pit production has been considered on a larger scale in the past does not excuse NNSA of doing the necessary NEPA analysis of this level of pit production going forward. It does, however, allow NNSA to build upon previous analysis rather than starting from scratch and complete the necessary analysis in a timely and efficient manner.

Previously, NNSA prepared the Complex **Transformation Supplemental Programmatic EIS** to analyze the potential environmental impacts associated with pit production at different site alternatives: LANL in Los Alamos, New Mexico: SRS near Aiken, South Carolina; Pantex Plant near Amarillo, Texas; Y–12 National Security Complex in Oak Ridge, Tennessee; and the Nevada National Security Site north of Las Vegas, Nevada. At SRS, the Complex Transformation Supplemental Programmatic EIS also evaluated a pit production facility that would use the MOX facility and pit disassembly and conversion facility infrastructure. Additionally, pit production at LANL has been analyzed in several NEPA documents over the past two decades. RODs have authorized pit production levels of no more than approximately 20 pits per year at LANL. However, higher levels of pit production have been analyzed in: The Complex Transformation Supplemental Programmatic EIS, which analyzed pit production levels as high as 125 pits per year for the 5 sites listed above; and in the 2008 LANL Sitewide EIS, which analyzed up to 80 pits per year at LANL in the Expanded Operations Alternative.

DOE/NNSA Nuclear Emergency Support Team

The Department of Energy (DOE)/National Nuclear Security Administration (NNSA) is responsible for preparing for and responding to nuclear incidents and accidents domestically and overseas. These response missions include both national security and public health and safety disciplines.

Summary

The Nuclear Emergency Support Team (NEST) encompasses DOE/NNSA nuclear and radiological emergency response functions, including all NEST field-deployed and remote technical support elements. Managed by NNSA's Office of Nuclear Counterterrorism and Counterproliferation (CTCP, NA-80), NEST is responsible for executing the Department's Primary Mission Essential Function (PMEF) #2, Respond to Nuclear Incidents, which involves "providing operational support and decision-making in protecting against and responding to a nuclear incident, both domestically and internationally." NEST's critical incident response missions include countering weapons of mass destruction (WMD) threats; responding to accidents and incidents involving U.S. nuclear weapons; and conducting operations to protect public health and safety. NEST is comprised of experts from the CTCP offices and national laboratories, plants, and sites who execute or support the incident response missions for which the Department is responsible.

NEST's missions derive from a body of legal statutes, presidential policies, and international agreements, which prescribe the Department's specific roles in responding to various contingencies. In particular, in the event of an incident involving a nuclear threat device, including an improvised nuclear device or a nuclear weapon out of state control, presidential policy requires the Secretary of Energy to perform a critical coordination role with the Attorney General (for domestic incidents) or the Secretary of Defense (for overseas incidents) to inform the President and provide assessments of potential courses of action.

NEST Assets

Although NEST has existed in various incarnations for over four decades, individual NEST assets have been operational for more than 60 years. The following NEST elements execute the full range of the Department's countering WMD, nuclear weapon accident response, and public health and safety missions.

Joint Technical Operations Team (JTOT)

JTOT provides technical and scientific expertise along with operational support personnel in the field and at Home Team locations to support Federal Bureau of Investigation (FBI) and Department of Defense (DoD) operations to identify, characterize, and defeat WMD threat devices.

Stabilization Program (STAB)

The STAB program provides specialized training and equipment to regional FBI counter-WMD teams in over a dozen major U.S. cities, enabling rapid assessment of nuclear threat devices and identification of courses of action to defeat such devices through technical reachback during NEST operations.

Accident Response Group (ARG)

ARG scientists, technical specialists, and crisis managers rapidly deploy to the scene of an accident or incident involving a U.S. nuclear weapon or components and to assist in the resolution of the accident.

Radiological Assistance Program (RAP)

Divided into eight regions centered on DOE/NNSA laboratories and covering the entire United States, RAP personnel provide rapid response and technical advice during incidents involving radioactive materials that pose a threat to public health and safety or the environment.

Aerial Measuring System (AMS)

NNSA maintains a fleet of three fixed-wing aircraft and two rotary-wing aircraft based at Nellis Air Force

Base in Nevada and Joint Base Andrews in Maryland. AMS aircraft are equipped with radiation detection systems to provide measurements of air and ground contamination following a nuclear incident. AMS also perform Preventative Radiological/Nuclear Detection in support of major public events such as the Super Bowl.

Radiation Emergency Assistance Center/Training Site (REAC/TS)

REAC/TS scientists provide medical advice, specialized training, and onsite assistance for the treatment of all types of radiation exposure accidents.

National Atmospheric Release Advisory Center (NARAC)

NARAC provides near-real-time modeling predictions of the atmospheric transport of material from a radioactive release, including the associated effects on human health and the environment.

Federal Radiological Monitoring and Assessment Center (FRMAC)

FRMAC a scalable, deployable federal interagency organization, initially managed by NEST, that provides verified radiation measurements, interprets radiation distributions, and characterizes overall radiological conditions during major radiological or nuclear consequence management events.

Nuclear Search Program (NSP)

NSP is the nation's rapidly deployable scientific and technical team for Targeted Search Operations. NSP personnel are trained and equipped to detect, locate, identify, and quantify radiological or nuclear material and assess the risk for decision makers for safe and effective recovery and follow on actions.

Disposition & Forensic Evidence Analysis Team (DFEAT)

DFEAT scientists and operational personnel support FBI operations to disassemble nuclear/radiological threat devices, conduct forensic analysis, perform device assessments, and disposition such devices.

DOE Forensics Operations (DFO)

DFO scientists and operational personnel support FBI and DoD operations to collect nuclear debris for forensic evaluation following a nuclear detonation.

Capability Requirements

The operational scenarios below describe how NEST is postured and resourced to fulfill national incident response requirements. These capabilities are sustained as part of broader national response capabilities with key mission partners, including DoD, FBI, the Department of Homeland Security (DHS), and state, local, and/or tribal officials.

During steady-state (non-crisis) operations,

CTCP can make available NEST experts—both federal personnel and management and operating contractors—to federal, state, local, and/or tribal entities; foreign partners; and international organizations (e.g., International Atomic Energy Agency) in furtherance of national security and public health and safety objectives.

During the early stages of a nuclear threat

or incident, NA-80 may deploy NEST assets in a tailored manner to key mission partners and DoD Combatant Commands. NEST personnel would support contingency planning and potential or actual response operations while leveraging the Department's cadre of overseas officers at U.S. embassies and liaison officers at DoD Combatant Commands. NEST may also activate remote technical assistance capabilities depending on the severity of the incident.

During an operation to counter a confirmed or suspected nuclear/radiological device, an accident involving a U.S. nuclear weapon, or the discovery of material out of regulatory control requiring emergency removal, NEST will stand up Home Team capabilities to provide remote technical assistance to partners on a timeline consistent with their operational capabilities and requirements (i.e., NEST will be ready to receive and assess data as soon as it is available). NEST will have the capacity to deploy personnel to support a single full-spectrum operation, to include disposition and forensic exploitation at fixed DOE facilities in support of event attribution, while maintaining coverages as directed in national policies. Following a release of radioactive materials (e.g., nuclear detonation, deliberate radiological dispersal, reactor accident, or other incident involving a radiological release), NEST will provide timely, credible technical support to public health and safety officials on a timeline consistent with the availability of data from federal, state, local, tribal, and/or international partners. NEST will provide technical assessments and guidance; gather and organize radiological data; collect samples for forensics analysis; and provide other scientific support as needed. In the case of a nuclear detonation, NEST will perform post-detonation functions to exploit collected data in support of attribution. Prior to the cessation of operations, NEST will transition incident management and/or stewardship of the impacted area to appropriate authorities.

Status

NA-80 continues to evaluate and adjust NEST's operational posture as the nationwide impacts of the COVID-19 pandemic continue. Although the health of the NEST workforce continues to be a high priority, we remain mindful of the responsibility to perform critical national security and public health and safety missions, including its continued ability to execute incident response capabilities as described in PMEF #2.

Major Decisions/Events

Provide Nuclear Incident Response Briefings to Senior Departmental Leaders

As part of the transition process, briefings for the new DOE and NNSA leadership teams will be required to outline the Secretary's responsibilities according to presidential policy in the event of a nuclear or radiological incident.

Provide Nuclear Threat Briefings to Senior Departmental, Interagency, and White House Leaders

As the office responsible for administering the SIGMA 20 caveat, CTCP provides nuclear threat briefings to the senior leaders of DOE and NNSA, select interagency partners (e.g. the Department of State, DHS, and DoD), the National Security Council, and the White House, including the President and Vice President.

Production Modernization

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) has undertaken a major modernization of the Nuclear Security Enterprise's production infrastructure.

lssue(s)

The National Nuclear Security Administration (NNSA) cannot accomplish its mission to sustain the nuclear deterrent without reliable infrastructure that provides necessary capabilities for today and allows for the opportunity to expand future capacities. Modernization investments cannot be deferred as the NNSA is committed to fulfilling current requirements for stockpile stewardship. The Production Modernization program focuses on the NNSA's ability to produce critical components for nuclear weapons, including primaries, canned subassemblies (multiple components and materials), radiation cases, and non-nuclear components. Production Modernization is broken into four component subprogram areas: (1) Primary Capability Modernization; (2) Secondary Capability Modernization; (3) Tritium Modernization and Domestic Uranium Enrichment; and (4) Non-Nuclear Capability Modernization.

The program supports production modernization and qualification of explosive, pyrotechnic, and propellant materials; modernization of uranium operations, ensuring delivery of secondary components needed to maintain the stockpile; restarts and modernizes lapsed depleted uranium (DU) alloying and component manufacturing capabilities; maintains production of the Nation's enriched lithium supply; operates the national capability for producing tritium, and is building additional capacity to meet national security requirements; and provides funding to modernize production of non-nuclear components for multiple weapon systems.

Status

A key priority for production modernization activities is developing the capability to produce 80 pits per year (ppy) during 2030, consistent with federal law, national policy, and DoD requirements. Pits will be produced at two locations: Los Alamos National Laboratory (LANL) and the Savannah River Site (SRS). The FY 2021 Request supports pit production personnel and capabilities necessary to produce War Reserve pits starting in 2025 at LANL; production activities at Kansas City National Security Campus (KCNSC); certification activities at Lawrence Livermore National Laboratory (LLNL); and design, long lead material procurements, and planning for demolition and equipment removal at SRS. Production Modernization investments also support other key production capability modernization activities for strategic materials and non-nuclear components. These efforts are all critically linked to investments in repairing, replacing, and modernizing NNSA's facilities and stabilizing deferred maintenance to ensure the safety and reliability of the specialized infrastructure and equipment needed to provide capabilities that support the Nation's nuclear deterrent.

Milestone(s)

Over the next six years, Production Modernization plans to reach the following milestones:

- Build and certify plutonium pits to meet the First Production Unit (FPU) War Reserve pit and continue to sustain pit production to achieve 10 ppy then 30 ppy.
- Transition casting, salvage and accountability, and other operations to the newly constructed Uranium Processing Facility (UPF) at Y-12.
- Obtain CD-2/3 approval for the Energetics Material Characterization (EMC) capability.
- Coordinate with Holston Army Ammunition Plant on producing the first war reserve production lot of PBX-9502 for the W80-4 using newly synthesized TATB. This war reserve (WR) PBX-9502 culminates a multi-year effort with Holston Army Ammunition Plant to reconstitute the production of Insensitive High Explosives (IHE) for main charge production.

- Initiate start up activities at High Explosive Synthesis, Formulation, and Production Facility (HESFP) for LX-17 production in support of the W87-1.
- Obtain WR production of W87-1 booster and main charge materials.
- Complete installation of DUF6 to DUF4 conversion line and begin production.
- Re-start conversion of DUF4 to metal capability at commercial vendor.
- Achieve CD-1 in FY 2024 for re-establishing a domestic uranium enrichment capability.

Major Decisions and Events

- Successfully produced five development (DEV) pits in FY 2019 and produced 3 process prove-in (PPI) pits in FY 2020.
- Install equipment to produce the first WR pit during 2023 in PF-4.
- Achieved CD-0 approval in FY 2020 for the Energetic Materials Capability Facility, with continued support for Analysis of Alternatives activities.
- Completed Lithium Processing Facility CD-1 package and transitioned to preliminary design activities.
- Established Non-Nuclear Capability Modernization as a new program for FY 2021.

Background

The Department of Energy (DOE)/NNSA is focused on manufacturing nuclear weapons components of strategic interest that need to be replaced. These key components—including primaries, secondaries, and radiation cases—are critical to weapon performance, and their manufacture is tightly controlled. Production of these components and the materials needed to construct them was reduced or stopped during the 1990s when they were no longer required. Conducting LEPs and a greater emphasis on a responsive manufacturing infrastructure now require restoring or increasing the capacity of these material and component capabilities, necessitating new methods and approaches to provide sufficient throughput and efficiency. These strategic components require the availability of materials and subcomponent streams that are managed by DOE/NNSA and need to be tightly coordinated with component production.

The Primary Capability Modernization program

consolidates management of nuclear material processing capabilities in the National Nuclear Security Administration's (NNSA) Nuclear Security Enterprise (NSE). The program includes Plutonium Modernization as well as High Explosives and Energetics Modernization. Current priorities include producing the first war reserve plutonium pit during 2023, 30 pits per year (ppy) during 2026, and restoring national capability to produce 80 plutonium pits per year (ppy) during 2030. The High Explosives and Energetics Modernization program manages investments to modernize the HE and energetic manufacturing process that has atrophied over the history of nuclear weapons production.

The Secondary Capability Modernization

program is responsible for ensuring the availability of strategic materials and other sub-component streams necessary for the secondary stage, as well as modernizing the facilities and operations required to process these materials, fabricate them into parts, and assemble the final components. The program includes (1) Uranium Modernization; (2) Depleted Uranium Modernization; and (3) Lithium Modernization. Parts of the uranium operations infrastructure no longer meet modern nuclear safety and security standards. The Secondary Capability Modernization program focus specifically on decreasing mission dependency on these legacy sites and transitioning these capabilities to modern, secure, and safe facilities. Transitioning to modern facilities shortens production schedules; reduces risk and cost; and improves manufacturing processes for nuclear weapons materials. The Secondary Capability Modernization program also restarts the depleted uranium (DU) capabilities that lapsed in the early 2000s due to low demand signals and de-prioritization. The program is investing in key new technologies to modernize production of DU and ensure that the capability can remain cost-effective and efficient when meeting future demands. Lithium Modernization program supports technology maturation and process improvements that make lithium processing more efficient, safer to workers, and less impactful to surrounding infrastructure. The current lithium operations facility and its processes are oversized for today's mission, do not meet current codes/standards, and is well beyond its designed operational life. The program ensures the current lithium processing capability is sustained until the Lithium Processing Facility (LPF) becomes operational in the 2030s, and is developing the plan to bridge operations from the current facility to LPF.

The Tritium Modernization and Domestic Uranium Enrichment (DUE) program produces,

recovers, and recycles tritium to support national security requirements, and is responsible for establishing a reliable supply of enriched uranium to support U.S. national security and nonproliferation needs. Tritium is recovered from gas transfer systems, purified, and returned to the pipeline for future use at the Savannah River Site. The DUE program preserves and advances uranium enrichment technology to meet U.S. national security needs by down-blending highly-enriched uranium declared excess to national security needs to provide low enriched uranium (LEU) for tritium production. LEU inventories identified by the DUE program will sustain tritium production through 2041, at which point the U.S. will require a new domestic uranium enrichment capability to meet tritium production and other national security needs.

The Non-Nuclear Capability Modernization

program manages strategic investments to modernize capabilities for design, qualification, and production of non-nuclear components for multiple weapon systems of non-nuclear parts. Non-nuclear components and subsystems make up more than half the cost of each life extension program. The program focuses on improving and/ or increasing the capability and capacity of the NSE to manufacture nuclear weapons components such as neutron generators, electronic assemblies, gas transfer systems, and power sources. The Non-Nuclear Capability Modernization program supports efforts to identify and rectify supply issues such as obsolescence, discontinuation, or scarceness that affect component availability over time.

Recapitalization of the Nuclear Security Enterprise Infrastructure

Without predictable, stable, and timely funding from Congress, the age and condition of NNSA's infrastructure will put NNSA's mission, the safety of its workers, the public, and the environment at risk.

Summary

An effective, responsive, and resilient nuclear security infrastructure is essential to the U.S. capacity to be flexible enough to adapt to shifting requirements. Such an infrastructure offers tangible evidence to both allies and potential adversaries of U.S. nuclear weapons and nonproliferation capabilities and can help to deter, assure, and hedge against adverse developments, and discourage adversary interest in arms competition.

NNSA's infrastructure is vast, extensive, complex, and, in many critical areas, several decades old. Sixty percent of NNSA's facilities are beyond their life expectancy of 40 years and nearly forty percent are in poor condition. Many of the nuclear security enterprise's (NSE) critical production, utility, safety, and support systems are failing.

NNSA manages its own industrial base within its NSE and does not rely solely upon the commercial industry's infrastructure. This includes national laboratories, plants, and sites with many unique single point of failure production and test facilities that perform the research, development, production, testing, and dismantlement necessary to maintain and certify a safe, secure, reliable, and effective nuclear stockpile. This same infrastructure supports our nonproliferation and counter-terrorism mission (e.g., the same facilities that provide enriched uranium are also used to down-blend uranium).

lssue(s)

Infrastructure risks are generally considered to be high consequence, low probability events, making infrastructure investments a natural offset for short-term requirements. As a result, competing interests over the past thirty years postponed infrastructure modernization investments, which directly contributed to erosion of the critical infrastructure needed to ensure the U.S. nuclear deterrent's viability into the future. The need to recapitalize elements of our infrastructure has reached a tipping point. Without consistent, stable, and predictable funding from Congress, the age and condition of NNSA's infrastructure puts NNSA's mission, the safety of its workers, the public, and the environment at greater risk.

Status

With support from the Administration and Congress, NNSA is undertaking a risk-informed infrastructure recapitalization effort. NNSA is making progress in repairing, replacing, and modernizing NNSA's facilities and stabilizing deferred maintenance, yet much more remains to be done.

NNSA is working to better understand and quantify the condition of our infrastructure by introducing new tools and processes to quantify and prioritize our infrastructure needs. Some notable achievements in FY 2020 include:

- Completed 4 projects with a total project cost of \$174 million, under budget by \$38 million and ahead of schedule by an average of 6 months.
- Began Construction on 2 projects with a combined Total Project Cost of \$219 million.
- Began Conceptual Design on 2 projects worth \$600 million and preliminary/final design on 3 projects worth \$2.9 billion.
- Performed \$400 million of design work and \$1 billion worth of construction.

Milestone(s)

Infrastructure modernization is one of the five major mission priorities for NNSA, as listed in our Strategic Integrated Roadmap. Major milestones include, but are not limited to:

- 2022 Complete NNSA Albuquerque Complex
- 2022 Modernize the Enterprise Secure Network and Cyber Infrastructure
- 2025 Complete the Uranium Processing Facility
- 2025 Complete high explosive facilities
- 2025 Reduce deferred maintenance (DM) by 30 percent
- 2028 Complete Chemistry & Metallurgy Research Replacement Project
- 2031 Complete Lithium Processing Facility
- 2031 Complete Tritium Finishing Facility
- 2035 Complete execution of the Security Infrastructure Revitalization Program

Major Decisions/Events

The President's FY 2021 budget supports the NNSA's efforts to replace aging infrastructure with modern and efficient facilities. NNSA remains committed to achieving its major construction projects on schedule and on budget using best value acquisitions and ensuring safe quality construction.

Implementation of project management best practices, including the conduct of independent cost estimates, completing 90 percent design before establishing baselines, and properly aligning contractor incentives, will help ensure that the FY 2021 Request for these projects will be work executed on budget and schedule.

The Security Infrastructure Revitalization Program (SIRP) receives continued investment in FY 2021 to address physical security system upgrades at each NNSA lab, plant, and site.

Background

NNSA modernizes infrastructure by prioritizing investments to improve the condition and extend the life of structures, capabilities, and systems resulting in improvements in the safety, security, and quality of the workplace. To accomplish this complex challenge, NNSA makes strategic, prioritized investments in 1) Maintenance and Repair of Facilities; 2) Recapitalization; and 3) Line-Item Construction. These investments help achieve operational efficiencies and reduce safety, security, environmental, and program risk. NNSA uses prioritized enterprise risk management criteria to maximize return on investment, achieve program results, and reduce enterprise risk.

NNSA is simultaneously re-capitalizing our production capability in plutonium, uranium, lithium, tritium, and high explosives, as well as our ability for uranium enrichment and plutonium disposal. These simultaneous efforts will be a focus for NNSA for the next two to three decades. Additionally, NNSA is working to modernize aging and deteriorating mission-enabling infrastructure, such as light laboratories, utilities, manufacturing shops, emergency operations centers, and office buildings. To this end, NNSA is currently managing 30 Line-Item Construction projects worth \$22 billion.

Among our top security priorities, NNSA is focused on recapitalizing the NSE's security infrastructure. This includes replacing and refreshing aging physical and cyber security infrastructure. NNSA initiated a security revitalization program several years ago to refresh its security infrastructure with a consistent budgetary approach to avoid large budget spikes. Mission growth is also driving increased security requirements across the NSE. Examples of these security investments include (1) new security systems and additional security portals to support more mission work, and (2) new perimeter intrusion detection and assessment systems (PIDAS). The West End Protected Area Reduction Project reduces the Perimeter Intrusion Detection and Assessment System footprint by almost half while integrating with the new Uranium Processing Facility at the Y-12 National Security Complex.

Between FY 2015 and FY 2020, NNSA requested a higher percentage of funding for Recapitalization and Maintenance projects. These funding increases are essential to arresting the declining state of infrastructure, increasing productivity, improving safety, eliminating costly compensatory measures, decreasing DM, and shrinking the NNSA footprint through the disposition of unneeded facilities.

During this period, in FY 2018, Congress directed NNSA to establish the Infrastructure Modernization

Initiative to reduce DM by 30 percent by 2025. At the end of FY 2019, NNSA's total DM on fixed assets (real property) stood at \$4.8 billion. Excessive DM is an indication of the risks posed by infrastructure, but it is a financial surrogate that does not adequately measure condition, functionality, importance, or replaceability of infrastructure.

Therefore, NNSA is working to address DM, but our primary focus is on reducing the risk aging infrastructure poses to our workers, the environment, and the mission. Accordingly, we are deploying a new, science-based infrastructure stewardship approach that focuses on data-driven, risk-informed decision-making using innovative infrastructure tools and metrics to better assess conditions and prioritize investments.

Annual Assessment of the Nuclear Weapons Stockpile

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) and its national security laboratories must annually assess the nuclear weapons stockpile and assure it remains safe, secure, reliable, and militarily effective without additional nuclear explosive testing.

Issue(s)

The annual assessment process provides assurance to the President of the United States and Congress that the U.S. nuclear weapons stockpile is safe, secure, reliable, and militarily effective. Each year, the Department of Energy (DOE) and the Department of Defense (DOD) undertake a comprehensive evaluation to assess each warhead's existing certification basis in light of new information generated by the Stockpile Stewardship Program. This process provides the ability to maintain a credible nuclear deterrent and is used to determine whether a nuclear test is required to address any technical issues within the stockpile.

The directors of the national security laboratories (Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories) and the Commander of the United States Strategic Command (USSTRATCOM) provide an independent, comprehensive written assessment on the state of the nuclear weapons stockpile. They then provide the Secretary of Energy with an in person discussion on their assessments. To complete the cycle, the Nuclear Weapons Council (NWC) prepares a joint memorandum, signed by the Secretaries of Energy and Defense, summarizing the overall assessment of the stockpile. This memorandum, combined with the Laboratory Director Letters and the USSTRATCOM Commander Letter, form the Report on Stockpile Assessments (ROSA). The ROSA is submitted to the President by

February 1 of each year, and provides assurance that the nation's nuclear deterrent remains safe, secure, reliable, and militarily effective.

Annual assessment is required by public law, 50 United States Code Section 2525, which requires the Secretary of Energy and the Secretary of Defense to submit an annual assessment to the President by February 1 of each year. The President, in turn, is required to transmit the final package to Congress by March 15 of that same year.

Status

The Deputy Administrator for Defense Programs issued the 2020 (Cycle 25) Annual Assessment Execution Plan to the directors of the national security laboratories on January 14, 2020. This plan provides the necessary requirements and milestones to complete the Annual Assessment Review process and provide the ROSA package to the President by February 1, 2021 and to the Congress by March 15, 2021.

Milestone(s)

Action for Cycle 25 Assessment	Date
Annual Assessment Reports published and distributed	July 27, 2020
Laboratory directors sign Annual Assessment Letters	Sep 30, 2020
USSTRATCOM Commander provides Annual Assessment Letter	Dec 1, 2020
 Laboratory directors participate in Annual Assessment Review - brief the following: Deputy Administrator for Defense Programs NNSA Administrator Secretary of Energy 	Dec 8, 2020 (tentative)
ROSA submitted to the to the President	Feb 1, 2021
President forwards the ROSA to Congress	Mar 15, 2021
Officials provide briefing to Congress, if ROSA is not forwarded	March 30, 2021

Major Decisions/Events

The Secretary of Energy will be briefed on the results of Cycle 25 by the three national security laboratory directors and select Department of Defense members on December 8, 2020 (tentative).

Background

The annual assessment process requires subject matter experts from the three NNSA design laboratories to apply broad-spectrum, rigorous analysis techniques to inform their assessment of the current safety, security, and military effectiveness of the U.S. nuclear stockpile. These assessment tools and practices include focused experiments and integrated above ground experiments, computational simulations underpinned by past underground test data and modern experiments, and physical surveillance of randomly selected systems from the stockpile. The data collected by the laboratories are subject to peer review from other laboratories and red teams of nuclear weapons experts. The results of this rigorous process are captured in the laboratory system specific annual assessment reports and summarized in the Directors' annual assessment letters. Recent Director's letters reflect their assessment of the safety, reliability, and performance of the nuclear weapons stockpile, and affirmed that there is currently no technical requirement to perform a nuclear test.

Stockpile Management

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) directs and oversees all stockpile design, development, and production activities to ensure the United States nuclear weapon stockpile remains safe, secure, and reliable.

Summary

The Office of Defense Programs directs and oversees all stockpile design, development and production activities to ensure the United States nuclear weapon stockpile remains safe, secure, and reliable throughout the Nuclear Security Enterprise. This includes extensive surveillance of the warheads and bombs in the stockpile to identify aging concerns or defects. These surveillance activities allow the NNSA Laboratory Directors to certify that the nuclear stockpile remains safe, secure, and effective without resorting to underground nuclear explosive testing.

Stockpile Major Modernization

Stockpile Major Modernization is the stockpile management subprogram necessary to extend the expected life of stockpile systems for an additional 20 to 30 years. This subprogram develops warheads for new Department of Defense (DoD) delivery platforms, that are both based on current stockpile warheads and consistent with current military capabilities, for which current stockpile warheads cannot be made to work without significant impacts to required military requirements. NNSA, in conjunction with DoD, executes a modernization program following the joint NNSA-DoD Phase 6.X weapons acquisition process guidelines, which provides a framework to conduct and manage refurbishment activities for existing weapons.

Stockpile Sustainment

Stockpile Sustainment directly executes sustainment activities for the total (active and

inactive) stockpile for the B61, W76, W78, W80, B83, W87, and W88 weapons. As required by 50 United States Code 2525, safety, security, and effectiveness assessments are carried out annually to determine whether the systems continue to meet their certified requirements without the need for an underground nuclear explosive test. Sustainment activities for each weapon system includes surveillance activities, Weapon Assessment activities, and system maintenance, including production of limited life components (LLCs).

Production Operations

Production Operations activities provide a manufacturing-based program that drives individual site production base capabilities for warhead modernization activities; weapon maintenance; surveillance; weapon assembly and disassembly; and weapon safety and reliability testing. This program enables individual site capability and capacity to sustain the nuclear security enterprise's production mission, and it encompasses the workforce, facilities, and equipment that provide manufacturing and capacity across multiple sites.

Weapons Dismantlement

Weapons Dismantlement and Disposition (WDD) focuses on the safe and secure dismantlement of excess nuclear weapons and components. The WDD program has four major activities:

- 1. **Disassembly:** WDD enables the dismantlement of weapons and canned subassemblies and is a significant supplier of material for future nuclear weapons production and Naval Reactors.
- 2. Component Disposition: WDD ensures waste streams are identified to allow for the permanent disposition of weapon components.
- **3. Retired Systems Management:** WDD enables safety studies that ensure weapons in the stockpile awaiting dismantlement remain safe while in DOD custody.
- **4. Component Characterization:** WDD ensures that all potential hazards contained in weapon components are characterized to allow the weapons complex to safely work with individual weapon components.

Status

Stockpile Major Modernization

NNSA continues to focus on delivering four major modernization programs, having completed the W76-1 LEP in 2019. The W80-4 moved to Phase 6.3 in 2019, as approved by the NWC. The W88 Alt 370 and B61-12 LEP are working towards FPU in Q1 FY22 and Q4 FY21 respectively. Lastly, the W87-1 modification is entering Phase 6.2, Design Definition and Cost Study, in FY21.

Stockpile Sustainment

The Stockpile Sustainment program was renamed from Stockpile Systems. The B83-1 is executing sustainment activities, including surveillance and weapon assessments.

Production Operations

The Production Operations work scope provides the base capabilities to enable weapon operations (assembly, disassembly, and production) planned for the warhead modernization activities, Stockpile Systems, and WDD programs to meet delivery requirements. Model-based enterprise pilot efforts will be funded out of Production Operations through FY 2023.

Weapons Dismantlement

WDD continues to make significant progress on dismantling weapons and component disposition. WDD is on pace to complete a goal of dismantling weapons that were retired at the end of FY 2008. The Department of Energy (DOE)/NNSA has developed return schedules to remove retired weapons from DoD facilities while meeting DoD operational requirements. WDD continues to characterize components coming off the dismantlement line, and sites are eliminating excess component inventories on schedule.

Milestone(s)

Stockpile Major Modernization

The NNSA modified and delivered the W76 sealaunched ballistic missile warhead, providing the US Navy with a lower-yield capability called the W76-2. The 2018 NPR outlined the need for this capability to support credible and capable nuclear deterrence. On August 25, 2020, Pantex completed the First Production Capability Unit (FPCU) for the B61-12, a non-nuclear explosive prototype that allows the program to exercise processes to ensure readiness for rate production. In April 2020, Pantex completed the W88 Alteration (Alt) 370 FPCU.

Stockpile Sustainment

Complete required weapons sustainment activities including Limited-Life Components, Joint Test Assemblies and minor ALTs. (FY21 GTJDL)

Production Operations

Model-based enterprise pilot efforts will be funded out of Production Operations through FY 2023.

Weapons Dismantlement

The FY 2017 NDAA restricted funding for dismantlement activities through FY 2021 to \$56 million, and restricted the dismantlement rate to the schedule in the classified FY 2016 Stockpile Stewardship and Management Plan (SSMP). The WDD Program dismantled on the order of 300 warheads in FY 2020 (actual number is classified).

Timeline

Stockpile Major Modernization

B61-12 LEP and W88 Alt 370 expected completion is 2025. W80-4 expected completion is 2031. The W87-1 has an expected First Production Unit of FY2030.

Stockpile Sustainment

The Stockpile Sustainment program was renamed from Stockpile Systems, which was a continuing program. Cycle 26 of the Annual Assessment Process will begin at the end of the year.

Production Operations

Ongoing program.

Weapons Dismantlement

Ongoing program.

Major Decisions/Events

Stockpile Major Modernization

Phase 1 of the W93 will begin in FY 2021 if authorized and appropriated. The W88 Alt 370 will reach First Production Unit (FPU) in Q4 FY 2021, while the B61-12 LEP will reach FPU in Q1 FY 2022.

Stockpile Sustainment

Cycle 25 of the Annual Assessment process is concluding with delivery of the Laboratory Directors Letters on Annual Assessment. These letters, and an assessment from the Commander of Strategic Command, will form the basis of the Report on Stockpile Assessments, which will be send from the Secretaries of Defense and Energy to the President in the January timeframe.

Weapons Dismantlement

National Defense Authorization Act (NDAA) dismantlement rate limitation is lifted in FY 2021. Attain Known State Authorization for the W84 System to address technical risks.

Background

Stockpile Major Modernization

One of NNSA's core missions is to ensure the United States maintains a safe, secure, and effective nuclear weapons stockpile through the application of unparalleled science, technology, engineering, and manufacturing. NNSA extends the service life of weapons that have reached the end of their original design life through Life Extension Programs (LEPs). Other modernization efforts include Alterations (ALTs), which do not change the weapon's operational capabilities, and Modifications, which do change the weapon's operational capabilities. NNSA also conducts surveillance and assessment to ensure that weapons currently in the stockpile remain safe, secure, and effective. Labs, plants, and sites across the Nuclear Security Enterprise work together on this enduring national security mission.

Stockpile Sustainment

Stockpile sustainment activities are responsible for the day-to-day health of the stockpile. These activities include surveillance, annual assessments, and routine maintenance to ensure weapons remain safe, secure, and reliable over the projected lifecycle. Stockpile sustainment performs single-system and multi-system sustainment activities (i.e., assessment, surveillance, maintenance, and response to emerging issues) for all weapons systems in the stockpile. Stockpile Sustainment includes limited life component (LLC) exchanges, surveillance activities, significant finding investigations (SFI), weapons reliability reporting, and annual assessments that provide a comprehensive understanding of the health of the stockpile.

Production Operations

The scope of Production Operations encompasses sustainment of all weapon systems capabilities that enable individual weapon production and are not specific to one material stream. The program's goal is to maintain the base capability required to sustain a responsive and resilient stockpile through focused management and production process engineering, manufacturing, and production technologies.

Weapons Dismantlement

Weapons Dismantlement and Disposition (WDD) is a critical element of NNSA's integrated effort to transform the enterprise and the stockpile. Specific activities include weapons disassembly, recycling of material and hardware for LEPs, disposition of retired warhead system components, and ensuring components are available for safety testing. Other supporting activities specific to retired warheads include conducting hazard assessments; issuing safety analysis reports; conducting laboratory and production plant safety studies; and declassification and sanitization of component parts. WDD relies on several enabling programs to complete its mission, such as the Office of Stockpile Production Integration for shipping, receiving, and equipment maintenance; Infrastructure and Operations for infrastructure sustainment and containers; and the Office of Secure Transportation for the movement of weapons and weapon components.

Stockpile Research, Technology, and Engineering

The National Nuclear Security Administration (NNSA) must maintain a safe, secure, and effective stockpile without nuclear explosive testing.

Issue(s)

One of Department of Energy's (DOE) National Nuclear Security Administration's (NNSA) core missions is to maintain a safe, secure, and effective stockpile without nuclear explosive testing. To execute this mission, NNSA pursues a science-based Stockpile Stewardship Program (SSP).

The Stockpile Research, Technology, and Engineering (SRT&E) program provides the foundation for science-based stockpile decisions, tools, and components; focuses on the most pressing investments the nuclear security enterprise requires to meet Department of Defense (DoD) warhead needs and schedules; enables assessment and certification capabilities used throughout the enterprise; and provides the knowledge and expertise needed to maintain confidence in the nuclear weapons stockpile without additional nuclear explosive testing.

The NNSA Office of Defense Programs leverages leading-edge expertise in research and development to maintain the effectiveness of the nuclear weapons stockpile. These research, technology, and engineering activities include modeling, simulations, and flight tests that affirm the effectiveness of the nuclear weapons stockpile. Subcritical and hydrodynamic experiments, along with high energy density physics and advanced computing techniques, provide a technical basis for the annual assessment of the safety and reliability of the nuclear weapons stockpile.

Status

NNSA has developed leading-edge expertise in materials and weapons effects science; high energy density physics; advanced simulation and computing; and hydrodynamic and subcritical experiments. NNSA is delivering the simulation capabilities and high performance computing (HPC) resources to support the annual stockpile assessment and certification process.

Current priorities include continued execution of Enhanced Capabilities for Subcritical Experiments (ECSE) program activities and the procurement of, and site preparation at Lawrence Livermore National Laboratory for NNSA's first Exascale system to be delivered in 2022, and ready for program use in 2023. Both capabilities are needed to meet W80-4 LEP and W87-1 Modification certification requirements.

The SRT&E program includes Assessment Science; Engineering and Integrated Assessments; Inertial Confinement Fusion; Advanced Simulation and Computing; Weapon Technology and Manufacturing Maturation; and Academic Programs.

Inertial Confinement Fusion (ICF) will continue to maintain essential experimental capabilities and expertise in high energy density (HED) science. These efforts continue to provide data to reduce uncertainty in calculations of nuclear weapons performance and improve the predictive capability of science and engineering models in high-pressure, high-energy, high-density regimes.

ICF supports the national HED facilities, specifically, the National Ignition Facility (NIF), the Z Pulsed Power facility (Z), and the Omega Laser Facility (Omega); the experimental platforms, models, and experimental diagnostics that enable vast exploration of HED science for stockpile stewardship; and other national security applications throughout the Nuclear Security Enterprise.

Assessment Science supports subcritical experiments used to assess the state of the current stockpile, and certify warhead modernization programs and advanced diagnostics for subcritical hydrodynamic integrated weapons experiments that produce data for stockpile certifications.

Enhanced Capabilities for Subcritical Experiments (ECSE) will introduce a unique capability for the Nation by providing radiography and other
capabilities for monitoring the performance of special nuclear material; understanding the effects of plutonium aging; and certifying future weapon systems. ECSE addresses a key gap in NNSA's ability to assess the aggregate influences of plutonium aging, modern manufacturing techniques, modern materials, and evolving designs to enhance manufacturability and improve safety and security.

The Academic Programs of Stockpile Research, Technology, and Engineering are designed to support academic programs in science and engineering disciplines of critical importance to the NNSA Nuclear Security Enterprise, such as nuclear science, radiochemistry, materials at extreme conditions, high energy density science, advanced manufacturing, and high performance computing.

Engineering and Integrated Assessments

sustains NNSA's capability for creating and maturing advanced toolsets and technologies to improve weapon surety and support annual stockpile assessments.

Weapons Technology and Manufacturing

Modernization develops the materials, technology, and manufacturing solutions that will significantly reduce the time and cost of planned and future warhead modernization programs and manufacturing processes. This area has already provided great benefits to the current stockpile and is instrumental to a more responsive and resilient nuclear enterprise.

The Advanced Simulation and Computing

Program supports stockpile stewardship by developing and delivering predictive simulation capabilities for nuclear weapons systems in addition to deploying increasingly more powerful supercomputers at Sandia, Los Alamos, and Lawrence Livermore National Laboratories. Improvements in high performance computing and artificial intelligence are essential for NNSA next-generation simulation capabilities to support weapons design and science-based stockpile stewardship.

The Exascale Computing Initiative (ECI) is a

partnership between the DOE Office of Science and NNSA.

 Exascale computing will also enable NNSA to evaluate the nuclear deterrent against evolving threats and, if necessary, identify mitigation options for the current and future stockpile.

 In FY 2020, NNSA signed a \$600 million contract for its first Exascale supercomputer, El Capitan, slated to be delivered in 2022 and operating in 2023 at Lawrence Livermore National Laboratory (LLNL) to support NNSA's nuclear weapons programs. As a world leader in supercomputing, NNSA's acquisition of El Capitan is a critical addition to its next generation supercomputing systems.

Major Decisions/Events

Pursue Critical Decision-4 in FY 2025 for the ECSE project, to meet the W80-4 design validation experiment as well as W87-1 program requirements for system certification with a subcritical experiment in 2026.

Deliver the Crossroads high-performance

computing system for annual assessment, modernization programs, and surety (safety, security and use-control) assessments; and prioritize delivery of an exascale-class computing environment in FY 2022 in preparation for the El Capitan system delivery in FY 2023.

Deliver modern technologies necessary to enhance secure manufacturing capabilities and to provide timely support to critical needs of the stockpile such as increasing technology and manufacturing readiness levels (TRLs and MRLs) with reduced systems costs.

Develop the next generation of highly-trained technical workers able to support the NNSA core mission and to ensure there is a strong community of technical peers, external to the NNSA national laboratories, capable of providing peer review and scientific competition to strengthen the basic fields of research.

Background

SRT&E provides the scientific foundation for science-based stockpile decisions, as well as the capabilities, tools, and components needed to enable assessment and certification. It balances the most pressing investments the nuclear security enterprise needs to meet DOD warhead needs and schedules, and the critical long-term R&D needed for a robust and responsive future stockpile.

Stockpile Stewardship and Sustainment

NNSA must extend the lifespan of the aging nuclear warhead stockpile and ensure it remains safe, secure, and reliable without underground nuclear testing.

Issue(s)

One of Department of Energy's (DOE) National Nuclear Security Administration's (NNSA) core missions is to maintain a safe, secure, and effective stockpile without nuclear explosive testing. To execute this mission, NNSA employs a science-based Stockpile Stewardship Program (SSP) and is replacing or refurbishing the enterprise's aging infrastructure to hedge against technical and geopolitical surprise and provide a more capable work environment, all while continuing to reduce the overall size of the U.S. nuclear weapon stockpile. Within NNSA, Defense Programs fields innovative experimental capabilities, diagnostic equipment, high-performance computers, and modern computational codes that build on past nuclear explosive test data to simulate the dynamics of nuclear weapons and test nonnuclear components to ensure the effectiveness of nuclear weapons without underground explosive testing. NNSA uses these tools to make informed decisions on replacing and refurbishing weapons in the nuclear stockpile. NNSA leverages life extension programs (LEPs), alterations (Alts), and modifications (Mods), to address aging and performance issues; enhance safety features; and improve security in the nuclear weapons stockpile. These programs are the foundation of the United States' ability to maintain today's deterrent as we prepare for the uncertain security environment of the future. NNSA must ensure a safe, secure, and effective nuclear deterrent without nuclear explosive testing through continued investment in the Stockpile Stewardship Program and the enterprise workforce and infrastructure that makes stockpile stewardship possible.

Status

The scope, budgets, and schedules of the weapons modernization programs and the Department of Defense's nuclear delivery systems have been fully integrated through coordination within the Nuclear Weapons Council (NWC). Based on NWC guidance, NNSA will remain focused on delivering three LEPs (the W76-1, B61-12, and W80-4) and the W88 Alt 370 (including refreshment of the conventional highexplosive [CHE] main charge).



Milestone(s)/Timeline

Major Decisions/Events

- NNSA completed the first production unit of the W76-2 in February 2019; completed assembly of the Full Operational Capability by the end of FY 2019; and completed the delivery of units to the U.S. Navy in July 2020. The W76-2 supports the low-yield capability requirement outlined in the 2018 Nuclear Posture Review.
- NNSA completed two successful flight tests of the B61-12 in March 2020, and the Pantex Plant released the first production capability unit for the LEP in August 2020. NNSA expects to deliver the FPU in the first quarter of FY 2022. The B61-12 LEP will consolidate four families of the B61 bomb into one, and improve both the safety and security of the oldest weapon system in the U.S. arsenal. Timely execution of the B61-12 LEP will enable retirement of the B83-1, the last megaton-class weapon in the U.S. arsenal. The B61-12 is scheduled to complete production in FY 2026.
- NNSA completed the System-Level Final Design Review for the W88 Alt 370 in FY 2018. Twenty system-level qualification tests—including the Commander's Evaluation Test 2 and Demonstration and Shakedown Operation 29 flight tests—were completed in FY 2019. In FY 2020, the program achieved First Production Unit (FPU) for the Nuclear Explosive Package and completed the First Production Capability Unit. The W88 Alt 370 is on track for FPU in Q4 FY 2021. Last Production Unit is expected in the fourth quarter of FY 2025.
- The W80-4 is on track to meet DoD's requirement for the first production unit (FPU) for the W80-4 in FY 2025. The recent USAF early down select to a single LRSO contractor is enabling a 1-year earlier powered flight test that reduces W80-4 program risk by informing the System Baseline Design Review.
- In September 2018, the Nuclear Weapons Council (NWC) authorized restart of Phase 6.2, Feasibility Study and Design Option, for the W78 replacement warhead and named it the W87-1. NNSA completed a study on the feasibility of deploying the W87-1 in a U.S. Navy flight body during FY 2019. The W87-1 Mod program will replace the W78 warhead and support the feasibility of the U.S. Air Force's Ground-Based Strategic Deterrent missile system.

Background

The SSP supports a multifaceted understanding of the stockpile and allows NNSA to predict, detect, and evaluate potential problems related to aging. Routine scheduled surveillance of nuclear weapons may lead to significant finding investigations, which in turn inform the need for corrective action, such as initiating an alteration (Alt) or modification (Mod). Some issues may be resolved without any changes to weapons in the stockpile. Alts involve limited scope changes that typically affect the assembly. testing, maintenance, and/or storage of weapons. Mods are more comprehensive programs that increase safety, improve security, extend limitedlife component life cycles, and/or address identified defects and component obsolescence. As warheads and bombs age in the stockpile, they may require life extension programs (LEPs) to comprehensively address aging issues and meet modern safety and security requirements. LEPs involve modifications that refurbish warheads by replacing aged components to extend the service life of the weapon.

NNSA Major System Project: Uranium Processing Facility (UPF)

Success on UPF is contingent upon stable funding by the Administration and Congress and sufficient material and labor supply chains.

Summary

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) is managing the Uranium Processing Facility (UPF) project at the Y-12 National Security Complex in Oak Ridge, Tennessee. UPF is essential to NNSA's Nuclear Security Enterprise improvement efforts. Success on this project has been built upon stable and predictable funding profiles and Congressional support of the President's Budget Requests. The project receives significant attention from Congress and DOE as the largest single NNSA project underway. Congress requires a yearly certification that the project is on cost and schedule.

Issue(s)

The project is on budget; however, delays in material delivery and craft labor hiring are challenging schedule performance.

Status

Construction of UPF continued unabated during the COVID-19 emergency. UPF has been on budget and schedule for seven years due to strong Congressional support of the budget request. Timely delivery of glove boxes, process skids, and equipment from vendors and the ability to attract and retain craft workers are key to maintaining the schedule. Sustained financial support for UPF is critical to ensure project execution as the project reaches peak nuclear construction in FY 2021. The Y-12/Pantex management and operating (M&O) contract is being recompeted with an expected transition date of Oct 1, 2021. This contract transition will have to be carefully managed to avoid a negative impact on cost and schedule performance for transition and start-up of the new facility.

Background

The \$6.5 billion UPF project consists of two nuclear buildings, three industrial buildings, and supporting infrastructure. Budgeted at over \$750 million, it is a major system acquisition approved by the Deputy Secretary. It relocates processing capabilities from the 75-year-old Building 9212 to ensure the longterm viability, safety, and security of the Enriched Uranium (EU) capability at the Y-12 National Security Complex. The UPF project modernizes EU processing capabilities at Y-12 to reduce program and safety risk. The project has successfully completed the first three of seven subprojects under budget and on schedule.

The goals and objectives of the UPF project are to support the following modernization strategy:

- Provide new floor space for the high-hazard, high-security operations to ensure the longterm capability and improve the reliability of EU operations.
- Relocate EU processing capabilities into UPF to reduce dependency on deteriorating, end-of-life buildings and move operations into a modern manufacturing facility.
- Significantly improve the health and safety posture for workers and the public by replacing administrative controls with engineered controls to manage the risks related to worker safety, criticality safety, fire protection, and environmental compliance.

Next Major Decision/Event/Milestone (in FY 2022)

Completion of the Mechanical Electrical Building Subproject: January 2022

Y-12 / Pantex Management and Operating Contract Competition

NNSA will award a successor Management and Operating contract for the Y-12 and Pantex sites by October 1, 2021.

Summary

NNSA is soliciting a contractor to manage and operate the Y-12 National Security Complex (Y-12) in Tennessee and the Pantex Plant (Pantex) in Texas. The current Management and Operating (M&O) contractor—Consolidated Nuclear Security (CNS), LLC—is responsible for the NNSA Stockpile Stewardship and Management Program and Nuclear Nonproliferation Program activities conducted at Y-12 and Pantex. CNS is a limited liability company formed by Bechtel National, Inc.; Leidos; ATK Launch Systems; and SOC LLC. The current contract is comprised of two contract line items, management, and operations of the two sites for a period of up to 10 years and construction of the Uranium Processing Facility through project completion. A major requirement of the current contract was to combine the operation of the Y-12 and Pantex sites under one contract to streamline production operations and generate cost savings resulting from this combination. NNSA has validated cumulative cost savings of nearly \$760 million for Fiscal Years (FY) 2014–2019 under this contract.

lssue(s)

The Y-12/Pantex contract had a base performance period of 5 years with options to extend up to a period of 10 years by meeting specific performance and cost savings targets. The Fee Determining Official determined that CNS met the standard of performance for the first Gateway Decision, and NNSA exercised Option Term 1 extending the contract for years six and seven, from October 1, 2019, through September 20, 2021. In June 2020, NNSA's Fee Determining Official concluded that CNS did not meet the performance standard for the second option, and the contract will expire on September 30, 2021. The June 2020 decision not to exercise Option Term 2 sets an aggressive timeline to award a new Y-12/Pantex contract to be in place by October 1, 2021.

The new contract will include modified cost savings provisions to incorporate lessons learned and build on the success of the current contract. NNSA issued a draft Request for Proposal (RFP) on August 24, 2020, and conducted site tours and one-on-one meetings with industry in September 2020. We anticipate issuing the final RFP in the first quarter of FY 2021, and awarding the contract in the third quarter of FY 2021 to support a transition to the new contractor by September 2021. There has been significant industry interest in this acquisition. The Major Systems Acquisition project for construction of the Uranium Processing Facility (UPF) at Y-12 will continue to be performed by CNS as a separate contract line item until project completion.

Background

Y-12 and Pantex represent key nuclear production capabilities in the Nuclear Security Enterprise. Pantex, near Amarillo, Texas, is responsible for maintaining the safety, security, and effectiveness of the nation's nuclear weapons stockpile. Work performed at Pantex includes support of the nuclear weapons life extension programs; nuclear weapons assembly and dismantlement; the development, testing, and fabrication of high explosive components; and interim storage and surveillance of plutonium pits. Y-12, in Oak Ridge, Tennessee, is the nation's only source of enriched uranium nuclear weapons components and provides enriched uranium for the U.S. Navy. It performs materials science and precision manufacturing; stores enriched uranium; and supports efforts to reduce nuclear proliferation risk.

Low-Level Radioactive Waste Disposal

The Department of Energy utilizes an extensive infrastructure to dispose of low-level and mixed low-level radioactive waste to support cleanup progress. This includes both DOE and commercial radioactive waste disposal facilities.

Summary

- The Office of Environmental Management (EM) utilizes a variety of safe and efficient disposition paths for low-level and mixed lowlevel radioactive waste (LLW/MLLW) generated through cleanup activities.
- EM has safely and compliantly disposed more than 680 million cubic feet of LLW/MLLW at a variety of DOE and commercial disposal facilities.
- DOE's policy is to dispose of LLW and MLLW onsite, if practical. While the vast majority of waste is disposed of onsite, disposal at another DOE facility is used when onsite disposal is not available. LLW and MLLW waste can also be disposed of at a commercial facility if the facility is compliant with DOE and regulatory requirements and the disposal fees are costeffective.
- Decisions on offsite/onsite disposal are made on a site-by-site basis based on the government's best interest.

lssue(s)

 As EM works to develop a new onsite disposal capability at the Oak Ridge site in Tennessee, Congress has directed EM to evaluate the cost of onsite disposal versus offsite disposal, including potential impacts to the local community. EM completed this evaluation in July 2020 and will brief the House and Senate Appropriations committees on the results at a future date. These briefings have not yet been scheduled. The Department is in a formal dispute with the Environmental Protection Agency (EPA) Region IV and the Tennessee Department of Environment and Conservation (TDEC) regarding how to manage radioactive surface water discharges from the current and proposed Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) disposal facilities.

Milestone(s)

- EM anticipates beginning operation of the onsite disposal facility at the Portsmouth site in Ohio in 2021.
- The schedule for a Record of Decision for a new Oak Ridge onsite disposal facility has been impacted by the formal dispute with the EPA Region IV and TDEC.

Background

- The operation of DOE disposal facilities requires coordination with states and federal regulatory agencies. Interactions with regulators and other stakeholders differ depending on the location of the DOE site.
- The Nuclear Regulatory Commission (NRC) categorizes LLW into four classes for commercial LLW disposal: A, B, C, based on the concentration of specific short-lived and longlived radionuclides(10 CFR 61.55.), and Greaterthan-Class C. Greater-than-Class-C LLW is LLW in which the concentrations of radionuclides exceed the limits for Class C LLW in 10 CFR 61.55. These definitions are only used by DOE for commercial disposal.
- Unlike NRC, DOE has no LLW class designations—disposal must meet disposal site waste acceptance criteria and performance objectives of the disposal facility, in accordance with DOE Order 435.1, *Radioactive Waste Management.*

DOE Disposal Sites

Hanford Site

The large majority of LLW and MLLW at the Hanford Site is disposed of in Hanford's Environmental Restoration Disposal Facility (ERDF). ERDF is a waste facility regulated under CERCLA. A new facility, the Integrated Disposal Facility, has been constructed and is awaiting commissioning for the disposal of low-activity vitrified waste from Hanford's Waste Treatment and Immobilization Plant Low Activity Waste Facility.

Idaho National Laboratory (INL)

INL has two operating disposal facilities: a facility for disposal of remote-handled LLW, and the Idaho CERCLA disposal facility, where LLW and MLLW from site cleanup activities is disposed.

Los Alamos National Laboratory (LANL)

Area G, operated by the National Nuclear Security Administration (NNSA), has very limited LLW disposal capacity remaining. There are no plans for additional LLW disposal capacity at LANL.

Nevada National Security Site (NNSS)

The Area 5 Radioactive Waste Management Disposal Facility provides disposal for LLW and MLLW from DOE sites. NNSS provides an excellent disposal environment due to its arid conditions and deep groundwater. The state of Nevada grants a permit for the MLLW disposal facility pursuant to the Resource Conservation and Recovery Act (RCRA).

Oak Ridge Reservation (ORR)

EM operates a CERCLA disposal facility, the Environmental Management Waste Management Facility (EMWMF), for waste resulting from the cleanup of the East Tennessee Technology Park, Oak Ridge National Laboratory and NNSA's Y-12 Site. A new CERCLA facility is planned.

Paducah

Paducah does not yet have a LLW disposal facility.

Portsmouth

The new Onsite Waste Disposal Facility will operate pursuant to CERCLA. The facility is designed to accept waste from decommissioning and demolition of the gaseous diffusion plant at Portsmouth, as well as remediated soil. Operations are expected to begin in calendar year 2021.

Savannah River Site (SRS)

EM operates several LLW disposal facilities for waste generated from its various onsite missions. SRS receives some offsite LLW from the Naval Reactors' east coast shipyards. SRS has trenches and engineered vaults (designed for higheractivity LLW) in its E-Area. In addition, SRS disposes saltstone onsite. Saltstone is the separated and treated low-activity portion of tank waste that is grouted and placed in large engineered disposal units.

Commercial LLW Disposal Sites

Currently, all operating commercial LLW disposal sites are in states where the NRC has delegated regulatory authority and oversight for those disposal sites to the states (called "Agreement States").

- Energy*Solutions*, located in Clive, Utah, accepts Class A LLW and MLLW.
- Waste Control Specialists LLC (WCS), located near Andrews, Texas, accepts DOE LLW and MLLW (Class A, B, or C as defined by NRC in 10 CFR 61.55) in its dedicated facility for DOE waste. WCS also operates a RCRA hazardous disposal at the same site that accepts LLW below 10 percent of the Class A limit. The WCS disposal facility is robust, e.g., grouted waste packages in concrete disposal containers within a double-lined concrete disposal facility.
- In addition, EM has utilized US Ecology for disposal of non-radioactive hazardous waste. US Ecology operates facilities in Idaho and Nevada.

Commercial MLLW Treatment

Most MLLW must be treated prior to disposal. Currently, DOE has limited onsite MLLW treatment capabilities and mostly relies on commercial MLLW treatment facilities. These include the Perma-Fix Northwest facility, located in Richland, Washington, near the Hanford site; and EnergySolutions' Erwin, Tennessee, facility.

Soil and Groundwater Remediation

The Department of Energy's (DOE) Office of Environmental Management (EM) manages one of the largest groundwater and soil remediation efforts in the world. Soil and groundwater remediation activities include a variety of technologies to address different radioactive and hazardous contaminants. EM has successfully cleaned up 1.7 trillion gallons of contaminated groundwater and 40 million cubic meters of contaminated soil and debris.

Summary

EM is performing major soil and groundwater remediation activities at all of its sites, and complex groundwater plumes remain at the major EM sites. Highlights of EM progress to date include:

- EM has successfully treated 23 billion gallons of groundwater at the Hanford Site in Washington state using systems located along the Columbia River and at the Site's Central Plateau. The systems along the river treat approximately 1 billion gallons per year. In FY2020, Hanford has removed 30 tons of contaminated soil from areas near the Columbia River.
- EM has successfully treated more than 4 billion gallons of groundwater to remove trichloroethylene (TCE) contamination at the Paducah site in Kentucky. EM has also made progress in tackling the TCE contamination source term by installing systems and conducting projects that have removed almost 8,000 gallons of TCE from soil and groundwater at the site.
- EM has been successfully mitigating a chromium groundwater plume using pump-and-treat systems at the Los Alamos National Laboratory in New Mexico. This interim measure is successfully keeping the chromium from migrating off site.

• EM has made significant soil and groundwater cleanup progress utilizing an area completion approach at the Savannah River Site in South Carolina. To date, work has been completed at the Site's T, M, P, and R areas. In 2020, the Department recognized the successful cleanup of coal ash-contaminated land, which was completed \$8 million under budget. This project received DOE's Project Management Excellence Award. EM has also removed more than 1.6 million pounds of non-radioactive material from groundwater at the site.

Energy Technology Engineering Center (ETEC)

One of EM's more visible soil-and-groundwater remediation efforts is the cleanup of the Energy Technology Engineering Center (ETEC) in California. EM is responsible for the cleanup of soil, groundwater, and building demolition in Area IV and the Northern Buffer Zone (NBZ) at the ETEC site, located at Santa Susana Field Laboratory (SSFL).

DOE signed an Administrative Order on Consent (AOC) in 2010 to clean up chemically and radiologically contaminated soils to background levels.

In 2020, DOE reached a Consent Order with the State of California to demolish 10 of the remaining 18 DOE-owned buildings at the site. EM expects to complete the demolition of the 10 buildings by the end of CY 2020 and continues to work with California on a path forward to address the remaining 8 buildings.

Los Alamos DP Road

- EM is responsible for legacy waste cleanup activities at the National Nuclear Security Administration's (NNSA) Los Alamos National Laboratory in New Mexico.
- Contaminated debris, likely from legacy DOE activities in the area, has been discovered on property being privately developed for housing. NNSA conveyed the property to Los Alamos County following the completion of cleanup activities in an adjacent former solid waste management unit. This property is known as the Middle DP Road Site (MDPR Site).

The full extent of contamination is still unknown, pending sampling efforts that are currently underway.

Issue(s)

ETEC

The Department continues to work with the state of California on groundwater and soil remediation activities.

Los Alamos

- The extent of buried laboratory debris at the MDPR Site is unknown; therefore, work is underway to determine the potential presence of radiologically contaminated debris. The parcels upon which the MDPR Site is located are planned for business and residential development starting as early as FY2021.
- EM currently operates a network of 35 monitoring, extraction and injection wells at the Los Alamos National Laboratory to characterize a chromium plume and contain its movement, as part of an interim measure. The plume has responded positively to the interim measure, but the Department owes a final plan to the state of New Mexico as part of a Consent Order.

Status

ETEC

Planning for soil and groundwater remediation is underway.

Los Alamos

- The EM Los Alamos Field Office is preparing a preliminary screening plan to determine the extent of the MDPR Site contamination. Investigation is planned to begin in the second quarter of FY2021.
- The chromium plume interim measure was initially put on hold due to schedule delays as a result of COVID-19 but has been restarted as part of Phase 1 work scope.

Milestone(s)

Los Alamos

MDPR Preliminary Screening Plan is due to the New Mexico Environment Department by December 2020.

Major Decisions/Events

ETEC

In consultation with the State of California, EM will proceed with soil and groundwater remediation after the State issues its Environmental Impact Report.

Los Alamos

EM will determine the level of contamination and develop a remediation approach for the Middle DP Road Site.

Background

ETEC

In 2007, a court ordered that DOE complete an Environmental Impact Statement (EIS). The final EIS, completed in 2018, identified preferred alternatives for building demolition, groundwater and soils remediation. In 2019, DOE issued a Building Demolition Record of Decision (ROD) and is making steady progress on tearing down the 18 DOE-owned structures.

Los Alamos

The EM Los Alamos Field Office will perform additional investigation at the MDRP site.

Tank Waste

The Office of Environmental Management (EM) has made significant progress in addressing waste generated from past spent nuclear fuel reprocessing activities and other plutonium production activities. This "tank waste" is EM's biggest technical and budgetary challenge.

Summary

EM is responsible for the safe and effective management, including treatment and disposal, of radioactive waste from past reprocessing and other plutonium production activities. This waste, stored in aging underground tanks at three EM sites, poses a significant financial liability to the government.

This tank waste is being conservatively managed as high-level waste (HLW). HLW, as defined in the Atomic Energy Act (AEA) and the Nuclear Waste Policy Act (NWPA), requires disposal in a deep geological repository. In 2019, the Department of Energy (DOE) issued an interpretation of the definition of HLW to increase options for disposing of waste that could be properly and radiologically classified as something other than HLW.

At the Savannah River Site (SRS) in South Carolina, EM has completed the major components of the tank waste treatment system. The last major component was the Salt Waste Processing Facility (SWPF), which began hot operations in October 2020. The SWPF will process the majority of the site's remaining tank waste inventory by separating the highly radioactive waste from the less radioactive salt solution.

The Idaho Cleanup Project, at the Idaho National Laboratory, is in the final stages of preparing the Integrated Waste Treatment Unit (IWTU) to treat the remaining sodium bearing tank waste. The IWTU is expected to begin operations in 2021.

The Idaho Cleanup Project is also responsible for 4,400 cubic meters of solid radioactive waste called "calcine" that was generated from the reprocessing of spent nuclear fuel. There is not yet a defined path forward for treatment of this material, which is being safely stored on-site.

At the Hanford Site in Washington state, EM is constructing the Waste Treatment and Immobilization Plant (WTP), which is intended to vitrify (convert into borosilicate glass) a large portion of the tank waste stored in underground tanks. The WTP is the largest, most complex, and most expensive construction project in the entire Department. The components of the WTP that will treat low-activity tank waste through the Direct Feed Low Activity Waste Approach are expected to begin operations by the end of 2023.

The West Valley Demonstration Project (WVDP) in New York State is the first and only DOE site to construct, operate, and demolish a vitrification facility used to treat high level radioactive tank waste. All 600,000 gallons of the tank waste have been vitrified, and the glass canisters are in storage at the site pending disposal.

lssue(s)

EM is still working to finalize the approaches and capabilities for treating tank waste at Hanford and Idaho, and is working to ensure sufficient funding to allow for full utilization of the tank waste treatment system at Savannah River. With the Department's interpretation of the term HLW, there are opportunities to make meaningful progress on dispositioning waste that has been historically managed as HLW but does not have a high radioactive content.

Status

HLW Interpretation

- In June 2019, DOE issued its interpretation of the AEA and NWPA definition for HLW, which allows waste to be classified and disposed according to its radiological characteristics (risk-based), rather than solely according to its origin (source-based).
- In August 2020, DOE issued the Environmental Assessment and Finding of No Significant Impact concluding that SRS Defense Waste Processing Facility (DWPF) recycle wastewater can be safely stabilized and disposed of as low-level radioactive waste (LLW).
- This first application of the HLW interpretation was completed September 22, 2020, with 8

gallons of DWPF recycle wastewater shipped to the Waste Control Specialists, LLC (WCS) LLW disposal facility in Texas for treatment and disposal.

 In FY21, EM will evaluate potential next waste stream(s) under the HLW interpretation, and, if appropriate, will initiate the required environmental evaluations, and technical and safety analyses.

SWPF

SWPF received Critical Decision-4 (CD-4) and Authorization to Operate in August 2020, and began "hot" or radioactive operations in October 2020.

IWTU/Calcine

- The IWTU is in final commissioning in preparation for radiological operations. Construction of the facility was completed in 2011.
- Delays in commencing IWTU "hot" operations have caused the Department to miss a site treatment plan milestone corresponding to an Idaho Settlement Agreement milestone, resulting in fines of \$6,000 per day (since 2012). However, the Department has performed supplemental environmental projects in lieu of paying the fine.
- DOE is in the process of analyzing potential alternatives for the treatment of the calcine material.

WTP

- Since 2013, EM has been pursuing the Direct Feed Low Activity Waste (DFLAW) approach to begin the treatment of low activity tank waste by the end of 2023. Construction of all facilities needed for DFLAW operation should occur in 2021.
- The Department is conducting a comprehensive Analysis of Alternatives to evaluate options for the treatment of Hanford's high level waste.
- DOE and the U.S. Department of Justice are engaged in holistic negotiations with the State of Washington and the U.S. Environmental Protection Agency (EPA) regarding the Hanford cleanup mission.

Milestone(s)

SWPF

The first transfer of 4,000 gallons of salt waste from one of Savannah River's underground waste tanks to SWPF is scheduled for Q1 FY21.

IWTU

Final IWTU facility modifications in preparation for the start of radiological operations are scheduled to be completed in early 2021. The start of radiological operations is currently targeted for 2021.

WTP

EM currently expects to meet a milestone to complete hot commissioning of the WTP Low Activity Waste (LAW) Facility, part of the DFLAW approach, by December 31, 2023.

Major Decisions/Events

- Aspects of the Hanford cleanup mission are the subject of negotiations with the State of Washington and EPA.
- Decisions will be needed as a result of the Analyses of Alternatives for both WTP and Idaho's calcine waste.

Background

SWPF

The waste in Savannah River's tanks is a mixture of solids and liquids. After the liquid is evaporated the result is sludge-like material and crystalline salts. The crystalline material is commonly referred to as salt waste. Removing salt waste, which fills over 90 percent of tank space in the SRS tank farms, is a major step toward emptying and closing the Savannah River Site's 43 remaining tanks. In 2002, Parsons Corporation was selected to design, build, commission, and operate for the SWPF one year, which will process salt waste at a rate eight times faster than recent waste treatment operations. Construction was completed in the spring of 2016, eight months ahead of the revised baseline schedule and \$60 million under budget.

IWTU and Calcine

The IWTU will treat the remaining sodium bearing radioactive liquid tank waste at the Idaho National

Laboratory using a steam reforming process. The tank waste is stored in three underground stainless steel tanks with a total volume to of approximately 850,000 gallons. This process will convert the liquid waste into a dry granular solid, which will be stored onsite in stainless steel canisters within concrete vaults until disposal.

Calcine material generated from the reprocessing of spent nuclear fuel is also stored at the Idaho National Laboratory. The calcine material is a dry granular solid stored in six Calcine Solids Storage Facilities onsite.

WTP

The WTP is intended to treat radioactive waste stored in 177 underground storage tanks, some of which have leaked. Originally, all of the components of the WTP would have been commissioned at the same time, with tank waste fed directly into the Pretreatment (PT) Facility, where it would be separated into high level radioactive and a low level radioactive waste streams, and subsequently fed to the HLW facility LAW facilities, respectively, for vitrification. Vitrified material from the LAW facility would be disposed of on-site in the Integrated Disposal Facility, while the vitrified HLW would be stored until disposal in an geologic repository.

The HLW stream constitutes roughly 10 percent of the expected volume, but represents roughly 90 percent of the radioactivity. Under current plans, the WTP is designed to treat all HLW in the Hanford wastes, but only one-third to one-half of the LAW. The Department has not yet identified the approach to treat the remaining LAW in the tanks, commonly referred to as the "supplemental LAW."

In the summer of 2012, the Department directed the contractor, Bechtel National, Inc., to suspend production engineering and construction on the PT and HLW facilities due to unresolved technical challenges. To keep the mission moving forward, DOE developed an alternative approach intended to begin low activity waste treatment as soon as practicable while simultaneously completing resolution of the remaining technical issues associated with the PT and, to a lesser degree, HLW facilities.

WVDP

In 2018, EM and its cleanup contractor safely completed the demolition of the 50-foot-tall, 10,000-square-foot Vitrification Facility at the WVDP. The 278 canisters of vitrified waste produced at the facility are currently stored in casks on-site that have a design life of at least 50 years.

Waste Isolation Pilot Plant/Transuranic Waste Disposition

The Waste Isolation Pilot Plant (WIPP) is integral to the Department's cleanup mission and is used to dispose of transuranic waste from atomic energy defense activities. WIPP not only supports legacy cleanup activities, but also ongoing national security and scientific research missions.

Summary

The Waste Isolation Pilot Plant (WIPP) in New Mexico is the nation's only deep geological disposal site for transuranic (TRU) radioactive waste resulting from atomic energy defense activities. TRU waste consists of tools, rags, protective clothing, sludges, soil, and other materials contaminated with radioactive elements, mostly plutonium. These man-made elements have atomic numbers greater than uranium on the periodic table of elements (thus "trans-uranic" or beyond uranium).

Since the commencement of operations in 1999, WIPP has disposed of approximately 70,000 cubic meters of transuranic waste from 22 different sites. EM has successfully completed TRU waste removal from 15 sites.

EM has had no serious injuries or fatalities during WIPP's operating history. This includes the transportation of TRU waste shipments to WIPP over 15 million miles without a serious accident.

EM's shipment rate to WIPP is limited to approximately 10 per week, though the number of actual shipments has been less due to COVID-19. This is expected to increase once a new ventilation system is in operation and when the excavation of a new disposal panel (Panel 8) is completed.

A number of infrastructure projects are needed at WIPP to maintain safety and ensure the facility

is available to support DOE missions for the next 30 years. Two key projects underway are the new Safety Significant Confinement Ventilation System and the new Utility Shaft.

The National Nuclear Security Administration (NNSA) has announced plans to utilize WIPP to dispose of up to 7.1 metric tons (MT) of nonpit plutonium as TRU waste. This material is downblended with materials at the Savannah River Site (SRS) that allows the shipments to meet WIPP's waste acceptance criteria.

DOE is analyzing options for safely removing Los Alamos National Laboratory (LANL) TRU waste in temporary storage from the Waste Control Specialists, LLC (WCS) facility near Andrews, Texas. EM is working closely with key state and regulatory officials and WCS. At all times the safety of workers, the public and the environment remain DOE's overriding priority. In the interim, the waste continues to be stored in a safe configuration at WCS.

Issue(s)

EM and NNSA continue to demonstrate progress and evaluate opportunities to accelerate TRU waste disposal.

Status

WIPP-General

Waste emplacement operations were suspended in February 2014, following two unrelated events in the WIPP underground. On February 5, a salt haul truck caught fire, and on February 14, a waste drum in Panel 7, Room 7, breached, resulting in a radioactive release. The release did not pose a public health or environmental hazard, according to the U.S. Environmental Protection Agency. In January 2017, waste began to be emplaced from above ground, where it had been stored since shipments were halted. Waste shipments to WIPP resumed in April 2017.

Currently, due to COVID-19, WIPP receives up to approximately 5 shipments of TRU waste per week. Pre-COVID-19, WIPP was receiving up to 10 shipments per week.

FY 2021 shipments are expected to come from the Idaho National Laboratory, LANL, the Oak Ridge

National Laboratory, SRS, the Sandia National Laboratories, the Lawrence Livermore National Laboratory (LLNL), and the WCS facility in Andrews, Texas.

A significant issue at WIPP continues to be underground air quality due to lower than normal air flow and diesel equipment exhaust. Mitigating measures underway include use of battery-electric vehicles, as well as booster fans.

WIPP's first six panels are already filled, with waste emplacement ongoing in Panel 7. Work is underway to mine Panel 8, which is anticipated to be completed in late 2021.

WIPP Infrastructure Upgrades

Many of the existing WIPP infrastructure systems are beyond their design-life and have been subject to harsh environmental conditions of salt, dust, and high heat.

The new Safety Significant Confinement Ventilation System and Utility Shaft will improve underground operations, allowing concurrent mining and waste disposal operations.

Due to air quality concerns, WIPP will be replacing its diesel equipment vehicle fleet with an all batteryelectric fleet. The first electric vehicle arrived in the WIPP underground mine in FY 2019 but complete fleet replacement will take a number of years.

EM Support to NNSA Mission

Active coordination is occurring on near-term priorities, especially for LANL and LLNL. Shipments from LLNL to WIPP restarted in September 2020, for the first time in over a decade.

EM continues to downblend oxidized, surplus, nonpit plutonium using facilities in the K-Area Complex at SRS. This material was designated for WIPP disposal in a 2016 Record of Decision.

NNSA published an Amended Record of Decision (AROD) in August 2020, announcing its decision to dispose of up to 7.1 MT of non-pit plutonium as TRU waste at WIPP. This AROD changes the disposition pathway for a portion of the 34 MT of surplus plutonium that DOE/NNSA previously decided to fabricate into Mixed Oxide (MOX) fuel.

Legal

There is a current legal challenge to the methodology WIPP uses to account for the volume of waste (called the volume of record) disposed at WIPP. The case is currently in the New Mexico Court of Appeals.

Milestone(s)

None at WIPP, but various sites often have regulatory commitments associated with TRU waste shipment to and disposal at WIPP.

Annual Budget Process

DOE's nominal budget process includes four main processes and overlaps with multiple years active at the same time.

The Department of Energy (DOE) develops and executes the budget using processes similar to other federal agencies, managed on behalf of the Secretary by the Office of the Chief Financial Officer (OCFO, CFO). Implementing policy direction for programs and projects requires requesting funding and allocating that funding to specific appropriation accounts and control points. Knowledge of this process and associated timelines are important for developing and implementing policy for execution of Departmental programs and projects.

A Nominal Budget Formulation Process

Each fiscal year budget is built on leadership priorities and from previous year budget cycles and appropriations, federal spending agreements, and improvements in budget tools, there is a general structure and flow to the process.

The Office of Management and Budget's (OMB) circular <u>A-11</u>, *parts 2 to 4*, sets the minimum requirements for a budget. DOE has established its own processes to meet OMB's requirements. Annually the DOE budget process has four broad concurrent steps: Planning, Programming, Budgeting, and Execution (PPBE) borrowed and modified based on the Department of Defense process.

The PPBE processes typically actively manage three to four years concurrently during a given year. The budget is rarely passed by the end of the Fiscal Year – only once in the last two decades – resulting in a Continuing Resolution that can last additional months. In November, 2020, four years will be under review or consideration by some part of DOE:

Fiscal Year (FY) 2020 (Prior Year)

Led by the CFO's Office of Finance and Accounting, final reviews are being completed of FY2020 spending and the annual financial audit of DOE's financial management is being completed.

FY2021 (Current Year)

Should there be a FY2021 enacted appropriation, DOE would be operating based on the enacted FY2021 appropriations act. CFO's Budget Office would be distributing funds guided by the Act and OMB apportionment. Instead, DOE (and the rest of the government) is operating under a CR, and the amounts the Budget Office is releasing are based on FY2020 levels. Once a full-year bill is passed, appropriation amounts will be updated based on the enacted bill.

A delay in getting a bill also means DOE is still actively negotiating with the Hill on the FY2021 request, specifically in support of technical questions for a conference and for appeals to both funding and language based on Senate and House marks.

FY2022 (Budget Year)

In coordination with OMB, DOE has already built a full FY2022 budget request. The input is being reviewed at OMB through late November. In a nominal year, in early December, DOE would get decisions in the form of a Passback (initial OMB proposal to the Department's input), followed by a Department wide appeal on specific items as determined by leadership, and then Settlement (final decision for the President's Budget Request (PBR)) in mid-December, after which all material would be finalized to send Congress in early February.

FY2023 (Initial Formulation)

Early data collection and bottoms-up identification of policy proposals and funding needs would begin in conjunction with Passback and Settlement. In a nominal year, this process ramps up considerably once the current budget being formulated goes to the Hill. This aspect will likely happen while Congress is still debating FY2021 funding.

Stages in the Annual Budget Process

Planning (Year round)

The purpose of the Planning phase of the PPBE process is to gather or update all the information, cost data, and options necessary to prepare to make resource decisions based on priorities during the programming phase. Planning considers the full range of work to be done against current plans and should be fiscally unconstrained so that all requirements and other mission needs are considered. All offices conduct this review either explicitly or implicitly throughout the year. Some offices conduct a discrete Planning phase with stated objectives, guidance, and outputs (e.g., the National Nuclear Security Administration (NNSA)).

Programming (Winter and Spring)

The purpose of the Programming phase of the PPBE process is to make decisions to align available program resources with priorities resulting in a balanced, integrated, executable budget to be proposed to OMB as the basis for that year's Congressional budget request. This process is fiscally conscious, allocating available resources against office and DOE priorities.]

Budgeting (February through November)

The Budgeting process includes development of the OMB and President's budget requests and then the process of getting the President's budget passed by

Congress. This process starts in February or March and is supposed to end with Congressional passage of the budget by the following September. A wide range of inputs are considered from the output of the Planning and Programming efforts, to data on program performance and risks to achieving agency goals, to past financial performance.

Execution (October to September)

Execution is the process to spend enacted funds and to assess progress made toward achieving identified performance measures. These performance measures can either be low-level milestones for internal use, or high- level performance measures in accordance with the Government Performance and Results Modernization Act (GPRA-MA) of 2010. The results of the evaluation process feed back into the Planning process for the next PPBE cycle.

DOE's OCFO manages the front end of the execution process – understanding better congressional intent, requesting the apportionment from OMB, and preparing and issuing the allotment to program and functional offices. These offices then allocate funds and obligate them for the many missions of the Department. Those funds are later costed as work is completed. Failure to meet the legal requirements of execution can result in criminal penalties, so this process is carefully monitored through the DOE accounting system.



Overview of Nominal Funding Process

Spend plans, execution dashboards, and ad hoc reporting give DOE effective insight into the rate of spending and how it compares to program financial plans.

To understand the manner in which appropriated resources are being used to meet mission goals, DOE also tracks performance against its strategic goals, Agency Priority Goals (APGs), and over 100 officeestablished annual goals.

Budgets in an Inauguration Year

Budgets in an Inauguration year are typically on a different schedule.

- In year one (1) of an administration, the multiyear PPBE process is compressed into a few months. Issues developed during the campaign and papers prepared by DOE for transition are used to structure policies. The incoming President sets budget toplines. The transition team, incoming agency leadership, OMB, and the OCFO work in less structured way than a Nominal year to build a budget from December/ January to March/April. Congress then gets the budget with 4-5 months before the end of the Fiscal Year, not the usual seven (7).
- In year five (5) of an administration, much of the work has already been done during the Presidential campaign. During a change of Administration, the Inauguration and related activities often result in a delay to the release to Congress of the budget by a few weeks.

Corporate Business Systems Migration to the Cloud

Pursuant to OMB directive M-19-19, Update to Data Center Optimization Initiative, and the Federal Information Technology Acquisition Reform Act (FITARA), the Office of the Chief Financial Officer (CFO) and the Office of the Chief Information Officer (CIO) are moving aging data centers located in Germantown and Albuquerque to a Cloud service provider (Infrastructure-As-A-Service).

Summary

The Office of the Chief Financial Officer (CFO) manages over 35 DOE-wide mission support business systems including budget formulation and execution, procurement, accounting, payroll, human capital and financial data analytics. <u>OMB Directive</u> <u>M-19-19</u>, <u>Update to Data Center Optimization</u> *Initiative*, the Federal Information Technology Acquisition Reform Act (FITARA),¹ and the <u>FITARA</u> <u>Enhancement Act of 2017</u>, require agencies to consolidate and optimize data centers. In response to these requirements, the DOE Chief Information Officer (CIO) issued a Data Center Migration Plan, and CFO and CIO developed a plan to transition CFO-managed systems to Cloud infrastructure.

Issue(s)

The approved transition to the Cloud plan is a two phased implementation. Phase I consolidated all business systems into either Linux or Windows platform, and was completed in April 2019. Phase II will migrate all systems to the Cloud in six groups started in March 2020 and is in process.

Background

CFO and CIO jointly manage over 35 corporatewide mission support business systems, ranging from financial management, procurement, human resources and data analytics, to invoice and contractor benefits management. CIO manages the system operating infrastructure and CFO manages system application, database layers and operations and maintenance (O&M). These systems operate on over 200 virtualized and physical servers using more than 220 TB of data storage in a Germantown data center coupled with a backup site in Albuquerque.

Pursuant to meeting the requirements of OMB Directive M-19-19, FITARA and the FITARA Enhancement Act, DOE decided in 2018 to expedite the migration of systems to a Cloud service provider (Infrastructure-As-A-Service) as the data centers in Germantown and Albuquerque had numerous power and cooling issues. The Albuquerque data center is scheduled to be decommissioned with the completion of the new NNSA Office Building in FY 2022.

Status

Select accomplishments to date include:

- Completed platform consolidation
- Finished trade-off studies for selection of Cloud service providers
- Selected Microsoft Azure as the Cloud service provider for all CF systems
- Established non-production environment in Azure
- Successfully migrated all sandbox environments to Azure
- Activities are scheduled for completion by the end of FY 2021.

¹ Title VIII, Subtitle D of the National Defense Authorization Act (NDAA) for Fiscal Year 2015, Pub. L. No. 113-291, available at https://www.congress.gov/113/plaws/publ291/PLAW-113publ291.pdf

Major System List*

*This list of Major business systems does not list all business support systems.

Financial, Auditing and Payroll

- Standard Accounting and Reporting System (STARS)
- A-123 Management of Entity Risks and Internal Controls Application (AMERICA)
- Departmental Audit Report Tracking System (DARTS)
- Conference Management Tool
- Funds Distribution System (FDS) 2.0
- Vendor Invoicing Portal and Electronic Reporting System (VIPERS)
- Financial Accounting Support Toll (FAST)
- DOE Payment and Collection System (DOEPAC)
- Laboratory Directed Research and Development/ Site Directed Research, Development and Demonstration (LDRD)
- Automated Time and Attendance Processing System (ATAAPS)

Human Resources

- Corporate Human Resource Information System (CHRIS)
- Employee Self Service (ESS)
- ePerformance
- DOE Employee Data Repository (DOE Info)

Procurement

Strategic Integrated Procurement Enterprise System (STRIPES)

Travel

- Enterprise Travel System (ETS2)
- Foreign Travel Management System (FTMS)

Evidence-Based Policy Making Act, DOE Data Governance, and Data Strategy

The Foundations for Evidence-Based Policymaking Act places new requirements on DOE to gather and analyze evidence about its programs, plan and conduct program evaluations, and build a data strategy that supports making its data open.

Summary

The Foundations for Evidence-Based Policymaking Act of 2018 (Evidence Act) requires agencies to gather and use evidence to support policymaking and evaluate the effectiveness of programs. Agencies are required to formally document evidence building activities and program evaluations in a plan called a "Learning Agenda," which is sent to the Office of Management and Budget (OMB) annually as part of the agency budget input. Agencies must also develop a data strategy and a formal plan to make agency data open by default. To lead these efforts, agencies are to name a Chief Data Officer, Chief Evaluation Officer, and Chief Statistical Official.

lssue(s)

Executing requirements of the Evidence Act requires DOE-wide education, coordination, and support. Making DOE data open by default will require a significant culture change and governance effort. Interest among departmental elements on Evidence Act requirements has been tepid thus far. Compliance efforts are currently an unfunded mandate.

Status

- Evidence Act activity is being coordinated by the Chief Data Officer and Chief Evaluation Officer within the Office of Chief Financial Officer.
- DOE's Data Governance Board has been established and is coordinating inter-departmental efforts on data strategy and Evidence Act deliverables.
- OMB's response to DOE's first Learning Agenda proposal is expected in November 2020.

Milestone(s)

- Chief Data Officer, Chief Evaluation Officer, and Chief Statistical Official named in 2019.
- DOE Data Governance Board (DGB) chartered in February 2020.
- Three DGB meetings held through October 2020; two additional meetings expected by end of calendar year 2020.
- DGB issued a data call to identify DOE's priority data sets, supporting IT systems, and data governance policies currently in use.
- Several departmental elements have conducted initial data maturity assessments.
- CF sent initial Learning Agenda proposals to OMB in September 2020.

Background

The Foundations for Evidence-Based Policy Making Act of 2018 builds on several existing laws that require agencies to measure the effectiveness of federal programs. The Act pushes beyond existing agency requirements to establish a strategic plan, program and agency priority goals, and performance monitoring by instituting new requirements to conduct in-depth evaluations. These evaluations require agencies to build and analyze a body of evidence to guide decision-making. The Act also creates expectations for agencies to manage data more strategically, most notably through new open data requirements.

OMB has published two guidance documents on implementing the Evidence Act:

 <u>Phase 1: Implementation of the Foundations for</u> <u>Evidence-Based Policymaking Act of 2018: Leaning</u> <u>Agendas, Personnel, and Planning Guidance</u>

- <u>Phase 4 Implementation of the Foundations</u> <u>for Evidence-Based Policymaking Act of 2018:</u> <u>Program Evaluation Standards and Practices</u>
- A third OMB guidance document on Open Data requirements and expectations is currently being circulated in draft form for agency comments.

The Administration also published a <u>Federal</u> <u>Data Strategy</u> and <u>Action Plan</u>, which have several requirements that support Evidence Act deliverables, and are expected to be coordinated by DOE's Chief Data Officer.

Definitions

Open Data

Data with these attributes:

- Available to the public;
- Includes standard metadata;
- Built on schemas that are public and that use open standards; and,
- Machine searchable and readable.

Learning Agenda

A term used by OMB to describe a process by which agencies formally identify priority questions that once answered, will help focus and improve success of critical agency mission areas. The process requires gathering and analyzing data to build evidence and conducting evaluations to answer priority questions. This process is documented in a formal plan called a Learning Agenda.

Evaluation Plan

A formal plan from an agency to OMB that describes processes, procedures, and expectations for conducting program evaluations within an agency.

Capacity Assessments

A term used by OMB to describe a process by which an agency evaluates its resources, procedures, and ability to conduct certain activities. OMB is currently focused on agencies conducting capacity assessments of agency data maturity and ability to conduct program evaluations.

External Interactions

DOE's interactions with Congress, Intergovernmental Partners, and the Office of Management and Budget (OMB) are key to fulfilling the Department's mission and implementing the Administration's priorities.

Summary

Interactions with key external partners are outlined in three main sections:

• Section I: Interactions with Congress

Information on committees of interest for DOE, members with special interests; required reports and updates to Congress; relevant pending legislation; leadership changes in a new Congress; and working with other legislative offices to clear materials for Congress.

- Section II: Interactions with Intergovernmental Partners
- Section III: Interactions with OMB

Section I: Interactions with Congress

Summary

The Secretary and members of DOE's legislative leadership team have regular interactions with Authorizing, Oversight, and Appropriations Committee Chairs and Ranking Members, and with individual Members of Congress, throughout the hearing, markup, and conference process. The Office of Congressional and Intergovernmental Affairs (CI), assisted by the Office of the Chief Financial Officer (CF) with respect to appropriations and the Office of the General Counsel (GC) with regard to authorization legislation, works with Congressional staff to address Member interests and constituent issues.

Within the Department, the Assistant Secretary for CI manages overall relations with Members of Congress and supports the Secretary as the chief strategic advisor on all congressional interactions not directly related to the House and Senate Appropriations Subcommittees. CI prepares Departmental officials for congressional hearings, including confirmation, programmatic, and oversight hearings before authorizing committees. In this capacity, CI manages testimony development, prepares DOE officials for engaging in hearings, and manages responses to questions for the record. GC provides technical drafting assistance to committees and members and prepares the Department's authorization legislation proposals. The Department's primary authorizing committees

are: Senate Energy and Natural Resources; Senate Armed Services; House Energy and Commerce; House Armed Services; and House Science and Technology.

The Chief Financial Officer (CF) leads the Department's day-to-day interaction with the Senate and House Appropriations Committees, informs DOE leadership and staff of the interests and motivations of Appropriators, prepares the Secretary for interactions with Appropriators, and works with Subcommittee staff to achieve the Administration and Secretary's budget priorities.

lssue(s)

Committees of Interest for DOE

• Appropriations Committees (CF)

The United States House of Representatives and United States Senate Appropriations Committees have jurisdiction over discretionary spending legislation for the Federal government. Each Appropriations Committee is divided into 12 subcommittees with jurisdiction over funding for designated Executive Branch departments and agencies. The Subcommittees on Energy and Water Development, and Related Agencies (referred to as "HEWD" for the House subcommittee and "SEWD" for the Senate subcommittee) have jurisdiction over DOE. References in this section to the Appropriations Committee refer to both the full Appropriations Committee and HEWD and SEWD. Member and staff information for the 116th Congress, as of November 1, 2020, is provided below.

CF serves as the central point of contact between Congressional Appropriations Committees and the Department. CF staff interact with the House and Senate Appropriations Committees regularly, primarily through the HEWD and SEWD subcommittees. CF's congressional relations functions include presenting the President's annual budget request ("rollout"); preparing principals for hearings before the Appropriations Committees; responding to formal inquiries; and providing information to the Committees through reports; in-person and telephone briefings; and technical assistance. As needed, CF arranges, prepares attendees, and participates in Program and Functional Office interaction with the subcommittees.

Committee		Chairman	Majority Staff Contact	Ranking Member	Minority Staff Contact
H O U	Appropriations Committee	Rep. Nita Lowey (D-NY)	Shalanda Young, Staff Director	Rep. Kay Granger (R-TX)	Anne Marie Chotvacs, Staff Director
S E	Subcommittee on Energy and Water Development, and Related Agencies	Rep. Marcy Kaptur (D-OH)	Jaime Shimek, Clerk	Rep. Mike Simpson (R-ID)	Angie Giancarlo, Clerk
S E	Appropriations Committee	Richard Shelby (R-AL)	Shannon Hines, Staff Director	Patrick Leahy (D- VT)	Chuck Kieffer, Staff Director
N A T E	Subcommittee on Energy and Water Development, and Related Agencies	Sen. Lamar Alexander (R-TN)	Tyler Owens, Clerk	Sen. Dianne Feinstein (D-CA)	Doug Clapp, Clerk

• Authorizing Committees (CI)

DOE activities fall within the jurisdiction of several congressional authorization committees. The Department's primary authorizing committees are: Senate Energy and Natural Resources; Senate Armed Services; House Science and Technology; House Armed Services; and the House Energy and Commerce Committee.

Committee	Chairman	Majority Staff	Ranking Member	Minority Staff
		Contact		contact
House Energy and	Rep. Frank Pallone	Jeff Carroll, Staff	Rep. Greg Walden (R-	Peter Kielty, Chief
Commerce Committee	(D-NJ)	Director	OR)	Counsel
House Committee on	Rep. Eddie Bernice	John Piazza, Chief	Rep. Frank Lucas (R-	Tom Connally,
Science, Space, and	Johnsen (D-TX)	Counsel	OK)	Counsel
Technology				
House Armed	Rep. Adam Smith (D-	Paul Arcangeli, Staff	Rep. Mac Thornberry	Dave Sienicki,
Services Committee	WA)	Director	(R-TX)	Professional Staff
				Member
Senate Energy and	Sen. Lisa Murkowski	Brian Hughes, Staff	Sen. Joe Manchin (D-	Sam Fowler, Chief
Natural Resources	(R-AK)	Director	WV)	Counsel
Committee	1			
Senate Armed	Sen. James Inhofe (R-	John Bonsell, Staff	Sen. Jack Reed (D-	Elizabeth King, Staff
Services Committee	OK)	Director	R.I.)	Director

• Oversight Committees (CI)

Cl coordinates with GC in managing Congressional oversight and investigation requests, including the document production process for oversight committee requests on DOE matters. The primary legislative bodies that deal with oversight of DOE issues include:

Committee	Chairman	Majority Staff Contact	Ranking Member	Minority Staff contact
House Oversight and Government Reform Committee	Rep. Carolyn Maloney (D-NY)	Dave Rapallo, Staff Director	Rep. James Comer (R- KY)	Chris Hixon, Staff Director
Senate Committee on Homeland Security and Government Affairs	Sen. Ron Johnson (R- WI)	Gabrielle D'Adamo, Staff Director	Sen. Gary Peters (D- MI)	David Weinberg, Staff Director
House Energy and Commerce Subcommittee on Oversight and Investigations	Rep. Diana DeGette (D-CO)	Chris Knauer, Director of Oversight	Rep. Brett Guthrie (R- KY)	Alan Slobodin, Chief Investigative Counsel
House Committee on Science, Space, and Technology Subcommittee on Investigations and Oversight	Rep. Bill Foster (D-IL)	Dahlia Sokolov, Staff Director	Rep. Ralph Norman (R-S.C.)	Josh Mathis, Staff Director

Other Members with Special Interest

There are a number of Congressional Caucus Groups that focus on specific issues related to DOE. CI has primary responsibility for interacting with these caucus groups, and others. Some congressional caucuses of interest to DOE include:

- Advanced Energy Storage Caucus
- Arctic Working Group Caucus
- Artificial Intelligence Caucus
- Biofuels Caucus
- Brain Injury Task Force
- Climate Solutions Task Force
- Coal Caucus
- Cybersecurity Caucus
- Energy Caucus
- Energy Savings Performance Caucus
- Grid Innovation Caucus
- High Performance Building Caucus
- Long Rage Strike Caucus
- National Labs Caucus
- Natural Gas Caucus

- Northwest Energy Caucus
- Nuclear Cleanup Caucus
- Nuclear Security Working Group
- Oil and Gas Caucus
- Problem Solvers Caucus
- Propane Caucus
- Safe Climate Caucus
- Smart Cities Caucus
- Solar Caucus
- Sustainable Energy and Environment Caucus

Required Reports and Updates to Congress (CF)

There is a statutory requirement that the Secretary notify HEWD and SEWD at least three full business days in advance of making any grant awards or contracts of more than \$1 million, issuing a letter of intent to make an allocation award, or announcing publicly the intention to make an award. CF works with program offices to notify appropriators of these awards.

Appropriations legislation instructs DOE to provide HEWD and SEWD reports on information of various

topics. Reporting requirements appear in both legislative bill text and the report language that accompanies appropriations bill text. CF adopts requirements in report language for an enacted appropriations bill and the original House and Senate reports, even if the legislation accompanying the report was never passed. Appropriators are interested in the Department adhering to this practice.

CF manages reports required in appropriations bill and requested in report language by assigning reports to program offices and tracking progress to completion. Once CF receives a finished report, the report is cleared through the Office of the Secretary and provided to OMB for clearance. The final report and cover letters are transmitted under CF's signature. In general, reports required by appropriations language are shared only with the relevant Subcommittee and are not public.

Working with Other Legislative Offices to Clear Materials for Congress

Testimony and Questions for the Record

A committee initiates a request to hold a hearing by contacting CI or CF to identify a witness for a hearing under development. This witness may be the Secretary, Deputy Secretary, or other leaders in the Department from relevant Program or Functional Offices. This usually occurs through a formal letter of invitation from the Chairman, and at times CI or CF may receive advance notice from committee staff. CI manages appearances before authorizing committees on authorizationrelated topics; CF manages appearances before appropriations committees. CI and GC are responsible for Oversight testimony.

Once testimony is drafted by the appropriate program office, CI and CF coordinate the draft testimony with relevant program and functional offices and officials for review and clearance, and then with the Office of Management and Budget (OMB) for approval. OMB may disseminate the testimony to other agencies or offices for review under this process. The Secretary and functional office witnesses often rely on CI or CF for Member biographies, briefing materials, and hearing preparation meetings, while Program Office witnesses use internal staff to work these tasks. Department witnesses are frequently asked to answer questions posed by Members of Congress after a hearing for the hearing record (Questions for the Record or "QFRs"). Responses to QFRs are prepared and cleared through the same process as testimony before being sent back to the Committee and incorporated in the official hearing record.

For budget testimony the Secretary traditionally testifies at hearings on the President's Budget before the Department's major committees of jurisdiction: House Energy and Commerce; House Science, Space, & Technology Committee, Senate Energy and Natural Resources, Senate Appropriations Energy and Water Development Subcommittee; and House Appropriations Energy and Water Development Subcommittee. Under Secretaries and Assistant Secretaries may also be asked to testify on the budget.

GC drafts DOE legislative proposals and obtains OMB clearance of these proposals. Further, GC acts as the DOE contact point with OMB on all non-budget legislative matters. This includes participating in the analysis and formulation of DOE positions and comments on pending and enrolled bills, as well as other agencies' proposed legislation and testimony.

Congressional Budget Office (CBO)

CBO is a legislative branch agency that produces independent analyses of budgetary and economic issues to support the Congressional budget process. CF staff provide technical assistance to CBO staff on an as-needed basis to explain President's Budget proposals or the impacts of pending legislation in Congress.

Government Accountability Office (GAO)

CF leads DOE interactions with the Government Accountability Office, a legislative branch audit agency with statutory authorities to review DOE programs and operations. CF designates lead offices for new audits, assists Program, Functional and Field offices in responding to data requests as needed, provides weekly reports on GAO activity, and tracks and reviews responses to GAO audit reports. As of October 13, 2020, GAO was performing 63 separate audits or assessments affecting DOE. The current number of audits is consistent with recent years.

Milestone(s)

House Democrats are expected to hold caucus leadership elections November 18 and 19 and contested committee chair elections the week of November 30. House Republican elections will likely occur around the same timeframe.

The Senate has not indicated the timing on caucus leadership elections. Past practice has been that this happens at the beginning of a new Congress.

The 117th Congress is scheduled to begin January 3, 2021.

Relevant Pending Legislation

1. Continuing Resolution through December 11

On October 1, the President signed a Continuing Resolution (CR) to fund the government through December 11, 2020. The CR continues spending at FY 2020 levels. Anomalies affecting DOE were included in the CR:

- Section 113 Intelligence authorization extension; and,
- Section 127 Stops the Western Area Power Administration payment to Treasury.

Of note, Section 140 of the CR extends Section 3610 of the Coronavirus Aid, Relief, and Economic Security (CARES) Act for the duration of the CR. This provision authorizes Federal contractors and subcontractors to be paid weather and safety leave if unable to work due to COVID-19.

2. FY 2021 appropriations bills

In July, the House marked up FY 2021 appropriations bills at both the subcommittee and committee level, and passed the bills off the Floor.

The Senate has not released any FY 2021 appropriations bills to date. The expectation is that SEWD will release a bill after the election ahead of potential final year spending negotiations with the House. The Senate is not expected to mark-up this bill and will instead use the text of the bill to undertake FY 2021 conference negotiations with the House.

3. FY 2021 Omnibus appropriations bill

During Summer 2020, the House Appropriations Committee considered the FY 2021 HEWD bill. This bill was considered on the Floor and passed. The expectation is that Congress will work to pass an Omnibus appropriations bill for the remainder of FY 2021. A decision on another CR will be made by leadership after the election.

4. FY 2020 National Defense Authorization Act

The National Defense Authorization Act (NDAA) authorizes appropriations for defense programs of the Department of Energy, including the National Nuclear Security Administration (NNSA); the Office of Intelligence and Counterintelligence (IN); and portions of the Office of Science (SC) and the Office of Environmental Management (EM). The NDAA also establishes new defense policies and changes to previous policies.

The NDAA process begins with the transmission of the President's budget request to Congress in January/February. The Administration/DOE often transmits legislative policy proposals to the committees of jurisdiction in conjunction with the budget request.

The House Armed Services Committee (HASC) and the Senate Armed Services Committee (SASC) begin work on the NDAA following annual budget hearings, which typically lead to the drafting and markup of separate bills in the House and the Senate in May/June.

Leadership Changes in the 117th Congress

CF is currently aware of two potential changes to the Appropriations Committees for the 117th Congress: the retirement of House Appropriations Committee Chairwoman Nita Lowey and the retirement of Senate Energy and Water Development Appropriations Subcommittee Chair Lamar Alexander. At this time, the committee replacements are unknown. If the Senate majority changes, a period of reorganization of all committees will likely occur, including voting on Chairmen and Ranking Members and possible redistribution of committee staffs.

CF maintains collegial relationships with the majority and minority staff of the House and Senate Appropriations Committees, especially on the Energy and Water Development Subcommittees. Appropriations staff interactions are focused on technical budget assistance and are normally less partisan than DOE's interactions with authorizing committees.

Cl is currently tracking potential changes to DOE's authorizing committees for the 117th Congress:

• Senate Energy and Natural Resources Committee

Senator Joe Manchin (D-WV) is the current Ranking Member of the committee and is expected to serve as Chair or Ranking Member for SENR in the 117th Congress (depending on Senate Majority). The current Chairman, Lisa Murkowski (R-AK), is term-limited under party rules governing committee chairmanship and will be unable to serve as Chair or Ranking Member for SENR in the 117th Congress. Sen. John Barrasso (R-WY) is widely expected to be the next Chairman or Ranking Member unless he decides to remain the Chairman of Senate EPW.

• House Energy and Commerce Committee

Rep. Frank Pallone (D-NJ) is the current Chairman of the committee and is expected to continue in this role in the next Congress. Ranking Member Greg Walden (R-OR) is retiring from Congress and at this time a replacement is unknown. Reps. Michael Burgess (R-TX), Cathy McMorris Rodgers (R-WA), and Bob Latta (R-OH) have expressed interest in running to replace Ranking Member Walden.

House Armed Services Committee

Rep. Adam Smith (D-WA) is the current Chairman of the committee and is expected to continue in this role in the next Congress. Ranking Member Mac Thornberry (R-TX) is retiring from Congress and at this time a replacement is unknown. Reps. Joe Wilson (R-SC) and Michael Turner (R-OH) are next in seniority and therefore the likeliest to replace Ranking Member Thornberry.

Section II: Interactions with Intergovernmental Partners

Cl maintains ongoing communications with governors, state legislators, tribal, and local officials across the country. Cl proactively engages stakeholders to ensure that their views are considered as part of the Department's decision-making process. Cl also communicates routinely with all relevant stakeholders on DOE announcements, initiatives, proposals, and grants; and assures appropriate follow-up.

The Department has a physical presence in 30 states. Of those, much of Cl's focus is on 12 states where multiple, ongoing DOE missions are executed at DOE sites and National Laboratories (California, Colorado, Idaho, Illinois, Ohio, Kentucky, Nevada, New York, New Mexico, South Carolina, Tennessee, and Washington).

Cl interacts on a regular basis with

intergovernmental and tribal associations including but not limited to: the National Governors Association; regional governors associations; National Association of Attorneys General; National Congress of American Indians; National League of Cities; National Conference of State Legislatures; National Association of Counties; U.S. Conference of Mayors; Southern States Energy Board; and the National Association of State Energy Officials. The focus of Cl's work with these organizations is to communicate the activities of DOE programs, policies, and initiatives; and solicit views, comments, and concerns from these groups. These efforts extend to a broad group of constituencies, to include business/industry, civic groups, colleges, universities, foundations, trade associations, and energy-oriented organizations.

Tribal Affairs

Cl engages with the 566 federally-recognized tribes, and the tribes' more than 250 reservations. This includes: advising and informing DOE senior officials on potential impacts of Departmental programs on tribal interests and culture; developing and enhancing working relationships with Tribal leaders and organizations and entities working with tribal governments; representing DOE with sovereign Tribal governments and at tribal meetings and conferences; and recommending policies and procedures for ongoing collaboration between DOE and tribes. Cl also works very closely with the DOE Office of Indian Energy (IE) to assist in the management of the Indian Country Energy Working Group, the National Tribal Energy Summit, and IE's work with congressional partners to advance the mission of implementing activities that assist American Indian Tribes and Alaska Native villages with energy development, capacity building, energy cost reduction, and electrification of Indian lands and homes.

Section III: Interactions with the Office of Management and Budget (OMB)

Summary

OMB is a critical partner in fulfilling the Department's mission and achieving Administration and Departmental priorities. CF serves as the Department's liaison to OMB to assess the effectiveness of agency programs, address competing funding demands among programs, and set funding priorities.

OMB Organization

The largest component of OMB is the five Resource Management Offices, the Budget or "B" side, organized along functional lines mirroring the U.S. federal government, each led by an OMB associate director. These are divided into divisions and branches. DOE works with three branches:

- Force Structure and Investment Branch (NNSA)
- Energy Branch (all programs excluding NNSA and the Power Marketing Administrations)
- Water and Power Branch (PMAs)

The Management or "M" side of OMB includes several offices that focus on policy and guidance for Departments to adhere to. For example:

- Performance Team: Manages implementation of the Government Performance and Results Act Modernization Act (GPRA-MA) that sets requirements for strategic planning and performance evaluation.
- Office of Federal Financial Management and Office of Federal Financial Policy: provide guidance and policy on financial management.

DOE staff also work with OMB-wide support offices which include the Office of General Counsel, the Office of Legislative Affairs, the Budget Review Division, and the Legislative Reference Division.

- The Budget Review Division performs government-wide budget coordination and is largely responsible for the technical aspects relating to the release of the President's budget each February.
- The Legislative Reference Division is the central clearing house across the federal government for proposed legislation or testimony. This Division is also responsible for preparing Statements of Administrative Policy (SAPs) for the President. These statements are used for OMB to communicate the President's and agencies policies to the government as a whole and set forth policymaker's agendas.

Transition Year Formulation

In a normal budget year, the contents of the President's Budget are negotiated between federal agencies and OMB from September to January, with a complete budget due to the first Monday in February. In recent transition years, the President has issued a top-level budget in either mid-February (Clinton), late February (Obama, Bush), or March (Trump). The full array of detailed budget publications has commonly been released in early April. The Trump Administration delayed a full budget release until May 2017. The Obama Administration delayed the budget requests in 2009 and 2013 due to the work needed to enact the Recovery Act and a full-year annual appropriation.

OMB typically has all budget-related policy appointees in place quickly. OMB will generally develop a top-level February budget in a manner that reflects the most important campaign promises, with fewer opportunities for cabinet agencies (which may not have confirmed appointees) to negotiate top-line numbers. OMB will usually initiate the process within a week or two of the Inauguration. OMB will usually provide:

- A single number for each agency's appropriations; and,
- A few policy issues to be highlighted in the February budget document.

Clearance Process

OMB ensures that agency reports subject to review, rules, testimony, and proposed legislation are consistent with the President's budget and with administration policies.

Within the Executive Branch, there are several types of clearance processes required for DOE documents. Requirements for OMB clearance of legislative material and the type of reports subject to OMB review are outlined in OMB Circulars A-11 and A-19.

Strategic Plan and Agency Priority Goals

Agencies are required to develop an Agency Strategic Plan and Agency Priority Goals (APGs), reviewed and approved by the Office of Management and Budget (OMB).

Summary

Federal agencies are required by statute to produce an Agency Strategic Plan and Agency Priority Goals (APGs). These materials, which are planned for public release in February 2022, express the Department's goals and highest priorities.

Agency Strategic Plan

- Required by the Government Performance and Results Act of 1993 (P.L. 103-62) as amended by the GPRA Modernization Act of 2010 (P.L. 111-352)
- Covers 2022 2026
- Secretarial Decisions:
 - Content: Emphases and broad areas
 - Methodology for Plan development
 - Development timeline

Agency Priority Goals

- Required by the GPRA Modernization Act of 2010 (P.L. 111-352)
- Reflect top priorities of Administration and DOE Leadership
- Advance progress toward Strategic Goals and Objectives
- Near-term results should be achievable within approximately 24 months
- Require quarterly review by the Deputy Secretary
- Progress updates posted quarterly on Performance.gov

Status

The Office of Management and Budget (OMB) deadlines for providing draft materials begin in June 2021. DOE should begin development of the 2022-2026 Strategic Plan and 2022-2023 APGs at the start of calendar year 2021.

Milestone(s)

Agency Strategic Plan

- June 2021: Draft Mission Statement, Strategic Goals and Objectives due to OMB
- September 13, 2021: Full draft due to OMB
- November 2021: Agencies receive OMB feedback
- December 23, 2021: Agencies deliver final draft Strategic Plan to OMB
- February 7, 2022: Agencies publish Strategic Plan

Agency Priority Goals (APGs)

- June 4, 2021: Draft Impact Statements (Topic Areas) due to OMB
- September 13, 2021: Draft APG Statements (Impact and Achievement Statements) due to OMB
- November 2021: Agencies receive OMB feedback
- January 14, 2022: Agencies provide final APG Statements to OMB
- February 7, 2022: APG Statements published on Performance.gov
- February 2022: Quarterly APG reporting process begins for 2022-2023 APGs

Background

The Agency Strategic Plan is an opportunity for DOE Leadership to articulate priorities. The plan is required to be prepared only by Federal employees and include:

- Mission Statement.
- General goals and objectives.
- Description of how goals and objectives contribute to Cross-Agency Priority goals.
- Description of how goals and objectives will be achieved, including resources required and how DOE is working with other agencies on goal achievement.

- Description of how goals and objectives incorporate views and suggestions obtained through congressional consultations.
- Description of how performance goals contribute to the general goals and objectives in the Strategic Plan.
- Key factors external to DOE that could significantly affect achievement of general goals and objectives.
- Description of the program evaluations used in establishing or revising general goals and objectives, with a schedule for future program evaluations.

The <u>current set of Agency Priority Goals (APGs)</u> cover FY 2020-2021:

- Commercial Adoption of Energy Technologies
- DOE Enterprise Cybersecurity
- Energy Sector Cybersecurity
- Environmental Management
- High Performance Computing (Exascale/Artificial Intelligence)
- Nuclear Stockpile Annual Assessment

Each APG has a Goal Leader and a Deputy Goal Leader within the Department. Quarterly Performance Reviews are held with Deputy Secretary and Goal Leaders to discuss progress. FY 2022-2023 APGs will be developed in conjunction with 2022-2026 Strategic Plan.

Department of Energy's Response to COVID-19

The health and safety of our DOE employees and contractors is paramount and guides all of the Department's return to the workplace decisions.

Summary

On May 18, <u>DOE's COVID-19 Return to the Federal</u> <u>Workplace Framework</u> was released, providing guidance for Federal officials to develop site/ facility plans for DOE's transition from a maximum telework posture toward more normal operations. The status of operations varies across the DOE complex. Facilities located in different parts of the country have taken into account different state and local guidance, and some have maintained certain essential functions throughout the COVID-19 pandemic. Accordingly, DOE site/facility plans cascade from DOE's Framework, reflecting these varied circumstances and site-specific needs.

The approval level for transitioning to different phases also varies based on the site/facility. The Secretary makes the determination regarding DOE Headquarters. The Heads of Departmental Elements determine the status of field elements under their purview, in consultation with the applicable Under Secretary. For the Power Marketing Administrations, the final approval rests with the Administrators after informing the Head of Departmental Element and applicable Under Secretary. Where multiple Departmental Elements have employees working at the same site, a unified decision is made regarding the entire workforce at that site. Where DOE has sites/facilities in the same geographic region that are managed by different Departmental Elements, Federal officials align their return to the workplace to the greatest extent practicable.

DOE's Framework is a three-phased approach that aligns with *Opening Up America Again* and OMB, OPM, and CDC guidelines. It takes into account state and local government orders and conditions, as well as the current operating conditions and staffing of individual Federal facilities. For example, the <u>DOE</u> <u>Headquarters COVID-19 Return to the Workplace</u> <u>Plan</u> states that DOE HQ will monitor applicable state and local orders and consider the spirit and intent of those orders to the maximum extent possible while implementing its plan. DOE HQ will continue to assess any community changes to inform risk-based decision-making regarding progressing or regressing through the phases.

In Phases 1 and 2, mission-critical employees whose jobs are better performed onsite than through telework returned to the workplace. These employees include senior leadership; staff supporting Primary Mission Essential Functions (PMEF) and Mission Essential Functions (MEF); and other high priority senior-level program staff. Employees in Phases 1 and 2 were allowed to selfidentify to remain on telework if they fell into one of the CDC-identified vulnerable populations, or if they lived with or cared for someone in a vulnerable population. Additionally, employees could selfidentify if they were responsible for caregiving where services/facilities were closed or modified due to COVID-19. Employees not included in Phases 1 and 2 of the return to the workplace remain on telework or Weather and Safety Leave, as appropriate. Employees may not voluntarily return to the workplace without prior approval by the appropriate Head of Departmental Element.

COVID-19 Hotline Response Team

A COVID-19 Hotline Response Team was established on March 15, 2020, to serve as DOE's central point of contact for inquiries/reports from supervisors, employees, and on-site support service contractors regarding potential COVID-19 cases. It is staffed by a team of safety and health professionals from the Office of Management; the Office of Environment, Health, Safety and Security; and the Office of Enterprise Assessments. The COVID-19 Hotline Response Team uses a standardized questionnaire to gather pertinent facts; assess their relevance and significance; and develop recommendations for appropriate protocol for COVID-19 cases. At DOE HQ, the team conducts workplace contact tracing and tracks each case to its outcome. Additionally, to help improve communication with the workforce, the COVID-19 Hotline Response Team responds to requests for clarification on Frequently Asked Questions (FAQs), DOECASTs, and other COVID-19

related guidance. The team tracks these questions to help guide the development of additional guidance and communications.

Flexibilities for Employees during COVID-19

Since the COVID-19 national emergency was declared, DOE has worked to provide as much flexibility as possible to employees while ensuring that DOE continues to meet its mission. Such flexibilities include:

- Instituting a teleworking policy that allows parents to telework with a child (or other persons requiring care) present at the home.
- Encouraging all supervisors to be as flexible as possible with employees (e.g., maximizing telework, adjusting work schedules) while ensuring mission requirements are met.
- Suspending core hours (9 AM 3 PM) to permit schedule flexibility.
- Promoting the use of alternative work schedules to help employees balance work and personal responsibilities. Such schedules may allow employees to complete their biweekly work requirement in fewer than 10 workdays and to adjust start and end times to accommodate doctor appointments, dependent care issues, and other pressing matters.
- Authorizing 20 Hours of Excused Absence for Caregiving per pay period.
 - Since April, supervisors have had the authority to grant teleworking Federal employees up to 20 hours of excused absence per pay period to care for or provide educational instruction to children as a result of school/caregiving facility closures due to COVID-19.
 - This flexibility is also extended to employees to care for other family members, such as an elderly parent or an adult child with special needs, whose care facilities were closed due to COVID-19.
 - This authority has been extended multiple times based on local conditions affecting DOE employees. It is currently set to expire on December 19, 2020, which coincides with the typical end of the first half of the school year.

Additionally, where compliance has been impacted by the national emergency, DOE has offered

temporary relief from adhering to certain DOE safety and security requirements. This relief has been critical to safeguarding the health and safety of DOE's workforce while allowing the Department to remain open to serve the American people and conduct mission critical functions.

Facility Changes at DOE Headquarters

At DOE HQ, many changes have been implemented to protect employees reporting to the workplace, such as:

• Enhanced entrance screening criteria and protocols

DOE HQ uses CDC-informed enhanced entrance screening criteria to determine whether an individual (e.g., Federal employee, onsite support service contractor, visitor) may enter a facility. Returning personnel are advised that they may not enter the workplace if they have flu-like symptoms, including a temperature over 100.4 degrees Farenheit.

• Social distancing protocols

Social distancing protocols have been implemented for Phases 1 and 2 and will be revisited prior to initiating Phase 3. For DOE HQ, this includes:

- Face Coverings Personnel are encouraged, but not required, to wear face coverings while in HQ facilities, especially in high traffic areas where social distancing cannot be achieved (e.g., busy hallways, lobbies, elevators). Personnel who wish to use face coverings are asked to bring them to the facility. Depending on availability and demand, face coverings are provided at facility entrances at request.
- **Common Areas** Areas such as cafeterias and gyms where employees are likely to congregate are closed until Phase 3.
- Meetings and other Gatherings To the greatest extent practical, meetings are held using virtual tools. In-person meetings must adhere to social distancing recommendations (six feet) between participants and limit the number of attendees. Conference rooms and auditoriums have modified seating and capacity controls to ensure social distancing.
- Workspace Redesign Open workspaces that cannot accommodate at least six feet

of distance between employees may require employees to work onsite in shifts or use other mitigation strategies to allow for social distancing. Walk-up services (e.g., badging, food services) require the installation of sneeze shields and other appropriate safety barriers.

- **Hygiene items and services** DOE HQ installed hand sanitizer stations at DOE facility entrances and in high traffic areas and replaced soap dispensers, sink fixtures, and paper towel dispensers with touchless equipment.
- **Signage** DOE HQ posted signage throughout its facilities reminding employees to use proven hygiene practices and social distancing protocols, to stay home when ill, and to report any COVID-like symptoms.

Phase 3 with Increased Flexibilities

When DOE's COVID-19 Return to the Federal Workplace Framework was developed in May, it was assumed that Phase 3 would entail a return to normal, pre-COVID operations. However, based on thencurrent conditions, DOE issued updated guidance in July 2020 to allow for <u>increased flexibilities</u> when Phase 3 begins at DOE HQ. These flexibilities will help employees effectively manage schooling, dependent care, health vulnerabilities, and other issues.

When Phase 3 starts at DOE HQ, all full-time telework agreements provided at the start of the COVID-19 crisis will be rescinded and Federal employees will return to the workplace, unless they request increased flexibilities under a new *DOE HQ Phase 3 COVID-19* telework agreement. Employees who do not wish to telework in Phase 3 and intend to return to the workplace cannot be required to enter into a telework agreement in accordance with the 2010 Telework Enhancement Act.

Phase 3 with increased flexibilities includes:

- Supervisors working with Federal employees to return to set schedules in the workplace that allow for expanded telework flexibility (up to full-time, if warranted).
- Suspending core hours (9 AM 3 PM) to permit schedule flexibility.
- Allowing employees to request schedule flexibility for commuting issues to accommodate for limitations in public transit services.
- Allowing employees to self-identify to remain on

telework using the same criteria as permitted for Phases 1 and 2. At this time, employees are not required to identify what health condition qualifies them for identification in the vulnerable category.

• Authorizing employees in a telework status who are responsible for caregiving in instances where services are closed because of COVID-19 to use up to 20 hours of excused absence per pay period.

DOE HQ COVID-19 Phase 3 telework agreements will be reassessed every month to account for changes in essential services and conditions in the NCR due to COVID-19 and are revocable per Departmental guidance. Adjustments to these interim agreements can be made on an as-needed basis due to changes in individual circumstances. Employees are expected to notify their supervisors immediately if their situations or conditions change. Once Phase 3 starts, monthly emails from employees recertifying that conditions remain the same will be required.

Current Status of DOE

Approximately 18% of DOE's Federal employees are reporting into the workplace and 74% are teleworking. The majority of the Department's labs, plants, and sites remain in Phases 1 or 2. A few sites remain in Phase 0. At this time, only one site (EM-MOAB) has moved to Phase 3, as of September 21, 2020.

DOE HQ entered Phase 1 on June 8, 2020, and Phase 2 on June 29, 2020.

Next Steps and Leadership Communication

The Secretary currently sends out a weekly COVID-19 HQ-wide communications to employees that give updates on cases within the Department, answer frequently asked questions, and provide information about employee assistance resources.

Major Decisions/Events

DOE's senior leadership can continue to support the Department's Return to the Workplace Framework. Opportunities in this regard include:

- Continue supporting the exploration of a post-COVID-19 telework/remote-work posture that could save money and capitalize on efficiencies.
- Continue providing weekly communications to DOE employees regarding COVID-19.

Enterprise Cybersecurity

The Department of Energy networks are targets of multiple nation states and other malicious actors. DOE Office of the Chief Information Officer (OCIO) coordinates and synchronizes cybersecurity functions across the full spectrum of DOE mission and operations. The Department also has a sector specific cybersecurity responsibility that is carried out by the Office of Cybersecurity, Energy Security, and Energy Resilience (CESER).

Summary

Protecting the information assets of the Department of Energy (DOE) is of vital importance to financial and national security posture. Due to the high concentration of advanced research, the responsibility for the transmission of 11% of the electricity for the United States, and the national security missions of the Department, DOE is constantly targeted by sophisticated nationstate adversaries. Additionally, DOE has statutory, sector-specific cybersecurity responsibility for the Energy Sector. This document is focused on the Chief Information Officer's (CIO) functions. CESER prepared a separate paper on DOE sector-specific cyber programs.

DOE is a complex agency both in the scope of its mission space and its unique organizational structure. DOE encompasses 17 National Laboratories and approximately 100 field installations across the country. The mission of the Department spans from open, collaborative research to maintaining the Nation's nuclear stockpile. Given this extreme divergence in mission focus areas, cybersecurity postures and approaches are carefully tailored to provide appropriate risk management for each installation. The organizational structure of the Department adds to this complexity. Cybersecurity funding and authority is divided between the CIO and the program offices. The CIO is responsible for developing policy, performing oversight, and providing an enterprise wide incident response and coordination capability. Program offices such as Science (SC), Environmental Management (EM), and the National Nuclear Security Administration (NNSA) directly fund the cybersecurity programs for their field elements at the National Laboratories, Power Marketing Authorities (PMAs), sites, and plants. In short, the CIO coordinates and oversees cybersecurity activities for the Department, and the program offices fund and execute DOE cybersecurity policies.

Creating policy and direction for such a large and diverse agency is extremely challenging. To ensure appropriate guidance on cybersecurity is promulgated, OCIO employs an open and collaborative development process for directives. This process is designed to capture and incorporate requirements from the multiple mission areas and provide appropriately tailored guidance for the complex.

The cybersecurity program of the Department has existed for over twenty years, but it has been primarily focused on protecting traditional information technology (IT). In FY 2020, the Department has increased its focus on cybersecurity risks associated with DOE's industrial control systems. These control systems are used to operate our advanced scientific tools, the electric grid in the PMAs, and in manufacturing and other plant facilities across the Department. The OCIO is coordinating the tailoring of policies to specifically address the cyber risk for control systems and is developing Department-wide capabilities to provide cyber monitoring, incident response, and education opportunities for protecting the DOE's critical infrastructure.

lssue(s)

Topic 1

Currently, enterprise visibility into the status of cybersecurity networks across DOE is an issue. Each site has insight into their environments, but the OCIO continues to deploy solutions that will roll this site-specific visibility up to an enterprise level.

Topic 2

The Department needs to update our cybersecurity strategy and policies. This includes updating the current IT cybersecurity policy, DOE Order 205.1C,

creating a strategy for protecting control systems, and developing a enterprise policy for the various national security systems at DOE.

Topic 3

DOE faces challenges in workforce recruitment and retention as we work to attract cyber professionals with the right training and experience. Workforce modeling in both the public and private sector predicts there will be a significant gap between the required number of cybersecurity professionals and the pool of available qualified candidates.

Topic 4

Supply Chain Risk Management (SCRM) is critical to ensuring IT products and services are secure for achieving mission outcomes by highlighting the risks of potentially malicious functionalities, counterfeits, and vulnerable products due to poor manufacturing and development practices. The DOE SCRM program supports compliance with the Federal Acquisition Supply Chain Security Act, North American Electric Reliability Corporation (NERC), and Critical Infrastructure Protection (CIP) requirements. Quantitative Risk Management (QRM) training and guidance helps cybersecurity SMEs express risk in terms of probability and cost to more effectively communicate with executives and budget planners. QRM is meant to supplement rather than replace existing qualitative approaches.

Status

Topic 1

In FY 2020, deployed Big Data Platform (BDP) as a central cloud-based repository for consolidating cybersecurity sensor data for cyber operations and analytics. In addition, the capability can be leveraged by other programs for their research if they have an approved plan.

Continuing to deploy cybersecurity sensors as part of the federal Continuous Diagnostics and Mitigation (CDM) program. Department of Homeland Security (DHS) funding for expanding the licensing and integration of cybersecurity sensors was diverted to support a major shift to remote work in FY 2020. DOE anticipates continuing the deployment when DHS restores funding in FY 2021.

Topic 2

- The Department is updating DOE Order 205.1C to address new threats. This process will take a year, and the process will include input from our Management and Operating (M&O) community, program offices, and other stakeholders.
- At the end of FY 2020, the Control Systems Working Group (CSWG) was established to coordinate across programs to develop a strategy that includes asset inventory; vulnerability management and assessment; instrumentation; configuration; and alignment with ongoing processes and systems. This effort is not currently funded.
- In FY 2021, DOE is developing a new policy to address national security systems at DOE. This effort is being led by the OCIO. The operators of these systems, NNSA and the Office of Intelligence (IN), will be critical partners in this process.

Topic 3

- The Department is leveraging both Cybersecurity and Science, Technology, Engineering, and Mathematics (STEM) direct hire authorities and internship programs.
- The Department is working in interagency forums to explore cybersecurity reskilling programs and expanding cybersecurity workforce initiatives to incorporate recruitment and retention incentive programs.
- National Labs face this same issue, but have more flexibility to address the problem. Because they are not limited to the same processes and compensation structure as the federal government, they can employ a number of site specific incentive programs to help attract the best available talent.

Topic 4

 Enterprise SCRM program achieved full operational capability in FY 2020 to evaluate potential exposure based on five risk lenses: Cybersecurity, Foreign Interest, Geo-Political, Compliance, and Financial. To date, the program has more than 90 active users, and has completed over 400 assessments. CESER and IN have additional programs in development related to testing individual IT components, which will further DOE's understanding of supply chain risk.
Factor Analysis of Information Risk (FAIR) methodology has been integrated into the DOE Enterprise Cybersecurity Risk Management methodology. We will continue to offer training and assistance in conducting risk analysis in scenarios such as investment tradeoffs and modernization efforts.

Milestone(s)

Update DOE Cybersecurity Strategy by 2nd QTR FY 2021.

Deploy the full-scale Vulnerability Disclosure Program by FY 2022.

Major Decision/Events

DOE CyberFire and International Hackathon scheduled for FY 2021. The biannual training and hackathon allows DOE to develop technical workforce skills and partner with key international, federal, and industry partners. Department of Energy Actions to Improve Contract and Project Management to Facilitate Removal from the Government Accountability Office High Risk List

The Office of Environmental Management and the National Nuclear Security Administration are taking actions to improve their contract and project management to facilitate the Department's removal from the General Accountability Office's (GAO) High Risk List. Congressional oversight and increased statutory requirements will continue and may increase if progress is not made to resolve the issues identified by the GAO.

Summary

The Department of Energy (DOE) is the largest civilian contracting agency in the Federal government and spends approximately 90 percent of its annual budget on contracts and projects to operate its scientific laboratories; engineering and production facilities; and environmental restoration sites. DOE's contract and project management functions have been on the Government Accountability Office's (GAO) High-Risk List for Fraud, Waste, Abuse and Mismanagement since the list's inceptions in 1990. Over time, as DOE successfully implemented changes, GAO narrowed the focus of DOE's designation to the National Nuclear Security Administration's (NNSA) and the Office of Environmental Management's (EM) major contracts and projects exceeding \$750 million.

The most recent GAO list report¹ includes DOE's contract and project management based on observations and recommendations applicable to EM and NNSA. Given the risks posed by EM's and NNSA's major contracts and projects, the Energy and Water Development Appropriations Bill, 2019, House Committee on Appropriations report (H. Rept. 115-697) required DOE to provide a plan for removal from the High-Risk List.

lssue(s)

DOE has implemented numerous improvements affecting contract and project management across the Department since its inclusion on the list. GAO recognized those improvements, and in January 2009, removed the Office of Science (SC) from the list because of improved contract and project management performance. This was the first instance of GAO narrowing the scope of the Department's high-risk designation since the establishment of the list.

NNSA and EM contract and project management remained on the list. In February 2013, GAO recognized NNSA's and EM's success in managing non-major contracts and projects (those less than \$750 million), and narrowed DOE's high-risk designation further to include only major NNSA and EM contracts and projects. This designation remains as of the 2019 High Risk List, the last time it was issued by GAO.

GAO updates the High-Risk List and reports on the status of progress of departments and agencies in addressing high-risk areas at the start of each new Congress. Based on this schedule, the next list will be issued in 2021. GAO uses five criteria to assess progress. The criteria guide agency actions to make progress for removal from the list.

¹ High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas. <u>https://www.gao.gov/products/GAO-19-157sp</u>



GAO High-Risk Area 5-Criteria Progress Chart

The criteria and DOE's most recent progress assessment in 2019 are:

• Leadership Commitment

Demonstrated strong commitment and top leadership support. – *Met*

Capacity

Agency has the capacity (i.e., people and resources) to resolve the risk(s). – *Not Met*

• Action Plan

A corrective action plan exists that defines root causes and solutions, as well as provides for substantially completing corrective measures including steps necessary to implement solutions GAO recommended. – *Partially Met*

Monitoring

A program has been instituted to monitor and independently validate the effectiveness and sustainability of corrective measures. – *Partially Met*

Demonstrated Progress

Ability to demonstrate progress in implementing corrective measures and resolving the high-risk area. – *Partially Met*

GAO determined that the Department met the Leadership Commitment criterion and is continuing to make improvements to address the other criteria. The remaining observations and recommendations are applicable to only NNSA and EM.

DOE's continued presence on the list has resulted in increased Congressional attention to DOE's contract and project management challenges and, specifically in 2019, the Committee on Appropriations' report to the *Energy and Water Development Appropriations Bill, 2019,* directed DOE to provide a plan for getting off the list.² DOE submitted the plan with the status of actions to the Committees on Appropriations in July of 2020.

Status

Leadership Commitment

DOE leadership has consistently and continually engaged with program offices to improve contract and project management throughout the Department. In 2018, the Deputy Secretary launched a comprehensive initiative to improve acquisition management across the Department.³ The initiative outlined strategies to consistently award contracts to responsible, high-performing entities; incentivize excellent performance; hold contractors accountable for results; and obtain the best value for the American taxpayer. The GAO highlighted this initiative in its 2019 report as evidence that DOE continues to meet the Leadership Commitment criteria.

Capacity

NNSA and EM need to recruit and retain people and resources for oversight of capital asset acquisitions to resolve issues identified by GAO in contract and project management to fully address the Capacity criterion. Prior to 2019, Congress placed a statutory limit on the number of NNSA personnel which has since been increased. NNSA started a hiring campaign to recruit additional staff which included

2 H. Rept. 115-697 - ENERGY AND WATER DEVELOPMENT APPROPRIATIONS BILL, 2019 <u>https://www.congress.gov/congressional-report/115th-congress/house-report/697/1</u>, page 79.

³ Deputy Secretary of Energy Memorandum "Improving Acquisition Management" – September 12, 2018

a job fair that resulted in approximately fifty onthe-spot, contingent offers for new hires. Further efforts include targeted recruitments, especially at universities that graduate significant numbers of Science, Technical, Engineering, and Math (STEM) students. EM is addressing capacity issues by developing a new EM Cleanup Program Policy that provides guidance on resource requirements for contract and program management. Additionally, EM is continuing to partner with the US Army Corps of Engineers for project management support.

Action Plan

The Department implemented systematic action plans over several years to overhaul the methods and processes for managing contracts and delivering projects and services. DOE put in place dedicated project management oversight offices; standardized processes for training, qualifying and credentialing the corps of federal project directors; policies and procedures to methodologically track project execution; requirements for substantive, independent project reviews (including for safety) throughout the project execution cycle; earlier senior leadership involvement in project execution; improved cost estimation techniques; and higher expectations for contractor project delivery.

NNSA's implementation of these reforms has resulted in a record of delivering projects with estimated costs under \$750 million, within cost and schedule baseline. Performance on these projects has also led outside agencies to seek counsel on managing construction projects. NNSA currently has only one project over \$750 million under execution, the Uranium Processing Facility (UPF). UPF is a \$6.5 billion nuclear project at the Y-12 National Security Complex with a projected delivery date in FY 2026. The project is parsed into seven sub-projects, two of which would each qualify as major projects. Four of the seven sub-projects have been delivered at or below baselines and, as certified to Congress, the overall project remains on cost and schedule.

EM has also made significant progress to address contract and project management issues. Prior to 2008, when DOE conducted a root cause analysis of contract and project management and developed an action plan, project baselines were only 44 percent successful (12 of 27 projects). The EM project portfolio which has been baselined after 2008 has a 94 percent success rate (60 of 64 projects).⁴ EM expects to continue this positive trend by:

- Developing smaller well-defined projects and sub-projects;
- Increasing design maturity prior to construction;
- Using Project Peer Reviews;
- Strengthening project management requirements to approve each stage in the design and construction process; and
- Improving funding based on project phases.

Notwithstanding the above progress, GAO noted "EM's 2017 cleanup policy does not direct EM to develop a root cause analysis and corrective action plan at either a program or project level when there is evidence that a cost or schedule baseline will not be met or there are cost overruns."⁵ To address these issues, EM is contracting for an independent assessment with the National Academy of Sciences (NAS) to:

- Assess program and project management practices benchmarked against DOE project management policies and other federal best practices for project planning and execution, technology insertion, contract management, project controls and reporting;
- Evaluate the efficacy of the EM approach for welldefined and measurable outcomes for cleanup activities and review EM's prioritization strategy and decision support for operational actions to achieve stated outcomes; and
- Evaluate the level and appropriateness of contractor and site operations oversight, as well as interaction with external entities to meet the stated outcomes.

EM is also revising the EM Cleanup Program policy to require a root cause analysis, including a documented plan with specific corrective actions for projects that exceed baselines or experience cost overruns.

⁴ DOE's definition of success is "completing 90% of projects across a three-year rolling average, not to exceed 10% of the original cost baseline for the original approved scope for all capital asset projects with a Total Project Cost greater than \$50M." (DOE Order 413.3B Program and Project Management for the Acquisition of Capital Assets).

⁵ High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas. <u>https://www.gao.gov/products/GAO-19-157sp</u>

Monitoring

GAO has acknowledged NNSA made progress in monitoring the management of NNSA contracts. NNSA revised contract clauses to strengthen oversight and reporting of management information; increased efforts to actively monitor and address subpar contract performance; and established field office peer reviews to evaluate contractor oversight activities. Beyond these efforts, GAO recommended that NNSA "should include quality cost information in its contractor performance evaluations to enable better performance assessments."⁶ Consistent with this recommendation, NNSA is implementing guidance to review cost information in contractor performance evaluations.

For the EM program, GAO reported that EM faces challenges in monitoring and independently validating the effectiveness and sustainability of in-place and proposed corrective measures. GAO specifically noted that "EM's 2017 cleanup policy does not follow most selected best practices for program or project management."⁷ EM analyzed the root causes leading to inadequate monitoring and found the need to improve the existing Integrated Planning, Accountability, and Budgeting (IPAB) System, and the Project Assessment and Reporting System (PARS); and to revise the EM Cleanup Program Policy to incorporate best practices. EM plans to enhance the monitoring of corrective measures by:

- Revising EM Cleanup Program Policy;
- Conducting Quarterly Program Reviews and annual site reviews to brief senior EM leadership on status;
- Generating EM Cleanup Program Portfolio monthly reports which provide status and metrics for projects and activities at all EM sites to EM senior leadership; and
- Conducting a study of options for updating or replacing the IPAB System and PARS, to provide current and complete data for decision-makers.

Demonstrated Progress

GAO reported the Department has partially demonstrated progress in implementing corrective

6 Ibid.

measures and resolving problems with contract and project management. NNSA has been able to predominantly fulfill the requirements of this criterion. GAO identified the expansion of cost and schedule estimating capabilities by NNSA's Office of Cost Estimating and Program Evaluation (CEPE), and increased use of best practices in this area as progress achieved. GAO linked this progress with the Department reevaluating and subsequently terminating the Mixed Oxide Fuel Fabrication Facility in favor of a less costly approach. GAO recommended additional progress was needed by NNSA in adhering to leading practices for planning and implementing common financial reporting. NNSA is implementing this type of reporting through the current Congressional budget structure. This reporting will be supported with project estimates from the updated independent cost estimation capability. GAO also identified the need for better estimates by NNSA for uranium enrichment. Currently, NNSA's uranium enrichment project is too early in its lifecycle to support a substantive basis for its cost. NNSA will apply relevant project cost estimation methods following best practices as the project matures.

EM contracts and projects continue to face significant cost and schedule challenges due in part to insufficient periodic lifecycle cost estimate updates; changing parameters over the lifecycles of first-of-a-kind, complex projects; and the use of incentive contracts without appropriate performance guarantees and penalties. To address these challenges, EM plans to:

- Revise the EM Cleanup Program Policy to incorporate lessons learned, as well as recommended GAO best practices;
- Update metrics for all projects to determine success rates and factors; and
- Continue to separate very large complex projects into more discrete projects and sub- projects with separate Performance Baselines that can be completed over a shorter period with more scope certainty.

EM is also taking steps to improve management of contracts and projects by implementing environmental remediation via the End State Contract Model (ESCM). This reform strategy

⁷ Ibid.

applies to complex acquisitions for cleanup-type requirements with end states that can be defined, and generally are valued over \$100 million. The term "End State" is defined as the specified situation, including accomplishment of completion criteria, at the end of a task order period of performance. In EM's case the end state is directly linked to an environmental clean-up activity. The essence of the ESCM is to:

- Streamline source selection evaluations by using focused discriminators resulting in awards to highly qualified responsible contractors;
- Price work under orders as the work can be defined;
- Tailor risk and incentives in each order based on the work involved versus a "one size fits all" contract type; and
- Provide for a quick "off-ramp" for a poorly performing contractor via an IDIQ minimum ordering amount.

The ESCM goal is to improve contract and project management by decreasing solicitation timelines and costs; separating the work into tailored, manageable orders; obtaining better pricing from better defined work scope; and appropriately shifting risk and accountability to contractors by providing the ability to establish the appropriate contract type (cost-reimbursement or fixed-price) for the work under each task order.

Background

GAO designated "DOE's Contract and Project Management for the National Nuclear Security Administration and the Office of Environmental Management" as one of thirty-five areas of high-risk vulnerable to fraud, waste, abuse, and mismanagement, or that need transformation in the Federal Government. In 1990, GAO added the Department to the High-Risk List, based on an assessment that DOE's management and oversight of contractors was inadequate and left the Department vulnerable to fraud, waste, abuse, and mismanagement. GAO updates the High-Risk List and reports on the status of progress of departments and agencies in addressing high-risk areas every two years, generally at the start of each new Congress. The most recent High-Risk List was published in March 2019.

For more information, please visit the GAO High Risk List website at <u>https://www.gao.gov/highrisk/</u> <u>overview</u>.



DOCUMENT 3



Transition 2020 Organization Overviews

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Energy Information Administration

Supporting the DOE Mission

The U.S. Energy Information Administration's (EIA) programs directly support DOE by providing policyneutral data and analyses on petroleum, natural gas, coal, electric, renewable, and nuclear energy, along with end-use energy consumption information for the residential, commercial, and manufacturing sectors. By law, EIA's data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government.

Mission Statement

EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$125,000,000
FY 2020 enacted	\$126,800,000
FY 2021 request	\$128,700,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 359

History

The Department of Energy Organization Act of 1977 established EIA as the primary federal government authority on energy statistics and analysis, building upon systems and organizations first established in 1974 following the oil market disruption of 1973.

Functions

EIA was created by section 205 of the Department of Energy Organization Act of 1977 (Pub. L. 95-91, codified at 42 U.S.C. § 7135). The Department of Energy Organization Act of 1977 specifies that:

• EIA shall establish a National Energy Information System (System) to describe and facilitate

analysis of energy supply and consumption to meet Federal, State, and Congressional needs. The System shall include information regarding production, distribution, ownership, consumption, transportation and marketing of energy resources. The System shall include information regarding various domestic and international sensitivities of energy resources and changes of patterns of energy supply and consumption.

- EIA shall maintain adequate resources to establish scientific, engineering, statistical and technological capabilities to perform analysis of energy information, including verifying its accuracy and independently evaluating it adequacy and comprehensiveness.
- The Administrator shall review energy information gathered by other agencies and make recommendations about the collection and reporting of such information.
- ElA shall provide periodic reports to Congress and the public to provide a comprehensive picture of energy resources, and shall make information available at the request of Congress.
- 15 U.S.C. § 796 grants authority to collect information and directs Federal Energy Administration, and later, by incorporation EIA, to publish a quarterly report regarding imports of energy sources, domestic reserves, refinery activities, and petroleum inventories and to file quarterly reports with the President and Congress.

Recent Organization Accomplishments

EIA constantly monitors and adjusts its program, as needed, to ensure that it is able to provide its customers with comprehensive coverage of the evolving energy sector. EIA's statistical and analysis reports include the following:

Hourly Products

U.S. Electric System Operating Data, Hourly Electric Grid Monitor (beta version), New England Dashboard

Daily Products

Today in Energy, Southern California Daily Energy Report, Daily Energy Report (internal government use only)

Weekly Products

Weekly Natural Gas Storage Report (a principal Federal economic indicator), Natural Gas Storage Dashboard, Weekly Petroleum Status Report, Gasoline and Diesel Fuel Update, Weekly Coal Production Report, This Week in Petroleum, Natural Gas Weekly Update, Heating Oil and Propane Update (October–March)

Monthly Products

Short-Term Energy Outlook, Monthly Energy Review, Petroleum Supply Monthly, Petroleum Marketing Monthly, Monthly Crude Oil and Natural Gas Production, Natural Gas Monthly, Drilling Productivity Report, Electric Power Monthly, Electricity Monthly Update, Monthly Solar Photovoltaic Module Shipments Report, Monthly Densified Biomass Fuel Report

Quarterly Products

Quarterly Coal Report, Quarterly Coal Distribution Report, Domestic Uranium Production Quarterly Report, Financial Review

Annual Products

Annual Energy Outlook, International Energy Outlook, Natural Gas Annual, Annual Coal Report, U.S. Crude Oil and Natural Gas Proved Reserves, Electric Power Annual, Uranium Marketing Annual Report, U.S. Energy-Related Carbon Dioxide Emissions, Petroleum Supply Annual, Refinery Capacity Report

Other Products, Tools, and Services

Energy Consumption and Efficiency Data (i.e., Residential Energy Consumption Survey, Commercial Buildings Energy Consumption Survey, Manufacturing Energy Consumption Survey), State Energy Portal, International Energy Portal, Country Analysis Briefs, U.S. Energy Mapping System, Electricity Data Browser, Petroleum Imports Browser, Coal Data Browser, API (Application Programming Interface), Excel Add-In, Energy in Brief, Energy Explained, Energy Kids

Special Data and Analysis Reports (recent examples)

Trends and Expectations Surrounding the Outlook for Energy Markets, Weekly U.S. and Regional Crude Oil Stocks and Working Storage Capacity.

Leadership Challenges

High level challenges currently being faced by the organization:

- Modernizing EIA's information management systems to a more efficient, and maintainable IT platform that increases automation and standardizes processes across the energy survey programs.
- Enhancing EIA's analysis tools, including an assessment of EIA's energy modeling capabilities to address emerging global trends.
- Implementing a strategic workforce development plan that meets EIA's evolving mission requirements and accounts for changing workplace dynamics (e.g., increased remote telework).

Critical Events and Action Items

Key weekly release events

Weekly Petroleum Status Report – each Wednesday Weekly Natural Gas Storage Report (principal Federal economic indicator) – each Thursday

Key monthly release events

January Short-Term Energy Outlook (STEO) – January 12, 2021 (forecast period extended through 2022) February STEO – February 9, 2021 March STEO – March 9, 2021

Key annual release events

Annual Energy Outlook (AEO2021) – release scheduled for January 2021

Organizational Chart

U.S. Energy Information Administration



Advanced Research Projects Agency-Energy (ARPA-E)

Supporting the DOE Mission

DOE's mission is, in part, to enhance U.S. security and economic growth through transformative science, technology innovation, and market solutions to meet our energy, nuclear energy, and environmental challenges.

The Advanced Research Projects Agency-Energy (ARPA-E) supports DOE's mission differently than other programs because it focuses on high risk/high potential advanced energy technologies. Pursuant to its authorizing statute – The America COMPETES Act of 2007 – ARPA-E accelerates "transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty." Its role is to identify, fund and actively manage research projects that will overcome the long-term and high-risk technological barriers preventing a potentially transformational technological innovation from the stage where private investment can drive it into a marketable product.

Using a highly entrepreneurial funding model and a portfolio approach, ARPA-E supports specific transformational energy technologies where a short-term R&D effort can deliver game-changing results over a defined period of time. ARPA-E's portfolio of technologies can potentially work in synergy to address multiple goals simultaneously. The Agency supports a number of competitive approaches to reach technology targets, but ultimately lets the private sector select those approaches best for business.

ARPA-E's Program Directors, acknowledged leaders in their respective fields of science and engineering, pitch new technical programs to agency leadership. The agency's streamlined awards process enables ARPA-E to act quickly and catalyze cutting-edge areas of energy research, with rigorous program design, competitive project selection processes, and active program management to ensure thoughtful expenditures. Program Directors establish milestones with researchers and in the event those milestones are not met, projects can be terminated in short order. ARPA-E's Program Directors play an active role in project management, including regular reviews of project progress.

ARPA-E prioritizes projects that will enhance the economic and energy security of the United States and ensures that we maintain a technological lead in developing and deploying advanced energy technologies. ARPA-E evaluates all of the proposals that it receives to determine whether or not they support these objectives.

Mission Statement

ARPA-E's mission is to overcome long-term and high-risk technological barriers in the development of energy technologies. Its goal is to "enhance the economic and energy security of the United States through the development of energy technologies" that (1) "reduce imports of energy from foreign sources; (2) reduce energy-related emissions, including greenhouse gases; (3) improve the energy efficiency of all economic sectors; and (4) ensure that the United States maintains or re-establishes a technological lead in developing advanced energy technologies."

Budget

Fiscal Year	Budget
FY 2019 enacted	\$366,000,000
FY 2020 enacted	\$425,000,000
FY 2021 request	\$0

Human Resources

The ARPA-E Director is authorized under The America COMPETES Act to use special hiring authority to bring on technical staff without regard to civil service constraints. ARPA-E technical staff are hired for 2-3 year terms, in order to ensure a steady stream of new ideas and approaches. The agency is always hiring and refreshing its staff.

As of September 2020, ARPA-E has ~55 Federal employees. ARPA-E currently leases the 8th floor suite of 950 L'Enfant Plaza in Washington, DC.

History

In 2005, leaders from both parties in Congress asked the National Academies to "identify the most urgent challenges the U.S. faces in maintaining leadership in key areas of science and technology," as well as specific steps policymakers could take to help the U.S. compete, prosper, and stay secure in the 21st Century.

In its report for Congress, Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future, the National Academies called for decisive action, warning policymakers that U.S. advantages in science and technology – which made the country a world leader for decades – had already begun to erode.

The report recommended that Congress establish an Advanced Research Projects Agency within the U.S. Department of Energy (DOE) modeled after the successful Defense Advanced Research Projects Agency (DARPA) – the agency credited with such innovations as GPS, the stealth fighter, and computer networking.

In 2007, Congress passed and President George W. Bush signed into law The America COMPETES Act, which officially authorized ARPA-E's creation. In 2009, Congress appropriated \$400 million to the new Agency, which funded ARPA-E's first projects. Since 2009, ARPA-E has funded more than 950 potentially transformational energy technology projects. Many of these projects have already demonstrated early indicators of technical success. For example, as of September 2020:

- 166 ARPA-E projects have attracted more than \$6.5 billion in private sector follow-on funding.
- 86 companies were formed by ARPA-E projects, including QuantumScape, which just announced its IPO and \$3 billion valuation.
- 229 projects have partnered with other government agencies to further development.
- ARPA-E projects have resulted in the U.S. Patent and Trademark Office issuing 609 patents.

Functions

In order to overcome the long-term and high-risk technological barriers in the development of energy technologies, ARPA-E is:

- Identifying and promoting revolutionary advances in fundamental sciences
- Translating scientific discoveries and cuttingedge inventions into technological innovations
- Accelerating transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty

ARPA-E coordinates closely with other DOE programs, the rest of the federal government, academia, and the private sector to identify "white space" where others are not making investments in innovation and where ARPA-E's support would be appropriate. Typically, these technologies involve entirely new learning curves, which offer the prospect of transformational and disruptive technologies with dramatically improved costto performance ratios compared to presentgeneration technologies.

The inherent design of ARPA-E makes it impossible to predict in detail the specific technologies that will garner future investment. Nevertheless, ARPA-E envisions building from existing learning, often in a nonlinear and unexpected fashion, with a focus on both transportation and stationary energy, in the following broad areas:

- Artificial Intelligence
- Fusion
- Nuclear
- Carbon Capture and Storage
- Electrification
- Biofuels
- Hydrokinetic Power

Recent Organization Accomplishments

 In 2020, ARPA-E launched the first-of-its-kind Seeding Critical Advances for Leading Energy technologies with Untapped Potential (SCALEUP) program. SCALEUP builds from ARPA-E's primary R&D focus to support the scaling of high-risk and potentially disruptive new technologies across the full spectrum of energy applications. SCALEUP is a means to address promising energy technologies that require scale-up or pre-pilot projects to enable a path to market and ultimately lead to realized commercial impact. SCALEUP performers are required to have at least one Commercialization Partner. Commercialization Partners may include potential customers, end-users, suppliers, corporate investors, manufacturers, and distributors, etc. Financial Partners, which may include venture capitalists, accelerators/ incubators, angel/impact investors, etc. are optional, but are considered in the selection process.

Two projects were selected under a "Fast Track" option offered to applicants who could justify the urgency of their funding need in order to receive funding at an accelerated pace relative to the full program timeline. ARPA-E developed the "Fast-Track" in response to disruptions in the investor and R&D financing communities caused by COVID-19, as well as related capital concerns on the part of a number of SCALEUP applicants. Teams not selected for the "Fast-Track" option are still eligible and under consideration for funding under the full SCALEUP program, where selections are anticipated in January 2021.

- Announce-Project Award Program Selections ment Date DIFFERENTIATE 23 \$15mm 11/19/19 BFTHF 15 04/07/20 \$32mm PERFORM 10 \$25mm 04/23/20 **GEMINA** 9 \$27mm 05/13/20 12 \$11.5mm 07/13/20 FLECCS REPAIR 10 \$33mm 08/06/20 REEACH 8 \$18.5mm 08/26/20 9 ASCEND \$14.5mm 08/26/20 6 **SMARTFARM** \$16.5mm 09/01/20 GAMOW 14 \$29mm 09/02/20
- Project Selections

• Funding Opportunities (currently in the application and selection phases as of 10/1/2020):

Program / Funding Opportunity	Announcement Date
SHARKS FOA	04/09/20
ULTIMATE FOA	04/21/20
ECOSynBio FOA	09/10/20

Competitions

Competition	Winners	Award	Announce- ment Date
GO Competition Challenge 1	10	\$3.4mm	02/12/20

Leadership Challenges

COVID-related impacts on agency and performer operations: COVID-related remote work requirements and travel bans have forced many ARPA-E research performers to either slow down or, in some cases, stop work. ARPA-E will continue to work with funded researchers to ensure they can start work when conditions allow and where necessary, will modify cooperative agreements to extend the time period they have to complete their research.

Program Director/Technology-to-Market Advisor recruiting: limited terms require constant recruiting: ARPA-E Program Directors and Technology-to-Market Advisors are hired for limited 2 to 3-year terms. This ensures a steady stream of new ideas in the agency, but also requires leadership to maintain constant recruitment efforts. The nature of ARPA-E programs requires the top tier of scientific minds as program directors, and these individuals are in high demand.

Implementation of SCALEUP Projects: ARPA-E plans to select most of the performers under its first-of-itskind SCALEUP program in January 2021. These are different than past ARPA¬-E projects in that they are closer to commercialization and require different forms of support. ARPA-E leaders, Program Directors, and Technology-to-Market Advisors will need to develop new procedures and policies to support SCALEUP performers.

2021 ARPA-E Summit – May 2021: ARPA-E is scheduled to hold its 11th Energy Innovation Summit in May 2021 at the Gaylord National Convention Center in National Harbor, Maryland. In addition to the normal challenges associated with managing such a large event, COVID-19 will likely impact Summit operations in a manner yet to be determined. ARPA-E leadership will need to work with its Summit production partner, eventPower, to adapt Summit operations to provide the safest event possible, while still providing the energy innovation community the opportunity to network at one of its premiere events.

Critical Events and Action Items

SCALEUP program selection announcements

SCALEUP performer selections are scheduled to be announced in January 2021. ARPA-E will want to drive significant interest in the projects, as the program's goal is to get them to pre-pilot stage with private sector support.

2021 Energy Innovation Summit

ARPA-E and its production partner, eventPower, will need to execute the 2021 Summit likely with changes from most year's operations due to COVID-19-related restrictions.

Organizational Chart

OPEN 2021 Funding Opportunity

Historically, ARPA-E holds an OPEN funding opportunity every three years. Budget-permitting, ARPA-E will need to conduct the review and selection process, which typically includes thousands of applications across a wide range of energy-related technical areas.



* ARPA-E Chief Counsel Functionally Reports to DOE General Counsel

Office of International Affairs

Supporting the DOE Mission

The Office of International Affairs (IA) has the primary responsibility for addressing international energy issues affecting the United States on behalf of the Department of Energy. The office seeks to:

- Promote American Energy Dominance, including expansion of markets for U.S. energy and energy technology exports as the U.S. changes from an energy importer to an energy exporter.
- Advance the U.S. competitive energy philosophy utilizing all fuels and all technologies.
- Enhance global energy security and enhance foreign investment protections in countries vulnerable to malign influence.

Mission Statement

The Office of International Affairs (IA) is the Primary DOE coordinator for the international implementation of activities across all program offices for the Secretary and Deputy Secretary advancing U.S. economic and energy security goals, including countering malign activities.

IA is also responsible for promoting US energy exports and trade to support growth, supporting ally and partner diversification of energy sources and supplies, strengthening global energy supply chains.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$22,878,000
FY 2020 enacted	\$26,825,000
FY 2021 requested	\$32,959,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 73

History

The Office of International Affairs was established when the Department of Energy Organization Act

of 1977 was passed. This Act also required an Assistant Secretary for International Affairs (IA-1). Since the Department was established in response to the oil price shocks in the 1970s, international affairs was always heavily involved in providing energy security for the United States.

Functions

IA's functions include:

Energy Security, Efficiency and Diversity of Supply

Enhance global energy security through diversification, resilience, and access to secure and reliable energy sources.

Work to counter malign influence through implementation of the Foreign Investment Risk Review and Modernization Act of 2018; ensuring the energy security of NATO and other allies.

Provide independent technical and policy advice for the Administration

Bilateral and Multilateral Engagement.

Maintain high-level cooperation with key energy partners.

Create a vibrant global regulatory and innovation ecosystem, in which the United States is the leader and strategically collaborates with allies and partners.

Market Development.

Develop and maintain energy markets to promote U.S. energy exports and trade.

Promote and protect the U.S. innovation base through results-oriented science and technology collaborations with allies and partners.

Regional Expertise.

Through regional expertise, The the Office of International Affairs leads the Department's coordination of global efforts to develop and execute policy and technical energy programs to promote security for the United States and its partners and allies; U.S. economic growth that benefits American business and people; and global political stability and prosperity through energy development. The regional offices of IA leverage years of global relationships with both foreign and domestic stakeholders to serve as the principal advisor to the Secretary of Energy on all International Energy issues.

IA maintains regular bilateral engagements with numerous countries including: Australia, Brazil, Canada, Egypt, Greece, India, Iraq, Israel, Japan, Jordan, Libya, Mexico, Poland, Qatar, Romania, Saudi Arabia, South Africa, UAE, United Kingdom, and Vietnam.

Recent Organization Accomplishments

Oil Demand Shock Actions Under COVID-19

IA played an instrumental role in domestic and international discussions with G20 and OPEC producing countries in order to advocate programs to balance the supply and demand of the oil market and reduce the negative impact from COVID-19.

Civil Nuclear Projects

IA is in the process of completing the signings of two Intergovernmental Agreements (IGA) with Poland and Romania for the development of civil nuclear reactors, supporting U.S. technology, and U.S contractor support (EPC's). These agreements will serve as a template for the region.

IA leads the interagency effort to bolster U.S. civil nuclear technology in Europe to ensure level playing field for US vendors; strengthen bilateral cooperation with long-term investment relation; thwart malign influence of Russia and China; and provide reliable, safe and clean energy options for allies and partners. IA is also pursuing civil nuclear development in the UK, Slovenia, Brazil and various other countries.

Partnership for Transatlantic Energy Cooperation (P-TEC)

Through IA's leadership in the P-TEC four lines of discussion, working groups were established on the topics of critical infrastructure, nuclear energy, security of fuel supply, and energy efficiency and renewable energy. As a result of this, member countries are developing programs to assure the desynchronization of the Baltics from Russian influence and promote integration into the European grid. Member countries are also working to ensure their security of supply through key interconnectors for natural gas and small scale LNG terminals throughout Europe.

P-TEC was founded to support the energy goals of the Three Seas Initiative (3S1) by providing support to European countries as they seek to reduce their energy dependence on Russia. P-TEC includes participation from 23 countries and European Union, as well as State and USAID. Participation is broken up into the four working groups (as described above) and each is co-chaired by a DOE Office and a P-TEC member country.

International Energy Agency (IEA)

IA has completed two strategic petroleum reserve agreements with Australia (leasing agreement) and New Zealand (ticketing arrangement) to help countries meet their IEA obligations.

IA-1 serves as a governing board member of the IEA and DOE has leadership roles on many IEA committees. Our leadership led to the creation of the Energy Efficiency Hub and the Nuclear Innovation Clean Energy (NICE) Future Initiative and Carbon Capture Utilization and Storage (CCUS) Initiative under the Clean Energy Ministerial.

The IEA provides authoritative and policyrelevant statistics, modeling, analysis, and activity coordination with a core focus on energy security. In recent years, the IEA has further developed its clean energy capacities with a systems-wide, "all fuels, all technologies" approach in sync with U.S. policy.

U.S. LNG Export Opportunities

IA helped facilitate LNG export opportunities for several countries including Croatia, Portugal, Greece, Israel, Morocco and Vietnam.

Committee on Foreign Investment in the United States (CFIUS)

IA implements the CFIUS program for the Department of Energy and reviews approximately 250 cases per year with an average of 40 active cases to address national security concerns over foreign exploitation of certain investment structures. Based on the expansion of CFIUS' jurisdiction and authority under the Foreign Investment Risk Review Modernization Act of 2018 (FIRRMA), IA anticipated this will rise to 1,000 investigations per year.

Energy Partnerships with UAE and Israel

Following on the recently signed Abraham Accords, IA is forming and developing strategic energy partnerships with the UAE and Israel to promote energy security and prosperity in the region.

Serbia and Kosovo

Following the President's signing of the Serbia-Kosovo Economic Normalization Agreement (ENA) IA leads a delegation of technical experts to the region to conduct an assessment for management of their cross-border lake and for energy diversification in the region.

Iraq Strategic Energy Dialogues

IA helped to facilitate \$6 billion in energy deals between U.S. companies and Iraq that were announced during the Prime Minister's visit to the White House in August 2020.

Israel-U.S. Binational Industrial Research and Development (BIRD) Program

In 2019, through the BIRD Energy program IA selected 7 projects for funding and invested \$6.4 million in cooperative Israel-U.S. clean energy projects. The total value of the approved projects was \$15.4 million, which includes \$9 million of cost share from the companies selected for funding.

BIRD Energy is a joint program between the U.S. Department of Energy, the Israel Ministry of Energy jointly with the Israel Innovation Authority, and the BIRD Foundation. This program develops innovation through U.S.-Israel cooperation on a range of clean energy technologies, including renewable energy, energy efficiency, natural gas, and energy-water technologies.

G20

IA coordinates DOE's G-20 activities, including U.S. engagement in the energy working groups and the G20 Energy Ministers' meetings, and supports the White House in executing its G-20 strategies. IA negotiated the G20 Energy Communique for the United States on September 28, 2020.

Leadership Challenges

Budget Constraints

Budget constraints prohibited the office from supporting over \$3 million worth of initiatives that would promote our objectives.

COVID-19

The COVID-19 pandemic has significantly limited our ability to travel and to foster personal connections with our allies and counterparts. At the same time, the pandemic has placed a higher demand on virtual international events and reduced staff in the building to assist with said events.

Critical Events and Action Items

2021 Q1 critical events and action items, in chronological order:

- Munich Security Conference (February 2021)
- Partnership for Transatlantic Energy Cooperation (P-TEC) Virtual Ministerial (February 2021 if not held late 2020)
- US-EU Energy Summit (March TBC)
- SMR U.S.-E.U. Conference (March TBC)
- CERA Week (March 1-5, 2021)
- International Energy Agency (IEA) Governing Board Meeting (March 24-25, 2021)
- Gulf of Aqaba Energy Dialogue (TBD)
- Eastern Mediterranean Gas Forum Ministerial (TBD)
- Strategic Energy Dialogues with KSA, UAE, Egypt, Qatar, and South Africa

Organizational Chart

Office of International Affairs



Office of Congressional and Intergovernmental Affairs

Supporting the DOE Mission

The Assistant Secretary for Congressional and Intergovernmental Affairs (CI) manages overall relations with Members of Congress and supports the Secretary as the chief strategic advisor on all interactions with congressional and state officials. CI also facilitates the confirmation process of all DOE Senate confirmed officials and notifies Congressional members and State officials of DOE announcements, initiatives, proposals, and grants which may affect their respective jurisdictions, across the full range of DOE's energy, national security, environmental, and science and technology missions, and assures any appropriate follow-up is provided.

Mission Statement

To promote the Secretary's, Department's, and Administration's policies, legislative initiatives, and budget requests with the Congress, State, territorial, Tribal, and local government officials, and other Federal agencies. CI is also responsible for managing and overseeing the Department's liaison with Members of Congress, other levels of governments, and stakeholders, which includes consumer liaison and public interest groups.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$6,200,000
FY 2020 enacted	\$4,395,000
FY 2021 requested	\$5,626,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 33

Functions

The CI functions are organized around the following major constituency groups: Congressional, Intergovernmental, Tribal, and External Affairs.

Congressional Affairs

CI provides oversight, management, and direction of legislative strategies in connection with the Department's policy and program initiatives, and ensures that the Department's positions are properly communicated with the Congress. CI provides advice and guidance to the Secretary, Deputy Secretary, and Under Secretaries on policy issues and Members' interests and concerns, and facilitates accurate, timely information and responses to the Congress. Congressional interactions and hearings on National Nuclear Security Administration (NNSA) issues are handled by the NNSA Office of External Affairs. Issues involving appropriations and appearances before the appropriations committees are handled by the External Coordination Office in the Office of the Chief Financial Officer (CFO).

Hearings

CI prepares Departmental officials for congressional hearings, including confirmation, programmatic, and oversight hearings before authorizing committees. CI works in close coordination with the CFO, which leads preparations for budget hearings. In this capacity, CI manages testimony development, prepares DOE officials for engaging in hearings, and manages the Department's response to questions for the record. The Department's primary authorizing committees are: Senate Energy and Natural Resources; Senate Armed Services; House Energy and Commerce; House Armed Services; and House Science and Technology.

Budget

Cl works in partnership with the CFO and Public Affairs offices on an annual basis as the CFO leads coordination and preparation of Departmental officials for the roll-out of the President's Budget to Congress. This includes multiple meetings, briefings, and hearings before the congressional committees of jurisdiction.

Congressional Communications

Cl, with the support of specific Program Offices, responds to congressional requests and inquires,

and prepares all Departmental officials for meetings, briefings, site visits, and engagements with Members of Congress, Congressional staff, or committees. CI notifies Congressional members of DOE announcements, initiatives, proposals, and grants which may affect their respective states across DOE's energy, national security, environmental, and science and technology missions, and assures any appropriate follow-up is provided. The CFO manages and coordinates briefings for the Energy and Water Appropriations Subcommittee staff in the House and Senate and provides all notifications to the appropriations committees, as needed.

Legislation

CI provides counsel, advice, and support on all legislative and non-legislative initiatives of Congress and the legislative implications of major Departmental programs and policies. CI works in counsel with the Office of General Counsel who officially manages, and catalogues, all legislation introduced to Congress that could affect DOE programs. The CFO leads the engagement with the appropriations committees on DOE annual funding bills.

Oversight and Investigations

Cl coordinates with the Office of General Counsel in managing Congressional oversight and investigations requests, including the document production process.

Intergovernmental and External Affairs (IGEA)

Cl maintains ongoing communications with governors, state legislators, tribal, and local officials across the country. Cl proactively engages stakeholders to ensure that their views are considered as part of the Department's decision making process. Cl also communicates routinely with all relevant stakeholders on DOE announcements, initiatives, proposals, and grants, and assures appropriate follow-up.

The Department has a physical presence in 30 states. Of those, much of Cl's focus is on 12 states where multiple, ongoing DOE missions are executed (California, Colorado, Idaho, Illinois, Ohio, Kentucky, Nevada, New York, New Mexico, South Carolina, Tennessee, and Washington).

Cl interacts on a regular basis with intergovernmental and tribal associations including but not limited to: the National Governors Association; regional governors associations; National Association of Attorneys General; National Congress of American Indians; National League of Cities; National Conference of State Legislatures; National Association of Counties; U.S. Conference of Mayors; Southern States Energy Board; and the National Association of State Energy Officials. The focus of Cl's work with these organizations is to communicate the activities of DOE programs, policies, and initiatives and solicit these groups' views, comments, and concerns. These efforts extend to a broad group of constituencies, to include business/industry, civic groups, colleges, universities, foundations, trade associations, and energy-oriented organizations.

Tribal Affairs

Cl engages with the 566 federally-recognized tribes, and the tribes' more than 250 reservations. This includes: advising and informing DOE senior officials on the potential impacts of Departmental programs on tribal interests and culture; developing and enhancing working relationships with Tribal leaders and organizations and entities working with tribal governments; representing DOE with sovereign Tribal governments and at tribal meetings and conferences; and recommending policies and procedures for on-going collaboration between DOE and tribes.

Recent Organization Accomplishments

CI has accomplished the following activities during the course of the 116th Congress.

Successful Nomination Hearings

During the course of FY 20 CI has supported the timely execution of multiple nominations hearing including the nomination of a new Secretary and Deputy Secretary of Energy. Earlier in the Congress CI also helped facilitate nomination hearings for the Assistant Secretary for Nuclear Energy, the Assistant Secretary for Energy Efficiency and Renewable Energy, the Assistant Secretary for Environmental Management, the General Counsel, the Director of the Advanced Research Projects Agency-Energy, and others.

Congressional Hearings

CI has supported Departmental participation in 52 hearings over the course of FY19/20 and helped to provide responses to 962 questions from Member of Congress.

State Negotiations

CI has been integral in maintaining and advancing relationships with stakeholders at the state level. In some cases CI has been a key partner in bringing states to the negotiating table to resolve differences and advance mutually beneficial solutions to shared challenges.

Congressional Engagement

CI has also helped to facilitate approximately 500 congressional member and staff briefings and advance congressional and intergovernmental notification of nearly 200 important DOE priorities, events, advancements, and funding announcements.

Industry Engagement

CI held numerous conference calls and industry roundtables over the course of the year to connect energy industries and stakeholders with Departmental leadership to help inform, and advance, DOE policies. These conversations spanned all of the applied energy sectors and helped inform the Department's, and Administration's, response to the COVID-19 pandemic and to major disruptions in energy markets resulting from that event.

Tribal and Arctic equities

Cl continues to be a key component in planning, organizing, and executing the Department's interactions with tribes. This includes participation in the Indian Country Energy and Infrastructure Working Group and in planning, organizing, and conducting the National Tribal Energy Summit which occurs every two years. Cl also helped advance the Department's re-establishment of the Arctic Energy Office in Fairbanks, Alaska.

Leadership Challenges

CI leadership challenges include:

Financial Constraints

Cl received a reduction of \$1.9 million in funding as part of the FY 2020 appropriations process.

This has created a situation where the office faces significant funding constraints to accomplish its mission. CI has implemented aggressive cost cutting, is working with the Office of the Chief Financial Officer to gain additional funding and remain solvent, and has requested increased financial resources as part of the FY21 and FY22 budget process.

New Administration Confirmation

Manage the confirmation process for new Administration officials in a smooth and timely manner with fewer staff given the political nature of Cl's workforce.

Stakeholder Coordination

Coordinate a high volume of stakeholder inquiries in the new Administration's energy priorities and leadership. Historically, CI has also organized roundtable events to connect the newly installed Secretary with organizations representing major energy industries and elected officials.

Staffing Resource Constraints

CI has an authorized staff level of 33 employees of these approximately 20 are Schedule-C positions. CI will lose more than half of its workforce during a transition making management of constrained staff resources while Schedule-C positions are filled an ongoing challenge. This is exacerbated by the fact that the beginning of the calendar year is often a busy time for CI due to the rollout of the President's budget request and required associated hearings and briefings.

Critical Events and Action Items

3-month events

Prepare the incoming DOE Secretary nominee for confirmation hearings, including DOE program briefings and congressional courtesy visits.

Develop issue-specific questions and answers, and briefings and background information on new Administration DOE and legislative issues.

Manage confirmed DOE Secretary's initial round of congressional hearings.

Advise on and schedule appropriate Secretarial participation in "Big Seven" Intergovernmental

Groups' Annual Washington DC Meetings (occurring in February and March) and conduct "meet-andgreet" roundtables with major energy industry trade associations if deemed appropriate.

6-month events

Manage the confirmation process for all DOE nominees (anticipate 2-4 nomination hearings to include waves of multiple nominees in each hearing).

Finalize and begin implementing an outreach and communications strategy with Members of Congress and leaders of major constituent groups (e.g., industry, environmental, academic groups).

Rollout the FY 2022 revised DOE Budget Request to Congress.

Manage program oversight and issue hearings for Program Secretarial Offices.

Coordinate the DOE Secretary and Deputy Secretary congressional, intergovernmental, and external

Organizational Chart

affairs engagements during anticipated travel and tours of the DOE complex and field sites.

Assist with Departmental priorities for inclusion in major legislative packages to include, but not limited to, the National Defense Authorization Act, and other major legislative packages that could contain DOE equities.

12-month events

Continue execution of the outreach and communications strategy with Members of Congress and leaders of major constituent groups (e.g., industry, environmental, academic groups).

Continue engagement and outreach on annual legislative priorities.

Develop and implement August congressional recess travel schedule for the DOE Secretary, Deputy Secretary, and Under Secretaries.

Assist the CFO with engagement on conference negotiations of appropriations legislation.



Office of Congressional and Intergovernmental Affairs

Office of Enterprise Assessments

Supporting the DOE Mission

The Office of Enterprise Assessments (EA) supports the Department's mission priorities for the secure, safe, and efficient operation of the nuclear weapons complex, science and energy research, and environmental cleanup by (1) conducting independent assessments of security, cybersecurity, and safety performance throughout the Department, (2) holding contractors accountable for violations of security and safety regulations, and (3) providing training programs that further technical competence and institutionalize enterprise security and safety lessons learned. EA, reporting directly to the Secretary of Energy, is organizationally independent of the DOE entities that develop and implement safety and security policies and programs so it can provide objective and timely information to DOE senior leadership on whether national security material and information assets are appropriately protected and whether Departmental operations provide for the safety of employees and the public. EA activities serve as an important check-and-balance that assists the Department in meeting its obligations as a selfregulating entity.

Mission Statement

The Office of Enterprise Assessments supports the Secretary of Energy and other stakeholders by enhancing DOE's safety, security, and cybersecurity programs. We do this through independently evaluating the effectiveness of requirements, performance, and risk management; conducting objective and effective enforcement activities; and providing high-quality training.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$76,770,000
FY 2020 enacted	\$78,779,000
FY 2021 request	\$81,584,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 94

History

EA was established in 2014 to provide separation for its independent functions from a much larger organization that also included DOE's safety and security policy functions. The core missions of independent oversight, enforcement and training have existed within other organizations for more than three decades.

Functions

EA's primary functions include:

Implementing the Congressionally-authorized DOE enforcement program to promote overall improvement in the Department's nuclear safety, worker safety and health, and classified information security programs.

Managing the Independent Oversight Program, providing the Office of the Secretary, DOE and contractor managers, Congress, and other stakeholders with an independent enterprise evaluation of the adequacy of DOE policy and the effectiveness of line management performance in safeguards and security; cybersecurity; nuclear safety, emergency management; environment, safety, and health; and other critical functions.

Operating the National Training Center, the Department's designated Center of Excellence for Security and Safety Training and Professional Development, which establishes and provides training and education for Departmental leadership and federal and contractor staff nationwide in the areas of health, safety, security, and professional development, thereby strengthening the expertise available to meet the current and future mission needs of the Department.

Recent Organization Accomplishments

Conducted a DOE-wide Pandemic Lessons Learned Review in 2020. EA partnered with several DOE line management program offices to conduct interviews and review documents across laboratory and field organizations, both Federal and contractor, as well as DOE Headquarters. The team collected more than 3,000 specific comments, resulting in more than 80 lessons learned, in addition to identifying best practices that may be utilized to enhance Departmental responses to similar crises in the future. A final report will be issued before the end of calendar year 2020.

Performed approximately 15 announced and unannounced cybersecurity assessments during FY 2020 of DOE classified and unclassified information management systems to identify potential cyber security weaknesses that could lead to compromise of sensitive DOE information. Developed new remote technical vulnerability and penetration testing capabilities that proved especially useful for continuing cybersecurity assessments during the COVID-19 pandemic.

Conducted approximately 15 safeguards and security assessments during FY 2020, including force-on-force exercises and limited-notice safeguards and security performance tests, at DOE / NNSA sites with strategic levels of national security assets, Special Access Programs and Sensitive Compartmented Information Facilities to provide assurances that national security assets entrusted to the Department are being protected from theft, sabotage, diversion, or loss.

Conducted approximately 40 nuclear, worker safety and health, and emergency management assessments during FY 2020 to identify weaknesses in DOE operations that could harm workers or the public. These activities included:

- A DOE-wide assessment of radioactive waste packaging and shipping practices undertaken at the request of the Deputy Secretary of Energy. The assessment included 16 site evaluations that culminated in a crosscutting analytical report identifying best practices and recommendations intended to promote organizational learning and improved performance in radioactive waste management throughout DOE;
- Continued emphasis on assessing major nuclear facility design, construction, and modification projects to include evaluations of safety design basis documents for the Tank Side Cesium Removal Project, Waste Treatment and Immobilization Plant Low-Activity Waste Facility, and Waste Encapsulation and Storage Facility at the Hanford Site; the Material Storage Facility at the Pantex Plant; the Tritium Facility at the Savannah River Site; and the Versatile Test Reactor at the Idaho National Laboratory; and

 A crosscutting assessment of safety culture sustainment processes at eight sites across the DOE enterprise. The assessment evaluated the maturity of these processes and provided insights for fostering and supporting continuous improvement in this area, which has been the subject of Government Accountability Office and Defense Nuclear Facilities Safety Board scrutiny.

Initiated five enforcement cases, completed four fact-finding visits and one regulatory program assistance review, and evaluated nearly 200 noncompliance reports during FY 2020. In addition, instituted a strategy to enhance the effectiveness of DOE's nuclear safety, worker safety and health, and information security enforcement programs through expanded use of civil penalty and remedy authorities, accelerated initiation of enforcement investigations, and renewed risk-based regulatory reviews to improve contractor adherence to DOE safety and information security requirements.

Through the National Training Center:

- In collaboration with the National Nuclear Security Administration and Office of the Chief Human Capital Officer, developed and implemented a new DOE enterprise-wide learning management system to provide a consolidated common platform for federal and contractor employee development, expansive course catalog access, and career development modules;
- Issued more than 14,000 completion certificates representing more than 130,000 student hours of training attendance during FY 2020; and
- Instituted transformational changes in the DOE Federal Technical Capabilities Program by revising corporate program requirements, developing new program-specific technical qualification standards, and establishing systems to support an enterprise approach to continuing training. This program is integral to DOE's commitment to recruiting, deploying, developing, and retaining a technically competent workforce that will accomplish DOE missions in a safe and efficient manner.

Leadership Challenges

None.

Critical Events and Action Items

Departmental action on the findings of the Pandemic Lessons Learned Review. EA will share best practices and lessons learned and encourage DOE line management to benefit from the findings in ongoing pandemic responses and in preparing for similar situations in the future.

Organizational Chart



Office of Enterprise Assessments

Office of Public Affairs

Supporting the DOE Mission

The Department of Energy's (DOE) mission is to ensure America's security and prosperity by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions. The Office of Public Affairs supports this mission by communicating these priorities to the public.

Mission Statement

The Office of Public Affairs (PA) is the principal point of contact for the Department of Energy with the news media and general public.

PA is responsible for ensuring that the public is informed about the Department's activities as well as the priorities and policies of the Secretary and the President with regard to energy policy, nuclear security, and scientific discovery.

PA advises the Secretary and other Department officials on all aspects of media relations, digital outreach, and communications opportunities. The Office also helps guide and produce remarks and public statements for the Secretary, Deputy Secretary, and senior leadership. The Office manages both the technical and editorial aspects of Energy.gov, the Department's public facing web platform, and administers all top-level DOE-branded social media accounts.

PA advises Department leadership on digital communications best practices and provides digital service to the public.

PA prepares and issues Department press releases and media advisories and serves reporters assigned to the Department by responding to inquiries, arranging interviews, and conducting news conferences. The Office also coordinates the public affairs units of all Department organizations and coordinates and advises the communications staffs of the 17 National Laboratories. The Office ensures that information provided to the news media by the Department is current, complete, and accurate.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$6,594,000
FY 2020 enacted	\$4,000,000
FY 2021 request	\$5,954,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 30

Functions

Strategic Communications

The Office of Public Affairs strategic communicators develop communications plans that tell the story of the Department of Energy and National Laboratories while promoting the Administration's energy policy goals.

Strategic Communications looks ahead to the next 3 – 6 months to identify proactive opportunities to drive a positive and accurate narrative for DOE offices and the Administration.

This includes:

- Integrating holistic communications that advance DOE priorities across all communications channels.
- Balancing program office priorities and announcements within both the Department and broader D.C., national, and global energy market news cycles.
- Supporting all engagements for the Secretary, the Deputy Secretary, and other key leaders – determining the strategic objectives and leading the planning process to ensure alignment on key themes, priority audiences, and tactics (e.g., media outreach, editorial boards, op-eds, planned remarks, digital updates, social media amplification, etc.), and tracking all deliverable.
- Working on emerging and breaking issues.
- Launching major announcements and reports.
- Coordinating with other departments and partners in the Administration.
- Leading special projects (e.g., STEM Rising, Direct Current podcast, etc., as detailed below).
- Aligning external communications objectives with internal communications efforts in order to inform and energize DOE staff.

Speechwriting

The Office of Public Affairs speechwriters develop all written material, including, speeches, talking points, blog posts, responses to Q&A's, and opinion pieces for senior departmental leadership.

Digital Communications

The Office of Public Affairs digital team supports the technical maintenance of Energy.gov, the Department of Energy's primary public-facing website, and the creation of multimedia and social media content for the general public that tells the story of the Department – WHO we are, WHAT we do, and WHY it matters.

Media Affairs

The Office of Public Affairs media affairs team is responsible for managing all media relations efforts across the DOE enterprise. This includes all engagement within the Department's program offices as well as DOE's laboratories, plants, and sites.

Recent Organization Accomplishments

Communications Accomplishments

In 2020, 130 speeches to date have been delivered and over 570 in the past four years. The Speechwriting team works closely with the Secretary, Deputy Secretary, Undersecretaries, and department senior staff to craft speeches and op-eds that further the communications and policy goals of DOE.

In 2020, 27 opinion pieces have been written and placed around the country to date.

PA developed DOE accomplishment snapshot documents and crafted and designed the Nuclear Fuel Working Group report and multiple Department-wide policy rollouts.

Digital Accomplishments

Social Media: In 2019, PA rolled out the implementation of Sprout Social for social media management across the enterprise, including several of our National Labs. Today, we have **100 active profiles** in Sprout with **135 employees** using the service across 33 unique groups. This product allows DOE to collaborate and streamline Department/Lab-wide messaging. (See DOE's Year in Digital for 2020 below)

DOE'S YEAR IN DIGITAL FOR 2020 (JAN. 1 – SEPT. 23).				
Engagements	Over 3 million engagements combined on Twitter, Facebook, Instagram, and LinkedIn.			
Engagements per channel	Twitter: 1.80 million engagements	Facebook: 1.07 million engagements	Instagram: 35,530 engagements	LinkedIn: 180,322 engagements
Follower Growth 2019 – 2020	Twitter: 1,146,054 +5.4 %	Facebook: 362,645 +2.7 %	Instagram: 101,146 +10.43 %	LinkedIn: 127, 434 +38 %
Operations	 Improvements to the day-to-day operations of Energy.gov include: Improved Energy.gov speed and reliability by migrating to Amazon cloud hosting; Improved site security and updating Energy.gov from Drupal 7 to 8; and Improved cost controls and financial health by establishing new contract task orders. 			
Content	 Continue developing informative content and promoting the Department through various brands/ channels, including: Direct Current – The DOE podcast covered topics ranging from artificial intelligence to COVID-19 to Mars exploration; STEM Rising – Over 100 articles and approximately 25 videos highlighting the Department's commitment to students and diversity; Energy 101 – Professional, animated, educational videos about energy sources and technology; Launched landing pages for COVID-19 Hub, Artificial Intelligence & Technology Office (AITO), and Arctic Energy Office and redesigned the International Affairs page as well as many more program office updates; and Created two official seals/logos: AITO and Arctic Energy Office. 			

Media Affairs Accomplishments

The Office of Public Affairs media affairs team issues approximately 300 releases on average each year. As of September 2020, 198 press releases have been issued to date.

PA media affairs also handles booking and staffing principal interviews. In 2020, there have been an average of 50 interviews a month conducted by DOE principals, including the Secretary, the Deputy Secretary, Under Secretaries, and Assistant Secretaries.

PA media affairs generated earned media for each of the accomplishments laid out in this report over the course of the Administration.

Leadership Challenges

PA is an extremely fast-paced working environment, and leadership will need to ensure adequate staffing quickly in order to maintain the pace. The Department's National Laboratories are spread throughout the country and have their own communications staffs. Ensuring coordination with the Labs and across the enterprise generally is critical to the overarching public affairs strategy.

Critical Events and Action Items

DOE Budget Rollout

PA will be responsible for coordinating with the Offices of the Chief Financial Officer and the Congressional and Intergovernmental Affairs on the public rollout of the Department's proposed budget.

CERA Week 2021

PA will play a major role in supporting CERA Week 2021, the largest international energy conference which takes place in Houston, Texas, annually.

Organizational Chart



Office of Public Affairs

Office of General Counsel

Supporting the DOE Mission

The Office of the General Counsel (GC) is responsible for providing comprehensive legal services to the Secretary, Deputy Secretary, and all Departmental elements—except the Federal Energy Regulatory Commission (FERC)—and for effectively representing the Department as counsel before Federal, State, and other governmental agencies and courts. These services are intended to advance the missions and objectives of the Department through advice, negotiation, rulemaking, legislation, regulatory enforcement, and, when necessary, litigation; and to ensure that the Department operates in compliance with all pertinent laws and regulations. GC is organized so as to provide each Departmental element (Fossil Energy, Science, etc.) with "program counsel" specifically skilled in its unique issues. Separate elements of GC provide specialized legal expertise for issues that affect many program offices, such as procurement, fiscal, regulatory, and environmental law.

Mission Statement

The General Counsel is charged by the Secretary of Energy with the authority to determine the Department's authoritative position on any question of law. The Office of the General Counsel provides legal advice, counsel, and support to the Secretary, the Deputy Secretary, and program offices throughout DOE to further the Department's mission of ensuring America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$33,075,000
FY 2020 enacted	\$33,075,000
FY 2021 request	\$35,111,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 145

History

The position of the General Counsel (GC-1) is established as a Senate-confirmed Presidential appointment in the Department of Energy Organization Act, Public Law 95-91, Section 202(e).

Functions

The Office of the General Counsel consists of all the attorneys in the Department that report directly or indirectly to the General Counsel. GC is organized so as to provide each Departmental element (Fossil Energy, Science, etc.) with "program counsel" specifically skilled in its unique issues. Separate elements of GC provide specialized legal expertise for issues that affect many program offices, such as procurement, fiscal, regulatory, and environmental law. In general, the legal staffs of those elements that have their own counsel outside of headquarters GC also report to the General Counsel, including the Chief Counsels for the Loan Programs Office, ARPA-E, and each of the Department's field offices. The most significant exception is the General Counsel for the National Nuclear Security Administration (NNSA) who reports to the NNSA Administrator.

Headquarters

The Office of the General Counsel (Headquarters) is comprised of the Immediate Office of the General Counsel, five program area Deputy General Counsels supported by eleven Assistant General Counsels (AGCs), the Director of the Office of Standard Contract Management, the Director of the Office of NEPA Policy and Compliance, and their staff. The functions and responsibilities of these offices are summarized below. Greater detail on the responsibilities of each AGC office described below is provided separately.

Immediate Office of the General Counsel: General Counsel & Deputy General Counsel (GC-1)

The General Counsel is ultimately responsible for determining the Department's authoritative position on any question of law for guidance of all Departmental elements and officials. To do so, he or she directs, manages, and supervises all DOE activities conducted by GC. In this connection, general functions and responsibilities undertaken by the General Counsel include establishing policies, issuing guidance, defining procedures, and rendering decisions pertaining to the General Counsel's areas of responsibility, including but not limited to providing counsel to the Secretary and to senior DOE officials; ensuring the provision of adequate legal support and services to DOE's program areas; representing DOE in legal matters, as required; and overseeing the performance of legal services by the Chief Counsel and Chief Patent Counsel of each of the Field Offices.

Deputy General Counsel for Administration (GC-20)

The Deputy General Counsel for Administration serves as DOE's Designated Agency Ethics Official and directs, manages, and supervises the Department's activities and functions assigned to the AGC for Ethics and Personnel Law (GC-21) and the Associate General Counsel for Finance and Information Law (GC-22). These offices serve as program counsel for the Offices of Management (MA) (on non-procurement matters); Economic Impact and Diversity (ED); the Energy Information Administration (EIA); Chief Financial Officer (CFO); Human Capital Management (HC); the Chief Information Officer (CIO); and Public Affairs (PA).

Many of the major functions and responsibilities of the AGC, the Associate GC and their offices involve: serving as DOE's Alternate Designated Agency Ethics Official (AGC for Ethics and Personnel Law) and managing the Department's ethics program for Federal employees; and providing legal services and review in connection with issues concerning the Freedom of Information Act (FOIA), the Privacy Act, records management, the Federal Advisory Committee Act (FACA), property, equal opportunity, personnel and appropriations law, and DOE's organizational structure.

Deputy General Counsel for Litigation, Regulation and Enforcement (GC-30)

The Deputy General Counsel for Litigation, Regulation, and Enforcement directs, manages, and supervises the Department's activities and functions assigned to the AGC for Litigation (GC-31); the AGC for Legislation, Regulation and Energy Efficiency (GC-33); and the AGC for Enforcement (GC-32). The AGC for Legislation, Regulation and Energy Efficiency (GC-33) serves as program counsel for the Office of Energy Efficiency and Renewable Energy (EERE) and the Office of Congressional and Intergovernmental Affairs (CI), and regulatory counsel for the Department. The AGC for Litigation and the AGC for Enforcement do not formally serve as program counsel for any DOE program office.

Many of the major functions and responsibilities of these AGCs and their offices involve: directing the agency's participation in litigation in which the Department is a party (which is almost all conducted by the Department of Justice) as well as its activities and functions with respect to the Department's contractors' litigation (which is conducted by contractor-retained counsel); promoting compliance with and prosecuting violations of DOE regulations promulgated under the Energy Policy and Conservation Act; providing for internal DOE review all DOE legislative proposals and obtaining Office of Management and Budget (OMB) clearance of these proposals; acting as the DOE contact point with OMB on all non-budget legislative matters; participating in the analysis and formulation of DOE positions and comments on enrolled bills and other agencies' proposed regulations, legislative matters, and testimony; and providing legal advice on administrative law and Executive Orders applicable to rulemaking, including legal review of draft regulations.

Deputy General Counsel for Environment and Compliance (GC-50)

The Deputy General Counsel for Environment and Compliance directs, manages, and supervises the activities and functions assigned to the AGC for Environment (GC-51), the AGC for International and National Security Programs (GC-53), and the Director of the Office of NEPA Policy and Compliance (GC-54). These offices serve as program counsel for the Offices of Environmental Management (EM); Legacy Management (LM); Environment, Health, Safety and Security (AU); Enterprise Assessments (EA); Intelligence and Counterintelligence (IN); Policy (OP); and International Affairs (IA).

Many of the major functions and responsibilities of the AGCs, Director and their offices involve: providing legal advice regarding environmental protection, compliance with the National Environmental Policy Act, and other applicable environmental protection laws, regulations, federal facility agreements, and other requirements; interactions with the Defense Nuclear Facilities Safety Board; defense and nuclear nonproliferation programs, including negotiating and drafting international agreements as appropriate; security, intelligence, and counterintelligence matters; international agreements relating to international science and technology cooperation, international trade, and investment activities, and other Departmental programs involving international cooperation.

Deputy General Counsel for Transactions, Technology, and Contractor Human Resources (GC-60)

The Deputy General Counsel for Transactions, Technology, and Contractor Human Resources directs, manages, and supervises the activities and functions assigned to the AGC for Procurement and Financial Assistance (GC-61); the AGC for Technology Transfer and Intellectual Property (GC-62); and the Office of the AGC for Contractor Human Resources (GC-63).

The major functions and responsibilities of the GC-61 office include: providing legal advice regarding DOE programs and functions involving procurement, financial assistance, and other transactions laws, regulations, policies, and activities; providing legal advice regarding source selection strategies and processes for major procurement actions throughout the DOE complex; managing and directing the defense of DOE procurement actions, including solicitations, competitive range decisions, and contract awards when such actions are protested to the Government Accountability Office; representing DOE in connection with contract disputes before the Civilian Board of Contract Appeals and providing assistance to the Department of Justice in connection with litigation relating to DOE contract cases; assisting in drafting, negotiating, and reviewing DOE solicitation documents and contracts, including procurement contracts, interagency agreements, funding opportunity announcements, grants, cooperative agreements, and technology investment agreements; advising the Office of Project Management and Assessments, the Project Management Risk Committee, and the Energy Systems Acquisition Advisory Board on DOE project matters; and advising the Office of Small and Disadvantaged Business Utilization on issues related to the Department's small business achievement. The major functions and responsibilities of the GC-62 office include: providing legal advice regarding DOE programs involving intellectual property and technology transfer laws, regulations, policies, and issues, including the formulation of DOE's patent policy; and the representation of DOE's interests in intellectual property and technology transfer matters, including patents, trademarks, copyrights, trade secrets, and related matters. GC-62 also coordinates the activities of field patent counsel regarding intellectual property and technology transfer matters. The major functions and responsibilities of the GC-63 office include: providing legal advice pertaining to DOE contractor labor standards; labor relations; workforce restructuring; employee pensions and other benefits and compensation; and other related issues as necessary, as well as providing policy support on contractor labor standards, labor relations, and workforce restructuring issues.

Deputy General Counsel for Energy Policy (GC-70)

The Deputy General Counsel for Energy Policy directs, manages, and supervises the activities and functions assigned to the AGC for Electricity and Fossil Energy (GC-76); the AGC for Civilian Nuclear Programs (GC-72); and the Director of the Office of Standard Contract Management (GC-73). These offices serve as program counsel to the Offices of Fossil Energy (FE); Electricity (OE); Nuclear Energy (NE); Indian Energy Policy and Programs (IE); Policy (OP), Science (SC); and Cybersecurity, Energy Security, and Emergency Response (CESER).

Many of the major functions and responsibilities of AGC offices GC-72 and GC-73 involve working with DOE programs on: the management, storage, and disposal of high-level nuclear waste and spent nuclear fuel;; nuclear energy fuel cycle activities; nuclear liability matters, including the Price-Anderson Act, indemnification under Public Law 85-804; DOE regulatory and NRC licensing authority under the Atomic Energy Act; agreements and initiatives relating to domestic science and technology cooperation; and the core functions established by the Nuclear Waste Policy Act of 1982 (NWPA), as amended, that pertain to the Nuclear Waste Fund and the management of the Standard Contracts for the Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR 961)

with Government and nuclear utilities; review of annual settlement claims for damages due to the partial breach of the Standard Contracts; and support of the Department of Justice in the negotiations of new settlements, extensions of existing settlements, and as the primary factual witness for DOE in litigation related to the Standard Contracts.

The major functions and responsibilities of the GC-76 office include: providing legal advice and counsel in connection with DOE's fossil energy programs, including the Strategic Petroleum Reserve; Naval Petroleum Reserves; Home Heating Oil Reserves; clean coal research and demonstration programs; and imports and exports of natural gas. GC-76 attorneys work closely with the staff of the Office of Fossil Energy in drafting opinions and orders in response to applications for authorization under section 3 of the Natural Gas Act to import or export natural gas, including liquefied natural gas (LNG). GC-76 also serves as program counsel for DOE's electricity and non-nuclear emergency preparedness programs, which are primarily handled by the Office of Electricity. GC-76 also provides legal support and advice regarding CESER's efforts to prepare and respond to threats to the energy sector; conduct research and development on tools to meet those threats; and engage with energy sector entities on behalf of the federal government. In addition to its roles as program counsel, GC-76 advises the General Counsel on Power Marketing Administration (PMA) legal matters, reviews PMA rate orders, and works with PMA counsel; represents DOE facilities in electric and gas utility rate cases before state public utility commissions; and represents the Department in FERC proceedings when transmission, generation, or reliability matters affecting the PMAs or DOE facilities arise.

Field

The Department employs a complement of lawyers who work in the field, including Chief Counsel, Chief Patent Counsel, Power Marketing Administration General Counsel, and their staffs.

Chief Counsel

There is a Chief Counsel at the majority of DOE field offices. Where there is no legal staff at a field office, those offices are serviced by the Chief Counsel at other field offices or at Headquarters. The Chief Counsel at the following offices are employees of their respective offices but are supervised by a Headquarters Deputy General Counsel: Chicago, Environmental Management Consolidated Business Center, Golden, Idaho, National Energy Technology Laboratory, Oak Ridge, Richland, Savannah River, and Strategic Petroleum Reserve. This supervision includes preparation of performance evaluations with input from the respective offices. Chief Counsels also have day-to-day client relationships with the field managers and staff at the offices where they are located.

The Chief Counsels of ARPA-E and the Loan Program Office are employees of their respective offices, but are supervised by the Principal Deputy General Counsel. This supervision includes preparation of performance evaluations with input from the respective offices.

All of the Chief Counsels have access to the General Counsel whenever they require.

Chief Patent Counsel

Chief Patent Counsels are responsible professionally to the AGC for Technology Transfer and Intellectual Property, pursuant to the guidance and direction of the General Counsel, but are supervised by a Chief Counsel. The AGC for Technology Transfer and Intellectual Property ensures that the necessary professional consultation occurs with the Chief Patent Counsel through a variety of means, including monthly conference calls with all the Chief Patent Counsels, and an annual Chief Patent Counsel meeting. Although not specified in Departmental guidance, both the AGC for Technical Transfer and Intellectual Property and the Chief Counsel have a role in the selection and evaluation of Chief Patent Counsels.

Power Marketing Administration General Counsel

Each of the four Power Marketing Administrations (PMA) has a General Counsel. The Deputy General Counsel for Energy Policy ensures that appropriate GC offices interact as appropriate with PMA General Counsels to ensure that the PMAs, as components of the Department, receive adequate legal services where necessary, that appropriate professional consultation occurs, and that there is consistency in legal interpretations between GC HQ and the PMAs.

Recent Organization Accomplishments

The Office of the General Counsel has provided legal advice, counsel, and support for the Department including: successfully resolving various litigation matters; prevailing in several bid-protests; successfully supporting program office missions and implementing Administrative policies and programs; and playing a pivotal role in the issuance and publication of several highprofile rulemakings. Through the efforts and accomplishments of the Office, the Department stands to save millions of dollars. Furthermore, the Office of the General Counsel has played a crucial role in the Department's response to the COVID-19 Pandemic.

Leadership Challenges

The Office of the General Counsel believes in the importance of a transparent and accountable management and work environment. As a result of the Office's ability to successfully adhere to these principles, it currently does not face any leadership challenges.

Critical Events and Action Items

The Office of the General Counsel neither anticipates nor foresees any critical events or actions that will take place within the first 3 months of the next Presidential term.



Organizational Chart

Office of the Chief Financial Officer

Supporting the DOE Mission

The Office of the Chief Financial Officer (OCFO) is responsible for management and financial integrity of DOE programs, activities, and resources through development, implementation, and governance of Department and government-wide policies and systems for budget administration, including development and execution; finance and accounting; internal controls; financial policy; corporate business systems; strategic planning; performance measurement; and, interface with the Office of Management and Budget (OMB), Government Accountability Office (GAO), DOE Inspector General (IG), Department of Treasury, and Congress.

Mission Statement

Stewardship of financial and business operations for the Department of Energy by an empowered workforce using technology and analytics. Mantra: Empowered People, Financial Stewardship, Performance Focus.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$48,912,000
FY 2020 enacted	\$52,000,000
FY 2021 request	\$53,591,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 220

History

The Chief Financial Officers (CFO) Act of 1990 established the CFO position at 24 agencies, including DOE. Under provisions of the CFO Act, the CFO reports directly to the Secretary and is responsible for overseeing financial management activities relating to programs and operations of the Department, and developing and maintaining an integrated agency accounting and financial management system.

Functions

Financial Management

CFO oversees DOE financial management operations and serves as the principal advisor to the Secretary and other Departmental officials on matters relating to DOE financial resources. CFO also develops DOE financial management policies, manages consolidated financial and accounting operations, manages the annual financial statement audit, prepares consolidated financial statements, oversees annual internal control reviews and DOE risk profiles consolidation, payment integrity program, and serves as the liaison to the payroll service provider.

Budget

CFO is responsible for and assures the financial integrity, formulation, execution, and analysis of the DOE budget. CFO serves as the liaison to the Office of Management and Budget (OMB) and to the Congressional Appropriations Committees for all matters related to the DOE budget. In addition, CFO budgets for and manages the DOE Working Capital Fund (WCF).

Financial Policy and Audit Resolution

CFO establishes and maintains financial, accounting, and budgetary policies that support the execution of the Department's mission. The Office also leads resolution of audit findings and coordination with audit organizations (DOE Inspector General and Government Accountability Office) to improve Departmental operations.

Corporate Business Systems

CFO develops and maintains corporate business systems, including the integrated agency-wide financial accounting, contracts administration, human resources, and various related data management systems.

Strategic Planning

CFO leads development of the DOE strategic plan, priority goals, and performance measures and monitors progress.
Risk

Through the Chief Risk Officer (CRO), CFO provides Departmental support to assess risk and propose mitigation strategies through integration of risk concepts into strategic planning, and risk identification and mitigation activities in collaboration with DOE's Program and Functional Offices, Field Offices and National Laboratories.

Performance and Data

Under supervision of the CFO, the Chief Performance Officer (CPO) collates and assesses data to assist in recommending improvements for Department-wide programs, issues, and initiatives, and proposes systems and tools to track progress towards agency and Administration goals. The CFO also serves as the DOE Chief Data Officer and chairs DOE's Data Governance Board, which is responsible for coordinating policy and governance of the Department's key data assets and execution of the Federal Data Strategy.

Recent Organization Accomplishments

Analyzed and consolidated Headquarters and Under Secretary Risk Profiles for consolidated DOE FY 2020 Risk Profile.

Maintained a clean audit opinion for 14 straight years.

Tracked Program and Functional office activity and obligations for CARES Act funding of \$100M for the Office of Science and NNSA for resources to fight the coronavirus outbreak as well as \$28M for ITrelated activities.

Led preparation of the Department's FY 2022 budget request to OMB.

Began joint pilot to implement Robotic Process Automation solutions for automating corporate business processes.

Revised Audit Coordination, Resolution and Followup Order to streamline audit follow-up processes.

Implemented three-year review plan for Financial Management Handbook and completed major updates.

Conducted mid-year update of DOE Management Priorities for year-end reporting.

Recent awards and acknowledgements:

- A-123 Management of Entity Risks and Internal Controls Application (AMERICA) received a Secretary's Honor and Gears of Government Awards
- DOE FY 2019 AFR recognized with best-in-class award from the Association of Government Accountants

Leadership Challenges

Implementing Recent Legislation

Implementing or carrying out the increasing number of unfunded, external administrative mandates, including extensive reporting requirements.

- Digital Accountability and Transparency (DATA) Act requires expanded federal financial reporting beginning May 2017 and reporting was again expanded with the COVID reporting beginning with June 2020 data;
- Program Management Improvement Accountability Act (PMIAA) requires establishment of program portfolios and improved recruiting of program managers to improve program management governmentwide;
- Payment Integrity Information Act (PIIA) of 2019 reorganizes and revises several existing improper payments statutes, which establish requirements for federal agencies to cut down on improper payments made by the federal government;
- Federal Information Technology Acquisition Reform Act (FITARA) that requires expanded information technology reporting; and,
- Foundations of Evidence-Based Policymaking Act which requires development and execution of an annual learning agenda, a Departmentwide evaluation plan, capacity assessments for conducting evaluations, an open data plan, and data maturity assessments.

Updating Business Systems

Ongoing replacement of legacy systems and implementation of new systems to increase DOE integrated financial management.

Hiring Qualified Candidates

Ability to attract and hire qualifies candidates to fill vacancies to reach full FTE allotment.

Critical Events and Action Items

Critical events or actions that will take place within the first 3 months of the next Presidential term.

3-month events

DOE started FY 2021 operating under a continuing resolution (CR) through December 11, 2020; there is a possibility for an extension to that CR for six months or full-year or for consideration of an amended FY 2021 Request based on revised priorities.

Potential consideration of additional COVID-19 relief and/or economic stimulus proposals.

Deliver the FY 2022 President's Budget Request (PBR) – February 2021.

Chief Financial Officer Chief Risk Officer Chief of Staff **Deputy Chief of Staff Chief Performance Officer Resource Management Deputy Chief Financial Officer** Financial Policy and Audit Corporate Business **Finance and Accounting** Budget Resolution Systems Enterprise Data **Financial Operations** Financial Policy **Budget Formulation** Management **Financial Reporting and** Budget Operations and Enterprise Business Audit Resolution Applications **Business Analysis** Execution Strategic Resources Enterprise Program Services External Coordination for Appropriations

Office of the Chief Financial Officer

Organizational Chart

6-month events

Update the DOE financial statement audit Management Representation Letter if changes have occurred.

Provide to Department of Treasury any subsequent changes to what was provided on the Governmentwide Management Representation Letter that have occurred from the date of DOE's financial statement audit opinion was issued.

Begin preparation of FY 2022-26 Strategic Plan and Agency Priority Goals.

12-month events

Develop and send to OMB FY 2023 budget request – expected September 2021.

Close out FY 2021 financial reporting and complete FY 2021 financial statements to support an independent audit.

Office of the Chief Human Capital Officer

Supporting the DOE Mission

The Office of the Chief Human Capital Officer (HC) supports DOE's strategic objective of attracting, managing, developing, and retaining the best federal workforce to meet future mission needs. HC supports DOE's mission accomplishment by providing human resources services, management, strategy, and solutions, including analytics; workforce and succession planning; recruitment and hiring; engagement and retention; competency development; and training and development.

Mission Statement

Supporting DOE's mission through workforce services, solutions, and innovations.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$26,125,000
FY 2020 enacted	\$24,316,000
FY 2021 request	\$26,191,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): HC has an FTE authorization of 134, but its overall workforce totals 319 FTEs due to the funding mechanism used to support the Human Resources (HR) Service Centers (SCs). The breakdown of FTEs across HC offices is as follows:

- 134 authorized FTEs, which includes HC's corporate body and a portion of the Oak Ridge (OR) HR Shared Service Center (SSC) workforce.
- 65 FTEs at the Bonneville Power Administration (BPA) HR SC.
- 32 FTEs at the Power Marketing Administration (PMA) HR SSC.
- 88 FTEs from the Oak Ridge HR SSC, funded by various DOE program offices.

History

The Chief Human Capital Officers Act of 2002 required the establishment of Chief Human Capital Officers (CHCOs) in the 24 Executive departments and agencies. The DOE CHCO is responsible for the strategic alignment of the DOE workforce to the mission of the Department, and for maintaining and directing its human resource management programs and policies. The CHCO advises and assists agency officials in carrying out Departmental responsibilities of selecting, developing, training, and managing a high-quality Federal workforce in accordance with merit-system principles. The CHCO also serves as the chief policy advisor on all human capital management activities and issues. The CHCO reports to the Deputy Secretary of Energy.

HC executes its mission through a service delivery model that aligns accountability for human resources (HR) under the CHCO within HR service centers responsible for operations and advisory services and a corporate body responsible for human capital management programs and strategic support. HC has consolidated HR operations to improve efficiency and effectiveness of HR services across the Department, reducing the number of HR service centers from 18 separate offices in FY 2013 to just 3 beginning in FY 2019.

The BPA HR SC provides HR services to the employees of BPA. The PMA HR SSC provides HR services to the employees of the Southwestern Power Administration (SWPA), Western Area Power Administration (WAPA), and Southeastern Power Administration (SEPA). The Oak Ridge HR SSC provides HR services to employees within the portfolios of the Deputy Secretary of Energy, the Under Secretary of Energy (except for BPA and PMA employees), and the Under Secretary for Science. Within the Under Secretary for Nuclear Security Portfolio, HR operational and strategic support is aligned under a separate HR office.

Functions

HC functional areas include:

Human Capital Policies and Strategies

Develop, implement, and administer human capital policies and strategies throughout the Department, including (but not limited to) recruitment; staffing; position management; benefits; employee and labor relations; performance management; telework; substance abuse testing; and personnel actions processing.

Strategic and Operational Services

Provide centralized HR services, including (but not limited to) staffing; recruitment; employee and labor relations; compensation; benefits; position classification and allocation; and performance management.

Legislative and Regulatory Support

Seek out and translate legislative and regulatory direction into Departmental strategies, policies, and programs to address DOE human capital needs.

Accountability Audits

Conduct human capital accountability audits across DOE to assess HR programs' adherence to legal and regulatory requirements.

Workforce Development Programs

Manage workforce development programs and evaluate their effectiveness to ensure they are developing employees who possess the skills to get the job done.

Critical Workforce Competency Analysis

Provide resources to define, assess, and close critical workforce competency skill gaps across the Department.

HR Service Center Oversight

Provide oversight of the HR Service Centers and subordinate offices, ensuring effective HR advice and solutions are offered to management officials and employees in all operational aspects of human capital management.

Labor-Management Relations

Provide direction and oversight of the Department's labor-management relations policies and programs. Provide advice to management officials on labormanagement regulations and collective bargaining agreements.

Recent Organization Accomplishments

HC employs strategic human capital initiatives to meet the workforce needs of today and plan for those of the future. HC's recent accomplishments include:

Strategic Human Capital Planning

HC is focused on positioning itself as a strategic partner to DOE program offices, promoting long-term, data-supported workforce planning to optimize resources in support of mission achievement. Some of these activities include:

• Senior Executive Service Recruitment Priority Assessment

Completed the Department-wide assessment of career and limited (LT) Senior Executive Service (SES) allocations, designating them into SES Priority categories based on complexity of work, breadth of responsibility, and impact to mission accomplishment.

SES Performance Management

Provided rigorous executive performance management guidance, successfully redirecting SES ratings distributions from the previous four years—level 5 ratings decreased from 52% to 30% with a more normalized distribution of Level 4—and revising the compensation structure to increase the average award by almost \$2,000 for each rating level.

Workforce/Staffing Plans

Partnered with the U.S. Office of Personnel Management (OPM) to initiate organizational assessments of DOE program offices. Results from the assessments will provide offices with additional data to inform strategic approaches to resourcing, functional alignment, and organizational structure.

Talent Management

In support of its mission, HC has advanced several talent management initiatives to better attract, hire, develop, and retain a high-quality workforce. Some of these initiatives include:

Innovating Hiring Solutions

Promoted the use of specialized hiring authorities, such as direct-hire that allows

DOE to reach applicants outside of the Federal government for mission critical occupations, and implemented new recruitment strategies to speed access to this talent. Developed over 170 standardized position descriptions to improve time-to-hire and implemented open continuous job announcements to improve the ability to reach candidates outside of the Federal government through the direct-hire authorities.

Departmental Learning Management System

Launched a new Departmental Learning Management System (LMS) to support the development needs of DOE employees. The new LMS provides tools to assess training needs. It also offers an expansive catalog of courses to strengthen job related skills and support upskilling and reskilling our workforce.

Employee Engagement

Led efforts to strengthen employee engagement across the Department by improving access to engagement data through custom analysis. Supported Departmental crowdsourcing efforts to provide opportunities for employees to collaborate and provide input on their work environment. Results from the 2019 Federal Employee Viewpoint Survey show an employee engagement index score of 72%.

Leadership Challenges

HC's leadership challenges include:

Competition for Highly Skilled Talent.

The Department faces increasing competition for highly-qualified talent in science, technology, engineering, and mathematics (STEM) occupations. This places increasing pressure on HC to develop and implement innovative strategies and leverage available hiring flexibilities to make DOE positions more competitive.

Workforce Succession

The Department employs approximately 13,000 Federal employees spread across 85 sites in 28 states. Thirty percent of DOE's current Federal workforce will be eligible to retire by FY 2024, including many of its most experienced and highly skilled employees. In order to maintain a workforce with the skills and experience required to meet DOE's highly complex and technical mission, HC must lead the Department in development strategies designed to grow the emerging workforce and effectively transfer knowledge from its senior members.

Critical Events and Action Items

3-Month Events

SES Allocations

Fill existing SES positions with onboard talent, and manage SES allocations to operate in a leaner, more efficient, and more accountable manner.

• Human Capital Management Accountability Program (HCMAP)

Align the HCMAP Policy with new OPM requirements and continue to execute the HCMAP Audit schedule.

6-Month Events

Expand Access to the LMS

Expand access to the Departmental LMS to all DOE contractor employees and decommission legacy learning management systems maintained within DOE program offices.

Increase availability of Standardized Recruitment Tools

Increase the efficiency of the hiring process by developing standardized job analysis tools.

12-Month Events

• Human Resources Information Technology (HRIT) Upgrade

Upgrade the HRIT system to take advantage of new technologies and improved reporting capability. Transition HC's hiring system from Monster to OPM's USA Staffing system.

OFFICE OF THE CHIEF HUMAN CAPITAL OFFICER



Office of the Chief Information Officer

Supporting the DOE Mission

The Office of the Chief Information Officer (OCIO) delivers value and innovation to enable and secure the mission.

The CIO provides Information Technology (IT) services to most federal employees and support contractors at DOE. The office is responsible for securing and responding to cyber security threats to DOE's IT and Control Systems (CS). The office provides oversight of the Department's \$3.1 Billion IT portfolio, and develops IT and cyber security policy for the Department.

Mission Statement

The mission of the OCIO is to help the Department securely carry out its mission.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$131,624,000
FY 2020 enacted	\$140,200,000
FY 2021 request	\$134,800,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 124

History

OCIO, formerly known as the Office of Information Management (IM), has been led by a CIO since 2002. In 2017, the CIO was designated as a direct report to the Secretary and Deputy Secretary, satisfying a key requirement of the Federal Information Technology Acquisition Reform Act (FITARA) of 2014. Current CIO Rocky Campione assumed his role in July 2019.

Functions

Implements and provides policy direction consistent with the Federal Information Security Modernization Act (FISMA) of 2014. The head of each agency is responsible for the operation and security of operating information technology (IT) systems, which is delegated through the CIO for implementation.

Sets the strategic direction to protect and modernize DOE's information technology, information resources, data, and cybersecurity systems across the Department for engagements with internal and external cyber stakeholders for senior departmental DOE officials, White House officials, interagency partners, international colleagues, congressional members, and private sector associates.

Manages IT budget-related oversight of DOE's strategic \$3.1B IT investment portfolio, as directed in the FITARA. Coordinates IT budget formulation and IT budget crosscut development of DOE-wide IT and cyber budgets in collaboration with the Office of the Chief Financial Officer.

Coordinates IT governance across the federated environment through the Cyber Council (Chaired by the Deputy Secretary), the Information Management Governance Board (IMGB) (Chaired by the CIO), and Enterprise Architecture Governance Board (EAGB) (Chaired by the Principal Deputy CIO).

Operates the integrated Joint Cybersecurity Coordination Center (iJC3) to provide 24/7 full spectrum cyber incident coordination and response to enable DOE mission essential functions. Ensures operational visibility to cybersecurity sensors across the Department and 53 operational sites.

Leads cybersecurity operations, strategy, policy, authorization, and assessment efforts required to develop and maintain an agency-wide cyber and information security program consistent with FISMA, Office of Management and Budget (OMB) Memoranda, National Institute of Standards and Technology (NIST) Guidance, and Department of Homeland Security (DHS) Cybersecurity Information Security Agency (CISA) requirements.

Coordinates the development and dissemination of cybersecurity threat information with the Office of Intelligence and Counterintelligence (IN).

The CIO serves as the Senior Agency Official for Privacy(SAOP) to implement: a federal privacy program to conduct and publish DOE Privacy Impact Assessments (PIAs) ensuring public transparency of internet facing websites; the management and approval of Privacy Act System of Records Notices (SORNs), which provide the required public notice when DOE collects, uses, maintains, or disseminates information about U.S. persons in an identifiable form; and the Social Security Number (SSN) reduction program. The OCIO also coordinates responses to privacy breaches.

The CIO serves as the DOE Senior Agency Official for Records Management (SAORM), the official recognized by the National Archives and Records Administration as having primary responsibility for the Agency's compliance with all records management laws, guidelines, and standards. Manages the Department's records management program, and reduces risk through modernized paperless business processes, the application of technology, and site assistance.

Provides enterprise IT services such as commodity IT, telecommunications, networking services including the DOEnet corporate network, and secure Internet Service Provider service in compliance with the DHS Trusted Internet Connection (TIC) policy; data center infrastructure and cloud migration services for application hosting in virtual cloud data center environments; and service desk services through the Energy IT Services (EITS) team to multiple program offices. Manages the Section 508 Accessibility program. Provide guidance in support of making websites and other IT interfaces across the Department accessible for people with disabilities.

Recent Organization Accomplishments

Maximum Telework Enablement (MTE)

Coordinated the Department's move to maximum telework, and directly supported MTE for approximately 10,000 customers. This has allowed DOE to continue to function during maximum telework.

Big Data Platform (BDP)

Launched the BDP in FY 2019. This integrates cybersecurity sensor data across the Department to provide timely access to data for identifying and responding to cyber threats.

Capstone Implementation

Implemented the National Archives and Records Administration's (NARA) "Capstone" approach for the electronic management of email records. All senior officials, also known as High Level Officials (HLO), now have their email held as a permanent record. We are implementing a 7-year temporary records retention for remaining email accounts within the Department.

Enterprise Anti-Phishing Efforts

Upgraded enterprise-wide anti-phishing security awareness training and simulated phishing platform tool, providing enhanced capabilities for sites to conduct simulated phishing exercises. These antiphishing efforts have helped make DOE's phishprone percentage (10%) significantly lower than other, similarly-sized government and industry organizations (26%).

Enterprise Cybersecurity Risk Management

Implemented several new initiatives, including the establishment of an *enterprise Supply Chain Risk Management (eSCRM)* program to identify and understand potential risks associated with utilization of third party vendors; *Crowdsourced Penetration Testing* program to provide on-demand, scalable testing capabilities to improve detection and remediation of operational cyber vulnerabilities across the enterprise; and risk assessments using *quantified risk estimation* methods to help cyber professionals across the enterprise build defensible investment strategies.

DOE Order 205.1C (Cybersecurity) Implementation

Implemented DOE Order 205.1C, *DOE Cyber Security Program.* Released amplification guidance focused on improving the Department's maturity around Enterprise Cybersecurity Program Planning, Risk Management Methodology, and FISMA Inventory Methodology to assist programs with policy implementation tailored to their mission needs. This is scheduled to be updated in FY21.

Vulnerability Disclosure Program (VDP)

In response to the draft DHS Cybersecurity & Infrastructure Security Agency (CISA) Binding Operational Directive (BOD) 20-01, *Develop and Publish a Vulnerability Disclosure Policy*, the OCIO began development of a VDP policy to be implemented across DOE. The VDP establishes a formal mechanism for the DOE to receive, triage, and mitigate vulnerabilities on internet facing systems reported by third parties.

Leadership Challenges

Ensuring federal oversight in a highly federated environment with a mix of Management and Operating (M&O) and federal resources. Ensure mission, operations, and research are speaking with one voice and move collectively, particularly in cybersecurity funding requests and priorities. Existing M&O/contractor resources have inconsistent contract language and program oversight.

Developing and implementing a Control System (CS) strategy for the protection of critical infrastructure due to increased threats to critical infrastructure. The Department maintains a large collection of control system devices (e.g. SCADA, ICS, OT) which until recently was overlooked under existing FISMA, OMB, DHS, and NIST guidance.

Having visibility into the multiple Federal IT systems, not M&O contractor systems, running outside of the OCIO office.

Transition the Department into a 100% electronic records management environment, including fully enabling digital signatures.

Clarifying operational policy and oversight for classified network operations between DOE and federal partners.

Critical Events and Action Items

5G Catalogue

OCIO is developing a first-ever departmental-wide catalogue of 5G capabilities that will be provided to the White House and interagency in response to the Implementation Plan Framework for the National Strategy to Secure 5G. The catalogue highlights DOE leadership on 5G, presents a unified snapshot of current 5G capabilities, and invites the interagency to fund and collaborate with the National Labs' 5G efforts.

Budget, FY22/23

OCIO will continue developing and determining budget needs, requirements, and challenges to be reflected in the FY 2022 and FY 2023 budget requests/submissions. OCIO will also collaborate with the Office of the Chief Financial Officer and Departmental Elements to ensure funding for IT priorities such as modernization, cybersecurity, and privacy are reflected in DOE's budget request.

ICS Hackathon

OCIO will host a new International ICS Hackathon (team-based penetration testing) in partnership with the National Security Council (NSC), bringing together DOE National Laboratory/Power Marketing Administration (PMA) experts, ICS vendors, industry experts, and international partners.

Organizational Chart



Office of the Chief Information Officer

Office of Management

Supporting the DOE Mission

The Office of Management (MA) supports the DOE mission by establishing policy and providing oversight for approximately \$25 billion in annual procurement obligations, \$85 billion in real property inventory, and \$74 million for DOE's aviation fleet. MA also provides procurement services to DOE Headquarters organizations and serves as the Department's corporate lead for sustainability. Administrative functions include the management of headquarters facilities, executive correspondence control, Secretarial scheduling and advance, management of Departmental directives, and the delivery of other administrative services critical to the Department. MA also fulfills the statutory responsibilities of the Chief Freedom of Information Officer and the Department's Senior Procurement Executive.

Mission Statement

Assure the effective management and integrity of Department of Energy programs, activities, and resources by developing and implementing Department-wide policies and systems in the areas of aviation management, acquisition management, asset management, sustainability, Freedom of Information, conference management, and administrative services. Provide a safe and environmentally secure environment for all HQ employees through the deployment of a disciplined Occupant Emergency Plan.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$55,385,000
FY 2020 enacted	\$54,358,000
FY 2021 requested	\$57,258,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 244

Functions

Policy, Procedure and Standards Management

Develops, coordinates, and facilitates implementation of Department-wide policies, procedures, standards, and systems for all procurement; financial assistance; property; facilities and asset management; contractor human resource management; and sponsored strategic programs.

Acquisition and Financial Assistance Services

Provides acquisition and financial assistance services to Headquarters program and staff offices.

Emergency Response

Designated Official. Serves as the Secretary's Designated Official for Headquarters Emergency Response.

Emergency Planning

Prepares and maintains Occupant Emergency Plans for all Headquarters facilities.

Real Property Officer

Serves as the Department's Real Property Officer.

Senior Procurement Executive

Serves as the Department's Senior Procurement Executive.

Aircraft Management

Provides recommendations to the Secretary of Energy for the safe, efficient, and reliable management of aircraft use by DOE. Approves the acquisition and disposal of DOE aviation assets.

Sustainability Leadership

Provides overall leadership for sustainability in Departmental operations.

Budget and Administrative Support Services

Provides budget and administrative support services for the Office of the Secretary and other Departmental Elements.

Document Management

Provides the central repository for all official

documents of the Office of the Secretary; provides institutional memory for key Departmental actions and decisions; provides advisory committee management support; manages Freedom of Information Act activities; and manages correspondence addressed to or sent from the Office of the Secretary.

Directives System

Manages the Departmental directives system, which is DOE's mechanism for issuing policy requirements to DOE organizations and, in some cases, DOE contractors.

Delegations of Authority

Manages the delegations of authority system.

Conference Management

Manages the Departmental conference management activities.

Travel Management

Manages official travel and establishes policies and procedures with respect to employees travel and relocation allowances under 5 U.S.C., Chapter 57, and the Federal Travel Regulation.

Exchange Visitor Program Management

Manages DOE participation in the Department of State's Exchange Visitor (J-1) Program.

Recent Organization Accomplishments

Research and Technology Investment Committee (RTIC) Working Group

Provided proactive, hands-on leadership to support the RTIC, which is chaired by S2, and manage the RTIC Working Group. Recent accomplishments include launching a multi-program subcommittee to analyze DOE's approach to Artificial Intelligence resulting in the development of DOE's AI strategy; establishing a multi-program subcommittee on Critical Materials resulting in a proposed strategy for research, development and deployment of critical materials; conducting a STEM workshop and establishing a multi-program STEM working group to promote collaboration; launching crossprogram subcommittees on Integrated Energy Systems, Biotechnology and the Plastics Innovation Challenge to develop strategies for promoting U.S. leadership for these technologies; and initiating

the development of definitions for crosscutting technologies to facilitate decision-making on the appropriate level of investment.

Financial Assistance

Strengthened the process for approving financial assistance by developing and deploying the new INVESTOR (INvesting in Vital and Emerging Technologies and Objective Research) system to collect and share proposed financial assistance and laboratory calls, including 204 proposals covering 14 crosscutting technologies from 13 programs totaling about \$4 billion. The information is reported to DOE senior leaders to encourage transparency and opportunities for collaboration. The information is also being used to promote public awareness of financial assistance opportunities.

COVID Response

Played a central leadership role in developing and implementing DOE's framework and HQ plan for returning employees to the workplace. Provided leadership in developing and implementing strategies regarding contractors, including policies on weather and safety leave, resulting in the retention of thousands of highly skilled contractor employees. Established a Response Center to monitor the number of COVID infections and to serve as the central point of contact for managers and employees to seek information on any COVIDrelated matter. Established travel policies and monitored travel for the entire complex, including laboratories, to ensure adherence to those policies. Developed and implemented strategies for ensuring the safe operation of HQ facilities, including development and implementation of safety protocols, provision of hygiene products, and reconfiguration of space to promote social distancing. Launched initiative to determine how lessons learned regarding telework could be applied post-COVID.

Laboratory Operational Improvements

Provided leadership on Laboratory Operations Board initiatives to create efficiencies and promote lab productivity. Highlights include: launching a pilot program to use third-party independent auditors to evaluate compensation and benefits at NREL, the results of which will be used to potentially expand the program to all laboratories; developing a policy to enable laboratories to expand dependent care benefits to strengthen employee recruitment and retention; collaborating with CF to issue S1 direction on prioritizing infrastructure projects; and coordinating with programs to improve consistent implementation of corporate work authorizations procedures.

Managing the Departmental Directives

Provided strong leadership in managing the Directives Review Board to ensure proposed requirements are fully vetted. Actions include increasing senior leadership involvement in providing strategic direction; prioritizing directives to focus on necessary requirements changes; improving collaboration in developing complex directives; and consistently applying established directives principles to promote line authority and reduce transactional oversight. In the past year, led the revision of 33 directives and 2 cancellations, including 6 directives implementing S1 reforms to prevent the unauthorized transfer of sensitive science and technologies to hostile nations.

Improving Contract Management

Provided executive leadership to manage DOEwide contracts with a total award value exceeding \$530B, including HQ procurements valued at \$23.6B. Provided leadership to strengthen contract management by establishing a new S2-led Energy Acquisition Review Board to assess acquisitions exceeding \$750M and an SPE-led review process for acquisitions valued between \$500M and \$750M with a focus on improving acquisition planning and incentive structures. Other actions include reviewing 300 major contract actions to promote the use of IDIQ and fixed price contracts, which are now being especially championed by EM; completion of five procurement peer reviews to strengthen operations, contract administration, and staffing, including 2 virtual reviews during maximum telework. Provided executive leadership on a comprehensive revision of DOE's Acquisition Regulation.

Improved Efficiency and Effectiveness through Acquisition Strategies

Championed the use of category management by awarding innovative flexible enterprise-wide contracts to save money and streamline operations, resulting with DOE being on track to exceed its \$433M (4% increase) strategic savings goal. Led the Department's efforts to increase spend-undermanagement (SUM) and the use of GSA best-inclass (BIC) contracts, resulting in DOE achieving 123.2% of OMB's SUM goal and close to 60% of OMB's BIC goal. In addition, far exceeded HQ's small business goal (57% vs. 40%) for FY 2020.

Freedom of Information Act (FOIA)

In FY 2020, processed 1,170 FOIA requests, most of which were highly complex and involved multiple reviews. Closed the two oldest FOIA cases at the Department. Responded to an unprecedented 17 FOIA cases in litigation, all of which consisted of multiple submissions of thousands of responsive documents and completed 6 in full.

Facilities Improvements

Led the continued improvement of the Forrestal building, including the on-cost completion of more than 600 renovation projects valued at \$15.9M (e.g., new state-of-the-art SCIF, new suites for AITO and Boards and Councils). Collaborated with NNSA, IN and IA to develop a comprehensive HQ SCIF construction plan. Completed projects to provide improved services to HQ employees, including kitchenettes and an on-site dry cleaner (Forrestal). Collaborated with S3's office to lease the real estate needed to open the Arctic Energy Office in Fairbanks, AK.

Technology Improvements

Collaborated with CF to deploy a major upgrade of the STRIPES procurement system, enabling DOE to use bots to streamline processes. Deployed the first acquisition bot that scans databases for information on potential contractors, saving contracting officers at least 2 hours on each award. Automated the Forrestal parking payment system and conference room scheduling system.

Leadership Challenges

Achieving Sustainability Goals

Achievement of sustainability goals competes with funding for mission and other requirements including deferred maintenance.

Aging Infrastructure

Given that much of DOE's property portfolio reflects an aging infrastructure originating in the 1940s as part of the Manhattan Project, the challenge is to sustain, modernize, and effectively align real property assets with current and future mission requirements. Approximately 25% of the Department's facilities are either excess or under/ unutilized with over 1,100 of those assets being contaminated. This puts a drain on operations and maintenance funding and has resulted in deferred maintenance increasing to over \$8 billion.

Oversight of Contractor Pension and Medical Benefit Plans.

Departmental oversight of facility management contractor pension and medical benefit plans' increasing costs and liabilities; volatility and unpredictability of defined benefit pension plan assets; and associated complex legal and tax issues create programmatic, acquisition, and financial management challenges for the Department.

FOIA

Revalidate the process to review and approve FOIA releases.

COVID-19 protocols for Headquarters Facilities

Aligning policies with best practice recommendations to prevent the spread of COVID-19 in the workplace, including PPE, social distancing, telework, shiftwork and facility adjustments.

Critical Events and Action Items

Develop and publish the statutorily-required annual Conference Activities Report (January 2021).

Complete end of year sustainability reporting to Office of Management and Budget/Council on Environmental Quality.

OMB Memo M-20-03, "Implementation of Agencywide Real Property Capital Planning," which was issued last November, implements the Federal Property Management Reform Act through the Capital Planning process by connecting capital planning to budget, execution & metrics. The M-20-03 specifies agency-wide reporting to the Federal Real Property Council that addresses each agency's: mission requirements for real property; CFO and SRPO responsibilities; the annual budget process; major lines of business; needs assessment; alternatives analysis; prioritization process; life cycle cost estimate; performance goals and metrics; and, a list of prioritized capital projects. The purpose of the report is to inform agencies' decision making and assist in prioritizing agency actions, relative to real property. The report is due to OMB by January 8, 2021.

Office of Management Director MA-1 Office of Corporate Directives **Business Operations** Chief of Staff Program Office of Executive Office of Scheduling Office of Administration Office of Aviation Office of Asset Office of Acquisition Secretariat and Advance Management Management Management Office of Office of Office of Administrative Policy Policy Management and Analysis Support Office of Logistics Office of Office of Contract and Facility Correspondence Operations Management Management Administration, MIS. Office of Travel Office of Headquarters and Executive Management Commitments Group Procurement Services Office of Federal Office of Public Advisory Committee Information Management

Organizational Chart

Office of Small and Disadvantaged Business Utilization

Supporting the DOE Mission

Strategic Plan Goal 3: Management and Performance

Position the Department of Energy to meet the challenges of the 21st century and the nation's Manhattan Project and Cold War legacy responsibilities by employing effective management and refining operational and support capabilities to pursue departmental missions.

Strategic Objective 10

Effectively manage projects, financial assistance agreements, contracts, and contractor performance.

Mission Statement

The Office of Small and Disadvantaged Business Utilization (OSDBU) maximizes contract opportunities for small businesses while advancing the Agency's mission. This is accomplished through the three guiding objectives of the DOE Small Business Strategic Vision:

- Make it easier for small businesses to do business with the DOE.
- Maximize small business opportunities by cultivating more productive and collaborative relationships with internal DOE stakeholders.
- Maximize small business awards and improve the Agency's performance in the four Small Business Administration (SBA) socio-economic categories.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$3,170,000
FY 2020 enacted	\$3,337,000
FY 2021 request	\$3,401,000

Human Resources

FY 2020 Authorized Full-Time Equivalents (FTEs): 17

History

The Small Business Act Section 15(k) (15 U.S.C. § 644 (k)) mandates every federal agency create an Office of Small and Disadvantaged Business Utilization, whose purpose is to foster the use of small and disadvantaged businesses as federal contractors in supporting their respective agency missions.

Other historically significant events:

1996 Small Business Regulatory Enforcement Fairness Act (SBREFA)

This act established annual reporting on new Agency regulations that may be potentially onerous for small businesses.

2014 Consolidated Appropriations Act, Title III, Section 318

Congress authorized DOE to count first-tier subcontracts as prime contracting credit. These subcontracts are reported to the SBA through the Management and Operating Subcontract Reporting Capability (MOSRC).

2018 Small Business First Policy

In March 2018, the DOE revised this policy on the Agency's principles and commitment to engaging the small business community.

Functions

To achieve its three Strategic Objectives, the OSDBU focuses on inreach to Departmental Elements to coordinate small business activities, outreach to small businesses to provide education and counseling, and operations to manage human capital and budgetary functions.

Important activities include:

- Ensure compliance with the 21 requirements of the Small Business Act Section 15(k)
- Report annually to Congress in accordance with the Small Business Regulatory Enforcement Fairness Act.
- Review acquisitions that are not set aside for small businesses.

- Review subcontracting plans.
- Assist acquisition staff with pre- and post-award contracting activities.
- Provide training to Small Business Program Managers at DOE Headquarters, Sites, and National Labs.
- Establish small business goals for Program Elements.
- Respond to small business contracting concerns and provide best practices for small businesses to work with the Agency through outreach events, such as the Annual DOE Small Business Forum & Expo and socio-economic themed events.
- Provide Senior Procurement Executives advice and comments on acquisition strategies and market research.

The OSDBU has representation on the Small Business Procurement Advisory Council and OSDBU Directors Interagency Council to build collaborative relationships and share small business best practices across the federal government.

Recent Organization Accomplishments

Recent accomplishments include increased small business prime and subcontracting dollars awarded to small businesses, expanded education and counseling for small businesses to help make it easier to do business with the DOE, and improved socio-economic small business performance:

Small Business Achievement

The DOE earned a fifth straight "A" grade from the SBA for small business and socio-economic contracting achievement in FY 2019. (The most recent accomplishments refer to FY 2019 data, as FY 2020 data will not be finalized until March 2021.) The Agency achieved \$560 million more in total awards to small businesses over the prior Fiscal Year for a total of more than \$7.68 billion.

Socio-economic Achievement

For the third straight year, the Agency increased spend and improved its performance in all four SBA-graded socio-economic categories: Small Disadvantaged Businesses (\$290 million, 21.97% increase), Women-Owned Small Businesses (\$230 million, 28.75% increase), Service-Disabled Veteran-Owned Small Businesses (\$198 million, 76.45% increase), and Historically Underutilized Business Zone Small Businesses (\$125 million, 73.53% increase).

Most Improved Acquisition Forecast

The Professional Services Council awarded DOE the 2020 Federal "Most Improved" business forecast out of 60 federal agencies.

Expanded Small Business Education, Counseling, and Outreach

The OSDBU hosted the 18th Annual Small Business Forum & Expo (over 1000 attendees), Summer '19 New Mexico Small Business Expo (over 500 attendees), and several socio-economic themed events to provide matchmaking consultations between small businesses and Agency stakeholders, and to help small businesses navigate the Department's complex procurement environment. The OSDBU also expanded its small business counseling efforts to provide faster and more individually tailored business development customer care.

Increased Participation in Mentor Protégé Program

The Department has increased partnerships between DOE prime contractors and small businesses for a total of 40 Mentor Protégé Program Agreements.

Leadership Challenges

DOE's large procurement base and complex procurement environment create challenges at current staffing levels to comply with the requirements of the Small Business Act, the Small Business Regulatory Enforcement Fairness Act, and to grow small business utilization.

Critical Events and Action Items

The OSDBU is required to report each year to the SBA on compliance with Small Business Act Section 15(k) and other requirements. On the OSDBU's behalf, the SBA submits these reports to Congress. The OSDBU is also required to report annually to Congress through the Small Business Regulatory Enforcement Fairness Act.

• Small Business Act Section 15(k) Compliance Review Report

- Contract Bundling Report (15 U.S.C. § 644(p)(4))
- Mentor Protégé Report (15 U.S.C. § 657r(c))
- Training and Travel Report (15 U.S.C. § 644(k))
- Corrective Actions Report (15 U.S.C. § 644 (h))
- Small Business Credit for Puerto Rico Businesses Report (15 U.S.C. § 632(ee))
- Small Business Regulatory Enforcement Fairness Act

Organizational Chart



OSDBU

Office of Intelligence and Counterintelligence

Supporting the DOE Mission

The Office of Intelligence and Counterintelligence (IN) contributes to multiple DOE missions and is a critical contributor to policy and national security decisions, despite its relatively small size (i.e., relative to other Intelligence Community (IC) agencies). Not only does IN provides unique insights on foreign nuclear capabilities and activities, but it has a role in the Department's efforts to promote energy security, protect critical infrastructure, and support interactions with DOE's National Laboratories. In addition, the Office provides counterintelligence and cyber intelligence to protect the people, facilities and intellectual property throughout the DOE complex, as well as assist the Department in its mission to protect the energy sector, which is largely in private hands.

With roots in the Manhattan Project's intelligence effort to understand the progress of the German nuclear program, the Office is DOE's embedded intelligence element. IN is DOE's primary interlocutor with the IC, and it maintains strong connections to the Office of the Director of National Intelligence (ODNI), as well as the other 17 partner IC agencies.

On a day-to-day basis, IN draws on the resources of the entire IC to provide the Department's senior executives with intelligence support and analysis on the key foreign issues about which they must make decisions. The Office frequently addresses such issues as foreign nuclear programs and a diversity of energy security and science/technology (S&T) topics, as well as foreign intelligence targeting of DOE personnel, facilities and systems. Without these important contributions, decisions by DOE leaders would lack essential inputs regularly available to senior officials at other agencies. DOE brings to the national security policy making community several unparalleled capabilities other agencies and Departments cannot replicate. The Department also presents some unique cyber and counterintelligence vulnerabilities; IN plays an

important role in emphasizing the Department's strengths and mitigating its cyber vulnerabilities.

Scientifically Informed Analysis

Analysts at the National Laboratories and DOE Headquarters specialize in employing scientific and technical expertise, including experimentallyverified analysis, to tackle the most difficult challenges facing our country's national security leaders. IN's scientific and technical intelligence expertise concentrates on a focused—but vitally important—range of issues to support customers within the Department and throughout the U.S. Government. Whether in support of the Department's senior leaders, other senior U.S. Government policymakers, or other agencies, IN analyses shape the Nation's understanding on key issues listed below. IN analysis is deeply rooted in National Laboratory expertise, draws from diverse fields of technical expertise, and provides important context and details on enduring and emerging threats in the following areas:

- Foreign nuclear weapons and fuel cycle programs
- Nuclear material security and nuclear terrorism
- Counterintelligence issues
- Energy security
- Cyber intelligence
- Strategic scientific and technological developments and trends

The Counterintelligence Challenge

Because of new laws and policies designed to protect sensitive technologies in the DOE National Laboratory complex, IN is meeting new challenges to identify foreign threats to some of the nation's most important defense resources and technologies. Operating from 15 field offices at DOE facilities nationwide, counterintelligence professionals work closely with experts and managers from across the Department to protect vital national security information and technologies, representing intellectual property of incalculable value. Our partnerships with the IC and law enforcement assist in fortifying the defense of the Department's laboratories, plants, sites, intellectual property, and technologies.

Cyber's Evolving Role

Cyber security and defense is a rapidly evolving and broad set of research, operations, and implementation activities. The Department and its laboratories are leaders in the cyber field. IN's cyber work benefits from a staff with expertise that ranges from basic research and cyber intelligence threat analysis to information technology support and tools development, including incomparable expertise in simulation and modeling and advanced supercomputing. These cyber experts cooperate with other agencies and programs to support the full spectrum of national security missions including: nuclear weapons stewardship, critical infrastructure and cyber threats.

The National Laboratories and the Intelligence Community

Central to this work is the enduring excellence in innovation present in the 12 Field Intelligence Elements (FIEs), located at the National Laboratories. The National Laboratories have been essential to accomplishing our decadesold missions and are crucial to anticipating and understanding new trends. They remain at the heart of our distinctive mission capabilities. IN oversees all aspects of the Strategic Intelligence Partnership Program's reimbursable activities which provides IC partners with access to the scientific expertise of the National Laboratories. The Intelligence Reform and Terrorism Prevention Act of 2004 directed the Secretary of Energy to make these resources available to the Intelligence Community (IC); and these experts will continue to excel in providing unparalleled capabilities unavailable to the IC anywhere else.

Mission Statement

Identify and mitigate threats to U.S. national security and the DOE Enterprise and inform national security decision-making through scientific and technical expertise.

Budget

IN's budget is classified and can be provided at a classified briefing with individuals with appropriate security clearances.

Human Resources

IN's human resource allocation is classified and can

be provided at a classified briefing with individuals with appropriate security clearances.

History

Intelligence and counterintelligence have been foundational activities of DOE and its predecessors dating back to its earliest days. The Office is older than the Central Intelligence Agency. Just as the Department traces its roots to the Manhattan Project, IN has its origins in a WWII program codenamed ALSOS, established to deploy scientists and intelligence officers to Europe in order to discover the extent and nature of German progress on nuclear weapons. In addition, counterintelligence officers at Los Alamos and Oak Ridge uncovered some of the earliest incidents of nuclear espionage against the U.S. nuclear weapons program.

Throughout the various organizational transitions in the interceding years—from the Atomic Energy Commission (AEC) to the Energy Research and Development Administration (ERDA) to DOEthe Department has maintained intelligence and counterintelligence functions. These elements have combined, split and recombined several times over the years but have coalesced around an indivisible, overarching counterintelligence and intelligence mission to inform DOE policymakers and protect DOE personnel, facilities and systems. Since a final combination of functions in 2006, IN has served as the exclusive DOE representative to the IC and is an active contributor to both the mission of the Department and the IC through the provision of experimentally-validated and technically-informed analysis and investigations. Today, the Director of IN serves as DOE's Senior Intelligence Officer and represents DOE at senior levels in the IC across all key intelligence disciplines, in addition to authorizing the intelligence activities at the DOE national laboratories and sites.

Functions

IN performs a number of unique activities for the Department. In general, these actions fall into the below categories:

 Deconfliction, coordination, and integration of all intelligence activities involving the Department. No intelligence activities should take place in the Department outside of these authorized channels.

- Foreign intelligence analysis and collections support on issues affecting DOE equities.
- Counterintelligence analytic and investigatory activities, to include cooperation and coordination with relevant law enforcement and IC partners.
- Cyber intelligence analysis in support of cyber defense work and support to the private energy sector.
- Facilitation of IC access to the DOE Laboratories through the Strategic Intelligence Partnership Program, a complementary part of the Department's Strategic Partnership Program (non-intelligence).

In addition, IN performs several additional, specific functions:

- Routine/daily intelligence support to the Secretary (S1), the Deputy Secretary (S2), their staffs and several other senior leaders throughout the Department.
- Ad hoc intelligence analysis/expertise on specific subjects for travel and meeting support.
- Management and issuance of Sensitive Compartmented Information (SCI) access for DOE employees and contractors.
- Management of the DOE Intelligence Operations Center, which provides 24/7 TS/SCI-level communications across the U.S. Government, specifically with the White House.

Organizational Chart

- Accreditation of all Sensitive Compartmented Information Facilities (SCIFs) located across the DOE Complex.
- Intelligence inputs to the Committee on Foreign Investment in the United States (CFIUS) process.
- Support to specific aspects of the Foreign Visits and Assignments program.
- Reviews of all Memoranda of Understanding (MOUs) and Cooperative Research and Development Agreements (CRADAs) involving foreign entities prior to signature.
- Exclusive DOE representation on IC councils, groups, organizations, and other fora.

Recent Organization Accomplishments

Highlights regarding recent accomplishments will be provided separately due to classification considerations.

Leadership Challenges

Descriptions of leadership challenges will be provided separately due to classification considerations.

Critical Events and Action Items

Critical events and actions will be discussed separately due to classification considerations.

OFFICE OF INTELLIGENCE AND COUNTERINTELLIGENCE



10/24/12

Office of Economic Impact and Diversity

Supporting the DOE Mission

The Office of Economic Impact and Diversity (ED) touches on all aspects of the DOE Mission through (1) its advocacy for its minority and underrepresented stakeholders; (2) its Equity in Energy Initiative which focuses on STEM enhancement, Workforce Development, Technical Assistance, Energy Affordability, and Supplier Diversity; (3) its enforcement of all antidiscrimination statutes; and (4) thought leadership on diversity and inclusion.

Mission Statement

ED advises the Secretary on (1) the effect of energy policies, regulations, and other actions of the Department of Energy and its components on minorities and minority business enterprises and on ways to ensure that minorities are afforded an opportunity to participate fully in the energy programs of the Department; and (2) Departmental compliance with civil rights and equal employment opportunity laws, regulations, and related directives and Executive Orders that prohibit workplace discrimination and discrimination in programs receiving federal financial assistance from DOE. ED ensures integration of Equal Employment Opportunity into DOE policies and decision; overseeing intake and processing of complaints of discrimination; and promoting a diverse DOE workforce and inclusive work environment.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$10,169,000
FY 2020 enacted	\$10,169,000
FY 2021 requested	\$9,931,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 37

History

The Office of Minority Economic Impact (OMEI) was established in Fiscal Year 1979 pursuant to

Section 641, Title VI, Part 3 of the National Energy Conservation Policy Act (Public Law 95-619), dated November 9, 1978. The mandate requires that the OMEI Director be appointed by the President with the advice and consent of the U.S. Senate. OMEI was created to ensure that minorities are afforded an equal opportunity to participate fully in the energy programs of the Department.

In 1993, the Office of Economic Impact and Diversity was established by bringing together the Office of Small & Disadvantaged Business Utilization (OSDBU), the Office of Civil Rights, and the Office of Minority Economic Impact. In the mid-1990s, two new offices -the Office of Employee Concerns and the Office of the National Ombudsman were added to ED, based on specific events that occurred impacting DOE employees. In 2004, DOE eliminated the Office of the National Ombudsman. That same year, ED consolidated the Office of Employee Concerns into OCR. In 2009, DOE transferred the civil rights function to the Office of Hearings and Appeals, and the diversity function to the Office of Human Capital Management. That action was reversed in 2010, resulting in the return of both of those functional lines to ED. In 2011, DOE created a separate Office of Diversity Programs in ED. In 2012, ED changed the name of Office of Diversity Programs to Office of Diversity and Inclusion. In 2012, a new Office of Ombudsman was established in ED. Due to the amendment of the Small Business Act by the National Defense Authorization Act of 2013, OSDBU transitioned from ED and now exists as a separate organization. In 2014, ED split the Office of Minority Economic Impact into two organizations, the Office of Minority Education and Community Development and the Office of Minority Business and Economic Development. In 2015, the Ombudsman function was moved to the Office of Management. In January 2016, the Office of Employee Concerns was moved from ED to the Office of Environment, Health, Safety and Security. In 2016, ED created a separate Office of Equal Employment Opportunity (EEO) to complement OCR. The EEO Office and OCR reported to the Deputy Director, Office of Civil Rights and Equal Opportunity.

In 2018, ED merged the Office of Minority Education and Community Development with the Office of Minority Business and Economic Development. The combined organization was re-named the Office of Minority Economic Impact. ED also merged the Office of Diversity and Inclusion with the Office of Equal Employment Opportunity into a single organization named, the Office of Equity and Diversity. The umbrella organization that previously oversaw the Office of Civil Rights and Office of Equal Employment Opportunity, was renamed as the Office of Civil Rights and Diversity, and currently oversees the Office of Civil Rights and the Office of Equity and Diversity.

In early 2019, ED established the Office of Minority Programs and Business Operations to oversee two portfolios, the Office of Resource Management and the Office of Minority Economic Impact.

In February 2020, ED underwent another reorganization, re-naming the Office of Minority Programs and Business Operations and as the Office of Minority Programs. It abolished the Office of Resource Management, realigned the few positions in that portfolio to report individually to the Deputy Director, Office of Minority Program, and re-established that portfolio as the Energy Workforce Division. In addition, it re-named subcomponent "Offices" as subcomponent "Divisions" to mirror the structure of other Department organizations.

Functions

Office of Minority Programs Key Functions

Develop and oversee all activities, internal and external, relating to the Equity in Energy Initiative[™] which is designed to expand the inclusion and participation of minorities, women, veterans, and formerly incarcerated persons across all department programs and in the private energy sector; provide strategic leadership and guidance to the Energy Workforce Division and Minority Education Institution Program Division; and oversee all budget, procurement, and personnel operations of ED.

Energy Workforce Division Key Functions

Develop policy recommendations to expand diverse business participation in DOE entrepreneurship/ research opportunities, and in the energy sector. Build relationships across the energy industry, diverse minority business, academia, and government.

Expand access and opportunity to diverse entrepreneurs and business opportunity seekers.

Research and analyze information on the current state of the minority business workforce needs of energy related industries and to encourage energy related industries to improve opportunities for displaced and unemployed energy workers.

Oversee research programs in collaboration with the Energy Information Administration to determine the effects of national energy programs, policies, and DOE regulations on minorities.

Minority Educational Institution Program Division Key Functions

Partner with minority serving institutions to provide research and development opportunities and financial assistance (grants and cooperative agreements) to continue to produce a diverse pipeline of scientists and engineers.

Engage in education and community-based research activities.

Provide technical assistance to underserved communities.

Manage the Minority Educational Institution Student Partnership Program (MEISPP).

Support research in areas of national interest related to the DOE's mission, and strengthen the educational science, technology, engineering, and mathematics (STEM) capabilities of minority institutions for full and creative participation in the mainstream of DOE research.

Prepare Annual White House Report on Historically Black Colleges and Universities.

Office of Civil Rights and Diversity Key Functions

Provide strategic leadership and guidance to the Civil Rights Division and the Equity in Energy Division; and guidance to all EEO Field Site Offices, including the EEO Office in the National Nuclear Security Administration (NNSA).

Civil Rights Division Key Functions

Advise the Secretary of Energy on all matters related to internal and external civil rights and equal employment opportunity matters.

Formulate and executes EEO Policies.

Oversee all phases of the EEO Complaint Process including intake, processing, and resolution of internal discrimination complaints under Title VII of the Civil Rights Act of 1964, the Age Discrimination Act of 1967, the Rehabilitation Act of 1973, the Equal Pay Act of 1963, and the Genetic Information Nondiscrimination Act of 2008, in accordance with related statutes, directives, and Executive Orders.

Conduct intake, processing, and resolution of applicable external complaints.

Enforce Title VI and Title IX requirements related to recipients of federal funding from the Department of Energy.

Prepare responses to Congressional inquiries related to Title VI, Title VII, Title IX, the Rehabilitation Act of 1973, the Age Discrimination Act of 1967, the Equal Pay Act of 1963, and the Genetic Information Nondiscrimination Act of 2008.

Conduct pre-award clearance reviews for Headquarters financial assistance awards or grants.

Conduct post-award compliance reviews of financial award recipients for all of DOE.

Monitor DOE field sites to ensure their compliance with Titles VI, IX, Section 504 of the Rehabilitation Act, the Age Discrimination Act, the Equal Pay Act, and the Genetic Information Nondiscrimination Act of 2008.

Prepare statutory and regulatory-required reports, including the Notification and Federal Employee Antidiscrimination and Retaliation Act of 2002 Report (NO FEAR Act Report); the Annual Federal Equal Employment Statistical Report of Discrimination Complaints (EEOC Form 462); and Annual Reports on Executive Order 12250 (all civil rights activities for the agency).

Conduct Title VI, Title VII, and Title IX training for DOE Headquarters and field sites.

Draft policy statements for the Secretary's consideration.

Develop training modules and administer harassment and NO FEAR Act training.

Conduct functional reviews of field site EEO Operations.

Coordinate with DOE stakeholder organizations, including the Offices of Human Capital, Hearings and Appeals, General Counsel, Ombudsman, Employee Concerns, and field sites and program offices.

Collaborate with federal agencies, including the Department of Justice, the National Science Foundation, and others.

Equity and Diversity Division Key Functions

Maintain a model EEO program, including the integration of EEO into the agency strategic mission, prevention of unlawful discrimination, leader engagement, assessment of the work environment, and completion of barrier analyses.

Manage the special emphasis programs for various demographic groups including women, Hispanics, Individuals with Disabilities, veterans, Blacks/African Americans, Asian American Pacific Islanders, LGBTQ, and others in accordance with Executive Orders and legislative requirements.

Conduct extensive analyses of the DOE workforce in collaboration with the Office of Human Capital to identify areas of concern in hiring, development, and promotions.

Develop and implement agency-wide EEO training.

Conduct special observances to enhance crosscultural and cross-gender awareness, and to promote harmony, pride, teamwork, and esprit de corps in the workforce.

Prepare EEO reports including the White House Initiatives on Asian American and Pacific Islanders, EEOC Management Directive 715, and the Federal Equal Opportunity Recruitment Program Report.

Enhance employee productivity and organizational performance by building an inclusive, collaborative, and open environment that enhances the employee experience.

Develop and implement agency-wide Diversity training.

Collect and analyze data as it relates to diversity in the agency.

Recent Organization Accomplishments

Launched Equity in Energy Initiative. This initiative, launched in August 2020, is designed to include and expand the participation of individuals in underserved communities, including minorities as defined in the legislation establishing ED, as well as women, veterans, and formerly incarcerated persons, in all the programs of the Department of Energy. It has five cornerstones: STEM enhancement, technical assistance, supplier diversity, energy affordability, and workforce development.

Realigned EEO Functions

On July 6, 2020, the Secretary approved ED's request to consolidate all EEO functions from field sites (except NNSA) under the leadership of ED-1 (hybrid model approved for the Power Marketing Administrations).

Awarded \$4 Million under ED's First Competitive Funding Opportunity Announcement in its 40 Year History

In April 2020, ED made 10 awards totaling four million dollars to advance ED's Minority Education, Workforce, and Training Program. Among other things, these awards will support hundreds of minority students and faculty members; engage seven Historically Black Colleges and Universities; serve 60 Qualified Opportunity Zones; and increase public-private partnerships that support underrepresented populations.

Established the Energy Workforce Division

In February 2020, the Energy Workforce Division was established to enhance support of minority business enterprises (MBEs) and underrepresented groups seeking participation in the energy sector. The staffing of this division is on-going.

Leadership Challenges

ED began effectuating the functional realignment of the DOE field EEO Offices into ED beginning on October 1, 2020, via Memoranda of Agreement between the site managers and the Director of ED. Sixteen employees at eight sites are impacted. The budget for those 16 FTEs, along with associated travel and overhead costs, will be transferred to ED in the FY22 Budget. The goal of the realignment is to increase efficiency and establish a community of practice for the EEO and Diversity and Inclusion professionals across the enterprise.

On September 22, 2020, President Trump issued an Executive Order related to diversity and inclusion training, which requires actions from Federal agencies, including DOE. The ED Director has been identified as the senior political appointee who will ensure the Department's compliance with the Executive Order and related OPM guidance. Utmost care needs to be exercised to effectively execute the Executive Order.

Critical Events and Action Items

Both items described under Leadership Challenges are critical events.

Organizational Chart



Office of Economic Impact and Diversity

Office of Hearings and Appeals

Supporting the DOE Mission

The Office of Hearings and Appeals (HG) promotes nuclear security through its role in conducting hearings and issuing decisions under 10 CFR Parts 710 and 712. Part 710 proceedings involve the eligibility of DOE employees (contractor and federal) to hold a DOE access authorization (a security clearance). In these proceedings, HG Administrative Judges conduct a hearing on the record, receive evidence, and issue a decision either granting or denying (in the case of an initial applicant), or restoring or revoking (in the case of an incumbent) the individual's security clearance. HG performs a similar function under Part 712, the Human Reliability Program, which establishes standards to ensure that individuals with unescorted access to nuclear materials meet the highest standards of reliability and physical and mental suitability.

HG supports Management and Performance in discharging its responsibilities under 10 CFR Part 708, pursuant to which HG investigates complaints, conducts hearings, and considers appeals filed by contractor employees who have allegedly suffered reprisal as a result of making a protected disclosure, such as reporting a matter related to public health and safety (i.e., "whistleblowers"). HG also issues orders, on behalf of the Secretary, on contractor whistleblower investigative findings by the Office of the Inspector General (IG), pursuant to 41 U.S.C. §4712.

In addition, HG's Alternative Dispute Resolution Office (ADRO) serves as a resource to all DOE components and contractors to explore efficient and cost-effective ways of preventing and resolving disputes, without the formalities and costs of litigation. HG provides mediation services and training, and promotes the use of dispute prevention and alternative dispute resolution techniques at all levels of conflict, and throughout the DOE complex.

HG supports a more economically competitive, environmentally responsible, and resilient U.S. energy infrastructure through its role supporting the DOE's Energy Conservation Program for Consumer Products, codified at 10 CFR Parts 430 and 431. Under this program, DOE has established and continues to establish minimum energy efficiency standards for numerous residential and commercial products. These energy efficiency standards not only save money and provide consumers with the benefits of improved, more efficient technology, but also result in substantial environmental benefits by reducing carbon emissions. HG has been delegated authority to rule upon Applications for Exception (i.e., grant relief) from the product efficiency standards to ensure that manufacturers will not suffer a serious hardship, gross inequity, or unfair distribution of burdens as a result of compliance.

To ensure transparency, HG publishes virtually all of its decisions (other than decisions in classified cases) on the HG website.

Mission Statement

HG's mission is to conduct fair and efficient hearings; to issue decisions of the Department of Energy with respect to any adjudicative proceedings which the Secretary may delegate; and to support the use of alternative dispute resolution methodologies throughout DOE.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$3,739,000
FY 2020 enacted	\$4,852,000
FY 2021 requested	\$4,262,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 22

Functions

HG is the quasi-judicial arm of DOE for conducting hearings and issuing initial Departmental decisions with respect to adjudicative proceedings which the Secretary has delegated. The procedures HG uses vary depending upon the type of case. HG's procedures are flexible and easily adaptable, minimizing "start-up" times and resulting in highquality work product. HG's procedural regulations are codified at 10 CFR Part 1003. HG's areas of jurisdiction include:

Personnel Security, 10 CFR Part 710

Under DOE's personnel security program, HG conducts administrative hearings and issues decisions concerning individuals' eligibility to hold a DOE security clearance and to access classified information or special nuclear material.

Human Reliability Program, 10 CFR Part 712

HG conducts hearings and issues recommendations with regard to individuals seeking certification to occupy positions affording unescorted access to certain nuclear materials, nuclear explosive devices, and facilities and programs. The program ensures that these people meet the highest standards of reliability and physical and mental suitability.

DOE Contractor Employee Protection ("Whistleblower") Program, 10 CFR Part 708

Under this program, HG conducts investigations and hearings, and considers appeals concerning whistleblower claims filed by DOE contractor employees.

Enhancement of Contractor Protection from Reprisal for Disclosure of Certain Information, 41 U.S.C. §4712

HG issues orders, on behalf of the Secretary, on contractor whistleblower investigative findings by the Office of the Inspector General.

Alternative Dispute Resolution Office (ADRO)

HG's ADRO serves as a resource to all DOE components and contractors to explore efficient and cost-effective means of preventing conflicts and resolving disputes, without the formalities and costs of litigation. ADRO directs the DOE Headquarters Mediation Program.

Freedom of Information Act (FOIA) and Privacy Act Appeals, 10 CFR Parts 1004 and 1008. HG

considers appeals of agency denials of requests for information under the FOIA and Privacy Act, and issues final agency decisions.

Exceptions and Special Redress, 10 CFR Part 430 and 431

HG rules on Applications for Exception filed by firms seeking relief from DOE's energy efficiency standards for consumer products, and considers petitions for special redress filed by parties requesting relief from DOE regulatory requirements in other miscellaneous proceedings.

Hydroelectric Production Incentives Program, §242 of the Energy Policy Act of 2005

To support the expansion of hydropower energy development, DOE's Office of Energy Efficiency and Renewable Energy administers the Hydroelectric Production Incentives Program that provides incentive payments to qualified hydroelectric facilities based upon electric energy generated and sold. Under this program, the full or partial denial of an incentive payment may be appealed to HG.

Alternative Fuel Transportation Program, 10 CFR Part 490

Section 133 of the Energy Independence and Security Act of 2007 (EISA) mandates that DOE establish a regulatory program to promote the acquisition of alternative fuel vehicles (AFVs) by State governments and certain alternative fuel providers. Under DOE's Alternative Fuel Transportation Program, codified at 10 CFR Part 490, a party seeking an exemption from the AFV purchase requirements may file for an exemption with HG.

Medical and Physical Fitness Qualification Standards, 10 CFR Part 1046

In September 2013, DOE established standards for medical, physical performance, training, and access authorizations for protective force (PF) personnel employed by contractors providing security services to the Department. Under these standards, a PF employee who receives a certification disqualification may request a final review by HG.

Worker Safety and Health Program, 10 CFR Part 851

DOE contractors are subject to penalties for failing to operate a safe workplace. A contractor that receives a DOE final notice of violation imposing a civil penalty may petition HG for review of the final notice.

Fact-Finding Reviews and Management Inquiries

HG periodically conducts fact-finding reviews and management inquiries on behalf of various

Departmental elements, and issues reports of its findings. These reviews concern sensitive DOE personnel matters, sometimes at a high level, that may require disciplinary or other remedial action by DOE management.

The majority of HG's work involves personnel security clearance cases, whistleblower cases, Freedom of Information Act appeals, and alternative dispute resolution initiatives.

Recent Organization Accomplishments

HG's recent significant organization accomplishments include:

Continuity of Operations During COVID-19

Prior to the outset of the COVID-19 pandemic, HG took numerous operational readiness measures to ensure continuity of operations in the event of such an incident. As a result, HG was fully telework-ready and well positioned to discharge its various adjudicatory responsibilities, despite the disruption in normal operations.

Personnel Security Decisions

HG's average processing time for issuing personnel security decisions is currently 4 days from date of receipt of a trial transcript, a record low, and a 50% improvement over FY19. Despite these rapid processing times, the quality of work remains high; 94% of HG's personnel security decisions were affirmed on appeal.

Freedom of Information Act (FOIA) and Privacy Act Appeals Decisions

HG's average processing time for FOIA and Privacy Act appeals is currently at 9 days, 55% better than required by Federal law. For FY 2019 (the latest year for available statistics), HG's processing times were the lowest of any Cabinet agency. Despite this, the quality of HG's work remains consistently high; the Office of Government Information Services has previously cited HG's FOIA decisions as a model for the Federal government.

Alternative Dispute Resolution

HG opened 102 new ADR cases in FY20, versus 87 in FY19, evidencing the success of HG's outreach efforts. Mediations were completed, on average, within 48 days; the majority were conducted by HG Administrative Judges and ADRO staff. HG also transitioned ADR training to WebEx and related technology, resulting in enhanced participation; one such recent training had more than 800 participants.

Technology

HG is currently conducting 98% of its security clearance hearings by VTC/WebEx/telephone, thus increasing AJ efficiency and saving travel dollars. Electronic files and web content were transitioned from the DOE hosting environment to the new, less expensive Amazon Web Services (AWS) enclave. HG maintains all case records through a Legal Files electronic case management system, enabling HG to operate remotely throughout the pandemic without interruption. HG also successfully incorporated WebEx technology for the first time to conduct mediations and facilitations.

Federal Employee Viewpoint Survey (FEVS)

For FY 2019 (the latest year for available statistics), HG received among the highest FEVS scores at DOE. HG management anticipates that this trend will continue for FY 2020.

Leadership Challenges

HG's leadership challenges include:

Maintaining Employee Synergy During COVID-19

To keep employees engaged, and to maintain camaraderie—key aspects of employee morale—HG utilizes a weekly video conference call for all staff, solicits input for addressing workplace challenges, and maintains open lines of communication. As the pandemic continues, maintaining staff engagement will become an increasing challenge.

Succession Planning

A number of HG Administrative Judges and senior management are (or will soon be) eligible for retirement, creating a potential challenge in succession planning. HG recently hired several new attorneys and has increased leadership training to help address this challenge.

Security Clearance Adjudication

The National Background Investigation Bureau/ OPM has an increased backlog of security clearance investigations. As this backlog is reduced, HG will receive an increased number of security clearance cases for adjudication.

Alternative Dispute Resolution. HG is currently focused on enhancing the Alternative Dispute Resolution Program Department-wide; encouraging greater use of mediation; enhancing efficiency and effectiveness of the program; and ensuring more consistency in settlements across the Department. Continued support from DOE leadership is essential to the success of this initiative.

Organizational Chart



Office of Hearings and Appeals

Office of the Inspector General

Supporting the DOE Mission

Congress originally established Inspectors General to consolidate existing audit and investigative resources to more effectively combat fraud, waste, and abuse in Federal agencies. The Department of Energy Office of Inspector General (OIG) fulfills that role at DOE by:

- Conducting independent and objective audits, inspections, investigations, and other reviews.
- Serving as the law enforcement arm of the Department by conducting criminal and civil investigations that detect, deter, and disrupt illegal activities.
- Promoting economy, efficiency, and effectiveness in the administration of Department programs.
- Preventing and detecting fraud, waste, abuse, and mismanagement related to Department programs and operations.
- Informing the Department of Energy Secretary and Congress about problems and deficiencies in Department programs and operations and the need for corrective action.

Last Fiscal Year, DOE OIG, on a budget of \$54.2 million, recognized monetary accomplishments of more than \$650 million, and therefore provided the taxpayer with a \$12.13 return on investment.

The Inspector General has authority to inquire into all Department programs and activities as well as the related activities of persons or parties associated with Department grants, contracts, or other agreements. As part of its independent status, the Inspector General provides the Secretary with an impartial evaluation of management practices. As a fact-finding organization for high profile, controversial matters, the Inspector General is able to apprehend those attempting to defraud the Government and protect the interest of the U.S. taxpayer.

Additionally, as an independent reviewer of the activities of the Department, the OIG operates under its own strategic plan, goals, and measures.

Our most recent strategic initiatives will position us to enhance our effectiveness in providing oversight to Departmental programs.

Mission Statement

To strengthen the integrity, economy, and efficiency of the Department's programs and operations including deterring and detecting fraud, waste, abuse, and mismanagement.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$51,330,000
FY 2020 enacted	\$54,215,000
FY 2021 requested	\$57,739,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 291

History

Based on the Inspector General Act of 1978, as amended (the IG Act), virtually every federal agency has an Inspector General (IG). Approximately half are appointed by the President subject to Senate confirmation, and approximately half are appointed by the agency head.

According to the IG Act, the role of an IG includes the prevention and detection of waste, fraud, and abuse relating to each agency's programs and operations. IGs also promote economy, efficiency, and effectiveness in the agency's operations and programs.

IGs are nonpartisan and are selected solely on the basis of integrity and demonstrated ability in accounting, auditing, financial analysis, law, management analysis, public administration, or investigations. They have a dual reporting requirement—to their agency heads and to Congress. IGs are required by the IG Act to keep both fully and currently informed about problems and deficiencies in their agencies' programs and operations, as well as the necessity for and progress of corrective action.

Offices of Inspector General (OIGs) are located within their agencies but have substantial independence. For example, agency heads may not prevent the IGs from initiating, carrying out, or completing any audit, evaluation, or investigation, except in limited circumstances. IGs must maintain their independence, in both reality and in appearance, to provide credible oversight.

Under the IG Act, IGs are given broad statutory authorities, including access to all agency records and information. IGs also have the authority to subpoena relevant documents and information from non-federal organizations and individuals.

IGs should meet regularly with the heads of each agency to foster effective communications. According to the IG Act, IGs must have direct and prompt access to agency heads.

The Council of the Inspectors General on Integrity and Efficiency (CIGIE), an independent Federal entity to which all Federal Inspectors General belong, provides training for OIG employees and develops policies, professional standards, best practices, and common approaches for the work of the OIGs.

Functions

The Office of Inspector General (OIG) is headquartered in Washington, DC and has field offices located throughout the country. The organization is responsible for conducting audits, inspections, and investigations and for receiving and acting upon allegations reported through the OIG Hotline. The organization also has a corporate support function that addresses the administrative management of the organization.

The Office of Audits conducts audits of Department programs and operations. In-depth efforts are concentrated on providing reliable and credible financial and performance information and recommendations for improvements to senior Agency/Department management, Congress, and the U.S. taxpayer. A risk-based process is used to identify areas for audit coverage based on known or emerging risks and the greatest vulnerabilities to the Department's mission and operations. This process ensures comprehensive coverage over Department organizations, programs, and operations while meeting the Department's evolving needs. Special reviews of high profile, unplanned, or immediate matters can also be addressed by audits throughout the year.

The Office of Inspections, Intelligence Oversight, and Special Projects (OIIS) conducts independent and thorough reviews of Department programs and operations to evaluate operational efficiency, effectiveness, and vulnerability. Inspections are more discreet, shorter suspense projects that can be handed over to the Office of Audits or Investigations, as needed. Inspections can be selfinitiated, or based upon allegations of waste, fraud, abuse or mismanagement, including referrals from the OIG Hotline. Additionally, OIIS is responsible for reviewing the Department's Intelligence and Counterintelligence programs and operations, including the Department's oversight responsibility in accordance with Executive Order 12333. Finally, OIIS conducts whistleblower investigations under 41 USC 4712.

The Office of Technology, Financial, and

Analytics (OTFA) promotes the effective, efficient, and economical operation of the Department of Energy's programs and operations, including the National Nuclear Security Administration and the Federal Energy Regulatory Commission, through audits, inspections, and other reviews including the identification and analysis of Departmental data. The OTFA combines audit and data evidence to address management and security issues. OTFA conducts audits, inspections, and assessments of the Department's information technology systems and related initiatives, with focus on cyber security, information management, and the Federal Information Security Modernization Act. OTFA further provides timely, reliable expert data analysis in support of ongoing audits and investigations, develops risk models, and coordinated data mining efforts. OTFA uses the latest technology and techniques to discover current and emerging cyber and economic threats and coordinate data analysis. The combined efforts of OTFA help to ensure that information technology issues are properly addressed and not overlooked.

The Office of Investigations addresses alleged violations of law that impact Department programs, operations, facilities, and personnel. Priority is given to investigations of suspected violations of criminal and civil statutes, as well as serious administrative misconduct. Investigations are also used to identify opportunities for improving the economy and efficiency of Department programs and operations by identifying recommendations for positive change. Investigators work closely with Department of Justice prosecutors and other Federal, State, and local law enforcement organizations.

The Chief Counsel provides legal advice to senior leadership. Also within this office is the OIG Whistleblower Ombudsman, who educates Department employees about prohibitions on retaliation for whistleblowing, as well as employees' rights and remedies if anyone retaliates against them for making a whistleblower disclosure.

The Senior Counsel and Freedom of Information

Act and Privacy Act Division provides executive leadership and direction to all Freedom of Information Act and Privacy Act operations and business management activities in the Office of Inspector General.

The Office of Management and Administration

directs the development, coordination, and execution of overall OIG management and administrative policy and planning. This responsibility includes human resource activities and consultation; directing the OIG's strategic planning process; financial management activities; personnel management and security programs; administrative support services; and information technology programs.

Recent Organization Accomplishments

FY20 Results through September 17, 2020

Office of Audits

- \$556.4 million Identified as Questioned/ Unsupported Costs
- 20 Audit Reports Issued to the Department
- 94 Recommendations Made to the Department

Office of Inspections, Intelligence Oversight, and Special Projects

- Over 3000 Hotline Contacts (35% increase since FY18)
- 26 Contractor Whistleblower Retaliation Allegations

Office of Investigations

- \$100.3 million in Recovered Funds/Fines
- 39 Criminal/Civil Actions/Indictments

Office of Technology, Financial, and Analytics

 24 Ongoing Audits, Inspections, and Investigations were Supported

- Conducted Analysis of the Largest Fraud Investigation in the Department's History
- \$800,000 Misrepresented Salary Reported for One Employee
- Over 35,000 IT Weaknesses Identified
- 72 Recommendations Made to the Department

Leadership Challenges

Cooperative Audit Strategy

The OIG is currently finalizing audits for report issuance and will ultimately issue a capstone report on the Department's Cooperative Audit Strategy.

Timekeeping Initiative

Labor charges are the largest expense within the Department. The OIG has identified substantial increases in fraudulent behaviors by contractors related to overcharging labor hours. Most recently, in September 2020, a Department contractor agreed to pay \$57.8 million to resolve claims that the contractor had fraudulently overcharged the Department for labor hours dating back to 2009.

Administrative Remedies

The OIG is responsible for investigating the facts and circumstances underlying the referral of individuals and companies for suspension or debarment. The technical and legal quality of these referrals is at the heart of a robust suspension and debarment program. The OIG is in the process of ramping up our efforts in this area.

Department Directives: Reporting to OIG and Mandatory Disclosures

The OIG has identified two Department Directives that need to be substantially improved. These are DOE Order 221.1B, Reporting Fraud, Waste and Abuse to the Office of Inspector General; and DOE Order 221.2A, Cooperation with the Office of Inspector General. The OIG has identified ways in which these Directives could be significantly strengthened to improve the OIG's ability to carry out its statutorily mandated responsibilities. We are drafting the documents necessary to put such changes into effect.

Office Space

The OIG primarily relies on space provided by Department contractors, as provided under the IG Act. Four of these spaces are currently in some stage of renovation or relocation. One of our locations is on a Government-owned, Government operated facility. This site is unable to provide additional space needed by the OIG since they rely on their own appropriation for space. We are in the process of identifying options to deal with this situation. Our Headquarters space, which we pay for out of our appropriation, is the subject of several pending construction requests due to organizational growth and re-structuring.

Critical Events and Action Items

- Issue Opinion on Financial Statement Audit November 2020
- Issue Federal Information Security Modernization Act Report – November 2020
- Issue Semiannual Report to Congress November 2020
- Issue FY 2021 Management Challenges Report December 2020

Organizational Chart



Office of the Inspector General

Office of Strategic Planning and Policy

Supporting the DOE Mission

The Office of Strategic Planning and Policy (OSPP) fulfills the Department's strategic goals and supports its mission by coordinating policy across the Departmental Elements of the Department of Energy (DOE) and shapes long-term strategic planning and policy that is consistent with the Secretary's vision for DOE. OSPP also executes on the development of policy, road-mapping, and DOE planning of Secretarial priorities, while integrating the expertise of relevant Department Elements in all activities.

Mission Statement

The Immediate Office of the Executive Director for the Office of Strategic Planning and Policy (OSPP-1) serves as the principal advisor to the Secretary for strategic planning and policy. OSPP coordinates policy across the Departmental Elements of the Department of Energy (DOE) and shapes long-term strategic planning and policy that is consistent with the Secretary's vision for DOE. OSPP executes on the development of policy, road-mapping, and DOE planning of Secretarial priorities, while integrating the expertise of relevant Department Elements in all activities. OSPP acts as an internal coordinator and initial point of contact for White House and interagency meetings and policy development. OSPP supports the Secretary in accessing information and expertise within DOE and its National Laboratories. OSPP provides support for Departmental Elements' priorities and for the directions of the Undersecretaries and Assistant Secretaries.

OSPP coordinates strategic cross-cutting functions across the DOE enterprise. OSPP is staffed by an interdisciplinary team of senior policy advisors, constituted of technical and policy experts with broad skillsets and experience, who will formulate policy pathways to achieve the Secretary's strategic vision and act on secretarial direction, consistent with DOE's statutory mission. OSPP develops internal and external strategy documents, reports, white papers, opinion editorials and/or peer-reviewed publications of the Secretary, OSPP, and/or DOE, as appropriate.

Budget

During FY2020, the Secretary announced that the previous Office of Policy (OP) would be restructured to the new OSPP. During the course of calendar year 2020, the OP has been eliminated while the OSPP was established. The OP budget in FY 2020 was used to support both the OP and OSPP employees and functions during the transition. Therefore, while an FY 2022 budget request for OSPP is anticipated, the OP budget over the period is more informative and that budget can be found below.

Fiscal Year	Budget
FY 2019 enacted	\$10,010,000
FY 2020 enacted	\$7,000,000
FY 2021 requested	\$7,631,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 8

History

On January 28, 2020, the Secretary of Energy announced that the Office of Policy (OP) will be restructured to the Office of Strategic Planning and Policy (OSPP) as a direct report to the Office of the Secretary, rather than as a report to the Under Secretary of Energy. OSPP will provide a more efficient and effective approach to the analysis, formulation, development, and advancement of all policy within the Department.

Functions

- Serve as the principal advisor to the Secretary for the Department's overall strategic planning and policy.
- Coordinate, develop, and manage the Department's Strategic Plan.
- Coordinate and manage policy analysis and development activities that implement and support U.S. energy and national security, environmental, economic, science and technology policies.
- Develop, analyze, and recommend major Secretarial energy policy initiatives. Develop and analyze legislative proposals to assess their impact on national energy, economic, environmental, national security, science and technology policy.

- Conduct reviews of energy policy development plans and proposals of other Departments and agencies, of state and local governments, and of private and public interest groups as they pertain to domestic energy policy. Perform continual assessments of domestic energy conditions, especially as related to national security, economic competitiveness, environmental quality, and trade and market-opening activities.
- Manage departmental participation in regulatory processes of other Federal agencies that have an impact on energy policy.
- Maintain relationships with energy-related industries and trade groups and coordinates information to and from the energy industry.
- Serve as the principal advisor to the Secretary on domestic energy affairs and coordinate the implementation of domestic cooperative agreements.
- Maintain working relationships with state and local governments and domestic energy organizations.
- Work with the Office of International Affairs to coordinate programs to promote the export of U.S. energy goods, services, equipment, and technology, to open markets and develop and maintain a level playing field for U.S. investments abroad.
- Oversee the activities and responsibilities the National Laboratory Operations Board (LOB) to ensure appropriate, effective, efficient, and responsible coordination between DOE strategic planning and policy development and the National Laboratories.

Recent Organization Accomplishments

- Defined and presented innovation recommendations for the SEAB Innovation Report.
- Organized and led the DOE Space Coordination Group and completed a DOE Space Strategic Plan.
- Created a joint DOE-NASA MOU on executivelevel space coordination.
- Rolled out the Nuclear Fuels Working Group (NFWG) strategy.
- Organized DOE and interagency NFWG strategy implementation plans.

- Stood up a DOE Critical Minerals Coordination Group.
- Coordinated the drafting of a Department Critical Minerals and Materials strategy.
- Supported PA in defining the narrative for S1 communications leading to a more robust communications strategy with over 30 OpEds placed under S1's name in under 6 months.
- Led, through the Laboratory Operations Board, the drafting of an update to the DOE "State of the Labs" report.

Leadership Challenges

One of the greatest challenges facing OSPP is the recruitment and maintenance of highly talented individuals. OSPP works because of the quality of its people. The culture of the organization is one that expects high performance and leadership from each of its political and career employees. There are only so many individuals within the Department who possess the leadership skills, technical acumen, understanding of the organization, and ability to bring people together. Typically, pulling top-flight talent from elsewhere with the organization can leave a gaping hole in other important Department offices. We have chosen to work with a hybrid structure to provide maximum flexibility, in which some employees are OSPP employees, while other are detailed to OSPP from elsewhere within DOE. The maintenance and curation of talent and leadership are required for the relatively small team to multiply its effectiveness by building efficient teams/coalitions. The current team is excellent. However, evolving the team to meet Secretarial needs and directions will always remain and important periodic challenge.

A second important factor in the effectiveness of the organization as a whole is the perception of OSPP within DOE. Since it is intended to fill gaps between the silos of the Department and work strategically on cross-cutting work, the leadership must expend great deal of time maintaining relationships with senior leadership throughout the Department. This is an ongoing challenge that must continuously be considered.

Critical Events and Action Items

There will be a handful of important releases in the coming months, which could flow into the beginning of calendar year 2021, including the release of a DOE critical minerals and materials strategy and the update to the "State of Labs" report. However, more important will be the use of the OSPP office in the definition of Secretarial priorities and strategic communications. The office will be useful in setting up the internal strategy and planning necessary to execute throughout the remainder of the next Presidential term, especially when tied to the term of service of the Secretary.

Organizational Chart


Office of the Ombudsman

Supporting the DOE Mission

The Office of the Ombudsman (Ombuds) is aligned with and supports the Department of Energy's (DOE) mission and Strategic Objective 12, attract, manage, train, and retain the best federal workforce to meet future mission needs. The Ombuds provides the workforce with a confidential, independent, informal, and neutral resource to address workplace challenges. The Ombuds engages on many complex and high profile issues, and has successfully worked with employees at all levels to help address workplace challenges that distract from achieving the Department's mission.

Mission Statement

Help DOE work better together by tapping into the power of collaborative approaches to address workplace challenges.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$850,000
FY 2020 enacted	\$850,000
FY 2021 request	\$850,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 4

History

The Ombuds was established on March 6, 2012 and was created to provide an alternative for federal headquarters and field employees who want to speak with a neutral, independent party about workplace challenges in a confidential environment. To date, the Ombuds has supported over 7,000 individuals and addressed over 20,000 issues.

Functions

When faced with workplace challenges, the Ombuds provides confidential, independent, and neutral support to individuals and groups seeking a path forward. The Ombuds brings expertise identifying and addressing root causes of workplace challenges and offers tailored approaches to solutions. The Ombuds provides support to individuals, groups, leaders/management teams, and the Department as a whole by identifying the root cause of workplace challenges; brainstorming options and assessing pros and cons; and developing and implementing plans. The Ombuds identifies areas of concern or those of a systemic nature and makes recommendations on how they can be best addressed. In cases where a process exists for addressing a concern, the Ombuds makes referrals to other Department resources. Specific Ombuds functions include:

- Formulates strategic and performance plans; manages the human, financial and material resources of the Ombuds; and benchmarks against other ombudsman programs.
- Promotes understanding of existing processes for resolving disputes; advocates for alternative dispute resolution; and identifies systemic problems and proposes strategies for improvement.
- Briefs senior leadership on strategies and activities including statistical information on contacts with the Ombuds while maintaining confidentiality of the information; identifies systemic issues affecting productivity, morale and the workplace; and identifies strategies and options for improvement.
- Interfaces with the Office of the Chief Human Capital Officer; the Office of the General Counsel; the Office of Environment, Health, Safety, and Security; Office of Hearings and Appeals, National Nuclear Security Administration and other offices.

The Ombuds acts in accordance with the International Ombudsman Association's Code of Ethics and Standards of Practice, to the extent they conform to federal agency rules and regulations, and other federally mandated requirements. These govern the way in which the Ombuds receives workplace concerns, helps to resolve issues, and assists with general improvement of the Department.

The Ombuds is a resource for informal dispute resolution only and does not participate in any internal or external formal process. The Office does not investigate, arbitrate or adjudicate. In addition, contact with the Office does not forestall established timeframes within DOE formal processes, nor does it constitute legal notice to DOE or official notice to initiate a formal process.

Recent Organization Accomplishments

At the onset of maximum telework, Ombuds quickly developed a webinar for leaders, *Leading Teams Through Change*, with over 274 participants. Survey results revealed 98% of the participants agreed the content was useful, valuable, and relevant to their success at work and 95% would recommend to others.

Due to the International Ombudsman Association's conference and training being cancelled this year, Ombuds took a leading role in the Federal sector collaborating with other Federal ombuds to create and deliver training for new Federal ombuds. This resulted in 70 individuals receiving training that would not have been available for approximately one year. Survey results indicated 98% strongly agreed or agreed that the topics were relevant, the sessions were useful, and the trainers were knowledgeable, professional, & responsive to questions.

From 2012-2019 nearly half (48%) of all of the concerns brought to the Ombuds were issues within supervisory relationships. We obtained support and buy-in from stakeholders across DOE to address this systemic issue. We identified the top four areas of concern shared most frequently with us by DOE employees; developed an approach to understanding the behaviors leading to effective leadership; identified and interviewed a dozen DOE leaders and obtained input from their direct reports; collected & analyzed various sources of data; and developed recommendations for improving leadership. We are currently briefing key stakeholders on the analysis and recommendations which will culminate into recommendations to S1 during FY'21. Implementation of recommendations will result in long-term cost avoidance and increased engagement.

Led in the support to over 200 individuals addressing almost 1350 issues leading to the resolution of complex problems, improved working relationships, and increased focus on mission. The average time to close cases was fewer than 5 days. Due to the risk level associated with issues, cost avoidance is estimated to be more than 5 million dollars. Solicited input from the DOE workforce to inform revised Ombuds messaging resulting in the elimination of ombuds jargon and development of messages that clearly describe our mission, vision, services, and impact.

Leadership Challenges

The four members of the Office of the Ombudsman are responsible for providing support to the entire DOE federal workforce. Present staffing levels do not permit the Ombuds to fully realize its potential as an innovator for alternative dispute resolution within DOE.

Critical Events and Action Items

From 2012-2019 nearly half (48%) of all of the concerns brought to the Ombuds were issues within supervisory relationships. We obtained support and buy-in from stakeholders across DOE to begin to address this systemic issue. We developed an approach to understand the behaviors leading to effective leadership; gathered and analyzed data and developed recommendations to improve leadership. Briefings on the findings and recommendations will conclude by the end of this year. As we have done in the past with systemic issues, we will seek the Secretary's endorsement and support of the recommendations.

Organizational Chart

Office of the Ombudsman



Under Secretary of Energy

Supporting the DOE Mission

The Under Secretary of Energy (S3) is one of the statutory principal officers of the Department and holds such responsibilities as assigned by the Secretary.

The Under Secretary of Energy oversees nine Departmental Elements: the Office of Environment, Health, Safety, and Security (AU); the Office of Cybersecurity, Energy Security, and Emergency Response (CESER); the Office of Energy Efficiency and Renewable Energy (EERE); the Office of Fossil Energy (FE); the Office of Indian Energy and Policy Programs (IE); the Loan Programs Office (LPO); the Office of Nuclear Energy (NE); the Office of Electricity (OE); the Office of Project Management (PM); and the Arctic Energy Office (AE). These elements advance the Department's strategic goals of maintaining American leadership in fundamental research as the foundation for groundbreaking innovation and national security; and supporting commercialization and deployment of innovative technologies to deliver reliable, sustainable, and affordable energy and enhance American energy dominance.

The Under Secretary of Energy supports the DOE mission by:

- Advising and supporting the Secretary and Deputy Secretary.
- Participating in establishing strategy, priorities, and resource allocations for the Department (including development of budget requests).
- Engaging with high-level external audiences such as Members of Congress; senior Executive Branch counterparts; state, local, and tribal government officials; foreign government and international organization counterparts; and key DOE contractors in support of DOE's energy missions.

Mission Statement

To ensure America's security and prosperity by addressing its energy challenges through transformative science and technology solutions.

Budget

The chart below reflects the combined budgets for the organizations reporting to the Under Secretary of Energy, excluding the Power Marketing Administrations.

Fiscal Year	Budget
FY 2019 enacted	\$5,255,929,000
FY 2020 enacted	\$5,877,124,000
FY 2021 requested	\$3,446,148,000

FY 2020 authorized full-time equivalents (FTEs) in organizations reporting to the Under Secretary of Energy total 6,990; 4,759 of those FTEs support the Power Marketing Administrations.

Functions

The Under Secretary of Energy focuses on energy policy, applied energy technologies, energy security and reliability, and certain DOE-wide management functions.

Arctic Energy Office (AEO)

The Arctic Energy Office leads cross-cutting operations in the Arctic with a mission to tackle the energy, science and national security challenges of the 21st Century. The office acts as a nexus for DOE activities and represents the Department in engagements involving the Arctic.

Office of Environment, Health, Safety and Security (AU)

AU is DOE's central organization with enterpriselevel responsibilities for health, safety, environment, and security; providing corporate-level leadership and strategic vision to establish, sustain, coordinate, and integrate these vital programs. AU is responsible for policy development and technical assistance; safety analysis; and corporate safety and security programs. The Associate Under Secretary for Environment, Health, Safety and Security advises DOE elements and senior Departmental leadership, including the Under Secretary of Energy on all matters related to environment, health, safety, and security across the complex.

Office of Cybersecurity, Energy Security, and Emergency Response (CESER)

CESER's goal is to improve the security of the United States energy infrastructure against all hazards via Cybersecurity; Infrastructure Security & Energy Restoration; and Innovation, Research & Development.

Office of Energy Efficiency and Renewable Energy (EERE)

EERE promotes affordable and reliable energy to enhance America's economic growth and energy security through technology development in the energy efficiency, renewable power, and sustainable transportation sectors.

Office of Fossil Energy (FE)

FE's mission is to discover and develop advanced fossil energy technologies to ensure American energy dominance, create American jobs, support a resilient infrastructure, maintain environmental stewardship, and enhance America's economy. Ensure America's access to and use of safe, secure, reliable, and affordable fossil energy resources and strategic reserves.

Office of Indian Energy and Policy Programs (IE)

The mission of the Office of Indian Energy is to maximize the development and deployment of energy solutions for the benefit of American Indians and Alaska Natives.

Loan Programs Office (LPO)

LPO's mission is to catalyze energy infrastructure investments to achieve America's energy objectives and advance economic growth.

Office of Nuclear Energy (NE)

The mission of NE is to advance nuclear power as a resource capable of meeting the Nation's clean energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration (RD&D). NE supports the diverse civilian nuclear energy programs of the U.S. government, leading federal RD&D efforts in nuclear energy technologies, including generation; safety; waste storage and management; and security technologies.

Office of Electricity (OE)

A secure and resilient power grid is vital to national security, economic security, and the services Americans rely upon. Working closely with its private and public partners, the Office of Electricity leads the Department's efforts to ensure the Nation's most critical energy infrastructure is secure and able to recover rapidly from disruptions.

OE also has oversight over the Power Marketing Administrations (BPA, SEPA, SWPA, and WAPA).

Office of Project Management (PM)

PM's mission is to provide enterprise level project management leadership, and assist in the development and implementation of Department-wide policies, procedures, programs, and management systems pertaining to project management, professional development, and related activities.

The office is charged with providing the DOE senior leadership with timely, reliable, and credible information to enable the best informed project execution decisions.

Recent Organization Accomplishments

Since the beginning of this Administration, the Under Secretary of Energy has made significant progress across its entire mission space, having...

- **Established U.S. Energy Dominance** for the first time, America became the world's number one producer of oil and natural gas.
- Led substantial increases in exports of U.S. Liquefied Natural Gas (LNG) by nearly five-fold and issued 20 long-term authorizations for LNG exports to non-free trade agreement countries since January 2017.
- Published the Small-Scale LNG Rule to expedite approval for small-scale natural gas exports.
- **Published 2050 LNG Policy Statement** to allow companies to export LNG through 2050 as an alternative to our original 20-year authorizations.

- Launched Coal FIRST (Flexible, Innovative, Resilient, Small and Transformative) Initiative to develop the power plant of the future, which can produce electricity and hydrogen from coal, biomass, and waste, with zero or even negative CO2 emissions.
- Implemented the Nuclear Fuel Working Group's Strategy to Restore American Nuclear Energy Leadership.
- Established the National Reactor Innovation Center (NRIC) to provide a platform for private sector technology developers to assess the performance of their nuclear reactor concepts through testing and demonstration.
- Launched the Advanced Reactor Demonstration Program to competitively-select two advanced reactor projects to result in fully functional advanced nuclear reactors within seven years.
- **Successfully Returned Electric Power** to communities affected by multiple catastrophic hurricanes and typhoons.
- Developed the North American Energy Resilience Model (NAERM) to understand risks to infrastructure and identify needed investments to improve system resilience across Canada, the U.S., and Mexico.
- Established Cybersecurity, Energy Security, and Emergency Response (CESER) office to improve the cybersecurity and resilience of the Nation's energy critical infrastructure.
- Established the Cyber Testing for Resilience of the Industrial Control Systems (CyTRICS) program to secure the Nation's Energy Supply Chain and support the Bulk Power Executive Order.
- Oversaw the expansion of renewable power, including a doubling of solar production from 2016 through 2019 and a 32 percent increase in wind production.
- Launched the American-Made Challenges, by investing more than \$40 million in 16 different American-Made prizes and competitions to advance energy innovation and American manufacturing.

- Launched the Energy Storage Grand Challenge, a comprehensive strategy to position the U.S. for global leadership in the energy storage technologies of the future.
- Launched the American-Made Solar Prize, a competition designed to revitalize solar manufacturing in the United States, leading to four rounds that will result in \$12 million in prizes.
- Launched the American-Made Solar Desalination Prize, a \$9 million prize competition designed to accelerate the development of low-cost desalination systems that use solar-thermal power to produce clean water from salt water.
- Created the Energy-Water Desalination Hub as part of the White House Water Security Grand Challenge, announcing nearly \$100 million for the National Alliance for Water Innovation to address water security issues in the United States.
- Initiated the Plastics Innovation Challenge which launched a comprehensive program to design new highly recyclable or biodegradable plastics, develop novel methods for deconstructing and upcycling existing plastic waste, and address plastic waste.

Leadership Challenges

The Department has no material weaknesses to report as a result of internal control evaluations. The Department continues work to address Management Priorities, which represent important strategic management issues the Department has in fulfilling responsibilities and initiatives to support the Administration in securing a better future for the Nation. **Organizational Chart**

Office of the Under Secretary of Energy (S3)



Fiscal Year Budget FY 2019 enacted \$120,000,000 FY 2020 enacted \$156,000,000 FY 2021 requested \$184,621,000

Human Resources

Mission Statement

Office of

Cybersecurity,

Supporting the DOE Mission

Energy Security, and

Emergency Response

The Office of Cybersecurity, Energy Security, and

lead to engage with the energy sector. CESER

Emergency Response (CESER) is the Department's

leads all policy discussion with the private sector

to support the Department's agenda. Additionally

CESER is the lead for the National Security Council

CESER maintains the Emergency Support Functions

under the National Response Framework supported

NSPM-4 policy process on cyber issues. Finally,

by the Federal Emergency Management Agency

The mission of the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) is to improve the security of the United States energy

infrastructure against all hazards via Cybersecurity;

Infrastructure Security & Energy Restoration; and

Innovation, Research & Development.

FY 2020 authorized full-time equivalents (FTEs): 27

History

(FEMA.

In recognition of the increasing importance of cybersecurity for the energy sector, DOE created the Office of Cybersecurity Energy Security and Emergency Response (CESER) in 2018. The creation of CESER fulfilled a dual purpose: to work with industry to increase cybersecurity and physical security protections across multiple energy subsectors and interdependent sectors of critical infrastructure; and to coordinate emergency support function response for the energy sector. CESER was spawned from the Office of Electricity (OE) by divesting the legacy OE research and development, and infrastructure security and energy restoration divisions. Since this divesture, CESER is growing to address the entire energy sector, not just electricity concerns.

Functions

Cybersecurity

This division seeks to mitigate the risk of energy disruption from cyber incidents and other emerging technological threats within the energy environment. We strategically coordinate the Department of Energy's efforts to improve discovery, protection, prevention, and mitigation of cyber threats and vulnerabilities that disrupt, degrade, or threaten the U.S. energy sector critical infrastructure and operations. Focus areas include DOE Primary Mission Essential Function #3, Emergency Support Function #12, Defense Critical Energy Infrastructure, and Executive Order 13920 implementation.

Infrastructure Security & Energy Restoration (ISER)

The ISER division leads DOE's emergency preparedness and coordinated response and recovery to avoid disruptions to the energy sector caused by physical and cyber-attacks, natural disasters, and man-made events. Additionally, they assist efforts to reduce the impact of disruptive events and respond to and facilitate recovery from energy disruptions in collaboration with industry, the Department of Homeland Security, and other Federal, State, local, tribal, and territorial governments.

Innovation, Research & Development (IRD)

The IRD division manages an Innovation and R&D program designed to assist energy sector and DOE asset owners by developing cybersecurity, energy security, and emergency response solutions for energy infrastructure systems in collaboration with the National Laboratories, and other Federal government, industry, and academic organizations.

Corporate Business Office (CBO)

The CBO handles all project management, budgeting, and human resources functions. This office serves as the back office for all other divisions and facilitates our engagements with Congress and the Office of Management and Budget.

Recent Organization Accomplishments

- CESER manages DOE's premier cyber vulnerability testing program for industrial control system (ICS) digital components: the Cyber Testing for Resilient ICS (CyTRICS) program. During FY2020, CESER began signing agreements with major manufacturers and asset owners to provide digital components for testing. CyTRICS will complete a full pilot test of program processes in the fall of 2020.
- Pursuant to direction in Section 5726 of the FY2020 National Defense Authorization Act, CESER launched a 2-year pilot Securing Energy Infrastructure Executive Task Force (SEIETF) to partner with digital component manufacturers and asset owners to address cybersecurity in sector supply chains. The SEIETF convenes a broad set of stakeholders from across government, industry, academia, and the DOE Labs to: 1) evaluate technology and standards to isolate and defend critical industrial control systems (ICS) from cybersecurity vulnerabilities and exploits; 2) develop a national cyberinformed engineering strategy to isolate and defend critical ICS from cybersecurity vulnerabilities and exploits; and 3) identify new classes of security vulnerabilities of critical ICS.
- In August, CESER completed a new plan to strategically evolve the cybersecurity mission at DOE, to include building new capabilities to perform cyber discovery and pursuit functions; cyber threat intelligence sharing and situational awareness; cyber modeling and simulation; and fostering cyber protections for emerging technologies in energy sector systems. This included signing a 2-year lease on office space in Denver, CO, to open the DOE Integrated Security Center (DISC).
- Federal partners signed an MOU launching the Pathfinder program in February 2020.
 Pathfinder focuses on three core objectives:
 1) Advance Threat-Information Sharing and Analysis; 2) Improve Energy Sector-Specific

Knowledge Within the U.S. Government; and 3) Develop Joint Operational Preparedness and Response Procedures. Initial work to identify and coordinate existing federal stakeholder cyber activities in the energy sector was completed in FY2020.

- The energy sector has housed the premier cyber threat intelligence platform for over a decade. This program, known as the Cybersecurity Risk Information Sharing Program (CRISP) is a public-private partnership, co-funded by DOE and industry and managed by the Electricity Information Sharing and Analysis Center (E-ISAC). CRISP is extending its footprint of participants to include utilities that support Defense Critical Energy Infrastructure facilities. The "+ 30 Initiative" provides funding for critical electric sector companies to participate for a period of three years, working together with the E-ISAC and the Pacific Northwest National Laboratory (PNNL).
- In response to the President's Executive Order on Cyber Workforce and the Cyber Solarium Commission report, CESER launched the Operational Technology (OT) Defender Fellowship. This year long fellowship introduces OT Managers in the U.S. to national security through the lens of industrial control systems. This program is sponsored by CESER but managed through INL and the Foundation for Defense of Democracies.
- CESER, in coordination with DOE International Affairs, negotiated a Memorandum of Agreement with the United Arab Emirates to assist the growth and security of the Barakah Nuclear Power Plant, the world's first civil-nuclear power plant in the Middle East.

Leadership Challenges

Manpower

CESER is a growing office, striving to meet the mission of the Department. Currently, CESER has 23 full time federal employees and funds another 9 at the National Energy Technology Lab in Morgantown, WV. These employees are primarily at the Government Service (GS) 14 and 15 levels due to the advanced project management and technical expertise traditionally required for their roles. In 2020 CESER was allocated 13 new positions. Given the pandemic, CESER struggled to fill all of its opening. In FY21, CESER is allotted 16 more positions. Filling these roles inside of CESER's new structure is a top priority and will require a leadership focus.

Critical Events and Action Items

In the first quarter of CY2021, the Office can expect the quarterly Sector Coordinating Council Meetings. Depending on COVID-19 constraints, these events are usually hosted at DOE HQ and bring in the business and security leaders of the electric and oil and natural gas sectors.

Organizational Chart



Office of Cybersecurity, Energy Security & Emergency

Office of Fossil Energy

Supporting the DOE Mission

The Office of Fossil Energy (FE) plays a critical role in the U.S. Department of Energy's (DOE) mission to enhance national security and economic growth through transformative science, technology innovation, and market solutions to U.S. energy, nuclear security, and environmental challenges. This is accomplished though impactful early-stage research and development (R&D) that is poised for further advancement and scale-up of technologies, systems, processes, and methods that utilize fossil energy resources efficiently and responsibly. This ensures the continuous improvement of the standards of living of the American people with clean, efficient, and reliable energy. Additionally, FE enhances national security through its operation of the Strategic Petroleum Reserve (SPR), the nation's emergency crude oil "storage bank" built to protect the U.S. economy during significant petroleum supply or demand interruptions.

Mission Statement

Discover and develop advanced fossil energy technologies to ensure American energy dominance, create American jobs, support a resilient infrastructure, maintain environmental stewardship, and enhance America's economy. Ensure America's access to and use of safe, secure, reliable, and affordable fossil energy resources and strategic reserves.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$1,000,000,000
FY 2020 enacted	\$979,000,000
FY 2021 request	\$930,700,000

Human Resources

FY 2020 Authorized Federal Full-Time Equivalents (FTEs): 787

History

Fossil fuels provide more than 80 percent of the energy mix in the United States and around the world. The U.S. Energy Information Administration projects that fossil energy will remain at nearly 80 percent of the energy mix in 2040, both in the United States and worldwide. Carbon reduction is a global issue, and FE leads the world in technologies for reducing greenhouse gas emissions as costeffectively as possible. Hydrogen from fossil fuels, including coal, is expected to play a key role in the U.S. transition to clean, low-carbon energy systems. The International Energy Agency predicts the United States and other advanced countries that develop a successful hydrogen economy will rely primarily on fossil fuels along with carbon capture, utilization, and storage (CCUS). FE is already a world leader in this technology and is working to remove cost as a barrier to its widespread use. The vast majority of recent progress made on fossil energy technology development started with investments made by FE—and that progress demonstrates our impact. To name a few, our achievements and investments include advances in the recovery of rare earth elements and critical minerals from coal and coal by-products, new products from coal (i.e., guantum dots for use in medicine and electronics) creating new industries and good jobs in America's coal country. Other examples include highly efficient coal technologies that achieve nearzero emissions, and are commercially deployable in a competitive energy market, research on materials, coating, and sensors to improve the operational efficiency, security reliability, and safety of natural gas supply and delivery infrastructure, advanced methane detection and measurement technology validation, as well as horizontal drilling and stimulation methods that paved the way for oil and gas operators to set us on the pathway toward energy independence for the first time in decades. The United States is now the top producer of both oil and natural gas; however, challenges remain around issues such as methane emissions and produced water. At the same time, we have authorized more than 48 billion cubic feet per day of liquefied natural gas (LNG) exports from over 20 export facilities in the United States.

The SPR continues to serve as a valuable national emergency resource during natural disasters and other oil supply disruptions, as seen during Hurricane Harvey in 2017. The SPR is beginning a large scale effort to repair and replace key infrastructure to maintain the short-term and longterm effectiveness of its operation. The SPR is also analyzing the best taxpayer use of excess capacity that will be available at the end of oil sales currently mandated by law.

FE has the longest directly traceable history of any organization in DOE. In 1910, the predecessor to the National Energy Technology Laboratory (NETL)¹ was created as a U.S. Department of the Interior (DOI) Bureau of Mines laboratory in Pittsburgh, Pennsylvania. In 1961, Congress established the Office of Coal Research in the DOI that later shifted—along with the related DOI facilities to the Energy Research and Development Administration (ERDA), created by the Energy Reorganization Act of 1974—to carry out a more aggressive energy development program. In 1975, President Ford signed the Energy Policy and Conservation Act that authorized the establishment of the SPR. In 1977, the Department of Energy Organization Act created the DOE. Fossil energy coal and power plant research, development, and demonstration activities focused on a variety of technologies that addressed energy security, environment, and energy cost concerns; however, the highest priority was advancing technology to produce abundant and reasonable-cost transportation fuels from coal. Regarding the petroleum reserves, in 2000, the Northeast Home Heating Oil Reserve (NEHHOR) was established to help ensure adequate supplies of heating oil in the event of potential shortages due to colder-than-normal winters. In 2014, the Northeast Gasoline Supply Reserve (NGSR) was established in response to Superstorm Sandy, and DOE has proposed disestablishment of NGSR since 2018. In 2020, DOE proposed disestablishment of NEHHOR. The NGSR and NEHHOR have never been used for their intended purpose, are costly to maintain, and generally do not provide value to taxpayers.

Today, FE is focused on six research priorities: (1) develop carbon-neutral fossil energy plants of the future; 2) develop carbon-neutral Hydrogen (H2) technologies; (3) reduce the cost of carbon capture, utilization, and storage (CCUS); (4) increase fossil fuel productivity through big data and artificial intelligence; (5) address the energy water nexus; and (6) advance critical minerals (CM), rare earth elements (REEs), and coal-to-product technologies.

FE is also focused on four programmatic priorities: (1) maintain drawdown readiness while completing the Life Extension Phase Two (LE 2) at the SPR; (2) catalyze private sector investment in Appalachian petrochemicals infrastructure; (3) practice efficient regulatory reviews; and (4) strengthen NETL's technical capabilities.

FE's diverse workforce brings together scientists, engineers, technicians, and other professionals with a wide range of experiences to help solve America's fossil energy challenges.

Functions

Fossil Energy Research and Development (FER&D)

The FER&D mission is guided by the principles of energy dominance, national security, strong domestic energy production, and advancing clean coal technologies through early-stage R&D to revitalize the coal industry. The FER&D function focuses on cutting-edge, early-stage R&D that will prepare innovative new technologies for the private sector to further develop, scale up, and deploy. The FER&D program encompasses the following:

- Advanced Energy Systems aim to increase the availability, efficiency, and reliability of fossil energy power systems, while maintaining environmental standards through early-stage R&D. Specific efforts focus on Gasification Systems; Advanced Turbines; Solid Oxide Fuel Cells (SOFCs); Advanced Sensors and Controls; Power Generation Efficiency; Advanced Energy Materials; and Advance Coal Processing.
- **Crosscutting Fossil Energy Research** bridges basic and applied research by targeting concepts with the greatest potential for transformational breakthroughs. Specific activity areas include CM (including REEs); Water Management; Modeling, Simulation & Analysis; University Training and Research; and International Activities in support of the deployment of U.S. technologies and fossil energy resources to international markets.
- Carbon Capture, Utilization, and Storage (CCUS) technologies focus on post-combustion and pre-combustion carbon capture; utilization technologies to convert carbon dioxide (CO₂) into valuable products and commodities; and carbon

¹ For more historical detail on NETL, please visit: https://netl.doe.gov/about/history.

storage to ensure safe and secure geologic storage of CO₂.

- NETL Coal R&D supports the NETL scientists and engineers who conduct in-house research activities for FER&D programs. These scientists and engineers comprise the core competencies of NETL in the areas of computational science and engineering; energy conversion engineering; geological and environmental systems; materials engineering and manufacturing; program execution and integration; and systems engineering and analysis.
- Natural Gas Infrastructure Research focuses on early-stage research on innovative sensors, materials, and systems that enable industry to detect and mitigate resource loss and improve the reliability and operational efficiency of natural gas supply and delivery infrastructure. The program also has a significant role in addressing areas of public interest and concern, including pipeline safety and reliability; resource stewardship; and infrastructure security. Additionally, the program develops new technologies to reduce flaring and venting of natural gas through conversion to high-value, transportable products or electricity.
- **Gas Hydrates** include performance of earlystage R&D, through DOE National Laboratory and university-led efforts, to evaluate the occurrence, nature, and behavior of naturally occurring gas hydrates, and the resulting resource, hazard, and environmental implications.
- Unconventional Fossil Energy Technologies involve field research to improve the understanding of shale geology and fracture dynamics in key and emerging shales, including the Marcellus, Utica, Eagle Ford, Appalachia, Delaware, Bakken, Alaska, and Tuscaloosa basins.

Natural Gas Regulation

FE grants authorization, in accordance with the Natural Gas Act of 1938, as amended, requiring any person who wishes to import and/or export natural gas, including liquefied natural gas, compressed natural gas, compressed gas liquids, etc., from or to a foreign country to obtain an authorization from DOE. DOE grants two types of authorizations: short-term (blanket) and long-term authorizations. A short-term authorization enables a company to import and/or export natural gas on a short-term or spot market basis for a period of up to 2 years. Long-term authorizations are generally used when a company has a signed gas purchase or sales agreement/contract, tolling agreement, or other agreement resulting in imports/exports of natural gas, for a period longer than 2 years.

Petroleum Reserves

The SPR provides strategic and economic security against foreign and domestic disruptions in oil supplies via an emergency stockpile of crude oil. The SPR also fulfills national obligations under the International Energy Program, which provides assistance from the International Energy Agency (IEA) through its coordinated energy emergency response plans and provides a deterrent against energy supply disruptions. The SPR's storage cavern integrity and maintenance programs ensure the availability of the SPR's crude oil inventory. FE's Office of Petroleum Reserves (OPR) manages three petroleum stockpiles: the SPR, NEHHOR, and NGSR. In addition to its emergency response functions, OPR also partners with FE's Office of Oil and Gas to manage the Naval Petroleum Reserve (NPR) and Oil Shale Reserves program. The SPR is also executing a multi-year, \$1.4B Life Extension Program, and a continuing legacy environmental clean-up/ remediation effort at the previously-sold NPR field No. 1 (Elk Hills, CA), and landfill remediation as part of post-sale activities at NPR field No. 3 (Casper, WY).

External Coordination

FE leads and supports numerous efforts to coordinate development and deployment of CCUS, hydrogen production, and other advanced fossil energy technologies. FE plays an important role in implementing and supporting domestic policy efforts by providing information important to policy-makers and regulators, and working closely with various stakeholders and other federal agencies to coordinate government-wide actions such as implementation of IRS § 45Q tax credits. FE also leads numerous bilateral and multilateral international partnerships to leverage FE programs and further advance fossil energy technologies, projects, and supporting policies.

Recent Organization Accomplishments

FE's recent significant organizational accomplishments include:

Onshore Unconventional Technologies

FE awarded and launched four projects for advanced subsea system technologies to improve efficiency and capabilities for enhanced oil recovery offshore, as well as three for low-cost, efficient treatment technologies for produced water, including techno-economic analyses. Also, FE launched a new data visualization platform initiative for subsurface data that will lead and support realtime decision-making.

Advanced Technology Solution for Unconventional Oil and Gas Development

In a DOE sponsored Field Laboratory, the University of Alaska-Fairbanks and industry partner Hilcorp saw production increase from a polymer flood. Using polyacrylamide at their field site on Alaska's North Slope, their two-year operational anniversary passed in August 2020 with operational and production success that far surpassed initial expectations. Incremental heavy oil production has increased by approximately 700 barrels per day with no breakthrough of the injectant. At the Milne Point unit, this success has been rolled out to three other production pads, which will contribute to Trans Alaska Pipeline System reliability by meeting the low flow threshold in the pipeline.

Critical Minerals/Rare Earth Elements

NETL awarded three, 30-month, extramural projects to optimize and improve the efficiency of REEs and, for the first time, CM from coal-based materials in pilot-scale extraction and separation facilities. The significance and major impact of this effort is not only advanced technology development, but also the potential to more fully realize the complete use and value of coal and its capability to supply CM to domestic industries that are currently dependent on off-shore CM supplies.

Negative Emissions Technologies

The FE Carbon Capture Program leveraged past research in materials for expanding and accelerating the development of negative emission technologies such direct air capture (DAC) and biomass energy with carbon capture and sequestration. As part of this initiative, the program issued a Funding Opportunity Announcement (FOA) for (i) novel DAC materials and processes, and (ii) testing of existing DAC materials in integrated field units that capture CO₂.

Natural Gas Infrastructure Modernization Partnership Cooperative Agreement

FE published two handbooks: (1) the Artificial Intelligence (AI) for Natural Gas Utilities: A Primer and The Sampling of Methane Emissions Detection Technologies and Practices for Natural Gas Distribution Infrastructure (AI Primer) handbook; and (2) the Methane Emissions Detection Technologies and *Practices* handbook. The *AI Primer* is designed to assist pipeline operators, utility systems, and state regulators on how AI can be used to improve natural gas utility service and positing areas in which AI applications can further the safe, reliable, and affordable operation of natural gas infrastructure and enhance the reliability of natural gas pipeline delivery. The Methane Emissions handbook summarizes why methane leaks occur in the context of the natural gas distribution network and identifies existing and emerging leak detection technologies and practices.

Crude by Rail Research for Safe Energy Transport

FE; the U.S. Department of Transportation (DOT), Pipeline and Hazardous Materials Safety Administration; and Transport Canada, Transport of Dangerous Goods Directorate published a Report to Congress on a research study by Sandia National Laboratories (SNL) that investigated physical, chemical, and combustion properties of crude oils, and, in particular, the so-called "tight oils," like Bakken crude, in response to high-profile accidents involving movement of crude by rail. Based on the results of the study, which assessed vapor pressure as it affects the thermal hazards from the combustion events studied, DOE and DOT found that no further regulations by the Secretaries of Transportation or Energy or further legislation is necessary to improve the safe transport of crude oil with regard to vapor pressure.

Natural Gas Regulation

FE has undertaken many supportive and deregulatory measures in FY 2020 to ensure the long-term benefits of U.S. Liquefied Natural Gas (LNG) exports and America's global energy leadership in LNG. In FY 2020, FE issued approvals for LNG exports to non-free trade agreement countries to 7 new large-scale projects, including two proposed for the West Coast. Also, in FY 2020, to lock in the long-term benefits of U.S. LNG exports, DOE finalized a policy to extend long-term LNG export authorizations to 2050.

Unconventional Resources

West Virginia University and industry partner Northeast Natural Energy completed hydraulic fracturing of six Marcellus Shale wells at the Boggess pad near Morgantown, WV, utilizing stimulation designs based on innovative logging techniques and advanced modeling. These advanced engineered stage and clustering designs are expected to lead to increased resource recovery confirmed through ongoing production monitoring of the wells.

Hydrogen Technologies

The NETL Gasification Systems Program continued FE progress toward commercializing hydrogen technologies by a FOA focused on R&D that enables commercial approaches for a hydrogen-based energy economy while achieving net-negative CO₂ emissions through gasification of coal, biomass, and carbonaceous mixed wastes, such as plastics. The result will be increasingly efficient and fuel-flexible gasification-based plants able to use coal, biomass, and waste plastics for valuable hydrogen and fuels production, which are intended to be integrated with pre-combustion carbon capture to achieve negative carbon emissions.

Coal FIRST Concepts Advance toward FEED Studies

FE completed 13 concept designs and seven pre-FEED (Front End Engineering Design) studies under NETL's Coal FIRST (Flexible, Innovative, Resilient, Small, Transformative) plant concepts request for proposal, "Coal-Based Power Plants of the Future." The studies were used to identify three Coal FIRST plant concepts that are nearly ready for a full FEED study, and four additional promising plant concepts that require additional component development efforts. In addition, two FOAs with a combined value of over \$100M were issued to solicit cooperative agreements to meet the needs of the Coal FIRST program.

Gas Hydrates–Alaska North Slope

In collaboration with the Japan Oil, Gas and Metals National Corporation (JOGMEC), DOE developed the well design, pressure-core acquisition, and surface facility plans for the next phase on the Alaska North Slope long-term reservoir response experiment to drill three wells in FY 2021 to enable a long-term reservoir response experiment for a duration of 18–24 months. This long-term reservoir response experiment in Alaska utilizing depressurization production technology is the next critical step in advancing the production technology to a point where industry could further develop this potential resource.

Natural Gas Pipelines and Fuel Transportation

DOE advanced research on material properties to determine the performance limits of new and existing alloys for natural gas pipelines and fuel transportation. The examination of advanced alloys and composite materials could support pipe transport of natural gas along with other critical fuels and fluids (CO_2 , H2), which may reduce delays in the deployment of new pipelines and address Federal and state regulatory commissions' concerns on using a single pipe to transport new fuels and critical fluids.

Advanced Natural Gas Infrastructure Technology Development

DOE selected 16 research proposals focused on mitigating emissions from midstream natural gas infrastructure to cost-effectively enhance the safety and efficiency of the nation's natural gas production, gathering, storage, and transmission infrastructure. One of the areas of interest focused on accelerating the development of technologies capable of converting gas that would otherwise be flared into transportable, value-added products.

NETL Researchers Develop New Materials and Processes for Converting Coal to High-Value Products

NETL's research is enhancing the value of coal as a feedstock and developing cost-competitive, highvalue products derived from coal, creating new jobs, products, and markets for the industry. The research team has converted pennies worth of Powder River Basin coal into a C-based precursors and products with market values thousands of times greater. NETL Researchers have produced a high-surface-area carbon material that is ideal for use as a sorbent, solid, or mixed-matrix membrane, or sulfur anion storage cathode in LiS batteries. In addition, the research team also developed a novel manufacturing process for high-quality graphene films used commercially in electronic displays, LEDs, and touchscreens. NETL has filed or is filing a report of invention for each of these developments and is working with Ramaco Carbon to license the technologies.

Coal to Products

NETL developed a comprehensive report entitled, *Market Analysis of Carbon Products from Coal*, which contains quantitative estimates of market size and growth for carbon products, and information on producers, importers, exporters, and the potential for coal-derived carbon products to satisfy this demand, as well as barriers to market entry.

CO₂ Utilization

University of Kentucky Center for Applied Energy Research Develops Electro-Catalytic Process to Produce Formic Acid from CO_2 in a DOE sponsored project that uses an immobilized catalyst and a charge carrier to selectively reduce carbon dioxide (CO_2) directly and exclusively to formic acid. This lab scale system has continuously operated for more than 100 hours. The successful development of this process will produce a valuable product—formic acid—at a lower cost than is currently available, and will reduce the cost of CO_2 capture from utility coalfired power plants.

The Institute for the Design of Advanced Energy Systems Integrated Platform (IDAES) Spearheads Cutting-Edge Research and Modeling. Recent IDAES accomplishments include: (1) identifying a process bottleneck at an existing power plant enabling a 44% improvement in the plant's minimum operating load; (2) enabling the optimization of an aminebased post-combustion CO₂ process reducing the operating cost by 15-18% using models validated against data from the National Carbon Capture Center; (3) reducing the energy demand of a complex separation system by more than 40% through efficient, automated exploration of 42 million alternatives; (4) identifying how retrofitting existing generators with energy storage has the potential to reduce equipment wear and tear by

30%; and (5) showing that generator interactions with the bulk power market are more complex than previously thought—a finding with the potential to radically change how new power plants are designed and valued. IDAES has thousands of downloads and an active, growing global user community from multiple industries.

Advanced Energy Systems

For the first time in the United States, NETL partner, the University of Central Florida (UCF), detonated coal within a rotating detonation engine (RDE), a pressure gain combustion system. In a separate test, UCF accomplished the first ever detonation wave measurements in an RDE using advanced high-speed laser diagnostics leveraging particle image velocimetry (PIV). This effort demonstrates the potential for using a new, efficient, and clean mode of coal combustion in an RDE. The PIV measurement capability will enable quantification of flow field characteristics which, until now, could only be observed qualitatively or modeled based on theory alone.

SPR Crude Oil Engagements

In response to the severe disruption in crude oil prices caused by the COVID-19 pandemic, DOE provided storage for 21.1 million barrels of crude oil through emergency exchange agreements with U.S. producers. Marking the first time such agreements were initiated, these efforts reduced the growing glut of crude oil that led to significant risks to the U.S. economy. Other activity included sales of 9.85 million barrels of SPR crude oil to meet the requirements of Section 501 of the Consolidated Appropriations Act of 2018 (P. L. 115-141) and Section 403 of the Bipartisan Budget Act of 2015 (P.L. 114-74), raising a total of \$566.6M. DOE also completed a \$5 million test purchase of nearly 126 thousand barrels of sweet crude oil now stored at the Big Hill site. Finally, as part of DOE's efforts to improve global energy security, **OPR** and **DOE** International Affairs partnered with the Government of Australia to conclude an arrangement for the first-ever SPR storage of crude oil owned by a foreign nation.

Leadership Challenges

Strategic Petroleum Reserve

Determining the right size and configuration for the future of the SPR, whether to include emergency fill operations as a formal SPR mission, and whether to commercialize a portion of the SPR.

Program Direction Investment Levels

Support and approval for an increase in Program Direction is critical to supporting FE's programs and operations necessary to meet R&D challenges related to clean energy; low carbon; environmentally prudent development and water protection; national energy security; and jobs.

Workforce Recruitment and Retention at NETL

Recruitment and retention of qualified technical staff, according to needs indicated in staffing analyses, to rebalance the workforce; to strengthen and expand Federal competencies and expertise associated with strategic initiatives; to emphasize FE's S&T mission; and to satisfy a requirement for succession planning to accommodate the potential retirement of 40% of FE's current workforce in the next five years.

How to transition toward a low-carbon energy future leveraging fossil resources to minimize economic disparities and maintain power quality.

Critical Events and Action Items

Strategic Petroleum Reserve

The Secretary will need to provide the final authorization for the fourth and final Energy Security and Infrastructure Modernization (ESIM) Fund crude oil sale in the spring of 2021. This sale will raise the final \$450 million for the \$1.4 billion LE2 Project that SPR must have in hand to commit to construction contracts during the spring of 2021.

Office of Minerals Sustainability (OMS)

Secretary of Energy concurrence to elevate a Division of Minerals Sustainability to an Office level to elevate the importance of sourcing domestic resources to strengthen economic security. The function focuses on R&D and analysis that will support the U.S. need for technologies for the exploration, extraction, and processing of critical minerals in the U.S. This would support industries growing demand for these critical minerals in the high tech, automatic, energy storage, renewable energy, and other manufacturing industries.

Selections for Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM) FOA announcement

In September 2020, FE released a \$122 million FOA, "Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM) Initiative for U.S. Basins," that will competitively award R&D innovation centers that will enable multiple regions of the country to accelerate the full potential for carbon ores and critical minerals.

Release of Batch 2 Hydrogen FE FOA (large FY 2021 FOA with many hydrogen-related areas of interest) in February 2021

This FOA is currently being drafted and areas of interest are still to be determined. The FOA is also contingent on final FY 2021 Congressional Appropriations. Should the final appropriation not be passed by Congress by February 2021, the FOA will be delayed.

Announcement of winners of the Scienceinformed Machine Learning to Accelerate Real Time Decisions in the Subsurface (SMART) Visualization Platform (VP) Challenge Prize

The SMART VP Challenge prize competition aims to develop an intuitive data visualization tool for the subsurface environment that can be readily accessible by scientists, engineers, subsurface operators, and decision makers. The tool should work in unison with data generated by the SMART Initiatives machine learning solutions to resolve static and dynamic subsurface properties, features, and processes at scales ranging from sub-meters to hundreds of kilometers. Prize competitors are asked to focus on bringing the subsurface to life through the development of an innovative, user-friendly, intuitive and attractive visualization platform. FE seeks competitors with software development expertise who are up to the challenge of creating a new visualization platform which will assist in making subsurface insights accessible to a wider range of users and stakeholders. The SMART VP Prize Challenge offers up to \$1.5 million in total cash prizes.

Organizational Chart

Office of Fossil Energy



Arctic Energy Office

Supporting the DOE Mission

With a direct report to the Under Secretary and a crosscutting mission, the Arctic Energy Office (AEO) aims to be nimble and move across the DOE complex, coordinating the numerous activities within the Department. Utilizing this structure, it can bring together Program Offices, National Labs and stakeholders to one single point in the Department.

Mission Statement

The Arctic Energy Office will lead cross-cutting operations in the Arctic with a mission to tackle the energy, science and national security challenges of the 21st Century. The office will act as a nexus for DOE activities and represent the Department in engagements involving the Arctic.

Budget

AEO is operating within the Office of Policy (OP) funding line until an approved budget is provided for the new office. OP provided approximately \$100K to AEO in FY 2020, \$450K of carryover dollars in FY 2021, and \$250K in FY 2021 funds.

Human Resources

The office has hired three interim employees to stand up the office and identify qualified candidates for permanent staff. The Director is through an IPA with the University of Alaska, Fairbanks, a Senior Advisor is on staff via a change of station coordinated with Los Alamos National Laboratory, and another Senior Advisor is part of AEO via detail from DOE International Affairs. To support coordination of the AEO's initial stakeholder engagement and organizational development, an Advisor is on detail from Legislative and Government Affairs through February 2021.

History

The Secretary was granted the authority to establish the Arctic Energy Office, by the 2001 National Defense Authorization Act. Specifically, the language stated that "The Secretary shall locate such office at a university." This language drove the selection of University of Alaska – Fairbanks as a partner university for AEO. In the 2020 Senate Energy & Water Development (SEWD) Appropriations Bill report, under Crosscutting Initiatives, language is included to support the re-establishment of the Arctic Energy Office, including: "The Department is directed to support a renewed focus on the Arctic region, and as a cross-cutting activity, use the Arctic Energy Office as a centralized area to support the use of energy resources, but also innovative activities, including microgrids and integrated energy systems."

The office was officially re-established on November 27th 2019 by Secretary Perry, as committed to by Secretary Brouillette at his confirmation hearing, with a renewed focus on the Arctic region.

Functions

The office will have three primary areas of focus: Energy, Science, and National Security. While it will not provide funding opportunity announcements, it will coordinate and streamline existing research and deployment activities in the Arctic, including work by the Office of Science to measure solar radiation, work by Fossil Energy on modular gasification applications in challenging environments, work by the Office of Electricity on deployment of microgrid technologies in Alaska, and work by Energy Efficiency and Renewable Energy on next generation river power systems. The Office will build on this work to define a focused research agenda based on these activities.

Additionally, the Office will engage and collaborate with other governmental agencies with equities in the Arctic region, including the Departments of Defense and State.

The geographic scope of the office is not limited to activities within the state of Alaska. AEO will also support our international engagement obligations, such as the Arctic Council, which interacts with the 7 other Arctic nations in the region.

Recent Organization Accomplishments

Hired three interim employees over the course of the past six months; secured office space at University of Alaska-Fairbanks for AEO via GSA lease; launched new office and website in September 2020; coordinated 2020 Arctic Lab Partnerships (ALPs) virtual workshop to identify key arctic-relevant research needs; reviewed and updated document assessing arctic critical infrastructure; participated in monthly inter-agency Arctic Policy Working Group; coordinating AEO introductory meetings with DOE departments in preparation for launch of DOE-internal arctic working group; and initiated AEO introductory meetings with external organizations.

Leadership Challenges

As a new office within DOE, AEO currently has no consistent funding source within Congress for sustained and reliable funding levels. Bringing on permanent FTEs is a priority for the interim staff that the office is working on currently. AEO has a critical coordination role to play at DOE, ensuring that the above mentioned challenges are addressed is vital to ensuring the success of AEO in

Organizational Chart

coordinating Arctic functions at DOE. Critical Events and Action Items

Continued and sustained funding from Congress will be needed. Additionally, Congressional allies will need to be expanded beyond the Alaska delegation by educating others on the impacts of Arctic research well outside of Alaska and the Arctic Circle.

Office of Arctic Energy



Office of Nuclear Energy

Supporting the DOE Mission

As an applied research and development (R&D) organization, the Office of Nuclear Energy (NE) supports the DOE Mission by enabling nuclear innovation, supporting unique research infrastructure, and solving crosscutting challenges facing the nuclear energy sector. NE invests in R&D that the private sector or other nongovernment stakeholders are unable to perform due to the cost, scale, or timeframe required. NE funds and creates opportunities for world-class researchers in industry, academia, and the National Laboratories to collaborate and solve pressing scientific and engineering challenges. By leveraging private-public partnerships and our National Laboratory system, we are making nuclear energy more cost effective, accelerating advanced reactor deployment, making nuclear fuel cycles more sustainable, encouraging a resilient supply chain, and promoting a strong nuclear workforce.

Mission Statement

The mission of NE is to advance nuclear power as a resource capable of meeting the Nation's clean energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration (RD&D). NE supports the diverse civilian nuclear energy programs of the U.S. government, leading federal RD&D efforts in nuclear energy technologies, including generation; safety; waste storage and management; and security technologies.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$1,326,090,000
FY 2020 enacted	\$1,493,408,000
FY 2021 request	\$1,179,931,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 273

History

NE originated in January of 1980. During World War II, most nuclear research focused on developing an atom bomb. After the war, the United States government encouraged the development of nuclear energy for peaceful civilian purposes. Congress created the Atomic Energy Commission (AEC) in 1946 to control nuclear energy development and explore peaceful uses of nuclear energy. On March 1, 1949, the AEC announced the selection of a site in Idaho for the National Reactor Testing Station; this was the origin of what is now the Idaho National Laboratory (INL). The world's first usable amount of electricity from nuclear energy was generated in Idaho in 1951. Over the years, 52 mostly first-of-a-kind reactors were designed, built, and decommissioned at Idaho's National Laboratory.

Functions

NE can be characterized by ten major program activities that address the breath of issues important to sustaining nuclear power as a source of clean energy.

Sustaining the Current Fleet of Light Water Reactors

Light Water Reactor Sustainability

NE conducts R&D on technologies and other solutions that can improve economics, sustain safety, and maintain the technical reliability of the current domestic fleet of commercial nuclear power plants.

Accident Tolerant Fuels

Following the events at Fukushima, Congress directed NE to develop Accident Tolerant Fuels, a next-generation nuclear fuel with higher performance and greater tolerance for extreme, beyond design basis events. Partnering with industry, this program is on schedule to demonstrate batch reloads to commercial reactors in the mid-2020s.

Deploying Small Modular Reactors

Advanced Small Modular Reactor (SMR) Research and Development

NE supports first-of-a-kind costs associated with design certification and licensing activities;

engineering; supply chain development; and testing through cost-shared arrangements with industry partners to promote the development and deployment of SMRs that provide safe, clean, affordable power by the early 2030s. Broad SMR deployment would provide additional clean baseload for decarbonizing the U.S. electrical grid and for other sectors (i.e., industrial processes) of the U.S. economy.

Demonstrating Advanced Reactors

Advanced Reactor Demonstration Program (ARDP)

A key pillar of the NE mission is to establish an advanced reactor pipeline to improve the Nation's economic and energy security posture. In FY 2020, Congress appropriated \$230,000,000 for DOE to establish a comprehensive program to demonstrate multiple advanced reactor designs. The program will support 2 advanced designs that can be demonstrated in the next 7 years, and up to 5 additional designs that have a licensing and demonstration horizon in the early 2030s.

Advanced Reactor Technology R&D

NE conducts R&D that can help reduce long-term technical and regulatory barriers for multiple innovative advanced reactor technologies. Efforts focus on early stage, cross-cutting, industryinformed R&D that provides benefits widely applicable to the advanced reactors.

Crosscutting Technology Development

NE conducts high risk innovative R&D that could overcome technical limitations in Advanced Reactors and develops enabling technologies that have applicability across multiple technical areas. The Nuclear Energy Advanced Modeling and Simulation (NEAMS). The NEAMS program develops advanced modeling and simulation tools to address light-water and non-light-water reactor technology and fuel cycle needs.

Transformational Challenge Reactor (TCR)

The TCR program exploits advanced manufacturing methods to deliver a new approach to nuclear design and qualification.

Department of Defense (DoD) Mobile Microreactor

The DoD Strategic Capabilities Office (SCO) plans to construct and operate a mobile nuclear microreactor demonstration at a Department of Energy site before the end of 2023. In March 2020, SCO awarded three companies (X-Energy, BWXT, and Westinghouse) to each develop an engineering design and safety case for their respective mobile microreactor technologies.

Developing Advanced Nuclear Fuel Cycles

Domestic Uranium Supply

Uranium production in the United States has been on a steady decline since the early 1980s. In 2019, the US produced the lowest annual total in more than 70 years, less than 0.5% of the current average amount of U.S. uranium requirements. U.S. uranium properties are operating at minimal levels or have shut down. The nation's only uranium conversion facility is also idle and at-risk of shutting down permanently. A potential solution is a U.S. uranium reserve to provide assurance of availability of uranium in the event of a market disruption.

High-Assay, Low-Enriched Uranium (HALEU)

Many advanced reactor concepts being developed in the U.S. require high-assay, low-enriched uranium (uranium enriched 5 and 20% in the U-235 isotope), however a commercially sustainable source of HALEU does not exist. NE has partnered with industry to demonstrate HALEU production with U.S. technology to enable deployment of U.S. advanced reactor technology.

Advanced Fuels

NE supports long-term technology development activities to develop next generation light water and non-light water reactor fuels with enhanced accident tolerance, improved fuel utilization, and sustainability of nuclear energy.

Materials Recovery & Waste Form Development

Develop advanced material recovery as well as advanced waste form development technologies. Achieving sustainable, economic, and nonproliferation attributes in recycled LWR and Advanced Reactors is critical for the nuclear fuel cycle.

Fast Neutron Irradiation

Versatile Test Reactor (VTR)

The VTR is a sodium-cooled reactor-based fast spectrum testing capability needed modernize U.S. infrastructure for early stage R&D for the testing of advanced fuels, materials and instruments. In accordance with the rigorous methodology established by Department of Energy Order 413.3B, Program and Project Management for the Acquisition of Capital Assets, Critical Decision 1 was approved on September 11, 2020.

Nuclear Science User Facilities and Enabling Capabilities

Idaho Facilities Management (IFM) and Idaho Site-wide Safeguards and Security (S&S)

NE has two major infrastructure programs that provide the basis to enable nuclear research and development missions with significant quantities of nuclear materials. The Idaho Facilities Management (IFM) program provides the basis for planning, acquisition, operation, maintenance, disposition, and protection of NE-owned facilities and capabilities. The S&S program funds all physical and cyber security activities for the INL, providing protection of the Department's nuclear materials; classified and unclassified matter; government property; personnel; and other vital assets.

Nuclear Science User Facilities

Provide single point access, at no cost to the user, unique nuclear energy research capabilities at multiple DOE and University locations through competitive awards. Support commercialization of innovative concepts.

Space Nuclear Power and Propulsion Systems

NE designs, builds, tests, and delivers safe and reliable nuclear power systems for space exploration (the National Aeronautics and Space Administration) and national security applications on a full cost recovery basis.

Nuclear Waste Management

Interim Storage.

The Nuclear Waste Policy Act (NWPA) of 1982 made DOE responsible for the United States' spent nuclear fuel and high-level nuclear waste. The Department remains committed to fulfilling the Federal Government's legal and moral obligations to properly manage and dispose of that material. The mission of the Interim Storage program is to develop and implement a robust interim storage program as part of a waste management system, and to continue to support the Department's responsibilities for maintaining the security for the Yucca Mountain site.

Used Fuel Disposition R&D

This program includes longer-term scientific research and technology development to enable storage, transportation, and disposal of used nuclear fuel (UNF) and wastes generated by existing and future fuel cycles.

Crosscutting DOE Programs and Projects

Nuclear Fuel Working Group (NFWG)

The NFWG effort was established from the outcome of a Department of Commerce 232 submittal by the U.S. Uranium mining and extraction industry requesting some fraction of the uranium market be reserved for U.S. origin uranium. Preserving the U.S. ability to mine and extract uranium requires both direct support to the U.S. mining and extraction companies as well as revitalizing and expanding the nuclear industry as a whole to create increased demand for domestically sourced uranium.

Grid Modernization Initiative (GMI)

GMI is a collaborative, crosscutting R&D initiative among the Offices of Electricity (OE); Energy Efficiency and Renewable Energy (EERE); Fossil Energy (FE); Cybersecurity, Energy Security, and Emergency Response (CESER); and NE.

Water Security Grand Challenge (WSGC)

NE participates in the WSGC alongside EERE and FE. NE currently funds a selection of projects and programs that support solving energy-water related issues in conjunction with goals of the WSGC.

TeamUSA Civil Nuclear Working Group

The United States Government interagency civil nuclear working group, "TeamUSA," supports the expansion of safe and secure use of nuclear power worldwide.

Nuclear Cooperation Initiative (NCI)

The U.S. Nuclear Cooperation Initiative, supports the President's strategy outlined in the Nuclear Fuel Working Group (NFWG) report to restore the United States nuclear energy leadership and competitive nuclear advantages.

Nuclear Power Ministerial 2021 (NPM)

The NPM is held every four years, and the International Atomic Energy Agency (IAEA) selected the United States Government to host the 2021 event. The NPM brings together IAEA members to explore views on the development and deployment of nuclear power. The Office of Nuclear Energy is leading the planning for the NPM, which is scheduled to take place October 18-20, 2021.

Stewardship of the Idaho National Laboratory

Idaho National Laboratory (INL)

NE provides oversight of the one of the most complex National Laboratories, the Idaho National Laboratory. The Idaho Operations Office is responsible for the effective stewardship of the INL, ensuring effective and efficient mission accomplishment; design, construction, operation, and maintenance of research facilities; integrated environment, safety and health protection; business systems; cultural and biological resources; and security and emergency management.

Federal Program Management

Provides federal staffing resources and costs associated with operations within the Office of Nuclear Energy. Federal staffing is a program concern as the NE Program Direction budget remains essentially flat while programs have grown appreciably in the past four years. An aging workforce, a highly competitive job market for experienced nuclear energy related disciplines, and the flat budget have left NE staffing at a level well below its 2016 total. The current onboard head count in NE is about 80 lower than the FY 2016 level.

Recent Organization Accomplishments

Small Modular Reactor Licensing

In partnership with DOE, NuScale Power, LLC (NuScale) successfully completed the final phase of the U.S. Nuclear Regulatory Commission's (NRC) first-of-its-kind Design Certification Application review of NuScale's SMR technology in August 2020, and is now on track to complete license approval in August 2021.

Hydrogen Generation Demonstrations at Operating Nuclear Power Plants

DOE awarded two cooperative agreements to demonstrate the feasibility of producing hydrogen through low temperature electrolysis.

Public Private Partnerships and the Gateway for Accelerated Innovation in Nuclear (GAIN)

In November 2015, the Department established the GAIN initiative. GAIN provides industry with access to the unique research capabilities and expertise at the DOE's National Laboratories through its GAIN NE Voucher Program awards.

National Reactor Innovation Center (NRIC)

NRIC was established by the Department in FY 2020 to accelerate demonstration of advanced reactors by providing technology developers with access to the physical infrastructure, materials, sites, and expertise to test and demonstrate their reactor concepts; assess performance; and accelerate the licensing and commercialization of these new nuclear energy systems.

Nuclear Energy University Program (NEUP)

In FY 2020, DOE awarded over \$56,000,000 through NEUP to support 58 university-led NE R&D projects in 25 states. NEUP seeks to maintain U.S. leadership in nuclear research across the country by providing top science and engineering students and faculty opportunities to develop innovative technologies and solutions for civil nuclear capabilities. In addition, NEUP awarded 21 critical university nuclear infrastructure projects and 3 larger scope Integrated Research Projects.

Nuclear Energy Advanced Modeling and Simulation (NEAMS)

In FY 2020, Kairos Power submitted a Topical Report to the NRC requesting approval to apply the BISON NEAMS code in a future license application for a fluoride-salt cooled high-temperature reactor (FHR). The BISON code is a versatile, high-fidelity nuclear fuel performance code that provides insight into how nuclear fuel behaves in a reactor. This direct application of a NEAMS tool to license an advanced reactor design is a very strong statement of support regarding the value of NEAMS products to industry and the worth of DOE's investment in these modeling tools.

Transformational Challenge Reactor

The TCR program established processes and tools for centralized collection of design; in situ manufacturing monitoring; part tracking and postmanufacturing characterization; and testing data streams into a digital platform, simplifying tracking, quality assurance, and analysis. The program also developed multiple artificial intelligence tools to facilitate correlation between manufacturing and testing data, to be used within the digital platform to more efficiently evaluate component quality.

Industry Cost-Shared Licensing Modernization Project

NE directly supported establishing and successfully executing the four-year Licensing Modernization Project (LMP) on schedule, achieving the project's aggressive goals for support of near-term advanced reactor deployments by establishing a risk-informed and performance-based approach to advanced reactor design and licensing.

Regulatory Approval for Advanced TRISO Fuel Form

The Department's cost-shared partnership with industry resulted in the NRC's August 2020 approval of the performance parameters established for Uranium Oxycarbide (UCO) Tristructural Isotropic (TRISO) coated particle fuel. This was a major collaborative effort among the Electric Power Research Institute (EPRI), the members of the industry's Technology Working Group for High Temperature Reactors (HTR), and the National Laboratories, resolving this long-led technical issue on the path to deployment of robust TRISO-fueled technologies for both commercial and defense use.

Advanced Materials

The American Society of Mechanical Engineers (ASME) recently added Alloy 617 into the Boiler and Pressure Vessel Code, which is the sixth material cleared for use in high-temperature reactors and could allow new designs to operate at even higher temperatures to access markets such as process heat applications and hydrogen production in addition to base load electricity generation.

Microreactor Demonstration Support

In February 2020, INL awarded Oklo Inc. access to high assay low enriched uranium (HALEU) generated from legacy Experimental Breeder Reactor–II fuel. HALEU will be used to develop fuel for an initial Oklo microreactor nuclear demonstration at the INL site. In March 2020, INL completed initial siting assessments for potential microreactor demonstrations at the INL site. Also, INL completed design and construction of the Microreactor Agile Non-nuclear Test Bed (MAGNET), which serves as a non-nuclear electrically heated prototypical test bed supporting industry-identified microreactor integrated system validation testing.

Sample Preparation Laboratory

The Sample Preparation Laboratory (SPL) Project at the INL officially broke ground in July 2020, beginning a planned three-year construction period. The SPL will fulfill the near-term capabilities necessary for conducting the advanced postirradiation examination needed to improve the understanding of nuclear fuels and materials performance.

Mars Perseverance Rover

In July 2020, the Mars 2020 Perseverance Rover successfully launched from Florida's Kennedy Space Center. Perseverance is powered by a multi-mission radioisotope thermoelectric generator (RTG) which was fueled, built, and tested by DOE National Laboratories.

Accident Tolerant Fuel

Test rods of accident tolerant fuel from all three fuel vendors in the ATF program are currently installed and operating in five commercial U.S. reactors. Other ATF samples are undergoing testing at INL and Oak Ridge National Laboratory. The industry, with the support of the National Laboratories, is gathering the data required to qualify the fuel for use in commercial U.S. reactors.

National and Homeland Security

In 2020, INL was recognized by the Cyberspace Solarium Commission as a leading cybersecurity center, capable of researching and testing the cybersecurity of critical technologies. INL was the only National Laboratory called out in the report as an exemplar capability. In 2020, INL also opened the doors to the Cybercore Integration Center, a new building that serves as a key component of an innovative and strategic partnership with the State of Idaho.

Nuclear Waste Management Cloud Platform

DOE has developed an integrated software platform hosted in a cloud environment that is capable of supporting a future nuclear waste management program. It positions the Department to be able to act quickly when Congress directs the next phase of a national nuclear waste management program to proceed.

Spent Nuclear Fuel Storage

The High Burnup Storage Demonstration, a project jointly funded by the Electric Power Research Institute and the DOE, is a critically important project related to the relicensing of the long-term storage of spent nuclear fuel, and is needed to help enable nuclear power generation to continue.

Leadership Challenges

Nuclear Retirement Drivers

Nuclear power supplies about 20% of U.S. electricity (approximately 55% of emissions-free electricity in 2019), but its share appears poised for decline. Since 2012 when 104 reactors were operating, 11 reactors have shut down earlier than their licensed lifetime. As of September 30, 2020, an additional six units [5.9 gigawatts (GW)] have announced intentions to close prematurely by the end of 2022.

The Versatile Test Reactor (VTR)

The United States has not had a fast neutron spectrum testing facility for over 20 years, forcing U.S. developers to rely on overseas facilities, effectively ceding U.S. nuclear energy leadership to China and Russia.

Nuclear Waste Management

The major challenge in nuclear waste management is obtaining Congressional action necessary to provide direction and funding to implement any disposal solution to address the country's growing inventory of spent nuclear fuel and high-level radioactive waste.

Stewardship of the Nuclear Infrastructure at the INL

When the INL was formed in 2005, research complexes at the site were transferred from other DOE elements to NE to reconstitute nuclear energy research capabilities. Many of these research facilities were not maintained as they were slated for disposition and disposal, and key support infrastructure was already removed.

Long-Term Thermal Irradiation Capability Needs

The Office of Naval Reactors (NR) has identified a need for a thermal irradiation testing capabilities through at least 2085. The Advanced Test Reactor (ATR), which currently fulfills this mission, is currently projected to operate until at least 2040. NE and NR are currently evaluating options and developing recommendations to ensure continued irradiation testing capabilities.

INL Receipt of Small Quantities of Commercial Spent Fuel for Research

In 2019, through successful negotiations with representatives of the State of Idaho (Office of the Governor and Office of the Attorney General), an addendum to the Idaho Settlement Agreement was reached and signed by the Governor of Idaho and Secretary Perry. This agreement provides a path forward to resume receipt of quantities of commercial spent nuclear fuel at Idaho National Laboratory, subject to the completion of clean-up milestones.

Critical Events and Action Items

Accident Tolerant Fuel

NE intends to award follow on cooperative agreements in February 2021 to the three fuel vendors developing accident tolerant fuel for use in existing commercial U.S. reactors. Advanced Test Reactor Core Internal Changeout. In March 2021, the Advanced Test Reactor starts an extended shutdown for nine months to conduct the major Core Internal Changeout (CIC) outage.

Organizational Chart

Office of Nuclear Energy



Office of Indian Energy Policy and Programs

Supporting the DOE Mission

The Office of Indian Energy Policy and Programs (Office of Indian Energy, or IE) supports the Department of Energy's Strategic Objective 5 -Increase Domestic and International Accessibility to American Energy Resources, which is to promote global deployment of American energy technologies and export of American energy resources. Specifically, the Office of Indian Energy works to achieve greater energy independence in Indian Country. Indian Country has a wealth of energy resources and is able to contribute to American energy dominance, as well as to its own prosperity. Through development of its resources, Indian Country can achieve greater energy independence, improve electricity access for its communities, and achieve energy and cost savings for tribal communities.

The Office of Indian Energy promotes tribal energy development and deployment to strengthen tribal energy and economic infrastructure and electrification; reduce costs; and increase efficiency by funding energy development, providing technical assistance, and building human and technical capacity for 574 federally recognized Indian Tribes and Alaska Natives across the U.S. This includes the deployment of generation, energy efficiency, or resilience projects on Tribal lands on a fuel and technology-neutral basis, and also consistent with the principles of tribal sovereignty. DOE will support projects that provide technical preparedness and capacity-building which will enable tribes to capitalize on their resources.

Mission Statement

The mission of the Office of Indian Energy is to maximize the development and deployment of energy solutions for the benefit of American Indians and Alaska Natives.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$18,000,000
FY 2020 enacted	\$22,000,000
FY 2021 request	\$8,000,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 7

History

DOE has implemented a Tribal Energy Program since 2002, beginning within the Weatherization and Intergovernmental Program in the Office of Energy Efficiency and Renewable Energy. The Office of Indian Energy was authorized by Congress in the Energy Policy Act of 2005 and formally established within DOE in 2010. Beginning with the 2015 appropriation, IE has been responsible for implementing all financial assistance, technical assistance and education and training activities within its statutory authority. With increasing resources, and using a fuel and technology neutral approach that respects tribal sovereignty, IE has strengthened its ability to deliver all of its programs supporting energy project development on tribal lands in Alaska and the lower 48 states.

Functions

The Office of Indian Energy functions are designed by the Energy Policy Act of 2005 to: promote Indian tribal energy development, efficiency, and use; reduce or stabilize energy costs; enhance and strengthen Indian tribal energy and economic infrastructure related to natural resource development and electrification; and bring electrical power and service to Indian land and the homes of tribal members. Specific activities include:

Financial Assistance

Provides competitive, merit-based financial assistance for fuel and technology neutral energy project deployment on tribal land.

Technical Assistance

Technical experts from DOE and its national laboratories, along with other partnering organizations, provide support to assist Indian tribes and Alaska Native villages with technical analysis, financial analysis, and strategic energy planning. The goal of the technical assistance is to address a specific challenge or fulfill a need that is essential to a current project's successful implementation, or ensure the success of a future project. The intended result is a tangible product or specific deliverable designed to help move a project forward.

Education and Training

Supports tribal efforts to build internal capacity to understand and navigate energy projects by providing regional workshops, webinars, Tribal Leader Forums, college student internships, a comprehensive online training curriculum, and an energy resource library.

Recent Organization Accomplishments

Since 2010, the Office of Indian Energy has invested nearly \$85 million in more than 180 tribal energy projects valued at over \$180 million. In 2018, the Office implemented a fuel and technology neutral approach to energy development with an understanding and respect for tribal sovereignty and self-determination and broadened the focus to energy system(s) for autonomous operation (i.e., microgrids). In 2019, eligibility was expanded to include intertribal organizations, and in 2020 the Office of Indian Energy also sought applications for community energy storage and the electrification of unelectrified buildings.

- In FY 2019, DOE's Office of Indian Energy awarded 13 grants for energy infrastructure, building on the 14 grants selected in FY 2018 and awarded in FY 2019. Combined, these fuel and technology neutral energy projects, valued at nearly \$60 million, represent a DOE investment of nearly \$21.5 million. These 27 grants represent over 19 MW of new generation in Indian Country, a savings of over \$4 million annually for those tribal communities, and savings of nearly \$90 million over the life of those projects.
- In March 2020, the Office issued a competitive funding opportunity for up to \$15 million for Indian tribes and tribal entities to deploy energy technology.
- In May 2020, the Office announced more than \$5 million in funding for nine tribal energy infrastructure projects. Combined, these projects

add up to over 3.7 megawatts of installed generation that will power over 180 tribal buildings, with combined lifetime savings of over \$24 million—significant investments that will yield tangible results to improve the quality of life for these communities."

- In August 2020, the office formalized and expanded the STEM education initiative through an interagency agreement with the Denali Commission (www.denali.gov). Initially, the program delivery included all twelve Alaska Native regions; however, the COVID-19 pandemic cut it short. This situation created the opportunity to transition to online learning in a fashion that began to bring this training to the Lower 48 states in addition to Alaska. Through this program students learn about energy careers and opportunities through hands on activities showing the full spectrum of energy solutions in the country.
- In October of 2020, the Deputy Secretary directed the Office of Indian Energy to implement a formalized process to consider and make prompt determinations on cost-share reduction requests received by IE for awards under the Energy Policy Act of 2005. Consistent with the Secretary and Deputy Secretary's direction to find ways to provide assistance within the Department's statutory authority to alleviate the financial impacts of COVID-19, the process will facilitate the Deputy Secretary's considerations for determining a reduction to be necessary and appropriate.
- In October of 2020, the Deputy Secretary directed that the IE Funding Opportunity announcement (FOA) process undergo a 30-60 day review by the MA office to be streamlined and simplified, in response to ongoing concerns expressed by tribes and tribal entities that the current process is overly complicated, cumbersome, and presents a barrier for many tribal communities to participate in the financial assistance offered by IE.

Leadership Challenges

Long Term Budget and Staffing. Continued support for increased budget requests are critical to continuing to support the Department of Energy's Strategic Objective 5 and implement the functions authorized under Energy Policy Act of 2005. Continuing to fill vacant positions is necessary to being able to execute the mission, particularly the Deputy Director position, which has remained vacant for nearly two years. The Deputy Director slot is essential to fill quickly, as it functions as the COO of the office, ensuring day-to-day management and staffing issues are overseen successfully.

Critical Events and Action Items

None. Implementation of the formalized cost-chare reduction request process should be monitored closely by HQ to ensure it is done in an effective and efficient manner.

Organizational Chart

Office of Indian Energy and Policy

Director

Deputy Director

ORGANIZATION OVERVIEWS | Office of the Under Secretary of Energy

Office of Energy Efficiency and Renewable Energy

Supporting the DOE Mission

The Office of Energy Efficiency and Renewable Energy (EERE) plays a critical role in advancing DOE's mission to ensure America's security and prosperity by developing affordable renewable energy and energy efficiency technologies (investing in research and development activities); reducing regulatory burdens; and improving grid reliability and resilience.

Mission Statement

EERE promotes affordable and reliable energy to enhance America's economic growth and energy security through technology development in the energy efficiency, renewable power, and sustainable transportation sectors.

EERE is accelerating the development and adoption of sustainable transportation technologies; increasing the generation of electric power from renewable resources; improving the energy efficiency of homes, buildings, and industries; stimulating the growth of a thriving domestic clean energy manufacturing industry; enabling the integration of clean electricity into a reliable, resilient, and efficient grid; and enabling a highperforming, results-driven culture through effective management approaches and processes.

EERE has stewardship responsibility for the National Renewable Energy Laboratory (NREL) in Golden, Colorado, which has 2,685 employees and a \$492,000,000 annual operating budget. NREL's mission is to develop clean energy and energy efficiency technologies and practices; advance related science and engineering; and provide knowledge and innovations to integrate energy systems at all scales.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$2,379,000,000
FY 2020 enacted	\$2,777,277,000
FY 2021 request	\$719,563,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 675-700 FTEs per FY 2020 Appropriations language located in Washington, D.C., and Golden, Colorado. Within this total, EERE also supports 44 FTEs at the National Energy Technology Laboratory who provide project management and procurement support.

History

The statutory foundation for EERE is authorized by United States Code, Title 15 (Commerce and Trade) and Title 42 (Public Health and Welfare) which specifies applicable programs, activities, goals, and objectives.

Functions

EERE is divided into three Technology Sectors— Energy Efficiency, Renewable Power, and Sustainable Transportation—as well as a Corporate Sector, which includes Mission-Critical Support Operations.

Energy Efficiency Sector

EERE's Energy Efficiency portfolio advances American energy competitiveness through the pursuit of research and development (R&D) targeted at high impact technology areas such as critical materials; plastics recycling; manufacturing processes; gridinteractive building systems; advanced lighting; space heating and cooling; and building envelopes. The overall goal of the energy efficiency portfolio is to strengthen the body of knowledge that enables businesses, industry, and the federal government to improve the affordability, energy productivity, and resiliency of our homes, buildings, and manufacturing sectors. This sector is divided into four main functions, including:

Advanced Manufacturing

The Advanced Manufacturing Office supports R&D focused on advancing and creating new understanding of underlying technologies, materials, and processes relevant to the productive use of energy in manufacturing, as well as the competitive manufacturing of energy related products. This office supports the development of technologies to enable domestic supply of critical materials related to energy applications, substitutes for critical materials, and technologies for reuse and recycling of critical materials.

Building Technologies

The Buildings Technologies Office supports R&D of innovative building energy technologies such as lighting, space conditioning, refrigeration, windows, and envelope and their effective integration into smart, efficient, resilient, grid-interactive, affordable, and secure building systems. In support of the Energy Storage Grand Challenge, particular focus will be placed on building system interaction with the grid in terms of controllable loads and thermal energy storage technologies. Through the Better Buildings Initiative, the Building office fosters the accelerated adoption of energy efficient technologies and practices by attracting and establishing close, trusted relationships with key market leaders, and encourage private sector investment into energy efficient technologies. Finally, it supports DOE working with industry and stakeholders to meet requirements for statutorilymandated efficiency standards and building energy codes determinations.

Federal Energy Management Program

The Federal Energy Management Program (FEMP) strengthens agencies' ability and agility to manage their critical missions, and provides strategic energy management assistance for agencies to become resilient, efficient, and secure in support of Administration priorities for American energy dominance. FEMP strives to increase government accountability and development of a futurefocused workforce. FEMP supplies agencies with the information, tools, and technical assistance they need to meet and track their energy-related requirements and goals through the following focus areas:

 Strategic Programming and Integration Planning. Providing agencies with information and resources to help them develop strategic programs and plans to successfully reduce Federal energy and water use. FEMP also develops, analyzes, and shares information about Federal laws and requirements.

- Facility and Fleet Optimization. Coordinating processes to integrate mission assurance with optimized and cost-effective facility and fleet operations. Specialty areas include strategic energy management; commissioning; data centers; Federal fleet management; guiding principles for sustainable Federal buildings; laboratories; metering; net zero energy, water, and waste; and operations and maintenance plans.
- Federal Leadership and Engagement. Providing accountability on Federal agency and Government-wide energy and water performance; engaging agencies in interagency working groups and workforce development opportunities; and recognizing their efforts. Specialty areas include agency reporting and data; the annual Federal Energy and Water Management Awards; interagency working groups; training; and veteran internships.

Weatherization and Intergovernmental Programs

The Weatherization and Intergovernmental Programs' mission is to facilitate strategic investments in the deployment of energy efficiency and renewable energy technologies and innovative practices across the United States by a wide range of government, community, and business stakeholders, in partnership with state and local organizations.

Renewable Power Sector

Through its Renewable Power portfolio, EERE will perform research to enable solar, wind, water, and geothermal industries to develop and ultimately deploy low-cost, novel power generation technologies. The overarching objective of the Renewable Power portfolio is to lower costs and improve the integration of renewable energy technologies with the grid. Research on improved integration is executed through the Energy Storage Grand Challenge and the Grid Modernization Initiative. Through investments in DOE National Laboratories, industry, and academia, the Renewable Power technology programs will continue to lead the world in developing domestic, clean, reliable energy choices in power generation, which strengthen the U.S. economy while increasing energy security. This sector is divided into the following functions:

The primary function of the Geothermal Technologies Office is to support R&D to strengthen the body of knowledge to support industry efforts to accelerate the development and deployment of innovative geothermal energy technologies. The program's technology portfolio prioritizes R&D in three closely related geothermal categories: Hydrothermal, Enhanced Geothermal Systems, and Low Temperature.

Solar Energy Technologies

The Solar Energy Technologies Office funds R&D to improve the affordability and performance of solar technologies while supporting the reliability and resilience of the U.S. electric grid. Reflecting the recent and projected future growth in photovoltaic (PV) deployment, the program is placing a continued emphasis on addressing the challenges and opportunities related to integrating increasing penetrations of solar onto the electric grid. The office's efforts include building the knowledge base upon which industry can achieve further reductions in the cost of solar electricity, promoting greater energy affordability.

Water Power Technologies

The Water Power Technologies Office conducts R&D to strengthen the body of scientific and engineering knowledge supporting industry efforts to develop new technologies that increase U.S. hydropower, and marine and hydrokinetic generation.

Wind Energy Technologies

The primary function of the Wind Energy Technologies Office is to drive innovation through research, development, and testing of advanced wind technologies. The portfolio focuses on land-based, offshore, and distributed wind, as well as integration of wind energy on the grid. The primary goal is cost reduction, while also informing market choices; ensuring the reliability, resilience, and security of wind power and the grid; exploring means for mitigating siting and environmental challenges; and nurturing a robust U.S. manufacturing sector and related workforce.

Sustainable Transportation Sector

EERE's sustainable transportation portfolio supports comprehensive, analysis-based research strategies that ultimately enable industry to accelerate the development and widespread use of a variety of promising sustainable transportation technologies. Broadly, transportation programs within EERE pursue four key parallel solution pathways: (1) fuel diversification, replacing conventional fuels with cost-competitive, domestically produced alternatives; (2) vehicle efficiency, using less fuel to move people and freight; (3) energy storage, delivering durable, reliable, resilient, and affordable energy storage options across sectors; and (4) mobility energy productivity, improving the overall energy efficiency and efficacy of the transportation or mobility system. The pathways and activities also include those necessary to address statutory requirements and the supporting advanced datadriven, technical, economic, and interdisciplinary systems analyses critical to informing R&D investment priorities. This sector is divided into three main technologies:

Bioenergy Technologies

The Bioenergy Technologies Office focuses on R&D of transformative, sustainable bioenergy technologies that can support a growing bioeconomy. The office invests in development of technologies for producing cost-competitive advanced biofuels, biopower, and bioproducts from the nation's abundant domestic, renewable biomass and waste resources.

Hydrogen and Fuel Cell Technologies

The Hydrogen and Fuel Cell Technologies Office focuses on R&D that supports multisector partnership efforts to develop and deploy hydrogen and fuel cell technologies that are cost competitive with conventional technologies. The overarching program goal, supporting the DOE H2@Scale initiative, is to facilitate wide-spread adoption of hydrogen and fuel cells across sectors by reducing the cost and improving the performance/durability of fuel cells, as well as developing affordable and efficient technologies for hydrogen production, delivery, and storage.

Vehicle Technologies

The Vehicle Technologies Office funds research to develop new, affordable, efficient, and clean transportation options that increase domestic economic opportunity. This research will generate knowledge that industry can advance to deploy innovative energy technologies to support affordable, secure, reliable, and efficient transportation systems across America. The office currently focuses on new innovations in electrification to include: advanced battery technologies; advanced combustion engines and fuels (including co-optimized systems); advanced materials for lighter-weight vehicle structures and better powertrains; and energy efficient mobility technologies and systems (including automated and connected vehicles, as well as innovations in connected infrastructure for significant systemslevel energy efficiency improvement).

Recent Organization Accomplishments

Led Significant Achievements in Promoting Security, Prosperity, and Energy Dominance

Global investment in clean energy has increased substantially in response to the need to address security, prosperity, and energy dominance challenges and opportunities. EERE's investment in R&D has supported the following successes:

- Between 2010 and 2019, the average cost to utilities of power purchase agreements (PPAs) for utility scale photovoltaic electricity decreased by 83 percent, and the cost for wind PPAs between 2010 and 2018 decreased by 69 percent.
- In the past 10 years, modeled battery costs for electric vehicles have dropped by 80 percent [to \$169/kilowatt-hour (kWh)], and in the past year alone, EERE-sponsored R&D has helped drive a 2.6 percent energy intensity reduction among industry partners.
- The Solar program met its 2020 goal for unsubsidized, utility-scale solar PV electricity of \$0.06/kWh in 2017; three years ahead of schedule.
- Achieved the 2020 cost target for offshore wind early, surpassing it by 3 cents per kilowatt-hour¹.
 Following this milestone, WETO significantly adjusted its offshore LCOE targets downward².

• Oversaw the expansion of renewable power, including a doubling of solar production from 2016 through 2019, and a 32 percent increase in wind production.

EERE supported researchers John B. Goodenough and M. Stanley Whittingham were **recognized as Nobel laureates** for their work in developing lithium-ion batteries. The development of lithium-ion batteries have resulted in numerous advancements in key industries such as mobile phones and plug-in electric vehicles.

Researchers at the National Renewable Energy Laboratory (NREL) **set a new world record** for solar conversion efficiency by fabricating a six-junction solar cell with an efficiency of nearly 50 percent.

Initiated the Plastics Innovation Challenge, which launched a comprehensive program to design new highly recyclable or biodegradable plastics; develop novel methods for deconstructing and upcycling existing plastic waste; and address plastic waste. Most recently, in March 2020, DOE announced the Bio-Optimized Technologies to keep Thermoplastics out of Landfills and the Environment (BOTTLE) funding opportunity and the launch of a BOTTLE Consortium focused on designing new plastics and recycling strategies, in collaboration with industry and academia.

Launched the American-Made Challenges. DOE has invested more than \$40,000,000 in 16 different American-Made prizes and competitions to advance energy innovation and American manufacturing.

Established the ReCell Battery Recycling R&D Center and launched the Lithium Ion Battery Recycling Prize to develop technologies to profitably capture 90 percent of all lithium-based battery technologies in the United States and recover 90 percent of the key materials from the collected batteries.

EERE created the Energy-Water Desalination Hub

¹ WETO showed that the modeled 2017 LCOE for offshore wind on the East Coast of the United States (the only place where nearterm deployment is planned) surpassed the 2020 target by \$0.03/kWh. This occurred through the FY18 GPRA reporting process, which was analyzed and reported in FY19 (e.g. in 2019 we report to OMB on how we performed in FY18, based on 2017 data due to a lag in data availability.) The levelized cost of energy targets for offshore wind (in 2015 dollar terms) were 14.9 cents/kWh by 2020 and 9.3 cents/kWh by 2030. DOE reported an LCOE for calendar year 2017 of 12.4 cents/kWh in 2017 dollar terms. When converted to 2015 dollars, the offshore wind LCOE in 2017 was 11.9 cents/kWh.

² After surpassing this goal, WETO revised its offshore LCOE targets to 8.6 cents/kWh in 2020 and 5.1 cents/kWh in 2030.

as part of the White House Water Security Grand Challenge, announcing nearly \$100 million for the National Alliance for Water Innovation to address water security issues in the United States.

Reduced the cost of electrolyzers, which produce hydrogen from water and electricity, by 80 percent **and automotive fuel cell costs** by 60 percent in the past decade, while their durability quadrupled to over 120,000 miles.

Funded the development of a renewable jet fuel used for the first time in a commercial flight from Orlando to London Gatwick, a blend of alcoholto-jet fuel produced using LanzaTech and Pacific Northwest National Laboratory technology.

Rolled Back Unnecessary Regulations, supporting a presidential priority by refocusing energy conservation standards to increase consumer choice and save over \$300 million for the American people.

Protected Consumer Lighting Choices by

preventing more stringent regulations on common incandescent lightbulbs that would have essentially regulated those products out of existence, denying families the ability to make their own lighting choices.

Initiated the Sustainability in Manufacturing

Partnership to help drive manufacturing productivity improvements, resulting in partners saving over \$6 billion in energy costs.

Leadership Challenges

Recruitment and Retention

Like many government agencies, it is a challenge for EERE to recruit and retain the best staff. For leadership positions, EERE needs to identify high caliber experts in technology areas with executive level management experience. At the staff level, EERE established a "Great Place to Work" program, to attract and retain the best and brightest.

Remaining Agile and Staying Ahead of Cutting Edge Research and Development

EERE works with DOE's national laboratories and private sector partners to find solutions to today's and tomorrow's technical challenges. Those solutions are vital to the EERE mission to create and sustain American leadership in the transition to a global clean energy economy.

Critical Events and Action Items

December 2020/January 2021

Critical Materials Funding Opportunity Announcement (FOA): Next-Generation Technologies and Field Validation Award Selections.

This \$30 million in funding is for research and development that focuses on field validation and

demonstration, as well as next-generation extraction, separation, and processing technologies for critical materials. *EERE, Advanced Manufacturing Office*

January 2021

Water Security FOA: Research and Development for Advanced Water Resource Recovery Systems FOA Selections

This \$20 million funding opportunity is to develop technology innovations that strengthen America's water infrastructure and enable advanced water resource recovery systems that have the potential to be net energy positive. *EERE, Advanced Manufacturing Office*

FY 2020 Perovskite FOA Selections

This \$20 million funding opportunity is to further advance perovskite research and development by funding projects in device and manufacturing R&D, as well as establishing an independent validation program. This FOA directly addresses FY 2020 appropriations language to further develop manufacturability of perovskites. *EERE, Solar Energy Technologies Office*

March 2021

Down Selection of the three Topic 1 awardees from the FY 2018 *Generation 3 Concentrating Solar Power Systems* FOA

Topic 1 of the FOA on Integrated Generation 3 CSP systems was broken down into three phases. Phases one and two were focused on further development on key components within the integrated system as well as finalization of the integrated system design. In Phase three, one awardee will be chosen to build a test facility that allows diverse teams of researchers, laboratories, developers, and manufacturers to test components and systems through a wide range of operating conditions necessary to advance the next generation of CSP technology. EERE, Solar Energy Technologies Office

TBD

Appliance Standards/Rulemaking.

There may be announcements related to two topics (showerheads and manufactured housing) in the coming months. If released, these announcements could draw significant interest from a diverse set of stakeholders, including members of Congress and the media. *EERE, Building Technologies Office*

Organizational Chart Office of Energy Efficiency and Renewable Energy


Office of Electricity

Supporting the DOE Mission

The Office of Electricity (OE) leads the Department of Energy's (DOE, the Department) research and development activities to provide long-term transformational strategies that will help ensure the Nation's most critical energy infrastructure is secure, reliable, and resilient. OE is leading the efforts to modernize the electricity delivery system to ensure that it supports the evolving grid and emerging threats. OE achieves this mission through a mix of technology and policy solutions in partnership with the public and private sectors. OE works with Federal, State, local, and industry partners to bolster the resilience of the energy infrastructure when major energy supply interruptions occur.

Mission Statement

A secure and resilient power grid is vital to national security, economic security, and the services Americans rely upon. Working closely with its private and public partners, the Office of Electricity leads the Department's efforts to ensure the Nation's most critical energy infrastructure is secure and able to recover rapidly from disruptions.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$156,000,000
FY 2020 enacted	\$190,000,000
FY 2021 request	\$195,045,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 74

History

In recognition of the important need to modernize the electric infrastructure, the Office of Electricity Delivery and Energy Reliability (OE) was formed in 2005 to focus on advance technology research and development in electric transmission and distribution (smart grid, renewable integration) and emergency response due to natural and manmade disruptions to the grid. Due to the increasing threat to our national security from growing cybersecurity attacks as well as the ongoing threat of natural disasters, in 2018, the Secretary of Energy directed the creation and standup of the new Office of Cybersecurity, Energy Security, and Emergency Response (CESER) to strengthen DOE's role as the sector-specific agency for the energy sector, support the Department's expanded national security responsibilities, and better address emerging threats and natural disasters. The realignment resulted in those two functions separating from OE. It also moved the four Power Marketing Administrations (PMAs) (Bonneville Power Administration, Western Area Power Administration, Southeastern Power Administration, and Southwestern Power Administration) from under the Deputy Secretary to be managed by the Assistant Secretary of Electricity. The purpose of the realignment of the PMAs was to enhance the synergy between OE and the PMAs to efficiently maximize technology advancement opportunities and to provide the benefit of having in-house real time knowledge of utility systems operations and the electric market. The reorganization allowed OE to focus on long-term strategic and foundational R&D efforts related to the resilience and reliability of our Nation's grid necessary to ensure national security. Specifically, OE is developing strategies to ensure the viability of our defense critical energy infrastructure against threat vectors.

Since the inception of OE, the organization has stimulated advancements in the electric delivery system; improved the understanding of critical dependencies; accelerated the rate of scientific development in supply and demand side electric technologies; identified barriers to continued reliable electric service; deepened consideration of security and resilience measures in infrastructure planning; assisted many states and regions in improvements to their own electricity policies; and expanded partnerships with State and private sector stakeholders. The organization delivers enabling solutions to achieve America's energy security and electricity policy while sustaining applied research into new advanced technologies and policies.

Functions

Advanced Grid Research and Development

OE leads national efforts to develop the next generation of technologies, tools, and techniques for the efficient, resilient, reliable, and affordable delivery of electricity in the U.S. OE manages programs related to modernizing the Nation's power grid, and leads activities designed to accelerate discovery and innovation in electric transmission and distribution technologies and create "next generation" devices, software, tools, and techniques to help modernize the electric grid. Efforts include, but are not limited to:

- grid scale energy storage;
- advanced modeling to simulate and assess the behavior of electric power systems, as well as associated dependencies on natural gas, and other critical energy infrastructures;
- new grid architectures and control mechanisms;
- advanced technologies such as solid-state high voltage devices, including transformers and power flow controllers that can optimize power delivery and enhance resilience (power electronics);
- complex interactive capabilities that can allow the system to respond to change (adaptive networks);
- new sensing technologies;
- intelligent communications and control systems; and
- new advanced materials that can offer benefits such as lowered cost, greater efficiency, and longer life for smart grid technologies.

Transmission Permitting and Technical Assistance (TPTA)

TPTA's Defense Critical Electric Infrastructure (DCEI) effort enhances U.S. national security by risk-managing and energy assuring critical defense facilities (CDF's) identified by the Secretary of Energy as authorized by the 2015 FAST Act. This work composes four lines of effort: 1) creating a DCEI program platform; 2) developing a DCEI financing and funding strategy; 3) establishing effective coordination mechanisms for key partnerships; and 4) developing DCEI project assessment tools. TPTA's recovery work furthers energy resilience and helps lower the cost of future disasters by supporting comprehensive recovery solutions for affected communities. TPTA also manages policies and programs related to the Energy Policy Act, as well as energy transmission and permitting on behalf of the Department.

Power Marketing Administrations

The four Federal PMAs operate electric systems and sell the electrical output of Federally-owned and operated hydroelectric dams in 34 States. The PMAs also play a large role in transmission, both as transmission owners and operators. All four of the PMAs function as balancing authorities for their regions. Through the Reclamation Project Act of 1939 and the Flood Control Act of 1944, in addition, the primary statute governing Bonneville's rate setting process is the Northwest Power Act, the PMAs are required to set rates to cover costs at the lowest possible rates to consumers consistent with sound business principles, forgoing any profit.

Recent Organization Accomplishments

Advanced Grid Research and Development

Energy Storage Grand Challenge (ESGC)

On January 8, 2020, DOE announced a crosscutting effort to create and sustain America's global leadership in energy storage use, production, and exports, while using a secure, domestic manufacturing supply chain that does not depend on foreign sources for critical materials. The vision for the Grand Challenge is to create and sustain global leadership in energy storage utilization and exports, with a secure domestic manufacturing supply chain.

Grid Modernization Initiative (GMI)

DOE announced the results of the 2019 Grid Modernization Lab Call with funding of approximately \$80 million over three years and is focused on developing projects in resilience modeling; energy storage and system flexibility; advanced sensors and data analytics; institutional support and analysis; cyber-physical security; and generation. This funding aims to strengthen, transform, and improve the resilience of energy infrastructure to ensure the Nation's access to reliable and secure sources of energy now and in the future. The selected projects will expand on prior GMLC efforts and the portfolio of projects to emphasize a fully integrated vision of the energy system, from fuel to generation to load, including interdependent infrastructures while focusing on bulk-power system impacts. The Strategy and Multi-Year Program Plan governing the GMI was recently revised to include a broader set of strategic goals and focused actions that address the objectives.

The Grid Storage Launchpad (GSL)

The GSL, OE's first ever construction project, will address the significant capability gaps that exists for accelerating research in and validating the performance of battery technologies that are suited for grid applications. The scope of the GSL includes the design and construction of a new research facility on the Pacific Northwest National Laboratory campus. Key elements of the GSL conceptual design, cost and schedule were completed and the solicitation for services to design and build the GSL was released for bid in July 2020.

Transformer Resilience and Advanced Components (TRAC) Program Vision and Framework

This document describes the opportunities, goals, and key activities needed for the design of nextgeneration transmission and distribution (T&D) grid technologies that will influence and shape the research and development (R&D) activities in the future. Standardized designs do not exist for many T&D grid components, and their customized nature drives up equipment and installation costs. Modular and scalable designs would enable greater standardization and allow for more cost-effective capacity expansion. Additionally, local intelligence with embedded sensors, data processing, and communications would enable real-time health monitoring, reducing maintenance costs and enhancing system reliability by preventing failures. In addition, the TRAC program developed a Solid-State Power Substation Technology Roadmap which examined the future of substation technology along with advancements in grid power electronics. The Roadmap details opportunities to improve the performance of substation components and to reconsider the design of these critical nodes to support evolution of the grid.

Kirtland Air Force Base DC Microgrid

A resilient DC microgrid project was brought online at Kirtland Air Force Base (KAFB) in December 2019, through a cooperative R&D agreement between Sandia National Laboratories, with funding from the OE and Emera Technologies. The project, the first of its kind between DOE and Department of Defense (DoD) sites, resulted in the installation of a single-bus, ten-node 250 kW DC microgrid on KAFB that links together generation and load between Kirtland DoD facilities, Sandia's Distributed Energy Technology Laboratory (DETL), and the Photovoltaic Systems Evaluation Laboratory (PSEL) to power a demonstration site consisting of six housing units, a laundromat and a community center as a proof of concept.

Transmission Permitting and Technical

Assistance

Bulk-Power System Executive Order

On May 1, 2020, the President signed Executive Order (EO) 13920, "Securing the United States Bulk-Power System," which authorizes the U.S. Secretary of Energy to work with the Federal partners and the energy industry to secure America's bulk-power system (BPS). In the EO, the President declared that threats to the bulk-power system by foreign adversaries constitute a national emergency. Serving as the backbone of our Nation's energy infrastructure, the BPS is fundamental to national security, emergency services, critical infrastructure, and the economy. The EO calls for DOE to adopt rules and regulations prohibiting certain acquisitions, import, transfer, or installation of bulk-power system components where there is a credible threat that could compromise the BPS. DOE is also working closely with its Federal and industry partners to develop a mechanism to pre-gualify equipment and vendors for the BPS supply chain.

CEII Final Rule

On May 15, 2020 the Critical Electric Infrastructure Information (CEII) Final Rule went into effect. The "CEII" designation protects and secures critical information about the Nation's electric infrastructure as part of DOE's commitment to improve energy security while ensuring a reliable and resilient flow of energy to America's communities and businesses. In the CEII final rule, DOE established administrative procedures for how the Department will designate, protect, and share CEII. The rule also provided procedures for DOE coordination with other Federal agency partners and industry to facilitate mutual understanding and information sharing as it may relate to CEII.

Leadership Challenges

OE's leadership challenges include:

Personnel Resource Demands

OE leadership is sought on a regular basis to help Federal agencies, States, local, and tribal communities meet the Nation's high expectations for innovative electric grid technology; high quality energy resilience system infrastructure analysis; and implement, manage, and execute changes affecting the energy infrastructure.

Financial Resource Investment

Responsible for the grid-scale energy storage program, one of the key components for the development of a flexible and resilient electric grid infrastructure and a top priority of the Department, as well as the lead to strengthen the security of the Nation's defense critical electric infrastructure and mitigate risks to the bulk-power system, OE will need substantial financial investment in order to succeed.

Critical Events and Action Items

Jan/Feb 2021

The Grid Storage Launchpad (GSL), the first ever OE construction project, will address the significant capability gaps that exists for accelerating research in and validating the performance of battery technologies that are suited for grid applications. The scope of the GSL includes the design and construction of a new research facility on the Pacific Northwest National Laboratory Campus. Critical Decision 2/3, required before construction start, is expected to take place in late January or early February.

May 1, 2021. Executive Order (EO) 13920, "Securing

the United States Bulk-Power System," issued on May 1, 2020, declared that threats to the bulkpower system by foreign adversaries constitute a national emergency. That designation will expire on May 1, 2021 and, absent legislative codification, the national emergency declaration would need to be renewed prior to that date. Additionally, during this time frame, it is anticipated DOE would be in the process of publishing a final rule prohibiting certain acquisitions, import, transfer, or installation of bulkpower system components where there is a credible threat that could compromise the BPS.

Second/Third Quarter of FY 2021

In 1964, Canada and the United States ratified the Columbia River Treaty (Treaty). The Treaty has no end date but either country can unilaterally terminate the Treaty from September 2024 onwards provided that at least 10 years notice is given. The second is the expiry of the pre-paid assured flood control operation in Canada of 8.45 million acre feet (MAF) that the U.S. purchased for sixty years in 1964 and the resulting shift to an ad hoc "Called Upon" flood control operation. This ability to terminate the Treaty, and changing flood control provisions whether the Treaty is terminated or not, have prompted both countries to undertake a review of the Treaty to determine its future. The Treaty has worked well in optimizing flood control and power objectives. It would be beneficial to resolve this ahead of 2024. The FY 2021 objective is to calculate and develop a U.S. position on the benefits and value for prepaid flood control.

Organizational Chart



Office of Electricity

Bonneville Power Administration

Supporting the DOE Mission

The Bonneville Power Administration (Bonneville) supports the Department of Energy's (DOE) Strategic Plan Objective 4: "Improve electric grid reliability and resilience" of Goal 1, Promote American Energy Dominance.

With Bonneville's responsibility to serve the majority of the Northwest region's high voltage needs, Bonneville's asset management strategy for transmission covers nine primary asset programs including alternating current substations, direct current substations, control centers, power system control, system telecommunications, system protection control, rights-of-way, wood pole lines, and steel lines. The assets within these programs deliver electric power to more than 12 million people.

In its 2018–2023 Strategic Plan, Bonneville adopted a more flexible, scalable, economical, and operationally efficient approach to managing its transmission system. To ensure correctly-sized asset investments, Bonneville has and continues to increase its reliance on advanced technology, robust regional planning, industry standard commercial practices, and coordinated system operations. Bonneville is committed to taking a forward-looking approach with its investment decisions and is improving its capital investment program through the systematic incorporation of criticality, health, and risk into investment prioritization.

Mission Statement

As a public service organization, Bonneville Power Administration's mission is to create and deliver the best value for our customers and constituents as we act in concert with others to assure the Pacific Northwest:

- An adequate, efficient, economical and reliable power supply.
- A transmission system that is adequate to the task of integrating and transmitting power from Federal and non-federal generating units,

providing service to Bonneville's customers, providing interregional interconnections, and maintaining electrical reliability and stability.

- Mitigation of the impacts on fish and wildlife from the Federally-owned hydroelectric projects from which Bonneville markets power.
- Bonneville is committed to cost-based rates, and public and regional preference in its marketing of power. Bonneville sets its rates as low as possible, consistent with sound business principles and the full recovery of all of its costs, including timely repayment of the Federal investment in the system.

Budget

BPA is self-financing and does not receive annual appropriations.

Fiscal Year	Budget
FY 2019 enacted	\$4,410,452
FY 2020 enacted	\$4,133,669
FY 2021 request	\$4,245,831

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 3,000

History

The Bonneville Project Act of 1937 provides the statutory basis for Bonneville's power marketing responsibilities and authorities. In 1974, the passage of the Federal Columbia River Transmission System Act (Transmission Act) applied provisions of the Government Corporation Control Act (31 U.S.C. §§ 9101-9110) to Bonneville. The Transmission Act provides Bonneville with "self-financing" authority; establishes the Bonneville Fund (a permanent, indefinite appropriation) allowing Bonneville to use its revenues from electric power and transmission ratepayers to fund all programs without further appropriation; and authorizes Bonneville to sell bonds to the U.S. Treasury. As of the end of FY 2019, Bonneville has a revolving U.S. Treasury borrowing authority of \$7.7 billion, of which approximately \$2.4 billion remains available to be drawn.

The 1980 enactment of the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act) expanded Bonneville's authorities, obligations, and responsibilities. The purposes of the act include the following: to encourage electric energy conservation to meet regional electric power loads placed on Bonneville; to develop renewable energy resources within the Pacific Northwest; to assure the Northwest an adequate, efficient, economical, and reliable power supply; to promote regional participation and planning; and to protect, mitigate, and enhance the fish and wildlife of the Columbia River and its tributaries. The Northwest Power Act also established a revised statutory framework for Bonneville's administrative ratesetting process and established judicial review of Bonneville's final actions in the U.S. Court of Appeals for the Ninth Circuit.

Functions

Bonneville provides electric power services and transmission services, and acquires energy efficiency throughout the Pacific Northwest. Bonneville serves a 300,000 square mile area including Oregon, Washington, Idaho, western Montana, small parts of eastern Montana, California, Nevada, Utah, and Wyoming, totaling about 14 million people. Bonneville markets the electric power produced from 31 federal hydro projects in the Pacific Northwest owned by the U.S. Army Corps of Engineers and the Department of the Interior's Bureau of Reclamation. In addition, Bonneville acquires power from non-federal generating resources, including the Columbia Generating Station (CGS), a nuclear power plant. Bonneville uses the power from its non-federal purchases and the Federal projects, collectively the Federal Columbia River Power System (FCRPS), primarily to meet the Administrator's long term firm power sales contract obligations. Bonneville currently maintains and operates 15,197 circuit miles of transmission lines, 262 substations, and associated power system control and communications facilities over which this electric power is delivered. Bonneville also supports the protection and enhancement of fish and wildlife, and promotes conservation and energy efficiency as part of its efforts to preserve and balance the economic and environmental benefits of the FCRPS.

Recent Organization Accomplishments

Cost Management

In September 2020, Bonneville completed its public process to review proposed program funding levels

before filing its initial rates proposals for power and transmission services in Fiscal Years 2022 and 2023. In its Integrated Program Review, Bonneville concluded it will hold its program funding levels for power services below the rate of inflation, a key part of its strategic plan.

COVID-19 Response

Beginning in March 2020, Bonneville responded to the expanding COVID-19 pandemic by instructing all non-mission critical operating personal to telework for an indefinite period of time. Bonneville suspended transmission construction projects and limited field operations to critical work. As local health directives permitted, Bonneville resumed construction and maintenance activities. In June 2020, Bonneville completed an expedited rate proceeding to suspend its Financial Reserve Policy surcharge to provide its public power preference customers about \$3 million per month of rate relief for the remainder of FY 2020, and \$30 million for FY 2021.

Wildfire Mitigation

Wildfires pose a threat for transmission providers in the western United States. In 2020, Bonneville completed a Wildfire Mitigation Plan to prevent Bonneville transmission lines and other assets from sparking wildfires, and to protect Bonneville lines and assets from the threat of wildfires. During the 2020 fire season, Bonneville deployed an incident management team to coordinate its response to wildfires.

Columbia River System Operations Review (CRSO)

In September 2020, Bonneville and its partner Federal agencies completed the four-year CRSO. The CRSO produced an environmental impact statement covering the operations of the Federal Columbia River Power System and the associated effects on fish, wildlife, and cultural resources. The CRSO included extensive public involvement and engagement with Pacific Northwest states and tribal governments.

Grid Modernization. Bonneville continues a crossagency grid modernization initiative. Bonneville's strategic objective is to modernize Federal power and transmission systems and their supporting technology. Grid modernization involves improving transmission and generation system visibility and controls, and increasing the electricity market skills of Bonneville employees. Part of the grid modernization scope is Bonneville's evaluation of joining the Western Energy Imbalance Market (EIM) and enabling Federal and non-federal resources in its service area to access that market. Bonneville expects that joining the EIM will optimize the dayto-day operation of the power system and leverage hydropower in a market increasingly driven by intermittent renewable resources.

Integrated Regional Transmission Planning

In 2020, Bonneville began participation in the newly formed NorthernGrid regional planning organization under FERC Order 1000. Order 1000 requires transmission-owning utilities to participate in regional planning organizations to guide transmission resource development and optimize grid operations. In the Pacific Northwest, regional planning had been divided under two planning organizations. Bonneville's 2018–2023 Strategic Direction included the objective of pursuing a single entity to combine planning efforts and reduce duplication. The regional parties responding to this initiative included utilities subject to FERC jurisdiction and non-jurisdictional entities. The parties developed the functional structure of NorthernGrid and completed a funding agreement in 2019. The parties selected a project coordinator and began implementation in 2020.

Leadership Challenges

None.

Critical Events and Action Items

The Columbia River Treaty

The U.S. Government reached consensus on a high-level position for negotiations of the post-2024 future of the Columbia River Treaty in June 2015, and received the authorization to negotiate with Canada on the Columbia River Treaty in October 2016. Government Affairs Canada notified the U.S. State Department (DOS) in December 2017 of Canada's mandate to negotiate the Columbia River Treaty with the United States. Negotiations began in spring 2018 and continue to date. Both the DOS and Canadian negotiators have discussed shared objectives and exchanged information on flood risk management, hydropower, and ecosystem considerations.

Regional Electric System Reliability

Recent regional forecasts have shown that the Pacific Northwest as a whole is nearing periods of times of the year when regional power supplies may not be adequate to meet demand. In early 2021, Bonneville will continue to work with other regional utilities through the Northwest Power Pool on an initiative to develop a voluntary but enforceable program to ensure that the region maintains a balance of supplies and demand in a very high percentage of likely conditions.

Power and Transmission Rates

In November 2020, Bonneville will file a Federal Register Notice for its initial proposal for power and transmission service rates for Fiscal Years 2022 and 2023. During the first part of 2021, Bonneville will conduct formal rate proceedings with rate case parties, leading to the Administrator's Record of Decision for final rates to be in effect on October 1, 2021.

Organizational Chart



Bonneville Power Administration

Southeastern Power Administrtation

Supporting the DOE Mission

The Southeastern Power Administration (SEPA) supports the DOE strategic plan by continuing the core mission to market and deliver clean, renewable, reliable, cost-based Federal hydroelectric power and related services. Specifically, SEPA contributes to the DOE Strategic Plan Goal 1; Objective 2: to support a more economically competitive, environmentally responsible, secure, and resilient U.S. energy infrastructure. This ensures the reliability of service delivery and contributes to the stability of the national electricity grid in the specific area of power and transmission service and energy infrastructure.

Mission Statement

SEPA's mission is to market and deliver Federal hydroelectric power, at the lowest possible cost to public bodies and cooperatives in the Southeastern United States.

Budget

SEPA's total program budget is fully offset by Congressionally authorized use-of-receipts. No funding comes from traditional annual appropriations. All program costs are repaid through power sale revenues with no costs borne by the taxpayer.

Fiscal Year	Budget (Total Program)	Appropriations
FY 2019 enacted	\$75,324,000	\$0
FY 2020 enacted	\$77,301,000	\$0
FY 2021 requested	\$96,647,000	\$0

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 44

History

SEPA was established in 1950 by the Secretary of the Interior as a Federal agency that today operates within the Department of Energy (Department, DOE), as authorized by Section 5 of the Flood Control Act of 1944. Like the other Power Marketing Administrations (PMAs), SEPA must give preference to public utilities and rural electric cooperatives. Unlike other PMAs, SEPA does not own or operate transmission assets. This is due to private utility opposition and the political climate of the 1950's. SEPA was transferred from the DOE in 1977 when the Department was created.

SEPA is one of four PMAs managed by DOE to market the electric power and energy generated by Federal reservoir projects across the United States.

SEPA recovers 100 percent of costs through the rates charged to customers. In Water Resources Development Act of 2000 Section 212, Congress responded to dwindling appropriations for United States Army Corps of Engineers (USACE) hydropower infrastructure funding and authorized "customer funding" for major USACE hydropower investment. Annual appropriations for these investments are no longer needed. Today, USACE primarily only requests routine operations & maintenance appropriations from Congress for regional hydropower costs, as nearly all capital hydropower infrastructure projects are customerfunded.

In 2001, Congress responded to dwindling appropriations for SEPA by allowing the purchase power and wheeling (PPW) portion of the budget to be funded using offsetting collection from power sale revenue up to an annually authorized ceiling amount. This amount changes year to year. In FY 2020, the Congressionally approved ceiling amount was \$56 million. This was the third consecutive year the enacted PPW level fell short of the request level due to Congressional Budget Office scoring issues.

In 2010, Congress authorized net zero appropriations to allow annual authorized program direction (PD) expenses to be offset through revenue.

Functions

SEPA's primary functions are:

- Market 3,392 megawatts of hydroelectric capacity from 22 Federal multipurpose projects, operated by the USACE at cost-based rates.
- Serve 474 public power customers across an 11-State service area.
- Arrange wheeling (transmission) contracts for the delivery of Federal power.
- Dispatch power from three plants on the Savannah River as an approved energy Balancing Authority in accordance with current North American Electric Reliability Corporation (NERC) standards and criteria.
- Conduct annual repayment studies to determine if power rates will produce sufficient revenue to reimburse all generation, transmission, and marketing expenses.
- Establish and effect interim five-year term power rates for four regional electric systems which Federal Energy Regulatory Commission (FERC) approves on a final basis.

Recent Organization Accomplishments

SEPA markets nearly 3,400 megawatts of hydroelectric capacity, averaging 7.7 billion kilowatt hours of hydroelectric energy annually. This is "clean power" without carbon emissions, and annually reduces emission of carbon dioxide by 6 million tons, sulfur dioxide by 3,080 tons, and nitrogen oxides by 2,700 tons. Without this SEPA power, 13 million barrels of fuel oil, 3 million tons of coal, or 25 billion cubic feet of natural gas would be depleted annually to account for SEPA customers' electricity demands.

In 2020, SEPA finalized a Renewable Energy Certificate (REC) component of the Kerr-Philpott Power Marketing Policy to allow distribution of PJM regional transmission organization generated credits to be distributed to the preference customers in the PJM footprint. SEPA anticipates exploring the value of adding REC components to the Cumberland marketing policy in 2021.

In 2020, SEPA transitioned 11 power system operators from a General Service (GS) to an Administratively Determined (AD) pay scale based on division C, title III, Public Law 116-94. This will allow operators to be paid according to industry standards and will help with recruitment and retention.

SEPA is constantly working both internally and with the USACE to manage the program costs recovered in power rates. As put forward in the FY 2021 budget, SEPA is pursuing the purchase or build of a headquarters building using alternative funding authority in Elberton, Georgia, which will save considerable costs over leasing.

SEPA successfully repays the Federal investment in the hydropower facilities, as well as a significant portion of joint costs shared with flood control, navigation, recreation, and other project purposes.

SEPA consistently meets system reliability targets for the NERC Control Performance Standards (CPS) to meet or exceed industry averages. CPS1 measures a generating system's performance to match supply to changing demand requirements and support desired system frequency. CPS2 measures a generating system's performance to limit the magnitude of generation and demand imbalances.

SEPA has established Memoranda of Agreements with preference customers and the four regional USACE Districts to provide funding to rehabilitate hydroelectric generating equipment. This enhances reliability and lessens future budget impacts. Customers have committed to provide over \$1.7 billion over the next 20 years.

Leadership Challenges

The Nation's electricity landscape continues to change. Many utilities have excess power due to slow economic growth, behind the meter generation, and energy conservation efforts, and impacts from the COVID-19 pandemic. Natural gas prices and price incentivized renewable options offer low cost alternatives to the Federal power products. In addition to changes in fuel and use profiles, the structured electricity markets are evolving and impacting conditions for generating, purchasing, selling, and transferring energy within those markets. Structured markets also direct transmission investment cost recovery and reliability guidelines. While many structured market efforts intend to lower prices, the reality is higher prices for some customers of Federal power which is not always recognized as a renewable energy source.

SEPA works closely with their customers and generation partner, USACE, to find ways to improve the value and cost of Federal Hydropower. This is done through regional partnerships as well as National level efforts such as the Federal Hydropower Council and support for the DOEled Federal Hydropower R&D Memorandum of Agreement. Leadership engagement and support of the initiatives underway will be important to their success.

In 2020, USACE withdrew a Proposed Rulemaking on Municipal and Industrial Water Supply from 2016, but is continuing to make water supply policy changes through administrative processes where possible. These changes will affect water storage at Federal dams which could negatively impact Federal hydropower production through diminished storage availability, generation capability, and increased power rates. Since FY 2018, Congress has not approved SEPA's requested level for PPW use-of-receipt authority due to CBO scoring issues. This authority is necessary to ensure SEPA has access to funding to meet contractual obligations. If Congressionally enacted levels of PPW fall short of need, SEPA will activate the continuing fund to ensure access to funds to meet contractual obligation for power purchase and transmission wheeling agreements. Solutions to address the PPW scoring issue continues to be discussed with the effected PMAs, DOE, OMB, and appropriators.

Critical Events and Action Items

None at this time.

Organizational Chart



Southeastern Power Administration

Southwestern Power Administration

Supporting the DOE Mission

Southwestern Power Administration (Southwestern, SWPA) supports the Department of Energy (Department, DOE) Mission and strategic plan goals by marketing and reliably delivering clean, renewable, reliable, cost-based Federal hydroelectric power and related services to regional non-for-profit wholesale utilities. SWPA contributes to the stability of the national electric grid in the specific areas of power and transmission service and energy infrastructure. SWPA maintains and upgrades its energy infrastructure to ensure reliable and efficient delivery of Federal power, which is an integral part of the Nation's electric grid. SWPA modernizes its energy infrastructure by incrementally improving facilities, increasing transmission capacity where feasible, accommodating interconnection requests, and enhancing transmission grid security and reliability to support the rapidly changing utility industry, evolving regional needs, and interest in renewable resources. Finally, SWPA partners with its customers and other stakeholders to develop new and innovative solutions to address industry issues.

Mission Statement

To optimally use Federal resources to safely and sustainably provide clean hydropower, transmission, and related services to benefit our customers, regional communities, and the Nation.

Budget

Fiscal Year	Budget (Total Program)	Net Appropriations
FY 2019 enacted	\$126,876,000	\$10,400,000
FY 2020 enacted	\$131,863,000	\$10,400,000
FY 2021 request	\$157,194,000	\$10,400,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 194

History

SWPA was established in 1943 by the Secretary of the Interior as a Federal agency that today operates within DOE. As authorized by Section 5 of the Flood Control Act of 1944, SWPA markets and delivers Federal power, generated at U.S. Army Corps of Engineers (USACE) hydropower projects, primarily to public bodies and rural electric cooperatives. SWPA recovers 100 percent of its costs through the rates charged to its customers.

SWPA was transferred to DOE in 1977 when the Department was created.

Section 212 of WRDA 2000 authorized USACE to accept hydropower infrastructure funding from the power customers which has allowed for the significant major replacements and rehabilitations taking place today. Referred to as "customer funding," this funding source is critical to ensure that capital investments in the USACE hydropower program continue despite limited availability of appropriated funding for capital projects.

In 2001Congress began to fund the SWPA purchase power and wheeling (PPW) portion of the budget using offsetting collections from power sale receipts, up to an annually authorized ceiling amount.

In 2010, Congress authorized Net Zero appropriations to allow annual expenses to be offset through revenue. SWPA still must request annual appropriation for some capital transmission system expenses not covered by other funding authorities.

Today, SWPA serves over 100 not-for-profit wholesale utilities who in turn impact over 10 million end users in homes and businesses across SWPA's marketing area of Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas.

SWPA also serves several military installations that are critical to the United States defense posture.

Functions

SWPA's primary functions:

Market and deliver power from 24 Federal hydropower projects within its region. SWPA coordinates with USACE, which operates and maintains the dams and hydroelectric facilities, and the preference power customers to schedule power delivery.

Operate and maintain 1,380 miles of transmission line located in Arkansas, Missouri, and Oklahoma in accordance with North American Electric Reliability Corporation (NERC) and Southwest Power Pool (SPP) Regional Transmission Organization (RTO) standards and criteria.

Recent Organization Accomplishments

Clean Energy

On average, SWPA provides nearly 5.6 billion kilowatt hours (kWh) of clean renewable hydroelectric energy annually. This energy production reduces emissions of carbon dioxide by 4.6 million tons per year. The clean renewable hydropower marketed by SWPA replaces 9.7 million barrels of fuel oil, 3 million tons of coal, or 42.8 billion cubic feet of natural gas that would otherwise be depleted annually to meet SWPA customers' electricity demand.

Emergency Response and National Security

This clean resource can respond quickly to provide essential services that stabilize the Nation's grid, including system restoration and voltage control. During Hurricane Laura in 2020, SWPA coordinated with Midcontinent Independent System Operator (MISO), customers, and USACE to bring on hydropower generation, providing a much needed generation injection into the impacted area of congestion and capacity shortages due to transmission damage and constraints in the East Texas transmission corridor of MISO.

Infrastructure Investment

Since 1999, SWPA's customers have approved approximately \$909 million to replace or refurbish failing and obsolete equipment at USACEowned facilities to ensure generation reliability. Replacement and rehabilitation of major equipment has been completed at four projects under the program, with work at two projects in the construction phase. Replacement and rehabilitation work at 16 projects is in the design and planning stages, with four of those scheduled to enter the construction phase in FY 2021. The initiative has an estimated customer commitment of over \$1.5 billion for major replacement and rehabilitation work at the hydroelectric plants in SWPA's marketing area over the next 30 years.

Customer and Federal Partnership Coordination

SWPA works closely with preference customers, USACE, and other Federal agencies to explore ways to improve the value, reliability, availability, and efficiency of the region's Federal hydropower. In 2019, SWPA adjusted the scheduling times for preference customers improving the value of the resource in energy markets. SWPA is an active participant in the Federal Hydropower Council (FHC) which brings senior leadership from Power Marketing Administrations (PMAs), USACE, and Bureau of Reclamation together to explore issues on a national level, such as improving the value and cost of hydropower through refinements in the acquisition processes and project management for large hydropower infrastructure investment, such as generator rewinds and turbine replacements.

Cost Management

Every SWPA dollar spent is recovered in the customers' power rates- SWPA works diligently to manage costs. In FY 2019, SWPA worked in coordination with the DOE Realty Officer to purchase a headquarters facility in Tulsa, Oklahoma. This effort will save considerable costs over annual leasing and put downward pressure on power rates. Efforts like this and others have allowed SWPA to maintain steady power rates over the last seven years for the vast majority of customers.

Financial Performance

SWPA's financial performance is measured by SWPA's accomplishment in consistently repaying the Federal investment in the hydropower facilities, as well as a significant portion of the multi-purpose water resource projects' joint costs shared with flood control, navigation, recreation, and other project purposes. The Independent Auditor, KPMG, concluded that the FY 2019 Southwestern Federal Power System (SWFPS) financial statementscomprised of the combined accounts of SWPA and the related hydroelectric generating facilities and power operations of USACE, a component of the U.S. Department of Defense (DOD)—present fairly, in all material respects, the respective financial position of the SWFPS as of September 30, 2019, and the results of its operations and cash flows for the years then ended, in accordance with U.S. generally accepted accounting principles.

Leadership Challenges

High level challenges currently being faced by the organization:

COVID Pandemic

In response to the pandemic, SWPA had a highly successful transition to maximum telework status. Concerns that State and local electricity no-shut off policies would affect the ability of SWPA customers to pay invoices or the need to sequester and provide sustenance for SWPA dispatcher staff at the 24-7-365 electric operations center locations have not been realized to date. However, the possibility for these scenarios still exists and policy solutions are needed to ensure future pandemic or emergency response requirements are considered non-reimbursable for the PMAs as they are for other Federal entities.

Funding Security

The current funding mechanisms for the SWPA and USACE hydropower program and related infrastructure come from Congressional use of receipt authority. Total program cost for hydropower can be difficult to predict, particularly in drought conditions, and having access to funds when needed is an important management need. SWPA has limited ability to retain funds across fiscal year for long term planning purposes and relies heavily on annually-approved appropriation authority. Since FY 2018, Congressional Budget Office (CBO) scoring changes to PMA PPW use of receipt authority has impacted the approved fund level for these costs when power must be purchased to meet contractual obligations when hydropower generation is unavailable. SWPA has sought several solutions to secure financial stability, most recently a revolving fund that would allow the program to rely solely on power revenue receipts without annual appropriations requirements. Moving to this model would reduce risk, improve

long-term planning, and put downward pressure on power rates for millions of regional ratepayers. However, technical scoring issues have hindered support.

Grid Resiliency

SWPA continues investing resources and technology to defend against ever evolving threats to the electrical power grid. Through coordination with DOE's Office of Electricity and electric utility partners, Southwestern is working with the Department of Defense, DOE labs, DOE's Chief Information Officer, and DOE's Office of Cyber Security, Energy Resiliency, and Emergency Response to improve the Nation's grid security and resiliency.

Increasing Demand for the Water Resource

The USACE water resource projects from which SWPA markets the hydroelectric power are all multi-purpose. As the demand for water for other uses, in addition to the need for hydropower, increases, hydropower can be impacted by loss of water storage and availability, as well as required operational changes that will affect the amount of energy generation and the operating capacity of the generating units. Current USACE water policy negatively impacts Federal hydropower generation and viability in the Southwest and is one of the initiatives being discussed and explored in the FHC mentioned above. Under this policy, water storage (or hydropower's "battery") and water usage (hydropower's "fuel") is being removed without fair evaluation, deliberation, or compensation. Further, without associated financial credits or a reduction in the repayment obligation for the lost resource, such changes will increase SWPA's power rates to its customers, and the Federal hydropower customers will inappropriately subsidize other project purposes. SWPA is also concerned with the USACE interpretation of its discretionary authority to reallocate water storage to the water supply purpose under the Water Supply Act of 1958 (WSA). Previously, through its practice, the USACE had interpreted the WSA language of "serious affects" and "major change" by limiting water storage reallocations to the greater of 15% of storage or 50,000 acre-feet. Through more recent USACE legal opinion, the USACE has abandoned this set limit and is taking a project-by-project approach; the exact methodology will be unique to each reallocation request. USACE has already exceeded the previous

set limit in several recent storage reallocations and continues to do so in active studies in SWPA's region, and SWPA has raised concerns about the lack of an appropriate methodology for determining the impact to the hydropower purpose. The loss of a set limit introduces a higher level of uncertainty of the water resource for the hydropower purpose.

Competitiveness of SWPA's Power Rates

The Federal hydropower product is becoming more expensive, less competitive in the marketplace, and less desirable to customers in the evolving electricity marketplace. In some instances, the PMA rates are over market and customers are considering power supply alternatives to Federal hydropower. SWPA's integrated system composite firm energy rate is currently over estimated market rates; factoring in supplemental (non-firm) energy, SWPA's integrated system composite energy rate is, on average, slightly below estimated market rates. This could threaten cost recovery of existing Federal investment and jeopardize future funding for the PMAs and the USACE, which is provided, in varying degrees, through existing customers. Ensuring that SWPA's rates do not experience instability or upward pressure while increasing certainty and maximizing flexibility and benefits to SWPA's customers is essential to the sustainability of the Federal power program in SWPA's marketing area.

Critical Events and Action Items

None.

Organizational Chart



Western Area Power Administration

Supporting the DOE Mission

Western Area Power Administration (WAPA), contributes to a more economically competitive, environmentally responsive, secure and resilient U.S. energy infrastructure. A critical leader in the energy industry, WAPA is an integral asset to the Department's mission and future vision of a vibrant, reliable, and responsible energy economy with its vast interconnected power system, expert staff, and strong relationships with utility customers and Federal and industry partners.

WAPA operates and maintains one of 10 largest high-voltage electric transmission systems in the U.S. Mission activities include marketing power, controlling several balancing areas, and maintaining its 17,000-plus miles of high-voltage transmission lines across 1.5 million square miles in 15 central and western states. WAPA markets hydropower generated at 57 Federal hydroelectric dams to more than 700 customers each year, most of which are not-for-profit public utilities in rural America.

By managing its assets in a sustainable manner, and by maintaining and modernizing its facilities, WAPA ensures flexible and reliable operations to accommodate industry change and requested interconnections. WAPA engages increasing interest in renewable resources while partnering with industry to expand infrastructure to deliver renewable energy sources. WAPA performs its mission in a manner that promotes the development of higher capacity U.S. energy infrastructure to ensure flexible, reliable operations and efficient energy markets.

Mission Statement

Market and deliver clean, renewable, reliable, costbased Federal hydroelectric power and related services.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$89,372,000
FY 2020 enacted	\$89,196,000
FY 2021 requested	\$89,372,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 1,521

History

WAPA was formed from functions previously carried out by the Department of the Interior's Bureau of Reclamation (BOR) and International Boundary Water Commission (IBWC) upon the creation of DOE in 1977. WAPA markets and delivers clean hydroelectric power from 57 hydropower plants owned and operated by the U.S. Army Corps of Engineers (Corps), BOR, and IBWC. The primary authorization for BOR and Corps dams is to provide flood control, irrigation, and navigation, among other functions; however, any power produced in excess of project pumping needs, is sold to repay the government's investment in the projects (for example Hoover Dam). WAPA markets this power to customers in a manner that encourages the most widespread use at the lowest possible rates consistent with sound business principles. (Flood Control Act of 1944)

One of WAPA's greatest accomplishments occurred in 2009 when it was authorized by Congress via the American Recovery and Reinvestment Act to borrow up to \$3.25 billion from the U.S. Department of Treasury to support the development of projects that facilitate and optimize the delivery of reliable, affordable power generated by renewable energy resources. WAPA established the Transmission Infrastructure Program (TIP) to carry out and manage this authority and has already seen three projects successfully completed. WAPA's headquarters office is located in Lakewood, Colorado, which is within its service territory, and its Administrator and CEO reports to the Assistant Secretary, Office of Electricity.

Functions

In compliance with Reclamation Act of 1902 and the Reclamation Project Act of 1939, WAPA's

mandated functions performed include: power marketing; providing transmission and ancillary services; building transmission lines; operating and maintaining transmission infrastructure; and providing energy system balance and delivery services.

Recent Organization Accomplishments

Strategic Roadmap 2024

The creation of the Strategic Roadmap 2024 applies WAPA's historic mission to the dynamics of an evolving energy industry environment that includes a myriad of new regulations; a growing presence of interruptible and intermittent generation resources; and constraints on WAPA hydro resources. The Roadmap ties together WAPA's strategy, initiatives, capital budgets, and annual targets to enable the agency to continue to meet customer needs and provide the best value as an organization. It consists of four overarching goals ("Critical Pathways") all aimed toward promoting WAPA's mission. These Critical Pathways are: Business; Technology and Organizational Excellence; Mutually Beneficial Partnerships; Evolution of Services; and Powering and Energy Frontier.

Asset Management

WAPA's asset management program has allowed WAPA to identify how equipment operates, the current state of its assets, individual asset longevity into the future, and how best to invest for asset maintenance and replacement. The Asset Management program is a systematic process for managing WAPA's most important transmission system assets to optimize functionality, operational performance, and return on investment while identifying and managing associated risk. This program currently tracks the overall health of 12 types of transmission equipment starting with the most critical equipment and progressively adding other components each year.

Safety Record

WAPA has a long and proactive safety record. Incident, injury, and lost-time rates are below the industry average of 1.2 recordable incident rate (RIR) and 0.5 days away, restrictions, and transfers (DART) rate. WAPA continues to enhance and build upon its safety record.

Returns to Treasury

WAPA is tasked with full cost recovery of Federal investment in power generation and transmission. Once the rate is recovered from customers, WAPA returns some funds to Treasury to pay down the investment. The amount returned to Treasury varies from year to year as WAPA uses the balloon methodology to recover from customers and has access to receipts to finance ongoing operations. Over the past 12 years, WAPA has returned \$3.6 billion.

Keeping pace with industry

WAPA continues to monitor and respond appropriately to the changing energy environment in the West, particularly when it comes to markets. In 2019, WAPA successfully transitioned its balancing authorities and transmission operators to new reliability coordinators, fulfilling a critical regulatory requirement, after its existing reliability coordinator ceased operations. In addition, in 2019 and 2020 WAPA comprehensively evaluated and selected third-party vendors to provide cost-effective, efficient, and secure energy imbalance management services that will take advantage of greater resource diversity within a larger service territory than WAPA can access on its own.

Continuous process improvement

WAPA's Continuous Process Improvement Program is based on the Lean Six Sigma process improvement methodology. This methodology focuses on improving customer service, efficiency, and effectiveness to support the lowest possible rates consistent with sound business practices. Since the program's inception in March 2014, the program has resulted in more than \$110 million in mostly cost avoidance.

Expanding broadband access to rural America

WAPA had completed a project plan for the pilot project to support three customers' needs for access to broadband using WAPA's existing infrastructure. If successful, this project could provide support to WAPA customers who are otherwise unable to access broadband in rural America.

Transmission and Infrastructure Program

WAPA's Transmission Infrastructure Program (TIP) leverages WAPA's depth of transmission project

development experience and expertise, along with its statutory borrowing authority, to advance projects aimed at expanding and modernizing the electric grid.

TIP accomplishments: The Montana Alberta Tie Line (MATL) was the first TIP project, which was developed to deliver wind generation into the Alberta market. The project's \$161 million loan financing, primarily through construction, was repaid in August 2012. Electric District No. 5 to Palo Verde Hub (ED5-PVH), was the second TIP project and was energized in January 2015 to renewable energy development in the Southwest. The TransWest Express development phase supported preliminary activities before construction of a potential 725-mile transmission line between Wyoming and the Southwest capable of carrying 3000 megawatts of energy. Development activities included environmental reviews, feasibility studies, and permitting requirements. TIP contributed \$25 million to support the development phase and retains the ability to participate in the construction phase, if desired, in the future. To date, WAPA had advanced funding arrangements (AFA) with project developers to cover all costs associated with TIPled technical and other development assistance for the following projects: AES Energy Storage, Ten West, TransWest Express, Southline, SunZia, and Westlands.

Additionally, WAPA has Memorandum of Understandings (MOU) in place for the following projects: San Luis Transmission Project and Meade to Adelanto Transmission Upgrade.

Physical Security

WAPA has developed a data-driven, risk based approach to protecting its assets, as well as standardized security methodologies and processes throughout its four regions. In addition, WAPA continues to collaborate with stakeholders to implement the most cost effective and efficient security solutions for the enterprise. WAPA conducts risk assessments on its critical facilities every 30 months and its noncritical facilities every five years.

Cybersecurity

WAPA operates a large business information network that covers most of the Western U.S. and serves its widespread constellation of four control centers, seven administrative facilities, 300 substations, and 660 maintenance, communications and other facilities. This network provides administrative services such as email and internet connectivity as well as asset management and financial management systems.

In addition, WAPA operates supervisory control and data acquisition (SCADA) systems in our control centers at Watertown, SD; Phoenix, AZ; Loveland, CO; and Folsom, CA. These systems provide critical grid monitoring and control functions, are connected via private networks to the substations in their respective regions, and as appropriate to neighboring utilities and business partners.

WAPA's Cybersecurity Program has been extremely validated through multiple audits and peer reviews by DOE, the North American Electric Reliability Corporation (NERC), and industry peer groups. WAPA continues to work with the intelligence community, the National Laboratories, and DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) to provide opportunities to improve critical infrastructure skills and awareness.

Ten-Year Capital Plan

The WAPA-wide ten-year capital investment plan is developed via analysis conducted in the Asset Management, maintenance, and regional financial programs. WAPA headquarters financial programs are revised annually. The FY 2020 capital investment is estimated to be approximately \$250 million.

Wildfire Mitigation

Over the past few years, WAPA has evaluated its operational risk and vulnerability to wildfires across the enterprise following multiple severe wildfire seasons across its territory. WAPA reviewed its vegetation management programs for adequacy and accuracy given what the industry now knows about wildfire prevention. WAPA is also collaborating with State and Federal partners to ensure it is doing what it can to prevent fires caused by powerlines, mitigate the impact of fires on WAPA equipment, and provide support to firefighting efforts. WAPA has taken a leadership role in wildfire mitigation strategies, including low-tech and high-tech solutions, routine inspections, voluntarily complying with state laws and regulations in this area, and seeking the advice of wildfire experts on leading practices to reduce wildfire risk.

Leadership Challenges

WAPA's leadership challenges include:

Systems Operations. The changing nature of the grid, the influx of different types of generation, and increased intermittency require all utility operators to change the way systems are managed and operated. WAPA continues to evolve its operations to match the changing needs created by new generation resources.

Varying Hydro Conditions. WAPA markets and delivers power generated from 57 hydropower plants, and continually monitors and manages changes in hydrology. Each of the major river systems (Colorado, Missouri, etc.) is different and water conditions vary widely. In high water years, WAPA markets excess generation, and in low water years, WAPA must purchase power on the market to meet its contractual commitments to customers. In addition, with the rapid retirement of coal, nuclear, and some natural gas plants, hydropower has become one of the last remaining baseload generation sources available across the West, which is essential for continued grid reliability.

Regulatory Environment. WAPA is impacted by several regulatory activities. These include evertightening utility reliability standards; Environmental Protection Agency regulations; land use restrictions; tribal and cultural regulations and protocol; fish and wildlife regulations; and a host of related requirements. WAPA maintains a significant environmental team to manage its territory and expends considerable funds and resources to ensure continued compliance with regulations.

Critical Events and Action Items

January/March 2021. WAPA's Desert Southwest Region plans to announce its decision on energy imbalance management in late 2020 or early 2021. WAPA's Colorado River Storage Project, Rocky Mountain and Upper Great Plains–West will transition into the Southwest Power Pool Western Energy Imbalance Service in February 2021, and its Sierra Nevada Region will transition into California Independent System Operator Western Energy Imbalance Market in March 2021. In addition, WAPA's plans to implement its Responsible Workplace Reentry plan to safely return some employees to the office in response to the COVID-19 pandemic in late January or early March 2021. WAPA also plans to provide interconnections in support of the Keystone XL project. The design, procurement, and/or construction award may occur during early 2021. WAPA will implement new reliability compliance standards, including: BAL-003.2, CIP-008-6, PRC-006-3, PRC-012-2, PRC-027-1, PER-006-1, and TPL-007-4.

Organizational Chart



Western Area Power Administration

Loan Programs Office

Supporting the DOE Mission

The Loan Programs Office (LPO) provides access to debt capital for large-scale, all-of-the-above energy infrastructure projects in the United States. LPO executes this mission by:

- Guaranteeing loans to eligible innovative energy projects through the Title 17 Loan Guarantee Program (Title 17).
- Providing direct loans to eligible manufacturers of advanced technology vehicles and qualifying components through the Advanced Technology Vehicles Manufacturing (ATVM) Loan Program.
- Providing partial loan guarantees to support economic opportunities to tribes through energy development projects and activities through the Tribal Energy Loan Guarantee Program (TELGP).

Mission Statement

To catalyze energy infrastructure investments to achieve America's energy objectives and advance economic growth.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$39,000,000
FY 2020 enacted	\$39,000,000
FY 2021 request	\$3,000,000

Notes:

1) The Title 17 funding levels are offset by loan guarantee collections of \$20.7M in FY 2019 and \$3.0M in FY 2020 and FY 2021.

2) The Fiscal Year (FY) 2021 budget request maintains current Administration policy to eliminate the Title 17, ATVM, and TELGP. The FY 2021 request also cancels all remaining appropriated credit subsidy in the Title 17 (-\$160.7M) and TELGP (-\$8.5M) programs for the scored offset of -\$169.2M.

Loan Authority

LPO has more than \$40 billion in remaining loan guarantee and loan authority for the Title 17, ATVM, and TELGP programs to finance innovative clean energy projects, advanced technology vehicles, and component manufacturing and energy projects and activities that support economic development and tribal sovereignty.

Remaining Loan Authority	
Fiscal Year	Budget
 Title 17: Advanced Fossil Energy Advanced Nuclear Energy Renewable Energy & Efficient Energy 	\$8.5 billion available ¹ \$10.9 billion available Up to \$4.5 billion available ²
ATVM	\$17.7 billion available
TELGP	Up to \$2.0 billion available

Notes: The FY 2021 Budget Request proposes to cancel the remaining loan volume.

1) The Advanced Fossil Energy loan authority of \$8.5 billion includes the \$2 billion conditional commitment for the Lake Charles Methanol project.

2) Under this Solicitation DOE will make available up to \$3.0B in loan guarantee authority, plus an additional amount that can be imputed based on the availability of an appropriation for the credit subsidy cost of such imputed loan guarantee authority.

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 96

History

In 2007, the Loan Guarantee Program Office (LGPO) and the ATVM Loan Program Office were stood up and began operations under the Department's Office of the Chief Financial Officer. In November 2009, the first Executive Director of the LPO was appointed and in June 2010, LPO was officially established as a new, independent organization, absorbing the LGPO and ATVM organizations. In February 2018, the TELGP was transferred to the LPO from the DOE Office of Indian Energy Policy and Programs.

The LPO Executive Director reports directly to the Under Secretary of Energy and has the responsibility for managing the Title 17, ATVM, and TELGP loan programs.

Title 17 Loan Guarantee Program

Section 1703 of Title XVII of the EPAct of 2005 authorizes DOE to provide loan guarantees for

innovative energy projects in categories including advanced nuclear facilities, coal gasification, carbon sequestration, energy efficiency, renewable energy systems, and various other types of projects. Projects supported by DOE loan guarantees must avoid, reduce, or sequester pollutants or anthropogenic emissions of greenhouse gases; employ new or significantly improved technologies compared to commercial technologies in service in the United States at the time the guarantee is issued; and offer a reasonable prospect of repayment of the principal and interest on the guaranteed obligation. In FY 2011, pursuant to the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (Public Law No. 112-10), funds were appropriated that allowed DOE to pay the credit subsidy cost for certain renewable energy or efficient end-use energy technologies. There is currently \$160.7 million remaining in appropriated credit subsidy.

Section 406 of the American Recovery and Reinvestment Act of 2009 amended Title XVII of the EPAct of 2005 by establishing Section 1705 as a temporary program for the rapid deployment of renewable energy and electric power transmission projects, as well as leading edge biofuels projects. The addition of the Section 1705 program included an appropriation of funds that allowed DOE to pay the credit subsidy cost of certain loan guarantees. The authority to enter into new loan guarantees under Section 1705 expired on September 30, 2011, but the program continues to administer and monitor the portfolio of loan guarantees obligated prior to the expiration date.

ATVM

Section 136 of the Energy Independence and Security Act of 2007 (EISA) established the ATVM Loan Program, consisting of direct loans of up to \$25 billion in total loan authority to support the development and manufacturing of advanced technology vehicles and qualifying components in the United States. Currently there is \$17.7 billion in remaining loan authority and \$4.3 billion in appropriated credit subsidy. Per EISA subsection (d) (1), ATVM loans must be made through the Federal Financing Bank and the full credit subsidy cost must be paid using appropriated funds.

TELGP

The TELGP was authorized pursuant to Title XXVI of the EPAct of 1992, as amended, to make available up to \$2 billion in partial loan guarantees. Funding was first appropriated for the TELGP in FY 2017, and in FY 2018, DOE issued the first tribal energy loan guarantee solicitation to support tribal energy development. Pursuant to the Consolidated Appropriations Act, 2017 (H.R. 244, Public Law 115-31) Congress appropriated \$8.5 million to cover the credit subsidy costs associated with the \$2 billion in available loan authority.

Functions

The LPO currently utilizes the following six divisions to originate new loans and proactively monitor the portfolio: Origination Division; Portfolio Management Division; Risk Management Division; Technical and Project Management Division; Legal Divisionl and Management Operations Division. In administering the Title 17, ATVM, and TELGP loan programs, the LPO:

- Demonstrates the viability and finance-ability of new or significantly improved energy technologies.
- Funds innovative technologies that reduce greenhouse gas emissions and air pollutants.
- Creates jobs by financing the growth of commercial clean energy technologies.
- Provides direct loans to eligible automobile manufacturers and component suppliers for projects that re-equip, expand, and establish manufacturing facilities in the United States to produce advanced technology vehicles, ultraefficient vehicles, and components for such vehicles.
- Provides access to debt capital for tribal ownership of energy projects and activities that support economic development and tribal sovereignty.
- Protects United States taxpayers by ensuring the loans and loan guarantees LPO provides have a reasonable prospect of repayment.

LPO manages a portfolio comprising more than \$35 billion of loans, loan guarantees, and conditional commitments covering more than 30 projects. Overall these loans and loan guarantees have resulted in more than \$50 billion in total project investment. \$29 billion in loan funds have been disbursed and over \$11 billion of principal has been repaid to date. The portfolio currently has 3,953 megawatts of generation capacity and annual production of 2.3 million automobiles.

Recent Organization Accomplishments

LPO has had a number of accomplishments, including, but not limited to:

Launching new markets

LPO has provided:

- \$12 billion in debt financing to support the only nuclear power plant currently under construction in the United States at the Vogtle Electric Generating site in Georgia.
- \$2 billion, conditionally committed but not finalized yet, to support a pet-coke-to-methanol project which also captures and sequesters carbon dioxide.
- \$1.7 billion towards on-shore wind power generation.
- \$343 million towards a transmission line.
- \$7.8 billion to support automotive fleet modernization and electric vehicle manufacturing including the first debt financing to Tesla.
- \$5.8 billion to concentrating solar power, including the first projects in the United States with thermal storage.
- \$546 million to advanced geothermal energy.
- \$4.7 billion towards photovoltaic (PV) solar power generation including the first five utility-scale solar PV power plants larger than 100 megawatts in the United States.

Prudently managed portfolio

LPO manages a portfolio of \$35 billion in loans, loan guarantees, and conditional commitments, with losses of only 2.7% of total disbursements of \$29 billion.

Supporting Jobs in the United States

The Title 17 and ATVM programs have supported more than 55,000 jobs in the United States.

Reduced Pollution or Harmful Greenhouse Gas Emissions

Overall LPO projects have prevented more than 50 million metric tons of CO2 emissions.

Improved Loan Origination Process

In 2019, LPO employed an enhanced pre-application consultation process to better prepare prospective applicants to submit successful applications and shorten the time between formal application and loan closing. Overall, LPO reported 294 consultation conversations in 2019, and in 2020 there have been over 300 consultations to date.

Leadership Challenges

LPO challenges include but are not limited to:

Maintaining a strong and healthy portfolio

LPO's Portfolio Management Team vigorously manages the existing portfolio of loans and loan guarantees.

Expanding the existing LPO pipeline of project applications

LPO currently has a robust pipeline of project applications for both Title 17 and ATVM. However, the program needs to maintain a continuous outreach and business development effort to sustain the current pipeline and attract more applications for high-quality projects. Additionally, LPO needs to continue to raise awareness among tribal borrowers and distinguish the value of TELGP from other government programs that support tribes. LPO is addressing these challenges through sustained industry outreach and through the enhanced pre-application process.

Issuing conditional commitments to high-quality projects

LPO must continue with due diligence on highquality deals in the pipeline to advance worthy projects to conditional commitment.

FY 2021 Budget Request

The FY 2021 budget request proposes to eliminate the Title 17, ATVM, and TELGP, because the private sector is better positioned to finance the deployment of commercially viable energy and advanced vehicle manufacturing projects. The LPO continues to review applications submitted under currently open solicitations. LPO will continue to work with applicants and conduct due diligence consistent with current law.

Critical Events and Action Items

None.

Organizational Chart



*The Chief Counsel is the principal legal advisor to the

Executive Director and reports to the General Counsel of DOE.

Office of Environment, Health, Safety and Security

Supporting the DOE Mission

The Department of Energy (DOE) has a wide portfolio of missions and operations with many unique and significant hazards (e.g., nuclear, chemical, biological, industrial) and security risks (e.g., classified information and nuclear weapon material). The Office of the Associate Under Secretary for the Office of Environment, Health, Safety and Security (AU) plays a key corporate role in enabling DOE to perform its mission in a safe and secure manner in order to protect DOE's workers, the public, the environment, and national security assets.

AU works closely with stakeholders (including DOE Program and Field Office management; subject matter experts; and labor and community representatives) to develop and improve environment, health, safety, and security policy and guidance; foster continuous improvement before incidents occur; and provide corporate technical assistance, coordination, and integration to support all DOE organizations in the resolution of environment, health, safety, and security issues.

AU's unique position and expertise provides it with an overview of environment, health, safety, and security concerns from across DOE Headquarters, field sites, and contractor organizations. This wide perspective allows AU to provide crosscutting expert advice and implementation assistance for the protection of DOE workers and the public, as well as the Department's material and information assets. AU also represents the Department in national and international environment, health, safety, and security matters to assure the Department's interests are represented.

Mission Statement

AU is DOE's central organization with enterpriselevel responsibilities for health, safety, environment, and security; providing corporate-level leadership and strategic vision to establish, sustain, coordinate, and integrate these vital programs. AU is responsible for policy development and technical assistance; safety analysis; and corporate safety and security programs. The Associate Under Secretary for Environment, Health, Safety and Security advises DOE elements and senior Departmental leadership, including the Under Secretary of Energy on all matters related to environment, health, safety, and security across the complex.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$202,839,000
FY 2020 enacted	\$207,839,000
FY 2021 request	\$209,688,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 262

History

From the inception of DOE (and its predecessor Agencies, e.g., the Atomic Energy Commission), DOE has had an organization reporting directly to the Secretary, Deputy Secretary, or an Under Secretary responsible for developing and supporting implementation of policies and requirements to ensure the protection of workers, the public, and the security of DOE assets. This has been and remains a critical function given that DOE operates facilities with significant hazards and significant national security assets. These hazards include high level radioactive waste and toxic chemicals. National security resources include classified information and material related to DOE's nuclear weapon surety mission.

AU was created in May 2014, as part of a broad DOE reorganization. The Department's environmental, health, safety, and security policy offices, along with the Headquarters Security Operations, were consolidated within the Under Secretary for Management and Performance, reporting to a new Associate Under Secretary for Environment, Health, Safety and Security. AU continues to manage DOE's longstanding environmental, health, safety, and security programs and provides specialized expertise and support to DOE Program Offices to protect DOE workers, the public, the environment, and DOE national security assets. DOE has an excellent safety record, is a leader in environmental management, and has enhanced its multiple levels of protection to ensure national security. However, significant safety and security challenges remain at DOE, and DOE continues to learn and improve based upon sharing of best practices and lessons learned from events (such as the accident at the Waste Isolation Pilot Plant). AU works closely with the Program Offices to support efforts to improve safety and security performance and to foster improvements throughout the DOE complex.

Functions

AU's major programmatic activities include:

Policy Development

Leads the Department's development of environment, health, safety, and security policies and requirements, and supports the effective and efficient implementation of policies and requirements to ensure DOE complies with statutory, regulatory, or executive order requirements in accomplishing its mission.

Policy Implementation Assistance

Works proactively with DOE Program and Field Offices to provide high-quality, customer-oriented assistance to enable effective implementation of environment, health, safety, and security requirements. Supports the field in resolving environment, health, safety, and security issues. Provides consultations on requests for exemptions from DOE requirements. Supports DOE's National Training Center in developing and conducting environment, health, safety and security training that is tailored to DOE needs and missions.

Environment, Health and Safety Leadership

Provides leadership and support for improvements in environmental, safety, and health performance throughout the DOE Complex through its various corporate roles such as Designated Agency Safety and Health Officer for DOE's Federal Employee Occupational Safety and Health (FEOSH) program; chair of the Nuclear Safety Committee; Champion for Integrated Safety Management (which is the Departments framework for the safe performance of work and promoting a strong safety culture); co-chair of DOE's Safety Culture Improvement Panel; and lead for designing programs by which DOE is reducing the environmental footprint of its operations.

Security Program

Provides personal protection to the Secretary and Deputy Secretary of Energy (where warranted), and other executive personnel as designated by the Secretary. Manages the DOE Headquarters security program to protect personnel, facilities, property, and classified information. Manages the enterprisewide effort to help DOE programs deter and detect insider threat actions by federal and contractor employees.

Classified Information Protection

Serves as a central focal point for identification of classified information within the Department. Also serves as the single denial authority for classified information under the Freedom of Information Act which prevents inadvertent releases of classified information. AU supports the National Declassification Center and ensures that information protected under the Atomic Energy Act remains protected at the National Archives.

Other key AU activities include:

Corporate Environment and Safety Programs

Manages corporate programs that assist the DOE complex with ensuring that environmental and safety requirements are being met, including:

- DOE's Analytical Services Program, which ensures that the analytical environmental laboratories that DOE utilizes to support disposal of low-level radioactive waste meet regulatory requirements.
- The DOE Laboratory Accreditation Program, which implements performance standards for DOE contractor radioactive dosimetry and radiobioassay programs.
- The DOE Filter Test Facility, which inspects and tests all the high efficiency particulate air filters used at DOE sites to ensure confinement of radioactive material.

Health Studies

Manages and conducts studies to increase scientific knowledge on the health effects of exposure to ionizing radiation and other industrial hazards:

- *Domestic.* Studies on health effects to workers and to the public living in communities near DOE sites.
- *International.* Studies, mandated by Congress or required by international agreement, which take place in Japan, Marshall Islands, Russian Federation, and Spain.
- United States Transuranic and Uranium Registries. Research on the potential health effects of transuranic elements based on evaluation/ study of DOE workers who volunteered for this program, i.e., "registrants."

DOE Chief Medical Officer

Serves as the Department's Chief Medical Officer; keeping fully abreast of emerging national and international developments in public and occupational medical issues.

Occupational Illness Compensation Program

Supports the implementation of the Energy Employees Occupational Illness Compensation Program Act by providing information regarding employment status; exposures to radiation and toxic substances; and operational history of over 350 DOE facilities to the Department of Labor, the National Institute for Occupational Safety and Health, and the Presidential Advisory Board.

Former Worker Medical Screenings

Provides medical screening examinations to former workers who may have been exposed to harmful conditions as a result of working for DOE. As of September 2015, over 110,000 medical examinations have been conducted by the program.

Operating Experience Program

Manages DOE's Corporate Operating Experience Program to identify and disseminate performance indicators, lessons learned, and operating experience to prevent adverse events and improve performance.

Employee Concerns Program

Manages DOE's Employee Concerns Program which encourages the expression of employee concerns and provides DOE federal, contractor, and subcontractor employees with a process to have concerns addressed. Manages DOE's Differing Professional Opinion Program which addresses the resolution of technical environment, safety, and health concerns that could not be resolved at the local level.

Voluntary Protection Program

Operates DOE's Voluntary Protection Program (VPP) utilizing the integrated safety management framework that encourages DOE and NNSA contractors to pursue excellence in worker safety and health beyond compliance with rules, orders, and standards. The program parallels the Occupational Safety and Health Administration VPP.

Nuclear Safety Research

Manages DOE's corporate Nuclear Safety Research and Development Program and supports a broad range of projects to enhance nuclear safety in the design, construction, and operation of DOE nuclear facilities.

Liaison to Defense Nuclear Facilities Safety Board (DNFSB or Board)

Coordinates interactions with the DNFSB to facilitate effective communications between the Board and DOE Senior leadership to address the Board's nuclear safety concerns.

Security Technology

Provides technical security expertise to internal and external organizations to identify opportunities to enhance the security protection programs and develops and promotes deployment of new technologies to improve security.

Medical Disqualifications

Provides for and coordinates Independent Reviews of Protective Force Medical Disqualifications pursuant to 10 CFR Part 1046, *Medical, Physical Readiness, Training, and Access Authorization Standards for Protective Force Personnel.*

Recent Organization Accomplishments

Revised and issued DOE Order 140.1A, *Interface with the DNFSB*, and the accompanying Desk Reference document of good practices to reflect changes to the DNFSB Enabling Statute Congress enacted in the FY2020 NDAA.

Finalized and issued 10 CFR Part 830, *Nuclear Safety Management.* The revised 10 CFR Part 830 was part of the Departments' Regulatory Reform Initiative and culminates a several year, cross Program Office effort to reduce unnecessary burden and provide a more efficient and effective nuclear safety framework.

Led by the Office of Nuclear Safety, the Department evaluated Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2020-1 and provided a comprehensive, technically defendable response.

Led the development and implementation of DOE's Pandemic Response Plan providing the framework for DOE's response to the COVID-19 crisis. Provided the primary staffing and leadership for the COVID-19 Response Team responsible for case management to support contact tracing and data management for Headquarters and field sites. This also included providing senior leadership with ongoing daily updates regarding local and national case information, allowing the Secretary to make critical and timely decisions while managing the phases of the Department's overall response to the pandemic.

As the champion for DOE's Integrated Safety Management and Employee Concerns Programs, both focused on improving DOE's safety culture and safety conscious work environment, AU was instrumental in recognizing and bringing these two initiatives together. Organizing and executing our first virtual annual meeting, bringing together over 100 senior leaders from across DOE, we were able to provide critical insights on how the Department can continue to improve our safety leadership and performance.

In the face of the rapidly emerging pandemic early in the year, AU established the framework and approach that allowed DOE to offer temporary relief from safety and security requirements contained in DOE's directives and regulations where compliance has been adversely impacted because of this national emergency. This has been critical to safeguarding the health and safety of our workforce while allowing the Department to remain open to serve the American people and conduct mission critical functions.

Transitioned protection services to the new Secretary, conducted 68 protective operations

missions (including 16 international), coordinated design and build of CLASSIFIED workspace for the Secretary at his residence, and developed from scratch and implemented COVID-19 cleaning procedures and testing protocols (since adopted by DOC, DOL, and EPA).

Deployed trackable Federal and contractor Insider Threat Awareness online training for cleared personnel, thereby addressing an outstanding Executive Branch annual requirement.

Completed 109 Formal Technical Security Reports, deployed to provide Field support (to include that for the Secretary and Deputy Secretary), and preplanned COMSEC Key Distribution supply-chain and technical support during COVID-19 period of maximum telework to ensure that Departmental mission critical systems and networks remained operational.

AU-11 made significant increases in the number and quality of the Worker Safety and Health forums, with the focus on finding high quality speakers, training the team, increasing our distribution list, promoting, and collecting feedback for improvement. Currently averaging about 250 safety professionals in attendance and offering certificates for CEUs.

Developed a complete overhaul of our policy clarification portal (formerly a response line). The new Portal is significantly more user friendly, making it easier to search and browse previous policy clarifications, as well as submit a new inquiry.

Issued DOE O 426.1B, Federal Technical Capabilities, in March 2020.

Conducted virtual DOE-VPP Participants meeting with over 130 participants. Prior to that, DOE-VPP onsite reviews at the 4 DOE sites were conducted.

Collaborated with the National Council on Radiation Protection and Measurements and the Oak Ridge National Laboratory on the epidemiologic studies of several DOE worker populations, specifically workers at the Rocky Flats Plant (RF), the Tennessee Eastman Corporation (TEC 1943-1947), Middlesex, Fernald, and Hanford, including the transfer of radiochemical assays and other relevant data from the U.S. Transuranium and Uranium Registries (USTUR). One focus was to refine the models for estimating doses associated with DOE worker intakes.

AU worked collaboratively with Department of Labor; the National Institute for Occupational Safety and Health; and the DOE Former Worker Screening Programs to adapt joint outreach efforts under the COVID environment to a virtual platform.

Rapidly promulgated and implemented procedures to conduct remote audits of commercial waste disposal facilities under the DOE Consolidated Audit Program (DOECAP) during the pandemic. DOECAP audits support compliance with DOE requirements and also assure stakeholders that the Department is properly handling its radioactive wastes.

Coordinated complex-wide efforts to address per- and polyfluoroalkyl substances (PFAS) at DOE, engaging dozens of Program Offices and sites in a new working group, gathering and synthesizing data to improve understanding of PFAS uses and impacts within DOE, and engaging with external stakeholders focused on this emerging contaminant of concern.

Developed and deployed new ES&H data analysis and visualization tools for Program Offices and Sites, including:

- Launching a new Corporate Safety
 Performance Dashboard, which presents, in a
 single location and easily understood format, a
 set of strategic ES&H metrics of high importance
 and fundamental interest to DOE management.
- Developing a Chat Bot tool, successfully adopted by the DOE COVID-19 Hotline, which uses machine learning tools to analyze a question or phrase typed by the user to quickly return prioritized results from a defined data set.
- Advancing the development of a suite of machine learning tools to support critical ES&H functions, integrating multiple data sets with advanced algorithms to enable more rapid and robust analysis.

Successfully completed installation and startup of replacement vehicle barriers at the Forrestal facility. Successfully designed and procured replacement access barriers and CCDF equipment, and designed and specified replacement radio system. Implemented innovative protective force contract changes and staffing plans to sustain the required Site Security Plan staffing levels while developing a "reserve" of healthy officers that was called upon to staff the DOE HQ during quarantines, resulting in sustained secure operation of HQ facilities.

Collaborated successfully with HQ program offices to conduct Headquarters Security Officer (HSO) program surveys and implement corrective actions. Reconfigured HQ survey inspections into two parts, the data evaluation/interviews and physical inspection. The data evaluation/interviews are being conducting online using WebEx. This effort provided the ability to continue the Survey mission during a time where social distancing was required.

Successfully developed and converted all Classified Matter Protection and Control (CMPC) Training (CMPC Overview, CDCS, Congressional Courier, and CMPC briefings for elected officials) to virtual/ WebEx training. Remote training has increased the speed of the delivery and participation of CMPC training across the board. To date, over 350 participants have received and completed training.

Successfully implemented a continuous evaluation process for HQ personnel security which processed over 60,000 alerts and completed validation of over 1,000 high and medium alerts while completing adjudication of over one third of high and medium alerts referred to adjudication.

Developed and implemented improved HQ management process for Other Government Agency (OGA) security clearances, including obtaining DOE Security Committee and Senior Management approval and successfully implementing the process for 22 other agencies, resulting in the termination of 1,000 security clearances to date.

Updated, revised, staffed, and implemented the AU Continuity of Operations (COOP) program plan. Revitalized AU emergency notifications by developing and implementing a process which engaged all AU senior management, simplified interface with DOE Emergency Operations, and eliminated redundancy.

Initiated the review, revision, and update to 6 DOE Orders: DOE O 474.2 A, *Materials Control and Accountability* (MC&A); DOE O 472.2, *Personnel* *Security;* DOE O 473.1A, *Physical Protection;* DOE O 473.2A, Protective Force; DOE O 142.3A, *Foreign Visits and Assignments;* with DOE O 470.3C Change 1, *Design Basis Threat (DBT),* approved in September 2020.

Completed over 30 field assistance requests to facilitate implementation of the DOE Directives thru innovative use of virtual communication methods and professional involvement. The assistance focused on implementation of the DBT; Personnel Security; Protective Force; Physical Security Systems; Foreign Ownership, Control or Influence (FOCI); and technical advice and assistance.

The Office of Security initiated and championed the Secretary's COVID-19 Security 180-day Regulatory Relief mechanisms.

Published new and updated classification guidance on denuclearization activities, isotope separation, and counter unmanned aircraft systems (CUAS).

- Denuclearization classification guidance helps nuclear non-proliferation activities as they may occur around the world and provides DOE needed guidance on how to identify and protect information generated by those activities.
- Isotope separation guidance provided detailed instructions to different programs engaged to produce enriched uranium or staple isotopes.
- CUAS guidance was needed in order to consistently identify and protect information regarding the security posture of the DOE against this new threat as both DOE activities and the threat itself evolve over time.

Managed execution of FY20 budget, formulated FY21 budget and developed an execution plan, and initiated formulation of FY22 budget.

Provided advice and guidance on multiple new procurement actions such as the competitive reprocurement acquisitions for the Filter Test Facility; TSCM/TSP program; Protective Force services; Environment, Health, and Safety crosscutting support services; Security support services; and Headquarters Security Access and Alarm system services.

Recruited and filled over 20 critical hires and 14 promotions, and off boarded 14 staff.

Leadership Challenges

Onboarding and organizational integration of new personnel during the Pandemic is a challenge. Onboarding is the first, and sometimes most lasting impression of the Organization, and we should consider a holistic approach. Once onboard, substituting virtual interaction for in-person interaction and conducting a fair and meaningful evaluation during the year probationary period would be challenges.

Use of consensus standards is required by law. The DOE role in helping to ensure that Consensus Standards, when issued, are timely and useful for the Department is an ongoing challenge. There is a cost-benefit that needs to be carefully considered. The value to DOE, Consensus organizations, and the commercial industry will be enhanced by a more focused and coherent approach to Standards development, particularly in the area of advanced reactors.

Critical Events and Action Items

Meet with DNFSB

The DNFSB is led by five presidential appointees who provide oversight advice and recommendations to the Secretary on nuclear safety issues that could impact adequate protection of public health and safety at defense nuclear facilities. It has proven beneficial for the incoming Secretary to have a short meeting with DNSFB within the first 3-6 months of taking office. There are several current DNFSB Recommendations being implemented by DOE which impact DOE missions.

Organizational Chart



Office of the Associate Under Secretary for Environment, Health, Safety and Security

Office of Project Management

Supporting the DOE Mission

The Office of Project Management (PM) supports the Department's mission by providing enterprise level project management leadership and expertise to ensure the efficient delivery of new or updated capital asset capabilities to enhance America's energy and nuclear security, and address the environmental legacy and liabilities of the cold war. In support of this goal, PM provides project management policy, guidance, and independent assessments to enable senior leadership to make informed decisions for capital asset projects within a mature project management framework and governance structure. PM monitors the Department's effectiveness in delivering capital asset projects using a project management success metric, which states, "On a three-year rolling basis, complete at least 90% of departmental projects baselined since the start of FY 2008 within the original scope baseline and not to exceed 110% of the cost as reflected in the performance baseline established at Critical Decision (CD)-2," which is the decision point where project scope, cost, and schedule commitments are established.

Mission Statement

PM's mission is to provide enterprise level project management leadership, and assist in the development and implementation of Department-wide policies, procedures, programs, and management systems pertaining to project management, professional development, and related activities.

The office is charged with providing the DOE senior leadership with timely, reliable, and credible information to enable the best informed project execution decisions.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$15,000,000
FY 2020 enacted	\$12,600,000
FY 2021 request	\$15.600,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 30

History

The project management office was originally called the Office of Field Management (FM) and was under the purview of the Office of the Chief Financial Officer in the 1990s. In FY 2000 Energy & Water Development Appropriations, the Senate initiated and the House concurred to eliminate funding for DOE's Office of Field Management. At that time, it was viewed by many that the office had lost its independence. Thus, it lost its credibility.

During the intervening period, appropriators directed DOE to contract with the National Research Council (NRC) to study DOE's project management. Numerous reports were produced and provided to Congress. In its first report, NRC recommended that External Independent Reviews (EIRs) of DOE projects be undertaken and guidelines established for them. The NRC's second report yielded the study entitled, Improving Project Management in the Department of Energy. That became a principal tool in revising DOE's project management, along with the Deputy Secretary's Project Management Initiative, directing changes in the Department's project management effort. Taken together, the external NRC study and the Deputy Secretary's initiative formed the basis for creation of the Office of Engineering and Construction Management (OECM), which continued to reside under the authority of the Office of the Chief Financial Officer.

In FY 2001, OECM began to address the voids in DOE's project management caused by the elimination of funding for FM. Work began systematically on the following issues: a newly designed DOE Order; a revised Energy Systems Acquisition Advisory Board (ESAAB) process; a revised EIR process; development of a Project Engineering and Design (PED) requirement for new projects; research into a career development program for project managers; and liaison with the engineering and construction industries, to name a few. In FY 2006, OECM was placed under the purview of the Office of Management (MA), vice CFO, to enhance its independence, and minimize any budget influence over capital asset project baselines. In 2007, the Deputy Secretary met with the Comptroller General of GAO to clarify their expectations for removal from their GAO High-Risk List (HRL), specifically for "Contract (Project) Management." The Department had been on this List since its inception in 1990. The Comptroller General provided the five criteria which was used to determine inclusion on the High-Risk List, one of which was the need to conduct an internal root cause analysis. This immediately precipitated a Department-wide initiative, led by OECM, to complete a DOE project management root cause analysis. In April 2008, the Department produced its DOE "Contract and Project Management Root Cause Analysis (RCA)" followed in July 2008 with its Corrective Action Plan (CAP). These documents highlight the top ten issues that had impeded improved project execution performance, to include lack of upfront planning, inadequate federal staff, deficient risk management, funding turbulence, and more. The documents continue to be a key reference as we refine project management processes. As a result of the improvements initiated under the CAP, GAO has narrowed their focus of the High-Risk List to only contract and project actions greater than \$750 million, and only for NNSA and EM.

In FY 2012, the project and contract management oversight offices within the Office of Management (MA), the Office of Engineering and Construction Management (OECM) and Office of Procurement and Assistance Management (OPAM) respectively, were merged and consolidated into a singular Office of Acquisition and Project Management (APM). The OECM Director became the new APM Director and took on the additional role as the Department's Senior Procurement Executive (SPE). This complemented the consolidation of similar functions and mergers within both NNSA and EM. These APM organizations worked collaboratively to address continuous improvement initiatives regarding project management.

In FY 2015, the Under Secretary for Management and Performance reorganized and consolidated parts of the Office of Management (MA) and the Office of Environmental Management (EM) into one organization and created a new office entitled the Office of Project Management Oversight and Assessments (PMOA). This new office reported directly to the Under Secretary for Management and Performance (S3), but the Director was directly accountable to the Deputy Secretary when performing functions as the Executive Secretariat of the Energy Systems Acquisition Advisory Board (ESAAB) and the Project Management Risk Committee (PMRC). The Deputy Secretary chairs the ESAAB, and the PMRC is the senior project management advisory committee to the ESAAB and other senior leaders. The PMRC is chaired by an administration senior advisor to the Deputy Secretary of Energy. In the absence of a senior advisor, the PM Director serves as the Chair of the PMRC.

This reorganization was prompted by the Secretary of Energy's "Improving the Department's Management of Projects" Memorandum, dated December 1, 2014. It elevated the function and organizational position of project management, which resulted in a new Dash-1 Directorate. In this memo, each Under Secretary was also directed to establish, if it did not already exist, its own project assessment office that does not have line management responsibility for project execution. These assessments offices conduct peer reviews of projects in their purview that have a total project cost of \$100 million or greater (or lower as deemed appropriate by the Under Secretaries). These offices were established to model the review process already established in the Office of Science, and recognized as best practice. In 2017, the Under Secretary for Management and Performance was reorganized and replaced by the Under Secretary of Energy. The Office of Project Management Oversight and Assessments (PMOA) was renamed the Office of Project Management (PM) and retained as a direct report to the Under Secretary of Energy. The Office of Environmental Management (EM) was moved from the Under Secretary of Energy to the Under Secretary for Science to foster increased collaboration between EM and the national laboratories to address the challenges of the environmental legacy of the cold war. In 2019, the Under Secretary of Energy designated PM as the Under Secretary of Energy's project assessment office and as the Project Management Support Office (PMSO) for all programs under his purview.

Functions

Executive Secretariat of the Energy Systems Acquisition Advisory Board and Project Management Risk Committee

Serve as a member and as Executive Secretariat of the Energy Systems Acquisition Advisory Board (ESAAB) and the Project Management Risk Committee (PMRC) for the Deputy Secretary. The Board and Committee review all capital asset projects with a Total Project Cost (TPC) of \$750 million or greater. Upon request, the Committee also addresses projects with a TPC less than \$750 million that are at risk of not meeting their performance baselines or are of special interest.

Independent Project Peer Reviews

Conduct independent Project Peer Reviews (PPRs) annually on all projects under the Under Secretary of Energy's purview and EM capital asset projects with a TPC of \$750 million or greater and on other projects at leadership or program request.

Project Management Support

Serve as the Project Management Support Office (PMSO) for all Under Secretary of Energy programs, (to include EERE, FE, NE, and OE) and execute the PMSO functions as detailed in DOE Order 413.3B.

External Independent Reviews

Conduct External Independent Reviews (EIRs) that validate the project performance baselines (to include scope, cost, and schedule) of all DOE and NNSA capital asset projects with a TPC of \$100 million or greater at the time of the project's formal baseline establishment.

Independent Cost Reviews and Estimates

Conduct Independent Cost Reviews (ICRs) or prepare Independent Cost Estimates (ICEs) at critical decisions and upon re-baselining, for capital asset projects with a TPC of \$100 million or greater, as required by statute.

Earned Value Management System Certification and Surveillance Reviews

Conduct initial certification and periodic surveillance reviews to ensure contractor Earned Value Management Systems (EVMS), a project controls management system, for capital asset projects comply with industry standards (EIA-748) and in accordance with contract requirements.

Project Management Policy, Guidance and Oversight

Provide DOE policy, guidance, and oversight for project management.

Project Reporting

Manage, operate, and improve the Department's Project Assessment and Reporting System (PARS), as the independent and auditable project data central repository of all relevant project data and documents. Provide monthly project status report from PARS, for senior leaders with independent assessments of capital asset projects with a TPC of \$50 million or greater. Develop and maintain the Department's project management knowledge repository.

Project Management Expertise

Provide project management advice and counseling to DOE Program Offices on current best practices, requirements, and project performance issues. Assess annual project budget submissions to ensure compliance with regulatory and statutory requirements.

Project Performance Metrics

Maintain project management performance metrics in PARS and share with senior leadership, OMB, GAO, and appropriate others, as requested.

Project Management Career Development Program

Manage the Project Management Career Development Program (PMCDP), along with associated mandatory (17) and elective (14) courses, to provide the professional development, continuous training, and certification of our Federal Project Directors (FPDs). Co-chair Certification Review Board, certifying FPDs at appropriate level.

Recent Organization Accomplishments

Project Management Risk Committee (PMRC)

As Executive Secretariat, supported 22 PMRC meetings to review 11 project critical decisions, two exemption requests, one project peer review, and several other actions over the past year.

Energy Systems Acquisition Advisory Board (ESAAB)

As Executive Secretariat, supported four ESAAB meetings in FY 2020 resulting in the approval of critical decisions totaling over \$11.6B.

Created and Update Departmental Project Management Documentation

Created or updated critical Departmental directives, policies, guides, standard operating procedures, technical standards, and other documents to include DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets.

Independent Cost Reviews and Estimates

Conducted 19 Independent Cost Estimates (ICEs) and Independent Cost Reviews (ICRs) in support of Critical Decisions (CDs) and Baseline Change Proposals (BCPs) valued at approximately \$16.1B. Conducted seven External Independent Reviews (EIRs) in support of validating a project's formal baseline (or re-baseline if a project was unable to achieve its original baseline during execution).

Earned Value Management System Certification and Surveillance Reviews

Conducted six Earned Value Management System (EVMS) certification and surveillance reviews. Developed the EVMS Compliance Standard Operating Procedure to synthesize and consolidate the extensive body of knowledge documents as well as testing protocols used in earned value reviews in order to provide consistency to reviews. Initiated a DOE sponsored research project through Arizona State University (ASU) to improve EVMS effectiveness and efficiency.

Project Peer and Independent Project Reviews

Supported the major Programs by participating in 25 Project Peer Reviews (PPRs), Independent Project Reviews (IPRs), Technical Independent Project Reviews (TIPRs), Project Definitions Readiness Index (PDRI) Assessments, and other similar reviews.

Training Curriculum Delivery

Transitioned PMCDP courses from classroom to virtual learning platform delivery, to deliver training in a more efficient and cost effective way, and to reach a larger segment of the DOE professional workforce. All of the 31 PMCDP courses are now available in a virtual learning environment.

Professional Development Program

Maintained a rigorous professional development program to provide Federal Project Directors (FPDs) with the experience, training, and knowledge needed to manage complex projects. DOE has 240 certified FPDs, and 95% of projects are led by a FPD certified at the appropriate level at the start of construction.

Research and Technical Publication Assistance

Currently supporting a research effort sponsored by the Construction Industry Institute, in concert with other Federal agencies, to develop cost estimating benchmarks for smaller-scale projects such as laboratories and mixed use office facilities. Additionally, PM is sponsoring a research project through Arizona State University (ASU) to develop an easier method to evaluate maturity of an Earned Value Management System (EVMS) and the project performance data accuracy for the organizations using the system. Many DOE contractors are required to utilized a EVMS compliant with the EIA-748 industry standard on their projects.

Annual Project Management Workshop

Host the annual DOE Project Management Workshop and sponsor the Department's Project Management Awards (workshop cancelled in 2020 in response to the Coronavirus pandemic mitigation efforts). This event is typically attended by nearly 400 federal employees and contractors, and facilitates the exchange of best practices and lessons learned.

Industry Leadership

Office of Project Management staff serve on the Board of Advisors for the Construction Industry Institute (CII), on the Project Management Institute (PMI) Global Executive Council, and actively participate in the Association for the Advancement of Cost Estimating-International (AACEI).

Updates to DOE Project Management Policy

Updated and published one DOE Guide (DOE G 413.3-6A, High Performance Sustainable Building); four DOE Guides (Risk Management, Project Definition Rating Index, Technology Readiness Assessment, and Earned Value Management System) are currently undergoing revision; and preparations have been initiated for the development of three new DOE Guides (Planning and Scheduling; Project Funding; and Scope). An administrative update to DOE Order 413.3B is also underway.

Leadership Challenges

Impacts of the Pandemic

Executing PM's mission under the constraints of the coronavirus pandemic; mitigation efforts have required the implementation of innovative communications methods with project teams and site offices, increased reliance on data analysis verse person-to-person engagement, and streamlining procedures. The flexibility and professionalism of PM's staff has contributed to our success during this period.

Improve Project Management Controls

Improving project management controls—such as the Earned Value Management Systems (EVMS) employed by DOE contractors across the DOE complex—to ensure sustained, timely, and reliable monthly project cost and schedule information.

Strengthen Project Assessment and Reporting

Enhancing capabilities of Department's PARS to provide efficient and effective cost/schedule analysis capabilities to highlight more current project issues.

EM Major System Project Peer Reviews

Leading a newly instituted process of conducting EM Project Peer Reviews (PPRs) of projects, \$750 million or greater.

Improve the Project Management Career Development Program

Improving PMCDP to enhance the skillset of DOE Federal Project Directors (FPDs) and project controls workforce.

Project Management Directives.

Maintaining PM directives (DOE Order 413.3B and 21 associated DOE Guides), incorporating all recent Secretarial policy memorandums.

Project Management Continuous Improvement

Sustaining continuous improvement momentum in project management, senior leader engagement, and conformance with all Departmental project management requirements.

GAO High-Risk List

Continuing efforts for removal from the GAO High-Risk List (for "Contract (Project) Management) for projects greater than \$750 million.

Critical Events and Action Items

3-month events

Brief the Deputy Secretary on GAO's High-Risk List to include the background, recent policy changes, project management success metrics, and strategy forward.

6-month events

Hold Quarterly ESAAB meetings to review all capital asset projects \$750 million or greater.

The Deputy Secretary will hold an Energy Systems Acquisition Advisory Board (ESAAB) meeting to review and approve the Critical Decision (CD)-1, Approve Alternative Selection and Cost Range, for both the NNSA Savannah River Plutonium Pit Processing Facility (SRPPPF) (\$4.6B) and the Los Alamos Plutonium Pit Production Project (\$2.7B).
Organizational Chart

Office of Project Management



September 24, 2020

Under Secretary for Science

Supporting the DOE Mission

The Under Secretary for Science (S4) is one of the statutory principal officers of the Department and holds such responsibilities as assigned by the Secretary.

As of November 2020, the S4 oversees five Department Elements: the Office of Science (SC); the Artificial Intelligence and Technology Office (AITO); the Office of Technology Transitions (OTT); the Office of Environmental Management (EM); and the Office of Legacy Management (LM). These elements advance the Department's strategic goals of maintaining American leadership in fundamental research as the foundation for groundbreaking innovation and national security; supporting commercialization and deployment of innovative technologies to deliver reliable, sustainable, and affordable energy and enhance American energy dominance; and meeting the Department's obligations to address environmental impacts of historic projects to create the nuclear deterrent and develop civilian nuclear power technology.

The S4 supports the DOE Mission by:

- Advising and supporting the Secretary (S1) and Deputy Secretary (S2).
- Participating in establishing strategy, priorities, and resource allocations for the Department (including development of budget requests).
- Engaging with high-level external audiences such as Members of Congress; senior Executive Branch counterparts; state, local, and tribal government officials; foreign government and international organization counterparts; and key DOE contractors.
- Providing executive oversight to ensure the effective execution of missions by SC, AITO, OTT, EM, and LM.

Mission Statement

The mission of S4 and the Immediate Office staff is to provide strategic leadership and educate

stakeholders to enable SC, AITO, OTT, EM, and LM to perform their respective missions (a) to maintain American preeminence in science and technology and (b) to deliver safe, timely, and measurable progress in reducing the Department's environmental liabilities.

Budget

Fiscal Year	Budget (millions)
FY 2019 enacted	\$ 13,928,000,000
FY 2020 enacted	\$ 14,634,000,000
FY 2021 requested	\$ 12,238,000,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs) in organizations reporting to the Under Secretary for Science total 2,237.

History

The Energy Policy Act of 2005 established the office of Under Secretary for Science. According to the Act, this office was created to enhance "toplevel coordination of research and development [R&D] programs." This office has been labeled with different titles from time to time (e.g., Under Secretary for Science & Energy during 2013–17). Since 2005, the S4 has overseen SC. The S4 has at times also been assigned by S1 to oversee other Department Elements; those assignments have varied under different administrations:

- 2005–2013: The S4 oversaw only SC. Anecdotally, a person who served as S4 before 2013 observed that oversight of SC alone (an element with its own statutory, Senate-confirmed Director) made either S4 or that Director redundant.
- 2013–2017: The S4 oversaw SC, the Office of Indian Energy Policy and Programs, and the Assistant Secretaries for i) Fossil Energy; ii) Nuclear Energy; iii) Electricity Delivery & Energy Reliability (now just Electricity); and iv) Energy Efficiency & Renewable Energy. This allocation of responsibilities encompassed certain policy and applied technology missions as well as fundamental R&D.
- 2017–present: The S4 currently oversees SC, AITO, OTT, EM, and LM. This allocation combines fundamental R&D with work to commercialize technologies born in the national

laboratories and to accelerate discharge of DOE's environmental stewardship obligations through innovation and effective project management.

Functions

By statute, S4 serves as the science and technology advisor to the Secretary and advises S1 with respect to specified research and development topics, and to the management of the DOE national laboratories. The statute also specifies that S4 shall carry out additional duties as assigned by S1 "relating to basic and applied research." The S1 also may assign other functions to S4, such as the current oversight of AITO, OTT, EM, and LM.

The S4 serves as a member of the Department's Research and Technology Investment Committee (RTIC), along with the S2; the Under Secretary for Energy (S3); the Under Secretary for Nuclear Security (S5); and the Director of the Advanced Energy Research Projects Agency-Energy. The RTIC provides a periodic venue in which these officers coordinate and prioritize R&D programs and investments throughout the Department.

The S4 also acts as DOE's principal liaison with the national security community on certain topics pertaining to science and technology.

Recent Organization Accomplishments

Elements in the S4 organization have achieved many important accomplishments since mid-2018. A few highlights are described below.

S4 Immediate Office

 In 2018, S1 directed S4 to oversee the development of policies to improve the protection of DOE-funded R&D against illicit foreign influence and misappropriation, including policies to enhance scientific integrity and address conflicts of interests (this is known within the S4 office as the Science & Security arena). In June 2019, DOE adopted a policy prohibiting personnel working in its national labs from participating in so-called "talent recruitment programs" sponsored by the governments of China, Iran, North Korea, and Russia (Foreign Talent Programs). Other policies to address similar Science & Security issues concerning DOE-funded R&D are under development by a cross-cutting intradepartmental task force of career staff.

 Relatedly, DOE anticipates the issuance of a National Security Presidential Memorandum in late 2020, directing all agencies to develop and implement broad policies to address conflicts of interest and of commitment in federally-funded R&D.

Science (SC)

- Since March 2019, SC has organized and managed the National Virtual Biotechnology Laboratory, which incorporates the biotech capabilities of all 17 DOE national labs and coordinates the prompt assignment of research projects among them to provide timely scientific and technical responses to the COVID-19 pandemic.
- In December 2019, DOE approved the mission need statement (CD-0) for the Electron Ion Collider (EIC) project, the first greenfield U.S. particle collider project in decades. In January 2020, DOE selected Brookhaven National Lab (BNL) as the site for the EIC, which will be developed and constructed in partnership with Jefferson Lab; in September 2020, leaders from DOE, Congress, and New York gathered at BNL to mark the launch of the project.
- In late 2018, S4 challenged the fusion energy sciences community to follow the example of the high-energy physics community's P5 process to develop better consensus about their field's research and infrastructure priorities. In response, the American Physical Society convened workshops that culminated in delivery of the Community Plan for Fusion Energy and Discovery Plasma Sciences to DOE's Fusion Energy Sciences Advisory Committee (FESAC) in early 2020.
- In June 2018, DOE commissioned the Summit supercomputer at Oak Ridge National Lab.
 With capabilities exceeding 200 petaflops, Summit became #1 on TOP500's list of global supercomputers until June 2020 and is currently exceeded only by the Fugaku machine in Japan. Designed to be optimized for machine learning and deep learning, Summit also has demonstrated unsurpassed AI capabilities.

Artificial Intelligence and Technology Office (AITO)

Secretary Perry established AITO in September 2019 as a direct report to S4, to enhance the coordination of DOE's development and deployment of AI technologies.

Office of Technology Transitions (OTT)

Since September 2018, OTT has worked with DOE national labs to convene a series of Innovation XLab summits on specified topics (e.g., energy storage, grid modernization, quantum information science). These summits gather experts from across the entire DOE lab complex to engage with academics and industry attendees to facilitate innovation and commercialization. The two most recent summits occurred virtually in October 2020 and attracted many hundreds of online participants.

Environmental Management (EM)

- In October 2020, EM celebrated the achievement of Vision 2020, a project to accelerate the decommissioning and demolition (D&D) of the Manhattan Project K 25 facility located at the East Tennessee Technology Park (ETTP) campus of the Oak Ridge Reservation. This initiative completed the D&D at ETTP under budget and four years ahead of schedule, thereby avoiding \$500 million of future costs.
- In September 2020, the S2 endorsed the Project Completion/Authorization to Operate (CD-4) milestone for the Salt Waste Processing Facility (SWPF) at Savannah River Site (SRS), a bespoke facility that had been under development since 2002 to accelerate the closure of liquid tank wastes at SRS. The SWPF began treating its first radioactive waste in October 2020.
- In May 2020, EM issued the Request for Proposals (RFP) for a new stand-alone management and operation (M&O) contract for the Savannah River National Lab (SRNL), removing the lab from the portfolio of the site-wide M&O contractor in order to attract a research-focused contractor and expand the scope of SRNL's R&D mission.
- In May 2020, DOE resolved a longstanding impasse with state regulators in California, which allowed EM to commence the demolition of structures at the Energy Technology Engineering Center (ETEC) site within the former Santa Susana Field Laboratory in Ventura County.

- In late November 2019, operations concluded at the Advanced Mixed Waste Treatment Project (AMWTP) at the Idaho Cleanup Project. AMWTP retrieved, packaged, and shipped to the Waste Isolation Pilot Plant (WIPP) for final disposition over 65,000 cubic meters of transuranic waste that had been removed from the Rocky Flats weapons facility in Colorado and buried in Idaho.
- EM is implementing the innovative end-state contract model for procurements. In contrast to long-term contracts with broad objectives but mostly unspecified interim goals, end-state contracts establish indefinite delivery/indefinite quantity (ID/IQ) relationships for services during the contract period, with specific tasks to achieve near-term cleanup progress (end-states) and corresponding pricing to be determined from time-to-time during the contract's term. In December 2019, EM awarded a 10-year, endstate contract for decommissioning, demolition, and remediation projects on the central plateau at Hanford, and end-state model procurements are underway with pending RFPs for other appropriate EM sites.

Leadership Challenges

Important and challenging topics that are likely to benefit from ongoing attention by S4 leadership include the following:

S4 Immediate Office

Developing DOE policies for Science & Security must take into account complex factors, including DOE's reliance on contractor-operated national labs and grants of financial assistance to third parties like universities; national security concerns; and inherent tensions between open scientific inquiry and prevention of illicit disclosure.

SC

- Despite DOE's long history in biological science, the COVID-19 pandemic has illuminated that more can be done to establish the appropriate, prominent place of DOE and its national labs in the federal bioscience enterprise.
- Since 2018, the field of fusion energy has made important progress, but maintaining that momentum will be challenging.
- U.S. investment in the ITER fusion project experiment in France continues to demand a

large share of the budget of DOE's Fusion Energy Sciences (FES) office, yet recent improvements in the management of that project have not put to rest all concerns about the cost and timing of that project.

- Building on the consensus-building Community Planning effort, FES's Advisory Committee is working on a proposed long-range fusion R&D strategy for the field. Because this entails setting priorities, leadership will be needed to preserve the recently-forged cohesion within the community.
- Well-financed private enterprises are showing progress toward fusion energy with a variety of technical approaches. To support such innovation, DOE has proposed a cost-sharing program for collaboration based on NASA's Commercial Orbital Transportation Services (COTS) program that nurtured SpaceX. Should Congress appropriate the necessary funds, FES will need to deploy staff with the appropriate skills to establish and oversee such public-private partnerships.

EM

- At Hanford, DOE's relationship with the State of Washington has been contentious and marked by evident State frustration and distrust. DOE has been working to increase trust through transparency and by maintaining a consistent focus on completing the direct-feed low-activity waste (DFLAW) treatment facility to vitrify certain tank wastes. As a result, the parties have recently been able to discuss difficult issues without the State seeking intervention by the court that issued an amended consent decree in 2016. Constructive engagement by DOE leadership will be needed to maintain that positive trend.
- Ongoing D&D efforts require a new solid waste disposal cell at Oak Ridge, which falls under U.S. EPA jurisdiction pursuant to a federal facility agreement. EPA's Region 4 seeks to mandate technical requirements for this cell that are inconsistent with protective standards for radioactive wastes established by DOE and by Nuclear Regulatory Commission. Pursuant to the facility agreement, DOE has formally appealed the Region 4 standards to EPA Administrator Wheeler. The objections have been presented by DOE leadership to the Administrator, but he has not resolved the dispute as of late October 2020 and this inter-agency controversy may continue into 2021.

Critical Events and Action Items

Critical events or actions that will take place within the first 3 months of the next Presidential term include the following:

S4 Immediate Office

More decisions regarding Science & Security are forthcoming. The prohibition concerning Foreign Talent Programs will be extended to all DOE financial assistance in the first quarter of FY21. A careerstaff team is developing, for consideration by DOE leadership in 2021, specific department-wide conflict of interest policy to implement that direction. Leadership will also be presented with options of additional protective measures relative to DOEfunded R&D in sensitive, strategic areas of science and technology.

EM

- At Hanford, DOE is in the midst of high-level, holistic negotiations with the State and U.S. EPA. The topics include disposition options for so-called supplemental low-activity waste (LAW)—that is, volumes of LAW that exceed the treatment capacity of the DFLAW facility now under construction. No disposition plan for supplemental LAW has been established; these negotiations may require critical DOE policy decisions on that issue in the spring of 2021.
- EM is preparing to treat radioactive liquid waste in a new facility at Idaho, the Integrated Waste Treatment Unit (IWTU). IWTU was completed in 2014, but technical problems emerged before "hot" (radioactive waste) operations began. The contractor expects in the spring of 2021 to confirm the remedies have worked and will request DOE's CD-4 decision to allow hot waste treatment to begin.

AITO

AITO operated in FY20 (and now under the continuing resolution) with a small PD budget and no funds for sponsoring R&D on its own initiative. While DOE requested increased AITO funding, HEWD's FY21 budget included no funds for it. Given this uncertain situation, the ultimate FY21 appropriation may require critical decisions regarding AITO in early 2021.

Organizational Chart



Office of Science

Supporting the DOE Mission

Within the DOE, the Office of Science (SC) plays a unique and complementary role as a missiondriven science organization supporting discovery science in six science program areas, in addition to mission-relevant, use-inspired research necessary to advance DOE's missions in energy, environment, and national security.

SC is the largest Federal supporter of basic research in the physical sciences in the United States. SC funds programs in physics; chemistry; materials science; biology; environmental science; applied mathematics; and computer and computational sciences; and is the Federal steward for several disciplines within these fields such as high energy physics and nuclear physics; fusion sciences; high performance computing science and technology; and accelerator and detector science and technology. SC is also the largest Federal supporter of fundamental research relevant to future solutions for clean energy. The scale and complexity of the SC research portfolio provide a competitive advantage to the nation as multidisciplinary teams of scientists, using some of the most advanced scientific instruments in the world, are able to respond quickly to national priorities and evolving opportunities at the frontiers of science.

The SC portfolio has two principal thrusts: direct support of scientific research; and direct support of the design, construction, and operation of unique, open-access scientific user facilities. SC supports over 25,000 researchers located at over 300 academic institutions and at all 17 of the DOE national laboratories. Thousands of researchers from universities, national laboratories, industry, and international partners are expected to use SC user facilities in FY 2020. In addition, SC is responsible for the stewardship of ten of the DOE national laboratories.

Mission Statement

The SC mission is to deliver scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic, and national security of the United States.

Budget

Fiscal Year	Budget (millions)
FY 2019 enacted	\$6,585,000,000
FY 2020 enacted	\$7,000,000,000
FY 2021 requested	\$5,837,800,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 785

History

The SC origins trace back to the Manhattan Project. By the close of World War II, it was evident that fundamental knowledge of atomic and nuclear physics had tipped the balance of world power. The Manhattan Project vividly demonstrated the importance of basic research and its linkages to some of the most urgent national priorities. Basic research programs in atomic, nuclear, and radiation physics, and in related disciplines of chemistry and applied mathematics, were foremost among those brought forward from the Manhattan Project.

The all-out effort to create the world's first nuclear weapon created a vast research and development apparatus-including large, multipurpose facilities that became the nation's first national laboratories—under the control of the War Department's Army Corps of Engineers. In 1946, the Atomic Energy Act transferred responsibility for nuclear research and development from the War Department to a new independent civilian agency, the Atomic Energy Commission (AEC). The tools needed to carry out this mission were of a scale that required the federal government to construct and operate them. Throughout the 1940s and 1950s, the AEC created a network of national laboratories to host machines, such as particle accelerators and colliders and arrays of isotope-separating centrifuges, that became the foundation of this new nuclear science. Many of the Commission's activities were unprecedented and exploratory. The Commission's charter directed it, in part, to ensure continuity of the ongoing activities and to carry out a diversified program of basic research.

Motivated by the Arab oil embargo, lawmakers terminated the AEC and placed its research functions under the newly created Energy Research and Development Administration (ERDA) in 1974. ERDA consolidated existing energy research activities across the AEC and other agencies; its basic research portfolio included nuclear, solar, fossil, and geothermal energy; as well as conservation, synthetic fuels, and power transmission. In 1977, the establishment of DOE gathered under one authority most of the federal government's energy-related research, policy, and regulatory activities (with the exception of regulation of the nuclear power industry). The Department of Energy Organization Act of 1977 specifically created the Office of Energy Research. In 1998, the Energy and Water Development Appropriations Act changed the name of the Office of Energy Research to the Office of Science (SC). Today, SC continues its longstanding leadership of fundamental scientific research for energy and is the largest U.S. Federal sponsor of basic research in the physical sciences.

Functions

SC accomplishes its mission and advances national goals by supporting:

- Research at the frontiers of science discovering nature's mysteries, from the study of subatomic particles, atoms, and molecules that are the building blocks of the materials of our everyday world; to the DNA, proteins, and cells that are the building blocks of entire biological systems.
- Science for energy and the environment advancing a clean energy agenda through fundamental research on energy production, conversion, storage, transmission, and use, and through advancing our understanding of the earth and its climate.
- 3. The 21st century tools of science—providing the Nation's researchers with state-of-the-art scientific user facilities considered the most advanced tools of modern science.

SC also has stewardship and primary oversight responsibility for the majority of DOE's national laboratories, stewarding 10 of 17 laboratories: Ames Laboratory (Ames), Argonne National Laboratory (ANL), Brookhaven National Laboratory (BNL), Fermi National Accelerator Laboratory (FNAL), Lawrence Berkeley National Laboratory (LBNL), Oak Ridge National Laboratory (ORNL), Pacific Northwest National Laboratory (PNNL), Princeton Plasma Physics Laboratory (PPPL), SLAC National Accelerator Laboratory (SLAC), and Thomas Jefferson National Accelerator Laboratory (TJNAF).

Office of Science Research

SC manages a fundamental research portfolio through six core program offices: Advanced Scientific Computing Research; Basic Energy Sciences; Biological and Environmental Research; Fusion Energy Sciences; High Energy Physics; and Nuclear Physics. The six SC research program offices are responsible for scientific program planning, including engaging the S&T communities; program budget planning; program execution; and management across the relevant scientific disciplines. The research program offices are also responsible for the selection and evaluation of their research and project portfolios that collectively make up the approximately \$7 billion in annual funding that is awarded as grants or cooperative agreements to universities and colleges, or as funding to the 17 DOE national laboratories operated under the Management and Operating (M&O) contracts.

Advanced Scientific Computing Research (ASCR)

ASCR supports research to discover, develop, and deploy computational and networking capabilities to analyze, model, simulate, and predict complex phenomena important to the United States. ASCR applied mathematics and computer science research as well as research on the linked challenges of capable exascale and data-intensive science, and computational partnerships under the Scientific Discovery through Advanced Computing (SciDAC) program, support the computational needs to advance basic science and clean energy. ASCR also supports 4 scientific user facilities: the National **Energy Research Scientific Computing Center** (NERSC) and the Energy Sciences Network (ESnet); the Oak Ridge Leadership Computing Facility (OLCF) at ORNL; and the Argonne Leadership Computing Facility (ALCF) at ANL.

Basic Energy Sciences (BES)

BES supports fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels to provide foundations for new energy technologies. BES supports a large portfolio of core research in chemical sciences, geosciences, biosciences, and materials sciences and engineering, as well as the Energy Frontier Research Centers (EFRCs) in key areas related to Departmental priorities. BES supports the Fuels from Sunlight and the Batteries and Energy Storage DOE Energy Innovation Hubs. BES also provides for the operations of five x-ray light source facilities, five nanoscale science research centers, and two neutron scattering facilities, and has six ongoing construction projects, one construction project planned as a new start in FY 2021, and two major item of equipment projects to advance research capabilities to maintain U.S. competitiveness in these areas.

Biological and Environmental Research (BER)

BER supports transformative science and scientific user facilities to achieve a predictive understanding of complex biological, earth, and environmental systems for energy and infrastructure security, independence, and prosperity. Starting with the genetic information encoded in organisms' genomes, BER research seeks to discover the principles that guide the translation of the genetic code into functional proteins and the metabolic and regulatory networks underlying the systems biology of plants and microbes as they respond to and modify their environments. This predictive understanding will enable design and reengineering of microbes and plants underpinning energy independence and a broad clean energy portfolio, including improved biofuels and bioproducts, improved carbon storage capabilities, and controlled biological transformation of materials such as nutrients and contaminants in the environment. BER research further advances the fundamental understanding of dynamic, physical, and biogeochemical processes required to systematically develop Earth System models that integrate across the atmosphere, land masses, oceans, sea ice, and subsurface. These predictive tools and approaches are needed to inform policies and plans for ensuring the security and resilience of the Nation's critical infrastructure and natural resources. BER supports four Bioenergy Research Centers and three scientific user facilities.

Fusion Energy Sciences (FES)

FES supports research to expand the fundamental understanding of matter at very high temperatures and densities, and to build the scientific foundation needed to develop a fusion energy source. The FES program includes experimental research on the fundamental science of magnetic confinement; theoretical research and advanced simulations to develop a predictive understanding of burning plasmas; materials research, fusion nuclear science, and enabling technology research and development; measurement innovation; general plasma science; and high-energy-density plasma science including the LaserNetUS consortium of high-power lasers. FES supports public-private partnerships through the Innovation Network for Fusion Energy (INFUSE) program to accelerate progress toward the development of fusion energy. FES supports continued progress on the U.S. contributions to the ITER Project to demonstrate the scientific and technical feasibility of fusion energy. FES also supports the operation of two SC user facilities, the DIII-D tokamak operated by General Atomics in San Diego, CA, and the National Spherical Torus Experiment Upgrade (NSTX-U) at PPPL in Princeton, NJ. These user facilities are integral to maintain a world-leading status and resolve highpriority scientific issues for the development of a fusion energy source.

High Energy Physics (HEP)

HEP supports research to understand how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, probing the interactions among them, and exploring the basic nature of space and time itself. HEP's portfolio of fundamental research and enabling facilities spans the three "frontiers" of particle physics: the Energy Frontier, the Intensity Frontier, and the Cosmic Frontier. HEP supports major facilities and experiments such as the Fermilab Accelerator Complex, upgraded Neutrinos at the Main Injector (NuMI) beamline of NuMI Off-axis v_e Appearance (NOvA) Experiment, and the Facility for Advanced Accelerator Experimental Tests (FACET). HEP supports two construction projects, the Proton Improvement Plan-II (PIP-II) and the Long Baseline Neutrino Facility (LBNF)/ Deep Underground Neutrino Experiment (DUNE) project, and four major item of equipment projects for accelerator and detector upgrades at CERN in Geneva, Switzerland, and for a next-generation cosmic microwave background experiment (CMB-S4).

Nuclear Physics (NP)

NP's mission is to discover, explore, and understand all forms of nuclear matter, including why it takes on the specific forms observed in nature and how that knowledge can benefit society in the areas of energy, commerce, medicine, and national security. NP supports theoretical approaches based on the theory of Quantum Chromodynamics (QCD) as well as research towards Quantum Computing. NP supports three scientific user facilities which collide particles at nearly the speed of light, producing short-lived forms of nuclear matter for investigation: the Relativistic Heavy Ion Collider (RHIC), the Continuous Electron Beam Accelerator Facility (CEBAF), and the Argonne Tandem Linear Accelerator System (ATLAS). NP supports two construction projects: the Facility for Rare Isotope Beams (FRIB) and the Electron-Ion Collider (EIC). In 2022, FRIB will afford access to eighty percent of all isotopes predicted to exist in nature. The EIC will illuminate how the mass of everyday objects is dynamically generated by the interaction of quarks and gluons inside protons and neutrons. One equally exciting NP frontier uses the nucleus itself as a laboratory for observing nature's fundamental symmetries, including the search for a nuclear decay predicted to only be possible if the neutrino is its own anti-particle.

Additional Programs and Activities

SC also manages and supports the following additional programs and activities: Strategic Planning and Interagency Coordination; International Science and Technology Cooperation and Trusted Research; Diversity, Inclusion and Research Integrity; Crosscutting and Special Initiatives; Workforce Development for Teachers and Scientists; the DOE Small Business Innovation Research Small Business Technology Transfer programs; Accelerator R&D and Production; Isotope R&D and Production; Science Laboratories Infrastructure; and Safeguards and Security.

Strategic Planning and Interagency Coordination (SPAIC)

The Office of Strategic Planning and Interagency Coordination (SPAIC) is the primary coordinator for interactions between SC and the other major federal organizations that fund basic research as well as interagency activities. SPAIC also conducts a formal annual SC strategic planning process preparing a written strategic ten-year plan for SC.

International Science and Technology Cooperation and Trusted Research

The Office of International Science and Technology Cooperation and Trusted Research is working to promote the norms, principles, and values of openness, transparency, and reciprocal collaboration that will inform our international collaborations. The office is also engaging stakeholders in the research enterprise and coordinating with interagency efforts to gain a better understanding of emerging risks and to develop a coordinated federal response. It is developing a comprehensive strategy for international engagement—by country and by topic—rather than in a project-by-project or program-by-program basis.

Diversity, Inclusion, and Research Integrity

Advancing diversity, equity, and inclusion (DEI) is central to advancing scientific excellence. Spearheaded by the Office of Diversity, Inclusion and Research Integrity, SC promotes diverse, equitable, and inclusive workplaces that value and celebrate a diversity of people, ideas, cultures, and educational backgrounds, which is foundational to delivering on SC's mission. Harnessing a diverse range of views, expertise, and experiences drives scientific and technological innovation and enables the SC community to push the frontiers of scientific knowledge for the betterment of America's prosperity and security.

Crosscutting and Special Initiatives

The Office of Crosscutting and Special Initiatives shepherds existing crosscutting topics and works to identify and spearhead new initiatives. Crosscuts are designed to bring together the capabilities and R&D of multiple programs and offices, providing synergy and breadth that can solve complex problems. The long-term objectives are to enhance research integration across the scientific community and to build and adopt new technologies and processes that will fundamentally change the nature of research.

Workforce Development for Teachers and Scientists (WDTS)

The WDTS program mission is to help ensure that DOE has a sustained pipeline of science, technology, engineering, and mathematics (STEM) workers to carry out its mission, whether at DOE laboratories, academia, or federal program offices. This is accomplished through support of undergraduate student internships, graduate student thesis research, and visiting faculty research opportunities at the DOE laboratories. WDTS is also responsible for annual, nationwide, middle-and high-school science competitions culminating in the National Science Bowl® in Washington, D.C.

Small Business Innovation Research (SBIR) Program/ Small Business Technology Transfer (STTR) Programs

The Federal agencies with annual R&D appropriations greater than \$100 million for extramural work are required by statute to operate SBIR and STTR Programs to support innovative research and technology development performed by small businesses. SC manages the DOE SBIR/ STTR Programs on behalf of the Department, with the exception of ARPA-E, in close coordination with all of the contributing SC research program offices and the DOE applied technology officesthe Offices of Fossil Energy (FE); Energy Efficiency and Renewable Energy (EERE); Nuclear Energy (NE); Environmental Management (EM); Defense Nuclear Nonproliferation (DNN); and Electricity (OE). The 12 participating programs are responsible for topic selection, reviewer assignment, award selection, and project oversight. The SBIR/STTR Programs Office is responsible for issuing topics and solicitations, managing the review and selection process, working with the SC Integrated Service Center to award SBIR/STTR Phase I and Phase II grants, issuing annual reports to the U.S. Small Business Administration, performing outreach, and setting overall policy for the Department's SBIR and STTR Programs.

Accelerator R&D and Production (ARDAP)

The Office of Accelerator R&D and Production (ARDAP) coordinates the ongoing accelerator science & technology R&D (AS&T R&D) investments made through the core R&D programs of SC, and to make investments to ensure that the U.S. continues to produce world-leading scientific facilities. ARDAP's vision is to support U.S. leadership in physical science R&D by coordinating and making accelerator R&D investments that are aimed at addressing AS&T needs and strengthening US capabilities. ARDAP also supports one scientific user facility, the Accelerator Test Facility.

Isotope R&D and Production (IRDP)

The DOE Isotope Program was moved out of the Office of Nuclear Physics and into its own office, the Office of Isotope R&D and Production (IRDP). IRDP supports the production, distribution, and development of production techniques for radioactive and stable isotopes in short supply and critical to the Nation, under the authority of the Atomic Energy Act of 1954. The office also supports R&D efforts associated with developing new and more cost-effective and efficient production and processing techniques, and on the production of isotopes needed for research purposes.

Science Laboratories Infrastructure (SLI)

The SC SLI program supports scientific and technological innovation at the SC-stewarded DOE laboratories by funding and sustaining mission-ready infrastructure and fostering safe and environmentally responsible operations. The program provides state-of-the-art facilities and infrastructure that are flexible, reliable, and sustainable in support of scientific discovery. SLI supports ongoing projects that will provide new laboratory buildings, renovated facilities, and upgraded utilities. While significant improvements to SC laboratory infrastructure have been made, it is important to maintain a strong level of investment and continue making improvements across the SC national laboratory complex. SC, through SLI, participates in the DOE-wide infrastructure crosscut, which is part of DOE's strategy for addressing critical infrastructure needs across the DOE laboratory complex.

Safeguards and Security (S&S)

The SC S&S program is designed to ensure appropriate security measures are in place to support the SC mission requirement of open scientific research, and to protect critical assets within SC laboratories. This is accomplished by providing physical controls that will mitigate possible risks to the laboratories' employees; nuclear and special materials; classified and sensitive information; and facilities. The SC S&S program also provides funding for cybersecurity for the laboratories' information technology systems to protect electronic data while enabling the SC mission.

Program Planning

Successful management of SC's large and complex scientific research portfolios and facilities is a result of the implementation of best practices in program planning, and program and project management. These practices include: (1) employing the best experts-program managers, project directors, contracting officers and other specialists who are experts in their respective fields; (2) conducting multiyear program planning and budgeting; (3) engaging with the broader S&T communities from universities, national laboratories, and industry in both planning and evaluation processes, including through dedicated Federal Advisory Committees; (4) openly competing research activities and projects to encourage the most capable performers to apply; (5) using external merit-based peer review both to inform selection decisions and to assess ongoing research and project performance; and (6) engaging awardees and contractors collectively on a regular basis to encourage exchange of results and ideas. SC's engagement with the broader S&T communities and stakeholders to obtain input in planning efforts is extensive and is accomplished through a number of different processes and mechanisms, including:

- SC-led scientific and technical workshops;
- Reviews and studies by the SC Federal Advisory Committees;
- External studies by organizations such as the National Academies;
- Interagency Committees and Working Groups;
- Requests for Information (RFIs) posted in the Federal Register; and
- SC program manager participation at national meetings and conferences.

SC has established a Federal Advisory Committee for each of the six SC research programs offices, which are governed by the Federal Advisory Committee Act (FACA) of 1972 (Public Law 92-463) and all applicable FACA amendments, federal regulations, and executive orders. The committees include experts from universities, national laboratories, and industries and provide valuable, independent advice to SC upper management regarding the scientific and technical issues that arise in the planning, management, and implementation of the research programs.

Program Management and Evaluation

Merit-based peer review provides the foundation for which SC selects and evaluates the quality and impact of the research and scientific facilities that it supports. SC's sponsored activities, whether at universities, national laboratories, or private sector organizations, are evaluated at multiple stages. Proposals solicited and received by SC are peer reviewed and the results of peer review inform selection decisions for funding. SC engages active researchers from academia, national labs, and/or the private sector to serve as reviewers who participate as volunteers. SC's merit review system is defined by 10 CFR 605. While 10 CFR 605 governs financial assistance (grants and cooperative agreements), SC applies its principles to national laboratory reviews as well. SC evaluates ongoing basic research activities and facility operations using merit-based peer review; the extent to which this is done may vary depending on the size of the award or project. For large and/or multi-institutional research activities and on-going DOE laboratory research activities and research facility operations. external peer reviews are periodically conducted to assess management and/or scientific progress.

Construction projects and Major Items of Equipment (MIE) are governed by the requirements of DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets. SC, through the SC Office of Project Assessment, in collaboration with the sponsoring SC program office, conducts regular project reviews to help ensure projects remain on schedule and within budget. These reviews have been an integral part of SC's success in maintaining cost and schedule baselines of its large, complex construction and MIE projects.

Lastly, through the use of its Federal Advisory Committees, SC evaluates its own business practices in order to maintain high standards for program and project management and obtain external advice for continuous improvement. SC charges each of its six Federal Advisory Committees on a periodic basis to establish a Committee of Visitors (COV) to assess the efficacy and quality of the processes used by the respective program office to solicit, review, recommend, monitor, and document funding actions and to assess the quality of the resulting portfolio and make recommendations.

Laboratory Stewardship (Planning and Evaluation)

SC conducts a formal laboratory strategic planning process annually whereby each of its ten national laboratories prepare written strategic ten-year plans that form the basis for detailed discussions during in-person meetings at DOE HQ between laboratory leadership and SC leadership on the laboratories' future directions, immediate and long-range challenges, and resource needs. SC's annual laboratory planning (ALP) process has been recognized as a best practice in the Department.

Each year, SC conducts an evaluation of the scientific, technological, managerial, and operational performance of the M&O contractors of its ten national laboratories. The evaluations provide the basis for determining annual performance fees and the possibility of winning additional years on the M&O contract through an "Award Term" extension. The evaluations also serve to inform the decisions the Department makes regarding whether to extend or to compete the M&O contracts. The current SC laboratory appraisal process has been in place since FY 2006. The appraisal process improves the transparency of evaluations, raises the level of involvement by the SC leadership, increases consistency in the way the laboratories are evaluated, and more effectively incentivizes contractor performance by tying performance to fee earned, contract length, and the public release of grades.

Recent Organization Accomplishments

SC's recent significant organization accomplishments include:

Scientific Discoveries and Findings

SC manages a research portfolio of over 3,000 active research awards. The primary accomplishments from SC-funded research and facilities are the resulting scientific discoveries and findings, which are predominately captured in the archival, peer-reviewed scientific literature. Recent scientific discoveries and accomplishments are on the SC webpage: https://www.energy.gov/science/ listings/science-highlights

Delivery of New Scientific User Facilities

SC supports the design, construction, and operation of unique open access scientific user facilities

that offer the scientific community and industry unmatched capabilities. SC currently operates 28 such facilities, including particle and nuclear physics accelerators and colliders; light sources and neutron scattering facilities; some of the fastest high-performance computers in the world for open science; nanoscale science research centers; and observational capabilities for environmental and atmospheric modeling. Since 2016, SC has successfully completed 17 such projects in various program areas. In September 2017, SC completed the construction and commissioning of the 12 GeV Upgrade project at Thomas Jefferson National Accelerator Facility, in Newport News, Virginia, on time and within budget. The 12 GeV project tripled the Continuous Electron Beam Accelerator Facility's (CEBAF) original operating energy and commissioned a new experimental area dedicated to providing insight into one of the universe's great mysteries: why the fundamental constituents of matter, quarks, may never be found in isolation. In 2019, the LHC ATLAS Detector Upgrade and LHC CMS Detector Upgrade projects were completed on cost and within schedule. The objective of ATLAS-U was to design and construct leading edge and innovative electronics components and corresponding firmware for the upgrade of the ATLAS high energy physics experiment, installed at the world's largest particle accelerator, the Large Hadron Collider (LHC), at CERN in Geneva, Switzerland. The CMS-U project comprised strategic upgrades to three systems of the CMS detector to cope with increasing collision rates ("luminosity"), also at LHC.

Capital Asset Project Performance

SC continues to lead DOE in project performance for capital asset projects, as measured by the Government Accountability Office's (GAO) project success metrics, which were initiated in FY 2008. SC has delivered 100% of its projects within 110% of their original approved cost baselines in the past three rolling measurements from FY 2018 to FY 2020. In FY 2020, SC has 48 active, capital asset projects (post Critical Decision-0), each with Total Project Costs greater than \$20 million. In 2019, the LHC ATLAS Detector Upgrade and LHC CMS Detector Upgrade projects received the DOE Secretary's Award of Achievement.

Research and Development Awards

In 2019, 41 of the 100 annual awards given out by R&D Magazine were won by researchers at DOE National Laboratories. The R&D 100 awards, sometimes called the "Oscars of Innovation," are given annually in recognition of exceptional new products or processes that were developed and introduced into the marketplace during the previous year. Seventeen of those 41 DOE researchers were at SC national laboratories.

Quantum Information Sciences

SC's investments in Quantum Information Sciences (QIS) have ramped up from \$6M in FY 2017 to \$195M in FY 2020. All six core SC programs and the isotope program are supporting research in QIS and efforts are focused on three key areas: early-stage core research within the SC programs, support for five National QIS Research Centers, and plans to develop a quantum Internet that will connect the National QIS Research Centers and DOE laboratories.

Leadership Challenges

SC's leadership challenges include:

ITER

ITER is an international research and development (R&D) project for the construction and operation of the world's largest fusion energy research facility near Cadarache, France. The purpose of the project is to validate the technical viability of magnetically confined "burning plasma," which is anticipated to lead to the realization of fusion energy as a clean and sustainable solution to power generation. The seven signatories to the 2007 ITER Agreement are the United States, European Union, China, India, Russia, Japan, and Korea. All seven Members are coowners of the ITER facility and, as such, are required to fund and govern the project. The current plan is to achieve the first operational milestone of the project, called "First Plasma," in 2025. A reassessment of the schedule due to COVID-19 impacts may result in a delay to the baseline schedule. Since the inception of the Agreement, the full U.S. construction costs have risen from a range of \$1.45 to \$2.2B to \$4.7 to \$6.5B, which includes more than \$1B in cost contingency. The U.S. in-kind contributions to the ITER project have been baselined up to First Plasma. (See separate transition paper on ITER.)

Exascale

It is critical to National security and economic competitiveness to maintain the DOE's Exascale Computing Initiative (ECI). The July 2015 Executive Order 13702 established the National Strategic Computing Initiative (NSCI) and identified DOE as one of the lead agencies. The NSCI called upon the DOE Office of Science (SC) and DOE National Nuclear Security Administration (NNSA) to "execute a joint program focused on advanced simulation through a capable exascale computing program emphasizing sustained performance on relevant applications and analytic computing to support their missions." In 2016, DOE initiated research and development activities to deliver at least one exascale (10¹⁸ operations per second) computing capability in calendar year 2021 with two other DOE exascale systems delivered in the 2022-2023 timeframe. This activity, referred to as the ECI, is a partnership between SC and NNSA that addresses DOE's science and national security mission requirements. Currently, within SC and NNSA, the total leadership computing capability (combined capability of existing DOE high-performance computers) is over 300 petaflops. In FY 2017, the SC R&D portion of the ECI was segregated into the Office of Science Exascale Computing Project (SC-ECP) in SC's Advanced Scientific Computing Research (ASCR) program. ECP provides the R&D necessary to effectively use exascale-capable systems and while ECI is focused the actual delivery of the exascale hardware. ASCR provides funds in ECI to support site preparations, nonrecurring engineering investments and acceptance activities at the Argonne (ALCF) and Oak Ridge Leadership Computing Facilities (OLCF). There were significant challenges associated with achieving this level of capacity due to the physical limits of existing computing technology and concomitant limitations in software design. Naive scaling of current high performance computing technologies would result in systems that are untenable in their energy consumption, data storage requirements, complexity to program effectively, and other factors. Unlike previous upgrades to DOE's Leadership Computing Facilities, an exascale system capable of meeting critical national needs cannot be developed through incremental improvement of existing systems.

Over the past six decades, U.S. computing capabilities have been maintained through continuous research and the development and

deployment of new computing systems with rapidly increasing performance on applications of major significance to government, industry, and academia. Maximizing the benefits of High Performance Computing (HPC) in the coming decades will require an effective national response to increasing demands for computing power, emerging technological challenges and opportunities, and growing economic dependency on and competition with other nations. Early this summer, Japan overtook the U.S. on the Top500 list that identifies the world's most powerful high performance computers with the deployment of their 415 petaflop Fugaku system. Recognizing the importance of HPC to economic competitiveness, nations in Europe and Asia, particularly China, continue to invest in HPC. The Chinese strategy is increasingly to base their HPC systems on domestic technology, and China continues to lead the U.S. in the number of systems on the Top500 list. In addition, China has 3 exascale machines in the pipeline: a Sunway system in Jinangnan targeted for 2020, a NUDT system in Tianjin targeted for 2021, and a Sugon system in Shenzhen targeted for 2022. The Chinese have an advantage in that they are not held back by an installed base that needs backward compatibility and therefore, there is no need to "play it safe," leading to an open ended design space ranging from the conventional to the exotic. However, in the past two years, there has been a lack of new Chinese systems on the Top500. (See separate transition paper on Exascale.)

Multiple Concurrent Large Capital Projects

SC is engaged simultaneously in many large capital projects across its lab complex. The lab complex has become a giant, multi-campus construction site, with concomitant project management challenges. As of October 2020, SC is managing 10 projects over \$50M that are past CD-2, close to 40 projects over \$50M that are between CD-0 and CD-2, and 10 projects over \$50M managed outside of the CD process because of the type of project or acquisition.

Critical Events and Action Items

Exascale. Application and exascale software testing and scaling will be initiated on exascale testbeds. The first exascale system is to be delivered during calendar year 2021.

Organizational Chart



Artificial Intelligence and Technology Office

Supporting the DOE Mission

Transform the Department of Energy (DOE) into the United States Government's (USG) lead agency in the civilian use of artificial intelligence (AI) by accelerating the research, development, delivery, and application of AI.

Mission Statement

The Artificial Intelligence & Technology Office (AITO), DOE's center for artificial intelligence, will accelerate the delivery of AI-enabled capabilities, scale the Department-wide development of AI, synchronize AI applications to advance the agency's core missions, and expand public and private sector strategic partnerships, all in support of American AI leadership.

Budget

Fiscal Year	Budget
FY 2019 enacted	N/A
FY 2020 enacted	\$2,500,000
FY 2021 requested	\$4,900,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 5. The current office breakdown is 5 FTES (4 of them political appointees), 3 detailees from other DOE offices, 1 detailee from a national lab, and 2 contractors.

History

AITO was founded in September, 2019, by former Secretary Rick Perry to serve as the enterprise's nerve center for AI work, to help assess, coordinate, and drive DOE's unmatched progress in this critical area. The goal of AITO is simple: to organize DOE's varied AI activities, whether they be R&D or applications or policy or infrastructure efforts; identify resources to accelerate their success; and most importantly, align them and focus them like a laser on ensuring Al is used as a force for good.

Functions

AITO is tasked with serving as the coordinating arm of AI within DOE, and between DOE and other USG organizations and outside stakeholders.

Recent Organization Accomplishments

AITO created the AIX database, which collects information on all DOE projects (including those at National Labs) which have some AI cross cut or aspect; there are currently 600+ projects in the database. AITO issued a RFI (closed in July 2020) to assess ideas for an AI Grand Challenge. AITO is an active participant in the COVID Insights Project, and AITO is co-chairing the <u>First Five Consortium</u>, to bring to market an app for first responders battling fires and floods.

Leadership Challenges

As a new office within DOE that is not codified by Congressional statue, AITO currently has no consistent funding source within Congress. Enlisting allies in Congress to support AITO and its mission, as well as sustained and reliable funding levels, are current challenges. Additionally, many staff members are currently either detailees or contractors. Bringing on FTEs is a challenge the office is working on currently. AITO has a critical coordination role to play at DOE, ensuring that the above mentioned challenges are addressed is vital to ensuring the success of AITO in coordinating AI functions at DOE

Critical Events and Action Items

Continued and sustained funding from Congress will be needed. Additionally, Congressional allies will need to be gained and fostered.

Organizational Chart

This chart represents the AITO staffing plan.



Office of Technology Transitions

Supporting the DOE Mission

OTT fulfills several Departmental and Interagency Strategic Goals.

Interagency

OTT is the interagency co-chair of the Working Group supporting the Cross Agency Priority Goal to Improve Transfer of Federally-Funded Technologies from Lab-to-Market, which highlights efforts to "improve the transition of federally funded innovations from the laboratory to the marketplace by reducing the administrative and regulatory burdens for technology transfer and increasing private sector investment in later-stage research and development (R&D); develop and implement more **effective partnering models** and technology transfer mechanisms for Federal agencies; and enhance the effectiveness of technology transfer by improving the methods for evaluating the ROI and economic and national security impacts of federally funded R&D, and using that information to focus efforts on approaches proven to work." This Working Group's efforts are guided by a Green Paper released in FY 2019 on maximizing U.S. innovation from government-funded research.

Departmental

OTT leads one of the Department's six Agency Priority Goals on **Commercial Adoption of Energy Technologies**, on which DOE publicly reports on a quarterly basis through FY 2021.

In addition, OTT leads the Department's efforts to increase the return on DOE R&D investment through the transition of national laboratory/ production facility-developed technologies to other government entities and the private sector, and to increase the commercial and public impact of DOE investments through expanded utilization of national laboratory facilities and expertise. Core to these efforts are a suite of OTT-maintained tools to facilitate access, programs to enhance impact, and policy reform efforts to streamline partnership development with external entities.

Mission Statement

OTT's mission is to expand the public impact of the Department's research and development (R&D) portfolio to advance the economic, energy and national security interests of the nation.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$8,505,000
FY 2020 enacted	\$14,080,000
FY 2021 requested	\$12,639,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 22

History

- Feb 11, 2015: OTT launched by Secretary Moniz and inaugural Director is dual-hatted as the Department's statutory Technology Transfer Coordinator.
- FY 2016: OTT announces first cycle of statutory Technology Commercialization Fund.
- FY 2017: OTT receives first appropriated budget from Congress.
- FY 2018: Functional transfer to OTT of EERE Tech-to-Market (T2M) portfolio of activities and associated FTEs is completed.
- FY 2019: Director of OTT designated the Department's Chief Commercialization Officer.
- FY 2020: OTT celebrates 5 years and receives first financial assistance funding from Congress (\$5 million for regional innovation ecosystems).

Prior to FY 2018

As a new organization with limited resources and broad mandate, OTT narrowed its initial focus to effectively deliver on statutory requirements, many of which were overdue and/or lacked effective implementation infrastructure within DOE.

FY 2018 to Present

With the functional transfer of EERE's T2M program to OTT in FY 2018, the office assumed a greater role as a Departmental node for support and direct funding of the multi-faceted technology transitions mission. Over the past three years, major mission areas have emerged around policy reforms to streamline access, market analysis, promotion of model success stories, and direct industry outreach and partnership development.

Functions

The Director of OTT or Chief Commercialization Officer, known in statute as the Technology Transfer Coordinator, serves, <u>by law</u>, as the "principal advisor to the Secretary on all matters relating to technology transfer and commercialization."

As outlined in Sec. 1001 of EPACT 2005, the Technology Transfer Coordinator has four broad statutory oversight responsibilities as the Secretary's principal advisor in the areas of technology transfer and commercialization. The Director, specifically, "shall oversee":

- 1. the activities of the Technology Transfer Working Group (TTWG);
- 2. the expenditure of funds allocated for technology transfer within the Department;
- 3. the activities of each technology partnership ombudsman; and
- 4. efforts to engage private sector entities, including venture capital companies.

The <u>TTWG</u> comprises DOE and Lab representatives and is charged in statute to, among other things, "coordinate technology transfer activities occurring at National Laboratories" and "exchange information about technology transfer practices."

In addition to TTWG oversight, the Tech Transfer Coordinator oversees DOE's technology transfer expenditures and its private sector engagement efforts, items 2 and 4 above. OTT has, in practice, exercised its statutory oversight responsibilities through requests for information and other factfinding tools which engage Labs and other facilities across the DOE complex.

In addition, OTT is charged with managing the statutory <u>DOE Technology Commercialization</u> <u>Fund</u>, "using 0.9 percent of the amount made available to the Department for applied energy research, development, demonstration, and commercial application for each fiscal year, to be used to provide matching funds with private partners to promote promising energy technologies for commercial purposes." This amounts to approximately \$30 million in cost-matched awards to the National Laboratories each year for technologies spanning the DOE applied R&D portfolio. Importantly, the disbursed funding is not OTT funding, but rather appropriated funding from the contributing offices: CESER, EERE, FE, NE, and OE. Based on current DOE policy, ARPA-E, EM, NNSA, and SC do not contribute to the TCF, though they are generally understood to also perform "applied" R&D at varying levels.

OTT is also charged with producing a technology transfer execution plan and reporting annual updates to it. The <u>latest public version covers 2016-2018</u> and a completed update is under review.

OTT produces an annual report to Congress on the utilization of federal technology across the DOE National Laboratories and Production Facilities and associated technology transfer success stories (latest published report on FY 2016-2017 data available <u>here</u>). OTT also submits required technology transfer data annually to the National Institute of Standards for its interagency report (latest published report for FY 2016 available <u>here</u>).

In addition to its efforts to ensure Departmental compliance with statutory requirements, OTT supports a broad portfolio of activities, tools and programs to enhance technology transfer-related outcomes and the nation's innovation ecosystem:

Energy I-Corps (EIC)

Fosters an entrepreneurial workforce and creates a cohort of DOE National Laboratory market-oriented researchers that have been immersed in an intense program of commercialization training centered on customer outreach.

Lab Partnering Service (LPS)

Provides a "front door" to the DOE for stakeholders to connect with leading DOE National Laboratory expertise, facilities, and technology through a searchable, online platform.

InnovationXLab Series (XLabs)

National Lab-hosted summits that seed publicprivate partnerships and a two-way exchange of information and ideas between industry, universities, manufacturers, investors, and end-use customers with innovators and experts from across the National Labs.

Energy Program for Innovative Clusters (EPIC

Funding to support development of regional energy technology innovation clusters.

Market Analysis

OTT conducts market analysis to proactively identify commercialization opportunities and inform marketing and engagement for DOE-developed technologies. OTT facilitates the development and use of market analysis content, methodologies, and data services across DOE offices, and conducts targeted analysis for crosscutting or important gap topics.

Recent Organization Accomplishments

- OTT mobilized quickly in response to the COVID-19 pandemic. The OTT <u>COVID 19</u> <u>Technical Assistance Program (CTAP)</u> provides lab funding for short-term assistance to outside entities with tough scientific or technical challenges related to combating COVID 19. We established a <u>COVID-19 portal</u> on the Lab Partnering Service, featuring a curated selection of experts, facilities, technologies, and IP that could be useful in the fight against the virus.
- Developed 2 all-virtual InnovationXLab Summits in October 2020 on <u>Quantum Information</u> <u>Science & Technology</u> and <u>Carbon Utilization</u>, engaging over 1,000 stakeholders in these strategic technology areas.
- Including these 2 Summits, OTT participated in and contributed substantial content to about 40 in-person and virtual events during FY 2020, reaching thousands of stakeholders in diverse technology sectors.
- Through its FY20 Technology Commercialization Fund round, OTT awarded 82 projects \$33 million in funding more than matched by \$36 million in private cost share.
- With the graduation of Energy I-Corps Cohort 10 in November 2019, OTT has successfully supported 111 teams from 12 National Labs through this program. The program has enabled Lab researcher participants to secure over \$40M in follow-on funding and launched 9 new companies.
- As of October 2020, the Lab Partnering Service enables public access to over 1,400 technology summaries, over 330 experts, over 290 success stories, over 200 facilities, and all 21 National

Labs and Production Facilities. The website has received over 40,000 website visits since formal launch in Summer 2018.

- Beginning FY21, OTT implemented a robust project management system to improve efficiency, transparency, and oversight of all funding and project management activities.
- Since FY 2019, OTT participation in the National Lab appraisal process has been formalized for the 10 Labs stewarded by the Office of Science through a dedicated performance element (4.3). OTT also provides input to the Idaho National Lab and National Renewable Energy Lab appraisals.
- Between July and October, 2020, OTT launched its first ever Prize and Funding Opportunity Announcement (FOA) combining for \$5 million in funding to support regional innovation clusters.
- While OTT is domestically-focused, our commercialization mission is necessarily global in scope and has resulted in several successful international engagements as well:
 - Director of OTT served as U.S. Head of Delegation at the <u>5th Mission Innovation</u> <u>Ministerial</u> in September, 2020.
 - Facilitated a <u>formal collaboration</u> between the DOE and the Dutch Ministry of Economic Affairs and Climate Policy on research and demonstration of hydrogen technology.

Leadership Challenges

Pending Legislation

There are a number of OTT-relevant bills under consideration by Congress with the potential to significantly impact OTT's structure and mission. These are outside the Department's control but noteworthy for the disruptive potential.

Defining Success

Transitions of technology from the federal research sphere to end user consumption/deployment can take years and even decades and rarely follow linear paths. As such, it is often very difficult to define success metrics for technology transition activities. However, many stakeholders, including OMB and Congress, have asked how OTT measures success and pushed for quantitative metrics, which have the potential to distort behavior in suboptimal ways if not carefully defined.

Virtual Engagement

Partnership development is a contact sport and OTT's outreach activities have been significantly disrupted due to the constraints imposed by COVID-19. The silver lining has been that OTT has successfully transitioned to virtual events with an even wider, though less personalized, reach.

Critical Events and Action Items

- Feb/Mar Energy Program for Innovation Clusters (EPIC) Selections. OTT will award ~\$4 million in financial assistance to incubators/ accelerators supporting regional energy innovation ecosystems.
- Apr Technology Commercialization Fund Selections. Stewarded by OTT, the TCF program will award ~\$30 million in matching funds to the National Laboratories for applied RD&D with high potential for commercialization

Organizational Chart



Office of Technology Transitions

Note: This org chart includes 2 approved slots that have not yet been classified as of Oct 2020.

Office of Environmental Management

Supporting the DOE Mission

The U.S. Department of Energy's (DOE) Office of Environmental Management (EM) directly supports DOE's Strategic Objective to continue cleanup of radioactive and chemical waste resulting from the Manhattan Project and Cold War activities. Successful cleanup depends on overcoming technical, quality assurance, schedule, regulatory, budgetary, and management challenges.

Mission Statement

EM's mission is to address the nation's Cold War environmental legacy resulting from nuclear weapons production and government-sponsored nuclear energy research.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$7,175,129,000
FY 2020 enacted	\$7,455,200,000
FY 2021 request	\$6,065,672,000

Human Resources

FY 2020 authorized Federal full-time equivalents (FTEs): 1350

History

The Office of Environmental Management was established in 1989 to address the significant environmental liability that resulted from decades of nuclear weapons production and governmentsponsored nuclear energy research that played a key role in domestic security and prosperity. This environmental legacy included millions of gallons of liquid radioactive waste, millions of cubic meters of solid radioactive wastes, and thousands of tons of used nuclear fuel and special nuclear material, along with huge quantities of contaminated soil and water. Over the past 30 years, EM has made significant progress in its mission, driving down environmental risks to the federal government. Out of an original 107 sites, cleanup activities have been completed at 91 sites in 30 states and the Commonwealth of Puerto Rico. EM is currently responsible for cleanup activities at 16 sites in 11 states.

Significant events that have occurred in the EM mission to date include:

- Opening the Defense Waste Processing Facility (DWPF) at the Savannah River Site in South Carolina in 1996. The DWPF is used to convert radioactive liquid waste currently stored at Savannah River into a solid glass form (through a process called vitrification) for safe long-term storage and ultimate disposal. The DWPF is currently the largest vitrification facility in the world.
- Opening the Waste Isolation Pilot Plant (WIPP) in New Mexico in 1999. WIPP is the only operating deep geological repository in the world and is used for disposal of defense-generated transuranic (TRU) waste. WIPP plays an integral role in the overall EM and NNSA missions, supporting cleanup efforts across the complex and national defense needs.
- Completing cleanup of the former Rocky Flats site in Colorado in 2005.
- Completing cleanup of the former Ashtabula and Fernald sites in Ohio in 2007, and the former Mound site in Ohio in 2008.
- Placing 6 of 9 former defense reactors at the Hanford Site in Washington state in an interim stabilized configuration (cocooning). A seventh reactor at Hanford, B Reactor, has been preserved as part of the Manhattan Project National Park.
- Completing in-situ decommissioning of the P and R reactors at Savannah River in 2011.
- Completing the bulk of planned cleanup activities along the Columbia River corridor at the Hanford site in 2015.
- Completing the demolition and removal of the gaseous diffusion plant complex at Oak Ridge in 2020.

Functions

Waste Management

EM is responsible for the safe and effective management, treatment, and disposal of a variety of types of radioactive waste, special nuclear materials, and spent nuclear fuel. Waste present at EM sites includes tank waste that was produced through plutonium production activities; TRU waste, which consists of clothing, tools, rags, soil, debris, and other items contaminated with small amounts of plutonium or other man-made radioactive materials; low-level and mixed low-level radioactive waste; and hazardous waste.

Facility Deactivation and Decommissioning (D&D)

EM is responsible for facility deactivation and decommissioning (D&D) to ensure facilities are in a safe configuration, followed by demolition or interim stabilization.

Soil and Groundwater Remediation

EM deploys a number of strategies to remediate soil and groundwater including soil removal, soil cap installation, and groundwater pump and treat.

Recent Organization Accomplishments

Finalizing and implementing DOE's interpretation of the term "high-level waste." This interpretation represents a science-driven approach that enables EM to more appropriately manage tank waste in a risk-based and more cost-effective manner.

Completing physical demolition of Hanford's Plutonium Finishing Plant, which produced twothirds of the plutonium metal used in the U.S. nuclear arsenal.

Approving the start of operation of the Salt Waste Processing Facility (SWPF) at Savannah River, which will significantly ramp-up EM's ability to address tank waste at the site. SWPF construction was completed approximately eight months ahead of schedule, and \$60 million under budget.

Completing a multi-year deactivation and decommissioning effort at the Oak Ridge East Tennessee Technology Park in Tennessee. This marks the first time a uranium enrichment complex has been removed. This effort was completed four years ahead of schedule, saving taxpayers \$500 million.

Completing the TRU waste treatment mission at Idaho's Advanced Mixed Waste Treatment Project, which involved processing this waste for off-site disposal.

Completing the transfer of radioactive sludge at Hanford's K basins away from the Columbia River to safer longer-term storage at Hanford's Central Plateau. This project was completed ahead of schedule and under budget.

Leadership Challenges

Environmental Liability

The EM mission is a significant contributor to the federal government's environmental liabilities, which are one of the largest costs the government faces. As of FY19, EM's liability is \$402 billion. EM's efforts to address tank waste, primarily located at the Hanford and Savannah River sites, account for approximately 60 percent of the overall liability, as well as, approximately 40 percent of the program's annual budget. With completion of the Salt Waste Processing Facility, Savannah River now has all of the planned facilities to address tank waste there. EM believes the bulk of the tank waste mission at that site could be completed in a decade, reducing liabilities. However, at Hanford, the liability is anticipated to continue to increase as EM works to develop a comprehensive strategy to address tank waste.

Regulatory Agreements

EM has approximately 40 agreements in place with EPA and State regulatory agencies that oversee EM's cleanup mission at virtually all sites across the DOE complex. The types of agreements include Federal Facility Agreements for sites on the EPA National Priority List; RCRA Consent Orders and Site Treatment Plans; Court-ordered Consent Decrees; and Court-enforceable Settlement Agreements. These agreements vary significantly in terms of how cleanup progress is addressed, such as by the number of milestones and level of detail in requirements.

Procurement/End State Contract Model

EM is working to implement a new acquisition approach for its major cleanup contracts called, the "End-State Contracting Model." This approach utilizes a single award Indefinite-Delivery Indefinite-Quantity contract structure. This model seeks to provide EM with flexibility to task its contractors with discrete scopes of work for site closure or endstates. This model will allow for more realistic and reliable pricing from contractors. EM has started transitioning to end-state contracts for cleanup activities at Hanford and the Nevada National Security Site and is in the process of competing end-state contracts at several major sites, including Savannah River, Oak Ridge, and Idaho.

Workforce Management/Recruitment

EM's workforce is critical to the success of the Department of Energy's cleanup mission. Approximately half of the current EM workforce will be eligible to retire by FY 2026. As part of its Human Capital Management Plan, EM commissioned the U.S. Office of Personnel Management (OPM) to review its current workload requirements versus the number of employees needed to accomplish the assigned workload. The results of this pending study will further assist EM to determine the necessary number of personnel, enhance its succession planning efforts, and contribute to an external recruitment strategy to meet mission objectives. In addition, as with much of the government, EM is currently in a maximum telework posture and is exploring the use of long-term telework options for its staff.

Critical Events and Action Items

Ongoing Procurements/Contract Transitions

In early 2021, EM anticipates awarding and launching transition activities for two major contracts at the Hanford and Savannah River sites. These include:

New Management-and-Operating Contract for Savannah River National Laboratory

EM is in the final stage of competing a new, standalone management-and-operations contract for the Savannah River National Laboratory, EM's corporate laboratory. This new contract is expected to enhance the ability of the laboratory to pursue its enduring mission by focusing the contractor on its research and development (R&D) missions, increasing SRNL's flexibility to pursue more diversified R&D projects and attracting additional expertise in the operation of R&D facilities. EM anticipates awarding the new contract by the first quarter of FY 2021, with transition expected to begin soon after.

Hanford Tank Closure Contract

In May 2020, EM awarded a new end-state contract for tank waste activities at Hanford (the Hanford Tank Closure Contract). However, in response to protests unsuccessful offerors filed with the Government Accountability Office, EM has decided to take corrective action on the procurement. This corrective action is ongoing and a schedule for a new award decision has not yet been finalized.

Hanford Holistic Negotiations

Currently, the tank waste mission at the Hanford site is driven by requirements in the Tri-Party Agreement among DOE, the Washington State Department of Ecology, and the U.S. Environmental Protection Agency (EPA); and the 2016 Amended Consent Decree between DOE and the states of Washington and Oregon. EM is on track to meet an Amended Consent Decree milestone to begin low-activity waste treatment by the end of 2023. However, a more comprehensive approach to the tank waste mission is needed. As a result, DOE, the Washington Department of Ecology, and the EPA have entered into holistic negotiations which are expected to continue through FY 2021.

Los Alamos National Laboratory Transuranic Waste Interim Storage at Waste Control Specialists, LLC

EM is working to finalize a disposition path for TRU waste from Los Alamos National Laboratory currently stored at the Waste Control Specialists commercial radioactive waste disposal site in Texas. The state of Texas has requested EM remove the TRU waste by the end of 2020. EM is actively pursuing options for removal. DOE will continue to closely work with state and regulatory officials on the path forward.

Organizational Chart

Office of Environmental Management



Office of Legacy Management

Supporting the DOE Mission

The Office of Legacy Management (LM) supports the Department of Energy (DOE) mission and Goal 3 of the Strategic Plan in the following areas:

Protect human health and the environment

LM protects human health and the environment by conducting long-term surveillance and maintenance (LTS&M) activities, currently at 100 sites, to ensure that environmental remedies put in place during site cleanup continue to protect human health and the environment. Our site inventory will expand as other DOE sites are transferred to LM upon the completion of remediation and regulatory closure.

Preserve, protect, and share records and information

LM protects and maintains legacy records and information, and makes technology solutions more efficient, relevant, and accessible to the LM stakeholder and user communities. In addition, we preserve the Yucca Mountain Project science and information.

Safeguard former contractor workers' retirement benefits

LM ensures prudent funding and risk mitigation in support of former contractor workers' retirement benefits.

Sustainably manage and optimize the use of land and assets

LM activities promote and enhance sustainable environmental performance for facilities and personal property and incorporate climate resilience in infrastructure planning and design consideration. We also ensure the beneficial reuse of land and assets, so former sites can become community assets.

Sustain management excellence

LM develops and maintains high standards for planning, budgeting, acquisition, and program and project management. The expertise of our 75 federal employees and over 500 contractor partners helps protect human health and the environment by maintaining 100 sites in 30 states and territories, from Puerto Rico to Alaska. LM is an OMB designated High Performance Organization. As stewards of taxpayer dollars, LM is steadfast in our commitment to conservatively manage our funds.

Engage the public, governments, and interested parties

LM management and staff recognize that engaging the public and governmental organizations is critical to achieving nearly all objectives of the organization. Public outreach, governmental collaboration, and effective dialog with tribal nations are central to all our work and remain a high priority. Engaging the public, governments, and interested parties includes strategic outreach, interpretive services, and participation in environmental justice (EJ) efforts. Outreach often takes the form of personto-person interaction between LM and community members at open houses, tours, and interpretive centers.

Mission Statement

The mission of LM is to fulfill the Department's post-closure responsibilities and ensure the future protection of human health and the environment. We are the caretakers of legacy sites that played a critical role in America's nuclear history. By supporting the Manhattan project and additional nuclear weapons development, as well as experimental peace-time nuclear energy applications, our sites helped America win World War II and the Cold War. We are the federal land managers and stewards of cultural, historical, and natural resources at sites that have been successfully cleaned up and have remedies in place. We work closely with federal, state, local, and Tribal governments to set clear expectations and monitor results to ensure public and environmental safety for generations to come. We use advancements in science and emerging technologies to efficiently improve existing protection levels at our sites.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$158,800,000
FY 2020 enacted	\$162,000,000
FY 2021 requested	\$317,000,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 75

History

DOE established LM in 2003 to manage post environmental remediation activities at former defense-related sites that were part of the nation's nuclear weapons complex. The sites have been remediated under a variety of authorities and programs, including: the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Uranium Mill Tailings Radiation Control Act (UMTRCA); the Formerly Utilized Sites Remedial Action Program (FUSRAP); the Defense Decontamination and Decommissioning (D&D) Program; Nevada Off-Sites, continental underground nuclear tests or proposed test sites in the United States within proximity of the Nevada National Security Site; Nuclear Waste Policy Act (NWPA, 1984) Section 151; and the Mercury Export Ban Act. LM conducts long-term surveillance and maintenance (LTS&M) at these sites where nuclear waste has been disposed, where residual contamination remains, or where passive or active treatment of groundwater contaminated by radionuclides or other contaminants of concern is being conducted. Today, LM is responsible for 100 sites in the United States and the territory of Puerto Rico. Our mission and portfolio continue to grow with the projected addition of new sites and programs.

Functions

Long-Term Surveillance and Maintenance

Protects human health and the environment through effective and efficient long-term surveillance and maintenance.

Legacy Records and Information Management

Preserves, protects, and makes accessible legacy records and information.

Work Force Management

Implements departmental policy concerning continuity of worker pension and medical benefits.

Legacy Land and Asset Management

Manages legacy land and assets, emphasizing safety, reuse, and disposition.

Community Impact Mitigation

Mitigates community impacts resulting from the cleanup of legacy waste and changing departmental missions.

Legacy Land and Asset Liaison

Actively acts as liaison and coordinates all policy issues with appropriate departmental organizations.

Recent Organization Accomplishments

LM's recent major organizational accomplishments include:

100th Site Added to the LM Portfolio

In 2019, LM marked a major milestone, when the 100th legacy site was added to LM's portfolio. The transfer of the Colonie, New York, site occurred a year earlier than planned and reflects the sustained progress by DOE in managing the responsibilities associated with the legacy of World War II and the Cold War. LM expects to receive up to 20 additional sites in the next 10 years.

Consecutive U.S. Environmental Protection Agency (EPA) Site Reuse Awards

EPA awarded the 2020 Federal Facility Excellence in Site Reuse Award to LM's Weldon Spring, Missouri, Site. The 228-acre site, located 30 miles west of St. Louis, Missouri, was remediated and revitalized for beneficial reuse as a community educational center, restored native prairie, and recreational site. The site has had more than 346,000 visitors to date. LM's Fernald Preserve, Ohio, was selected the 2019 winner in the same award category.

International Partnership to Advance LTS&M Science

In 2020, LM and Wismut GmbH signed an MOU that formalizes the exchange of information, professional development staff, and structured cooperation on LTS&M and management of legacy uranium mines and mills. Wismut is a German government-owned company engaged in the application of state-ofthe-art technologies for long term stewardship and remediation of legacy uranium mines and mills. Wismut's field operations are similar to the core mission of LM. LM has similar agreement with the International Atomic Energy Agency.

Lifecycle Baseline and Environmental Liability Validation

In 2020, LM completed an independent Life Cycle Baseline and Environmental Liability, \$8B, cost estimate validation that meet the standards of the GAO Cost Estimating and Assessment Guide (GAO-09-3SP, March 2009). The life cycle baseline approach for estimating and documenting environmental liabilities covers a minimum of 75 years.

Continuity Program

In 2020, LM published the Continuity of Operations (COOP) Plan and Business Continuity Plan. The LM Continuity Program is now compliant with requirements of DOE Order 150.1A and Emergency Plans.

Rocky Flats and Mound Pension Plan Termination and Disposition

In 2020, LM completed the Rocky Flats Plan Termination, Retiree Reimbursement Arrangement (RRA), reducing market volatile risks for over 1,200 former DOE contractor employees. This action resulted in retirees receiving either a lump sum payment or an annuity backed by an experienced and stable insurance company. LM's prudent strategy of fully funding its pension plans and taking advantage of favorable markets over time, allowed it to take similar action for all five of its pension plans (Fernald, Pinellas, Rocky Flats Mound, Rocky Flats Guards, Rocky Flats Non-Guards) over the past five years. LM's strategy reduced DOE's accounting liabilities by a combined \$773 million, and eliminated future risk to the department of continuing to sponsor these plans. LM successfully removed approximately \$200 million from DOE's long-term financial liabilities by annuitizing the Mound Employees' Pension Plan. Due to the funded status of the plan at the time, LM returned \$4.25 million to DOE: this was the first time DOE received funds back after a termination.

4.5 Acre Site Closure, Pinellas, Florida

In 2019, LM achieved the unconditional closure of the 4.5 Acre Site, which is a unit within the Pinellas County, FL, CERCLA/RCRA Category 3 Site. The unconditional closure is a first for an LM site. The closure order, issued by the State of Florida, specifies that DOE no longer has any responsibilities for the unit.

Defense-Related Uranium Mines (DRUM) Program

In 2019, LM delivered its first DRUM roll-up report to the Bureau of Land Management (BLM). DRUM is a partnership between DOE, federal land management agencies, and state abandoned mine lands (AML) programs to verify and validate (V&V) the condition of 2,500 defense-related uranium mines (mines) on federal public land by the year 2022. These mines provided uranium ore to the U.S. Atomic Energy Commission for defense-related activities that occurred between 1947 and 1970, and most are abandoned.

Final Disposition of Mound, Ohio, Site

In 2019, LM transferred the last property parcel at the Mound, Ohio, Site from LM to the Mound Development Corporation, a nonprofit community development arm of the city of Miamisburg, for beneficial reuse. DOE transferred ownership of remediated parcels on the 306-acre former weapons and research facility from 1999 to 2019.

Leadership Challenges

LM is facing challenges and opportunities with its aging disposal cells, pursuing major repairs requiring steady resources aimed at long-term stewardship.

LM is planning to transition from one support contractor (Navarro Engineering and Research Inc.) to another (RSI EnTech LLC) to fulfill post-closure responsibilities at over 100 sites.

In response to the GAO Report on Environmental Liabilities (GAO-20-373, May 2020), LM is working with the U.S. Nuclear Regulatory Commission (NRC) to develop agreements and establish procedures for returning a site back to the NRC for additional cleanup work. In response to GAO Report on Environmental Liabilities (GAO-20-373, May 2020), LM is preparing to assess the climate resilience of LM's sites and develop plans to mitigate any significant impacts using the National Labs.

Critical Events and Action Items

Critical events or actions that will take place before and within the first 3 months of the next Presidential term:

- December 2020 Releasing the draft environmental assessment of the proposed demolition of the Piqua, Ohio, Decommissioned Reactor Site for public review and comment period.
- January 2021 Start transition activities to new contractor to support the LM mission.
- Project K-25 History Center, Oak Ridge, Tennessee, transitions from Environmental Management (EM) to LM. This transfer of DOE property to the airport authority will support major Oak Ridge authorities. Also, the East Tennessee Technology Park Transition and continuation of support for the GSA transfer to airport authority.
- Tonopah Test Range, Nevada, transition of transfer from EM to LM.
- Colonie, NY, beneficial reuse disposition from LM to 3rd party through the GSA disposition authority. Colonie was our 100th site and we are divesting the site.

Organizational Chart



Under Secretary for Nuclear Security and Administrator, National Nuclear Security Administration

Supporting the DOE Mission

The Under Secretary for Nuclear Security (S5) and Administrator, National Nuclear Security Administration (NA-1) is one of the statutory principal officers of the Department and holds such responsibilities as assigned by the Secretary.

Established by Congress under the National Nuclear Security Administration (NNSA) Act of 2000, NNSA is a semi-autonomous agency within the U.S. Department of Energy responsible for enhancing national security through the military application of nuclear science. NNSA maintains and enhances the safety, security, and effectiveness of the U.S. nuclear weapons stockpile; works to reduce the global danger from weapons of mass destruction; provides the U.S. Navy with safe and militarily effective nuclear propulsion; and responds to nuclear and radiological emergencies in the United States and abroad.

As of November 2020, S5/NA-1 oversees numerous Department Elements, including but not limited to: the Office of Defense Programs (NA-10), the Office of Defense Nuclear Nonproliferation (NA-20), and the Office of Naval Reactors (NA-30). These elements advance the Department's strategic goals of maintaining the safety, security, and effectiveness of the nation's nuclear deterrent without nuclear explosive testing, reducing global nuclear security threats, providing safe and effective integrated nuclear propulsion systems for the U.S. Navy, and modernizing the nation's nuclear security infrastructure. S5/NA-1 supports the DOE Mission by:

- advising and supporting the Secretary (S1) and Deputy Secretary (S2);
- participating in establishing strategy, priorities, and resource allocations for the Department (including development of budget requests);
- engaging with high-level external audiences such as Members of Congress; senior Executive Branch counterparts; state, local, and tribal government officials; foreign government and international organization counterparts; and key DOE/NNSA contractors; and
- providing executive oversight to ensure the effective execution of its nuclear security missions.

Mission Statement

The mission of S5/NA-1 and the Immediate Office staff is to provide strategic leadership and educate stakeholders to enable our program and support offices to perform their respective missions to (a) protect the American People by maintaining a safe, secure, and effective nuclear weapons stockpile, (b) reduce global nuclear threats, and (c) provide the U.S. Navy with safe, militarily-effective naval nuclear propulsion plants.

Budget

Fiscal Year	Budget
FY 2019 Enacted Budget	\$15,228,600,000
FY 2020 Enacted Budget	\$16,704,600,000
FY 2021 Budget Request	\$19,771,000,000

Human Resources

In FY 2021 NNSA will have as many as 2,753 Federal employees including up to 1,943 in the Federal Salaries and Expenses account, 246 for Naval Reactors, and 564 for the Office of Secure Transportation.

History

This year marks the 20th anniversary of the National Nuclear Security Administration, though the organization's heritage goes back much further to the Manhattan Project of the 1940s and the subsequent establishment of the Atomic Energy Commission (AEC). Following World War II, the AEC and the National Laboratory system were created to oversee future research into atomic science and technology. Following the establishment of the Department of Energy in 1977 through the present day, NNSA's program offices have managed essential missions in support of national security.

For more than seven decades, America's Nuclear Security Enterprise has served a vital role in our national security. Whether maintaining the safety, security, and effectiveness of the U.S. nuclear weapons stockpile or responding to nuclear and radiological emergencies, the NNSA has further developed a strong record of success since its creation by Congress under the NNSA Act (Title XXXII of the National Defense Authorization Act for Fiscal Year 2000, Public Law 106-65). NNSA's programs have continued to achieve vital national security missions while maintaining a safe working environment for our over 50,000 person workforce.

Functions

S5/NA-1 serves as advisor to the Secretary for nuclear security and manages its national security laboratories, as well as nuclear and non-nuclear production and scientific testing facilities. NNSA's core missions, capabilities, and resources represent the application of science and technology to national security challenges.

S5/NA-1 oversees all programs within NNSA and is responsible for: policy and guidance; strategic and program management; program direction; budgeting; resource allocation; safeguards and security; emergency management; environment; contracts; intelligence; counterintelligence; and personnel.

 Nuclear Weapons Stockpile. NNSA supports the Nation's strategic deterrent in accordance with policy guidance to modernize the nation's nuclear stockpile, its design, engineering, and production infrastructure, support military capabilities and requirements as identified by the Department of Defense, and sustain the nuclear weapons currently in the stockpile while extending the life of certain existing systems. This is accomplished through a carefully balanced and executed Stockpile Stewardship and Management Program (SSMP) consisting of research and development; surveillance and assessment activities; maintenance; sustainment efforts, such as life extension programs (LEPs), alterations (Alts), and modifications (Mods); dismantlement and disposition; enabling and improving base capabilities; and materials development, all without nuclear explosive testing.

- Nuclear Threat Reduction. NNSA plays a central role in reducing global dangers by engaging countries and advancing capabilities to prevent, counter, and respond to nuclear and radiological proliferation and nuclear terrorism threats and incidents worldwide. NNSA applies its nuclear nonproliferation, counterterrorism, counterproliferation, and emergency response capabilities across the entire nuclear threat spectrum, from intent through crisis response.
- Naval Reactors. NNSA provides the design and development support required to equip U.S. Navy vessels (aircraft carriers and submarines) with militarily effective nuclear propulsion plants and to ensure their safe, reliable, and long-lived operation. NNSA is responsible for designing the reactor plant and developing the next-generation of ballistic missile submarines, attack submarines, and aircraft carriers; providing constant operational support to resolve any problems that arise with the nuclearpowered fleet while at sea; and providing the infrastructure needed to train nuclear-qualified sailors.
- Science, Technology, and Engineering. NNSA conducts world-class specialized research, development, testing, and evaluation activities using unique diagnostic tools, experimental platforms, and modeling and simulation architectures. From some of the world's fastest supercomputers to high-energy-density lasers and experimental test beds, the nuclear security enterprise delivers innovative and transformative scientific and technical solutions to the global challenges of the 21st century. NNSA works in partnership across the U.S. Government, academia, and industry to advance its platforms and capabilities and to be better prepared for future technological surprise.
- People and Physical Infrastructure. Success in the nuclear security enterprise depends on a highly capable workforce with specialized skills in a broad array of technical fields. Recruiting, retaining, and training today's and tomorrow's workforce with the necessary expertise is critical to mission delivery. NNSA, with its Management and Operating (M&O) partners and non-M&O

contracting partners, devotes extensive effort toward developing its Federal and contractor workforce to support the mission. Specialized facilities and equipment for commodities (such as uranium, plutonium, tritium, lithium, high explosives, and microelectronics) and generalpurpose infrastructure to enable safe, secure, and reliable operations are required to meet the mission.

Management and Operations. NNSA deploys layers of physical security, safeguards and safety personnel, and sophisticated cyber security systems to protect the workforce, materials, infrastructure, and sensitive information essential to ensuring mission success. NNSA ensures a robust Defense Nuclear Security Program with clear and consistent lines of responsibility and accountability. Safety operations include supporting safe and efficient material operations, as well as packaging and transporting sensitive materials. These include compliance with environmental, safety, health, and quality requirements and improving the physical infrastructure. NNSA works continuously to improve its project management across the enterprise in partnership with the leadership at its laboratories and other contractor-operated sites. NNSA is focused on building a culture of pride and accountability delivering results to meet its mission goals and providing the best value to the taxpayer. NNSA has systematically strengthened its project management cost estimating capabilities and acquisition systems. NNSA ensures that contract structures and incentives are cost-effective and will hold its contractors accountable to the terms and conditions of its contracts.

NNSA National Laboratories, Plants and Sites

The NNSA nuclear security enterprise is composed of NNSA Headquarters, the NNSA field offices, nuclear weapons production facilities, national security laboratories, and the Nevada National Security Site. At these locations, a highly trained workforce consisting of Federal employees, M&O contractors, and assigned members of the military works to ensure the success of the NNSA mission. NNSA Headquarters develops the strategy and oversees and coordinates activities to ensure they are accomplished in an efficient and fiscally responsible manner. NNSA stewards its laboratories, plants and site through field offices that provide day-to-day oversight and contract administration. The Field Office Managers report directly to the NNSA Administrator. The Field Offices serve as the local representatives of NNSA; integrating and balancing contract requirements and risk, approving regulatory controls for onsite high hazard work; and managing NNSA interfaces at the tribal, state and local level.

- National Security Laboratories. The national security laboratories are Lawrence Livermore National Laboratory (LLNL) in Livermore, California; Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico; and Sandia National Laboratories (SNL) in Albuquerque, New Mexico and Livermore, California. Their primary mission is to develop and sustain nuclear weapons design, simulation, modeling, and experimental capabilities and competencies to ensure confidence in the stockpile without nuclear explosive testing. Additional core missions include plutonium research and development (R&D); tritium R&D; high explosives (HE) and energetic materials R&D; special nuclear material (SNM) accountability, storage, protection, handling, and disposition; pits, detonators, neutron generators, and other non-nuclear component production; research, development, test, and evaluation (RDT&E) efforts for stockpile stewardship; engineering, design, and technical systems integration for Secure Transportation Asset; and nonproliferation, counterterrorism and counterproliferation technologies and capabilities. In addition to the national security laboratories, NNSA also has ongoing work performed by other DOE national laboratories, supporting both Weapons Activity and the Defense Nuclear Nonproliferation programs. The laboratories also perform essential work for the broader national security enterprise, including the Departments of Defense, State, and Homeland Security, and the Intelligence community.
- Nuclear Weapons Production Facilities. The nuclear weapons production facilities include the Kansas City National Security Campus (KCNSC) in Kansas City, Missouri; Pantex Plant (Pantex) in Amarillo, Texas; Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee; and Savannah River Site (SRS) in Aiken, South Carolina. These facilities conduct a range of activities that include assembling, disassembling, rebuilding, repairing,

maintaining and surveilling stockpile weapons and weapon components; fabricating joint test assemblies; assembling and disassembling test beds; conducting interim staging and storing of nuclear components from dismantled weapons; performing pit regualification, surveillance, and packaging; producing and procuring nonnuclear weapons components; extracting and recycling tritium; loading tritium and deuterium into gas transfer system (GTS) reservoirs of nuclear weapons; performing surveillance of GTSs to support certification of the stockpile; manufacturing uranium components for nuclear weapons, cases, and other weapons components; evaluating and performing tests of these components for surveillance purposes; storing Category I/II quantities of highly enriched uranium (HEU); conducting dismantlement, storage, and disposition of HEU; and supplying HEU for use in naval reactors. In addition, the nuclear weapons production facilities process uranium and plutonium to meet DOE/NNSA's nonproliferation goals and counterterrorism activities.

 National Security Site. The Nevada National Security Site in Nye County, Nevada, outside of Las Vegas, provides facilities, infrastructure, and personnel to the national security laboratories and other organizations to conduct nuclear and nonnuclear experiments. It is the primary location where experiments using radiological and other high hazard materials are conducted and the primary location where HE-driven plutonium experiments can be conducted.

Recent Organization Accomplishments

Elements within the S5/NA-1 organization have achieved many important recent accomplishments. A few are described below, and additional highlights can be found in the overviews for NNSA's organizational elements.

Office of Policy and Strategic Planning (NA-1.1)

Through an enterprise-wide collaborative effort led by NA-1.1, in May 2019, the S5/NA-1 issued three strategic documents that set expectations across the NSE for what NNSA does and how it is done, including:

• The NNSA *Strategic Vision* identifies our values, principles, mission priorities, and goals.

- The Governance & Management Framework focuses on the NNSA team approach to mission integration and strategic planning and establishes roles and responsibilities across the enterprise. The G&M Framework describes four key governance expectations that sustain constant focus and alignment on NNSA's vital mission.
- The *Strategic Integrated Roadmap* projects NNSA's key programs of record out 25 years and informs the process of prioritizing programs and priorities. This strategic document is updated annually.

Office of Defense Programs (NA-10)

- Annual Assessment: The NNSA Laboratory Directors continue to certify the nuclear stockpile based on Defense Program activities. Cycle 24 was completed in FY 2020 and Cycle 25 will be completed in FY 2021.
- **Exascale:** On May 12, 2020 the NNSA completed the Exascale Class Computer Cooling Equipment (EC3E) Project at Los Alamos National Laboratory (LANL), 10 months ahead of schedule and \$20 million under budget.
- **Pit Production:** Successfully produced development (DEV) pits. Installed equipment to produce the first war reserve pit during 2023 in PF-4.The achievements support the DoD requirement of producing no fewer than 80 pits per year during 2030.
- Life Extension Programs: NNSA continues to make warhead deliveries to the Department of Defense and has sustained its weapons activities through the COVID-19 pandemic, achieving its programmatic milestones on time and on budget.

Office of Defense Nuclear Nonproliferation (NA-20)

- Nuclear Material Removals: Completed several multi-year nuclear material removal campaigns from a number of foreign locations, including over 1000 kg of highly enriched uranium.
- Domestic Production of Mo-99: Partnered with commercial industry in the United States to produce the critical medical radioisotope molybdenum-99 (Mo-99). This was the first domestic production of Mo-99 in nearly 30 years.

- **Material Disposition:** Achieved a 2020 Amended Record of Decision providing the pathway to downblend and disposition 7.1 MT of surplus Plutonium at the Waste Isolation Pilot Plant (WIPP).
- **Cesium Irradiator Replacement:** Completed 151 Cesium Irradiator Replacement Project (CIRP) removals from U.S. hospitals and universities. DNN is on pace to remove all cesium-based irradiators in the United States by 2027.
- Warhead Measurement Campaign: Completed the Warhead Measurement Campaign that collected high fidelity, archival, radiation signature measurements of the W76, B61 and B83 in support of future arms control treaty negotiations.
- Nuclear Detonation Detection Payloads: Delivered 10 nuclear detonation detection payloads to the USAF for integration into operational national systems to detect, locate, identify, and characterize nuclear explosions globally, 24/7.
- IAEA safeguards agreements: Expanded efforts to promote the highest standard of IAEA safeguards agreements with all non-nuclear weapons States Parties to the NPT.

Office of Naval Reactors (NA-30)

- **Columbia-Class Submarine.** Naval Reactors is on track to support the start of ship construction in FY 2021 and is committed to delivering the 40+ year life-of-ship reactor core and the electric drive propulsion system necessary for the COLUMBIA-Class program. This year, Naval Reactors continues supporting oversight of the lead ship propulsion plant design, reactor component manufacturing, and safety analysis work required to support lead ship reactor testing.
- **Refueling Land-Based Prototype Reactor.** The S8G Prototype, located at the Kesselring Site in West Milton, NY, was built in the late 1970s and serves as a critical operating nuclear reactor to train sailors and prototypically test reactor technologies. Its refueling overhaul began in September 2018, and is scheduled to complete in 2022 in order to return to training nuclear operators in 2023.
- **Spent Fuel Handling Recapitalization Project.** The Spent Fuel Handling Recapitalization Project is designing and constructing the Naval Spent

Fuel Handling Facility that will be located at the Naval Reactors Facility in Idaho. To date, the facility site location has been fully excavated, concrete placement to support the facility foundations has begun, and preparations for structural steel fabrication is underway.

Leadership Challenges

Important and challenging topics that are likely to benefit from ongoing attention by S5/NA-1 leadership include the following:

- Supporting DoD warhead Requirements. NNSA and DoD are currently in complete schedule alignment regarding warhead acquisitions synchronized with DoD platform developments. However, sustained funding and long-term support are critical to remain in alignment.
- COVID-19. Critical national security missions do not allow for temporary cessation or operational delays. Multiple mission-critical activities cannot be performed in virtual environments or with social distancing regulations. NNSA will continue to ensure workforce health and safety, continue to manage its workflow, and establish efforts to complete work without delay.
- Evolution of proliferation threat. The proliferation threat continues to evolve, including through advances in nuclear and dual-use technologies, and this evolution threatens to outpace our response.
- Supply chain challenges. Changes in supply chain drive the need to identify and mitigate program, budget, and security risks, especially for the United States Nuclear Detonation Detection System (USNDS).
- Human Resources. Staffing remains an ongoing challenge. Additional federal staff are required to provide the oversight for existing programs and to work with the National Laboratories to develop innovative approaches to new challenges.
- Aging Infrastructure. Many facilities and systems are well beyond useful life, and obsolescence limits maintenance and repair options. Excessive deferred maintenance increases the risk of building and building system outages, leads to substandard working conditions, and elevates operational and safety risks.
Critical Events and Action Items

Critical events or actions that will take place within the first 3 months of the next Presidential term include the following:

- Multi-Domain Experiment: On November 6, Los Alamos National Laboratory will detonate a 2,500 kg TNT-equivalent charge at the Big Explosive Experiment Facility at the Nevada National Security Site. Results from this test will inform future experiments at the Low Yield Nuclear Monitoring testbed, which is designed to improve U.S. capabilities to detect low-yield evasive underground nuclear explosions.
- Oak Ridge Enhanced Technology and Training Center Groundbreaking Event: On November 16, NA-1 will participate in the groundbreaking event for the Oak Ridge Enhanced Technology and Training Center (ORETTC) in Oak Ridge, TN.
- U.S. Withdrawal from the Treaty on Open Skies: Effective November 22, 2020 the United States will no longer be a party to the Treaty on Open Skies. In a press statement on May 21, Secretary of State Pompeo said that the United States may reconsider our withdrawal if the Russian Federation returns to full compliance with the Treaty.
- Launch of next Global Burst Detector (GBD) III Payload in Support of Nuclear Test Monitoring: The U.S. Air Force's plans to launch the next GPS Block III satellite have been rescheduled to November 2020. The GBD payloads are part of the constellation of sensors comprising the U.S. Nuclear Detonation Detection System.
- Lovelace Biomedical Research Institute (LBRI) material movement: During the week of December 7, TRIAD plans to perform Phase 3 of the removal of material from LBRI. This phase builds upon lessons learned in the earlier two phases. TRIAD personnel will package and transport the material to LANL.

Organizational Chart

The NNSA organization chart as of January 2020 is reproduced below.



National Nuclear Security Administration

NNSA Office of Policy and Strategic Planning

Supporting the DOE Mission

NNSA's Office of Policy and Strategic Planning (NA-1.1) supports NNSA leadership on policy, strategic planning, and governance and management activities and initiatives, helping NNSA to be proactive, flexible, and resilient, as the Agency meets its mission objectives in an evolving, and often uncertain, strategic climate. NA 1.1 is organized around three sets of inter-related, activities:

- Management of NNSA directives that guide policy implementation throughout the enterprise, ensuring that policy priorities for the enterprise are understood and adhered to universally.
- Development of enterprise-wide strategic planning documents, which help to define strategic objectives and mission priorities, as well as activities looking at evolving strategic and crosscutting risks and opportunities that may impact NNSA in the long term.
- Leadership of governance and management initiatives that provide a common blueprint for how NNSA effectively achieves its mission, with an emphasis on risk management, clearly defined roles and responsibilities, and the recruitment and retention of a world-class workforce.

Through these efforts, the Office of Policy and Strategic Planning plays an essential role in ensuring that best practices are shared widely and communicated consistently throughout the enterprise.

Mission Statement

The Office of Policy and Strategic Planning (NA-1.1) serves as a central resource to the Under Secretary of Nuclear Security and NNSA Administrator, as well as NNSA senior leadership, on strategic planning, governance and management, and crosscutting policy issues. NA-1.1 oversees NNSA's enterprise-wide strategic planning processes and supports the development and integration of long-term

strategic priorities for the enterprise. It leads the annual laboratory, plant, and site strategic planning process; the planning stage of the Planning, Programming, Budgeting, and Evaluation (PPBE) process; and other integrated NNSA strategic planning efforts. NA-1.1 also spearheads NNSA's governance and management initiatives, working in collaboration with NNSA program, functional, and field offices as well as NNSA's management and operating (M&O) partners. The Office acts as the lead integrator on crosscutting policy issues to facilitate the development of enterprise-wide solutions and strategies to advance NNSA positions and priorities. NA-1.1 also provides strategic oversight and management of the NNSA process for developing and codifying internal directives and establishing NNSA's official position on DOE directives.

Budget

NA-1.1 has no program funding.

Human Resources

FY 2021 Allocated Staffing Level: 11 FTEs

History

NA-1.1 was reconstituted in 2015 to serve as an internal "Think Tank" unencumbered by the crisis of the day or requirements to produce detailed reports or implementation plans. As envisioned, the Director for the Office would have direct access to the Administrator and the Principal Deputy Administrator and act in an advisory capacity for developing policies and strategies for solving difficult NNSA challenges and the plans for communicating these policies and strategies across the NSE.

Functions

NA-1.1 brings its expertise to bear on several areas that directly support the NNSA Administrator. For example, the Office generates high-level policies, strategies, technical advice, information products, and creative solutions to complex problems on behalf of the Administrator. It facilitates decisionmaking by providing timely expert advice and analysis of policy and program options to NNSA leadership on the full breadth of issues that may arise across the dynamic nuclear security enterprise. NA-1.1 is well positioned to lead crossorganizational teams in the integrated analysis and resolution of complex, crosscutting, enterprisewide, or department-wide issues.

Effective July 6, 2020, the NNSA directives team has moved under NA-1.1. This realignment enables a more strategic approach to the development of NNSA internal policy and directives, helping to guide consensus on NNSA and DOE policies with crosscutting impacts.

The Office has three focus areas: Policy, Strategic Planning, and Governance and Management.

Policy

Internal

Manage the process for developing and codifying internal NNSA directives. Manage the process for establishing NNSA's official position on DOE directives.

External

Facilitate the development of "one NNSA" position, strategies, and next steps, as appropriate, on crosscutting policy issues.

Strategic Planning

Oversee enterprise-wide strategic planning processes and support the development and integration of long-term strategic priorities for enterprise.

Lead the annual laboratory, plant, and site strategic planning process, the planning stage of the PPBE process, and other enterprise-wide strategic planning efforts.

Governance and Management

Work with NNSA program, functional, and field offices and M&O partners to identify challenges to NNSA's governance and management, develop solutions, track and measure progress, and communicate results.

Recent Organization Accomplishments

Through an enterprise-wide collaborative effort led by NA-1.1, in May 2019, the Administrator issued three strategic documents that set expectations across the NSE for what NNSA does and how it is done: **The NNSA Strategic Vision** identifies our values, principles, mission priorities, and goals. **The Governance & Management (G&M)** Framework focuses on the NNSA team approach to mission integration and strategic planning and establishes roles and responsibilities across the enterprise. The G&M Framework describes four key governance expectations that sustain constant focus and alignment on NNSA's vital mission.

The Strategic Integrated Roadmap projects NNSA's key programs of record out 25 years and informs the process of prioritizing programs and priorities. This strategic document is updated annually.

Policy

Internal

Updated Supplemental Directive 251.1, Directives Management, to reflect the realignment of the NNSA Directives Team under NA-1.1.

Launched the NNSA Directives Website, enabling all NNSA organizations, no matter their location, to access every current and archived NNSA directive for the first time.

Replaced NNSA's email-based directives coordination process with an automated, webbased review and comment tool, reducing work across the Enterprise.

Collected NNSA's delegation and designation memoranda and made them available to the entire enterprise on the Directives Website.

Replaced NNSA's unstructured directives numbering system with the DOE numbering system, enabling NNSA organizations to quickly and easily find DOE and NNSA directives on the same or related topics.

External

Established a cross-cutting Policy Touchpoint with NNSA program offices to provide better transparency on National Security Council (NSC) and interagency-led topics and international activities with crosscutting equities.

Served as the NNSA coordinator for a recent Administration review of all NNSA laboratories, plants, and sites that may hold chemicals or precursor materials that would be reportable under the Chemical Weapons Convention. Provided a comprehensive review of the Administration's Nuclear Fuels Working Group study.

Strategic Planning

Stood up the Strategic Outlook Initiative to develop annual over-the-horizon studies that support NNSA's efforts to become a more agile, responsive, and proactive enterprise.

Designated as the lead for the planning phase under the PPBE process and drafted the FYNSP Planning Guidance for the FY 2022-2026 fiscal year nuclear security program.

Improved the way NNSA conducts the annual site-level strategic planning cycle to maximize participation, support transparency, and improve mission integration.

Governance and Management

Served as lead organization for engagement with the National Academies of Science, Engineering, and Medicine and the National Academy of Public Administration (NAS/NAPA) on their four-year implementation assessment panel on NNSA G&M reform. The final report was issued in September 2020.

Hosted a virtual G&M Town Hall for the NSE workforce to launch the NNSA strategic documents and engage in a continuing, open, and collaborative dialogue across the NSE on the topic of governance and management.

Conducted a series of focus groups with both federal and M&O partners at locations across the enterprise. These focus groups gathered information and generated ideas supporting NNSA's strategic effort to improve governance and management across the NSE.

Launched a series of G&M newsletters to provide enterprise-wide communication on governance topics.

Developed an enterprise-wide action plan that addresses the steps necessary to drive, track, and sustain culture change across the NSE, including metrics to measure success. Built a comprehensive Online Resource Library that will include reports that have impacted NNSA and predecessor organizations over the past 40 years, and will be easily accessible to both the DOE and NNSA workforce through SharePoint.

Supported the Office of Management and Budget in the development of the next iteration of governance training for the enterprise.

Leadership Challenges

A small staff only allows of a limited number of activities to be worked on at one time.

Critical Events and Action Items

3-month events

Build out a comprehensive Online Resource Library.

Release next iteration of NSE governance training.

Complete FY 2023 Planning Guidance.

Complete NNSA Policy on Enterprise Wide Strategic Planning.

6-month events

Complete annual update of the Strategic Integrated Roadmap.

Develop 2021 annual laboratory, plant, and site strategic planning guidance.

12-month events

Complete first over-the-horizon study under the Strategic Outlook Initiative.

Organizational Chart



NNSA Office of Cost Estimating and Program Evaluation

Supporting the DOE Mission

The Office of Cost Estimating and Program Evaluation was established by Congress in recognition of a gap in NNSA's capacity to independently determine the costs of projects and adequately budget for them, leading to poor mission performance.

CEPE is instrumental to meeting DOE's mission to ensure America's national security by accurately estimating costs, assessing alternatives, and evaluating NNSA's program performance, thereby ensuring responsible expenditure of taxpayer dollars and garnering credibility with Congress.

Mission Statement

The Office of Cost Estimating and Program Evaluation provides the administrator with independent, data-driven analysis on all aspects of the Nuclear Security Enterprise, leading to better mission planning and performance. Accurately estimating costs, assessing alternatives, and evaluating NNSA's program performance are vital to national security and the responsible expenditure of taxpayer dollars.

Our goal is to increase mission success through providing independent analysis to inform better planning, risk mitigation strategies, and program execution.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$2,600,000
FY 2020 enacted	\$2,600,000
FY 2021 request	\$2,200,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 19

History

The FY 2014 NDAA amended the NNSA Act to establish CEPE as the primary advisor to the Secretary and NNSA Administrator on cost estimating and program evaluation in the NNSA. The Director, CEPE is a direct report to the NNSA Administrator.

Functions

Independent Cost Estimates (ICEs) for nuclear warhead life extension programs (LEPs) and construction projects.

Cost estimating data collection and sharing.

Develop & manage submittal of Selected Acquisition Reports (SARs) for LEPs.

As part of the annual Planning, Programming, Budgeting, and Evaluation (PPBE) process, analyze the planning phase, advise on programmatic & fiscal guidance, and manage the annual program review.

Review the Future Years Nuclear Security Program to ensure it is accurate & thorough.

Independent review and & policy/procedures for Analysis of Alternatives (AoAs).

Review of Technology Readiness Assessments (TRAs).

Review cost and schedule baselines for projects/ programs and manage Congressional notification of overruns.

Recent Organization Accomplishments

In response to the FY 2019 NDAA granting CEPE authority to conduct ICEs on projects under DOE 413.3B, *Program and Project Management for the Acquisition of Capital Assets,* four ICEs on capital asset construction projects were completed in FY 2020 (Surplus Plutonium Disposition; Digital Infrastructure Capacity Expansion; High Explosive Synthesis, Formulation, and Production; and U1A Complex Enhancement Project).

CEPE completed independent reviews of the AoA for three projects (LANL Electrical Power Capacity Upgrades; High Explosive Synthesis & Formulation Plant; and Power Sources Capability) and is reviewing four projects (Domestic Uranium Enrichment, Combined Radiation Environments for Survivability Testing, Digital Infrastructure Capabilities Enhancement, and Energetic Materials Characterization).

During the FY22-26 Program Review, CEPE conducted an enterprise-wide review of unconstrained FTE requirements to meet NNSA's current program of record.

Leadership Challenges

Growing staff to meet increased requirements.

ICEs for construction projects.

Increased pace & number of LEPs.

In-depth review of AoAs to assess reasonableness of cost estimates, schedule analysis, and overall

Organizational Chart

analytical quality, technical soundness, and adherence to established process and policies.

Critical Events and Action Items

CEPE completed ICEs for the B61-12 LEP and the W88 Alt 370 prior to their Phase 6.5 entry by September 30, 2020. These ICEs will receive Congressional and public attention in early 2021.

ICEs on pit production at Los Alamos and Savannah River are ongoing and will be completed by the end of calendar year 2020. These ICEs will receive Congressional and public attention in early 2021.

The FY 2019 NDAA requires CEPE to review the plan to produce plutonium pits at LANL. CEPE plans to complete this review by September 30, 2020. This review will be sent to Congress by late 2020.



Office of Cost Estimating and Program Evaluation

NNSA Office of Defense Programs

Supporting the DOE Mission

Executing a National Nuclear Security Administration (NNSA) Mission. One of NNSA's three overarching missions is to ensure the safety, security, and effectiveness of the U.S. nuclear stockpile in support of the Nation's nuclear deterrent. This is carried out by NNSA's Office of Defense Programs (DP/NA-10) through the Stockpile Stewardship Program (SSP). The SSP was established to maintain the active stockpile; execute warhead acquisition programs [life extension programs (LEPs), Modification Programs (Mods) and Major Alterations (Alts)] as required to meet emerging Department of Defense (DoD) requirements; maintain and upgrade NNSA laboratory and production infrastructure; develop and maintain the underpinning science and engineering; and ensure a highly trained and skilled workforce. Since the inception of the SSP, these missions have been accomplished without requiring additional underground explosive nuclear testing through the application of specialized science, technology, engineering, and manufacturing.

The Nation has established the requirement to modernize the Nation's nuclear deterrent. This on-going effort includes both the DoD delivery platforms and the nuclear weapons incorporated on those platforms. In order to accomplish this mission, NNSA must maintain confidence in the state of the current stockpile, deliver on required warhead acquisitions, and ensure that NNSA has the laboratory and production capabilities required to design, develop, qualify, certify, and produce the warheads required by the DoD on their established timelines.

NNSA partners with the DoD to carry out this requirement to modernize the nuclear deterrent through coordination with the Navy, the Air Force, U.S. Strategic Command, and the Nuclear Weapons Council. To execute its mission, DP integrates activities across the NNSA weapons complex (eight sites), and with other NNSA support offices including the Office of Acquisition & Program Management; the Office of Safety, Infrastructure, and Operations; the Office of Defense Nuclear Security; and the Office of Information Technology and Cybersecurity.

Mission Statement

Ensuring a safe, secure, and effective nuclear stockpile through the application of science, technology, engineering, and manufacturing.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$11,113,080,000
FY 2020 enacted	\$12,457,097,000
FY 2021 requested	\$15,602,000,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 210

History

The SSP was established to sustain the U.S. nuclear stockpile through assessing and certifying the safety, security, and effectiveness of the nuclear stockpile without reliance on additional underground explosive nuclear testing. To accomplish these goals, NNSA utilizes a suite of capabilities to include a spectrum of specialized experimental capabilities, high-performance computers, and production facilities.

Ensuring the safety, security, and effectiveness of the stockpile is accomplished through a rigorous assessment process that annually establishes the state of the currently deployed stockpile warheads and through warhead acquisitions programs when it is determined that existing stockpile systems must be changed to ensure they continue to meet DoD requirements. Warhead modernization activities include LEPs, Mods, and Alts and address issues ranging from material aging to adapting existing stockpile warheads to new DoD delivery platforms. Enhancements to warhead safety and security features are also undertaken as part of these warhead acquisition programs. Warhead acquisition programs are carried out by NNSA jointly with the DoD, and coordinated through the Nuclear Weapons Council, utilizing a NNSA-DoD acquisition process referred to as the Phase X or Phase 6.X process. With four warhead acquisitions currently underway, NNSA is executing a large variety of complex design, component development, and production work.

Production activities are carried out at several NNSA sites dedicated to the manufacture of specific components required to produce a warhead and a site responsible for integrating these components to produce the warhead. To a very large extent, NNSA is its own vendor base. Commercial suppliers are utilized for some materials and in particular for commercial-off-the-shelf electronics. Safe and secure transportation of warheads and special nuclear materials between NNSA sites and between NNSA and DoD sites is accomplished through DP's Secure Transportations Asset (STA) program.

Functions

Stockpile Management

DP directs and oversees all stockpile assessment, design, development, and production activities to ensure the U. S. nuclear weapon stockpile remains safe, secure, and effective. Stockpile management activities focus on warhead acquisition programs; annual maintenance, surveillance, and assessments; program development and planning; providing safe and secure dismantlement of nuclear weapons and components; and sustainment of needed manufacturing capabilities and capacities, including process improvements, quality assurance, and investments focused on increased efficiency of production operations.

Production Modernization

DP is responsible for maintaining and upgrading nuclear weapon production facilities and capabilities. These efforts enable the longterm viability of nuclear weapons production infrastructure by improving the infrastructure and ensuring the capacity to produce strategic materials such as tritium, high explosives, and depleted uranium, and the ability to use these materials to produce the strategic components that compose a U.S. stockpile warhead to include primaries, canned subassemblies, and non-nuclear components.

Stockpile Research, Technology, and Engineering

DP leverages leading-edge expertise in research and development to maintain the effectiveness of the nuclear weapons stockpile. These research, technology, and engineering activities utilization of a spectrum of experiments to acquire data needed to support and validate numerical modeling and simulations, and surveillance and flight tests that help affirm the effectiveness of the nuclear weapons stockpile. Subcritical and hydrodynamic experiments, along with high energy density physics and advanced computing techniques, provide a technical basis for the annual assessment of the safety and reliability of the nuclear weapons stockpile and the certification of warheads produced through the warhead acquisition programs.

Secure Transportation

DP provides for the safe, secure transport of nuclear weapons, weapon components, and special nuclear materials to meet mission requirements. The program also provides for the specialized secure transportation workforce, including the Federal agents.

Recent Organization Accomplishments

Annual Assessment

The NNSA Laboratory Directors continue to certify the nuclear stockpile based on Defense Program activities. Cycle 24 was completed in FY 2020 and Cycle 25 will be completed in FY 2021.

Exascale

On May 12, 2020, the NNSA completed the Exascale Class Computer Cooling Equipment (EC3E) Project at Los Alamos National Laboratory (LANL), 10 months ahead of schedule and \$20 million under budget. The EC3E project nearly doubles the highly efficient warm-water cooling capability in LANL's Strategic Computing Complex (SCC), and enables facility operational support for multiple exascale-class supercomputers.

Pit Production

Successfully produced development (DEV) pits. Installed equipment to produce the first war reserve pit during 2023 in PF-4.The achievements support the DoD requirement of producing no fewer than 80 pits per year during 2030.

W76-2 Delivery

The NNSA modified and delivered the W76 sealaunched ballistic missile warhead, providing the US Navy with a lower-yield capability. The 2018 NPR outlined the need for this capability to support credible and capable nuclear deterrence.

B61-12 LEP

On August 25, 2020, Pantex completed the First Production Capability Unit (FPCU) for the B61-12, a non-nuclear explosive prototype that allows the program to exercise processes to ensure readiness for rate production. Received Phase 6.5, First Production and authorization.

W88 Alt 370

In April 2020, Pantex completed the W88 Alteration (Alt) 370 FPCU. Received Phase 6.5, First Production and authorization.

W80-4 Life Extension Program

Completed all Conceptual Design Reviews. Completed Phase II of the Integrated Baseline Review.

W87-1 Modification Program

Finalized and documented W87-1 surety architecture down-select.

Defense Programs Office of Secure Transportation

Defense Programs has continued to achieve safe and secure transport of nuclear materials and weapons.

Leadership Challenges

Supporting DoD warhead Requirements

NNSA and DoD are currently in complete schedule alignment regarding warhead acquisitions synchronized with DoD platform developments. However, sustained funding and long-term support are critical to remain in alignment. While the U.S. nuclear weapons stockpile and its supporting infrastructure are currently safe, secure, effective, and reliable, they are aging. Competing interests over the past thirty years postponed weapon and infrastructure modernization programs, which directly contributed to erosion of our critical capabilities, infrastructure, and capacity to ensure the deterrent's viability into the future. The need to modernize our nuclear weapons stockpile and recapitalize the supporting infrastructure needed to produce and maintain that stockpile has reached a tipping point. Sixty percent of NNSA's facilities are more than forty years old and nearly forty percent are in poor condition. Assessments of facilities

throughout the enterprise have identified numerous single-point failures. If not appropriately addressed, the age and condition of NNSA's infrastructure will put NNSA's deterrence mission, and the safety of its workforce, the public, and the environment, at risk. NNSA is undertaking a risk-informed, complicated, and time-constrained modernization and recapitalization effort. Delays in either the funding support needed to carry out this program or the execution by NNSA of this program will have impacts on the nuclear deterrent modernization program.

Covid-19

DP's critical national security missions does not allow for temporarily cessation or operational delays. Multiple mission-critical activities cannot be performed in virtual environments or with social distancing regulations. As certain tasks must be completed on-site, DP identified priorities, made decisions based on local situations, and is continuing to take action to protect the workforce. Consequently, NNSA has not missed any DoD deliverables or any major milestones due to COVID-19. Some deliverables were delayed to ensure workforce safety while meeting highest priority DoD deliverables. Until an effective vaccine is developed DP will continue ensure workforce health and safety; continue to manage its workflow; and establish effort to complete the work deferred during the initial and current stages of COVID-19.

Critical Events and Action Items

W88 Alt 370

First Production Unit (milestone)to be achieved July 2021.

B61-12 LEP

First Production Unit (milestone)to be achieved November 2021.

W80-4 Life Extension Program

Execute Phase 6.3 activities for the W80-4 LEP in support of the Air Force LRSO program.

W87-1 Modification Program

Complete W87-1 Modification Program Phase 6.2 activities, feasibility study, and design options, and enter Phase 6.2A, design definition and cost study in FY 2021.

Plutonium Pit Production

The Savannah River Plutonium Processing Facility is on schedule to complete the Conceptual Design Report and cost/schedule range in 2020, and receive CD-1 Approval from NA-1 in FY 2021 as stated in the Nuclear Weapons Council letter to Congress. FY 2021 funds will be used to continue design, procure long lead materials, and plan and prepare for demolition and equipment removal.

Plutonium Pit Production Expansion

Produce pits for the Process Prove-in (PPI) phase of product realization at LANL.

Organizational Chart



Office of Defense Programs

NNSA Office of Defense Nuclear Nonproliferation

Supporting the DOE Mission

The Office of Defense Nuclear Nonproliferation (DNN) is at the forefront of global efforts to deter and combat nuclear proliferation, and prevent nuclear and radiological terrorism. DNN leads the execution of NNSA's "Mission Priority #2: Reduce global nuclear security threats and strengthen the nuclear enterprise," and supports "Mission Priority #4: Strengthen key science, technology, and engineering capabilities."

DNN develops and implements policy and technical solutions to prevent state and non-state actors from acquiring nuclear weapons or the proliferation sensitive materials, technology, and expertise necessary to develop nuclear and radiological weapons and programs. DNN achieves its mission by executing programs that:

- Eliminate or remove nuclear and radioactive materials no longer in use, and minimize the need for future use.
- Safeguard nuclear materials and secure nuclear and radioactive materials and facilities in use.
- Support forensics-based attribution of interdicted materials and devices, or of a nuclear/radiological attack, and respond to emerging nonproliferation and nuclear security threats.
- Control the further spread of materials, technology, and expertise.
- Detect and counter proliferation and verify that obligations are being met.

In pursuing these objectives, DNN has established a strong record of success. DNN has secured, removed, or eliminated nuclear and radioactive material from numerous countries around the globe; helped ensure the long-term sustainability of the Nuclear Non-Proliferation Treaty (NPT); supported a variety of interagency and other partners with cutting-edge technology to address proliferation risks; and prioritized initiatives to ensure that the highest levels of nonproliferation norms are at the foundation of global civil nuclear commerce.

DNN is committed to being an organization that is innovative, adaptive, and anticipatory as it responds to current and evolving global nuclear risks.

Mission Statement

Develop and implement policy and technical solutions to eliminate proliferation-sensitive material and limit or prevent the spread of material, technology, and expertise related to nuclear and radiological weapons and programs around the world.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$1,626,175,000
FY 2020 enacted	\$1,778,605,000
FY 2021 request	\$1,660,139,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 190

History

DOE performs a unique and indispensable role in reducing global nuclear and radiological dangers, contributing to U.S. national security and global security writ large. The predecessor organization to today's DOE, the Atomic Energy Commission (AEC) was established under the Atomic Energy Act of 1954 and the AEC's—and now DOE's—role in nuclear nonproliferation dates back to its founding and the realization that without proper controls on nuclear technology and material, dozens of countries could acquire nuclear weapons, resulting in a dangerous and unstable world. In response, the United States led a global effort to prevent the spread of nuclear weapons to additional states. Many of those early efforts remain pillars of the global nonproliferation regime to this day including the Treaty on the Nonproliferation of Nuclear Weapons (NPT), export controls on sensitive technology, and international nuclear safeguards.

DOE's nuclear nonproliferation work is mainly performed by the National Nuclear Security Administration's Office of Defense Nuclear Nonproliferation (DNN), which was established when NNSA was created in March 2000. Early on, DNN assumed responsibility for long-time DOE programs that fulfilled statutory responsibilities over the export control of nuclear technology, met U.S. obligations under the NPT by providing support to the International Atomic Energy Agency (IAEA), and provided technical support to the negotiation and implementation of strategic nuclear arms control treaties and other multilateral nuclear nonproliferation treaties and agreements. DNN also consolidated the work that DOE had started after the breakup of the Soviet Union aimed at addressing the proliferation risks involving nuclear weapons, weapon-usable nuclear materials, and their storage facilities in the newly independent Soviet states.

DNN's nonproliferation mission expanded in response to the terrorist attacks carried out on September 11, 2001. New areas of focus included expanding efforts to install radiation detection monitors; accelerating existing efforts to convert research reactors and medical isotope production facilities from highly enriched uranium (HEU) to low enriched uranium (LEU); improving security for and disposition of radioactive materials that could be used in dispersal devices (i.e., "dirty bombs"); and increasing research into new technologies, techniques, and materials to help prevent the spread of weapons of mass destruction (WMD) to hostile state and non-state actors.

DNN programs have implemented high-profile nuclear threat reduction initiatives, including:

- Securing 268 buildings with radioactive sources worldwide, installing Radiation Portal Monitors (RPM's) at 60 sites, and deploying 67 Mobile Detection System (MDS) vans internationally since 2017.
- Delivering 47 space-based sensors to maintain U.S. capabilities to globally monitor for surface, atmospheric, and outer space nuclear explosions.
- Converting or verifying the shutdown of 106 civilian research reactors and medical isotope production facilities using HEU; removing or confirming the disposition of more than 506 metric tons (MT) of HEU and plutonium (Pu) from 48 countries and Taiwan; and permanently eliminating more than 163.5 MT of HEU by downblending it into LEU.

• Monitoring the conversion of 418.6 MT of HEU from dismantled Russian nuclear weapons into LEU used to generate nearly 10% of U.S. electricity under the 1993 HEU Purchase Agreement.

Functions

Global Material Security

Works with partner countries to increase the security of nuclear and radioactive materials, and improve partner capabilities to detect, disrupt, and investigate illicit nuclear trafficking to prevent the use of these materials by terrorists.

Defense Nuclear Nonproliferation Research and Development

Drives innovative research that develops technologies and expertise to detect foreign nuclear proliferation activities and produces technologies for integration into operational systems by leveraging capabilities at the national laboratories, plants, and sites, as well as at universities and within private industry.

Material Management and Minimization

Eliminates the need for, and use or production of, weapon-usable nuclear materials such as HEU and Pu through conversion of facilities, removal of materials no longer in use, and downblending or otherwise disposing of materials.

Nonproliferation and Arms Control

Strengthens the nonproliferation and arms control regimes to prevent proliferation, ensure peaceful nuclear uses, and enable verifiable nuclear reductions.

U.S. Nuclear Forensics and Counterproliferation Capabilities

Deter and Disrupt nuclear proliferation and threats by advancing U.S. nuclear forensics and counterproliferation capabilities and expertise, and identifying and responding to emerging threats to global nuclear security through the rapid development and application of technical solutions.

Recent Organization Accomplishments

Nuclear Material Removals

Completed several multi-year nuclear material removal campaigns, including: the removal of nearly 700 kilograms of HEU from the United Kingdom; the removal of 367 kilograms of HEU from Canada; and the removal from Ghana and Nigeria of their remaining stocks of HEU, as part of a cooperative effort with the IAEA, China, Russia, and the Czech Republic.

Domestic Production of Mo-99

Partnered with commercial industry in the United States to produce the critical medical radioisotope molybdenum-99 (Mo-99). This was the first domestic production of Mo-99 in nearly 30 years.

Material Disposition

In 2018, the Department terminated the Mixed Oxide (MOX) facility that had been the planned pathway for the disposition of 34 MT of surplus Pu. The Department now plans to dispose of this material via downblending of the surplus Pu and emplacement at the Waste Isolation Pilot Plant (WIPP), while removing surplus plutonium from South Carolina. In support of this effort, a 2020 Amended Record of Decision provided the pathway to downblend and disposition 7.1 MT of surplus Pu.

Cesium Irradiator Replacement

Completed 151 Cesium Irradiator Replacement Project (CIRP) removals from U.S. hospitals and universities. By replacing these irradiators, DNN has eliminated the risk of their radioactive sources being used in an act of radiological terrorism. DNN is on pace to remove all cesium-based blood irradiators in the United States by 2027.

Early Detection

Achieved significant, measured progress in early detection of foreign weapons development activity and proliferation through a series of threat-based, operational testbeds, and advanced methods and modeling.

Warhead Measurement Campaign

Completed the Warhead Measurement Campaign that collected high fidelity, archival, radiation

signature measurements of the W76, B61 and B83 in support of future arms control treaty negotiations.

Source Physics Experiment

Successfully completed the Source Physics Experiment to improve our Nation's confidence in characterizing foreign underground nuclear tests.

Nuclear Detonation Detection Payloads

Delivered 10 nuclear detonation detection payloads to the USAF for integration into operational national systems to detect, locate, identify, and characterize nuclear explosions globally, 24/7.

Training and recruitment of Technical Experts

Established university pipeline to migrate top talent toward technical applications in national nuclear security, awarding over 440 degrees, including 169 PhDs, resulting in more than 115 new career placements in the DOE/NNSA's national laboratories and 135 in the nuclear nonproliferation community.

IAEA safeguards agreements

Expanded efforts to promote the highest standard of IAEA safeguards agreements with all non-nuclear weapons States Parties to the NPT. Within one year of the organization's initial bilateral engagements with Liberia and Benin on IAEA safeguards agreements, both countries entered into force these agreements.

Civil nuclear licensing

Reduced processing times for applications to export unclassified U.S. civil nuclear technology by nearly 50 percent, while still maintaining strong nonproliferation controls on such transfers. The organization has also expanded outreach and assistance to U.S. exporters.

Leadership Challenges

Evolution of proliferation threat

The proliferation threat continues to evolve, including through advances in nuclear and dualuse technologies, and this evolution threatens to outpace our response. We are working to develop preventative measures in order to stay ahead of such threats, including through potential application of export controls.

Balancing of nonproliferation and civil nuclear goals

NNSA will continue to be challenged to develop strategies and approaches that advance U.S. nuclear nonproliferation norms in a manner that facilitates civil nuclear exports.

Supply chain challenges

Changes in supply chain drive the need to identify and mitigate program, budget, and security risks, especially for the United States Nuclear Detonation Detection System (USNDS).

Loss of technical expertise

Losing key expertise risks national capabilities for meeting future nonproliferation goals and success in high-priority nonproliferation and arms control applications.

Human Resources

Staffing remains an ongoing challenge for DNN. Additional federal staff, particularly mid-to-senior level officials, are required to provide the oversight for existing programs and to work with the National Laboratories to develop innovative approaches to new challenges.

Nuclear Forensics

Assuming U.S. Department of Homeland Security forensics roles and responsibilities.

Critical Events and Action Items

3-month events (December 2020-Feburary 2021)

The New START Treaty will expire on 5 February 2021 if not extended.

NNSA will announce the selection of awards for Mo-99 cooperative agreements in response to a funding opportunity announcement to establish domestic supplies of Mo-99 by December 2023.

The NNSA Administrator is expected to sign a Notice of Intent (NOI) to begin an environmental analysis which will provide National Environmental Policy Act (NEPA) coverage to the 34 MT Pu disposition mission. This NEPA analysis will evaluate the dilute and dispose alternative, also known as Pu downblending, and any other identified, reasonable alternatives for surplus plutonium disposition.

The 2021 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) Review Conference (RevCon), originally scheduled for April 27-May 22, 2020, is tentatively scheduled to take place from January 4-29, 2021. A final decision on the new RevCon dates and format of the meeting is expected in October 2020.

As early as January 2021, DNN will announce the awardees for a new university consortium under the IUP. This five-year grant (\$25M total funding) will continue DNN's efforts to establish basic R&D capabilities at U.S. universities and enable a pipeline of students who have performed nuclear engineering and nuclear physics research into the national laboratory system.

6-month events (March 2021-May 2021)

Conversion of Kazakhstan's IVG.1M Reactor to LEU fuel.

Issuance of the final Analysis of Alternatives report for a pit disassembly and processing capability. Pit disassembly and processing provides Pu oxide feed for the Surplus Plutonium Disposition program at Savannah River Site and supports the 34 MT Pu disposition mission. This is critical in order to resolve potential mission conflicts in PF-4 at LANL between NNSA's Office of Defense Program's pit production mission and the 34 MT surplus plutonium disposition mission.

12 month events (June 2021-December 2021)

Sign a Secretarial Determination to certify the sufficiency of supply of Mo-99 produced without HEU that will subsequently enact a ban on exporting HEU for medical isotope production.

Renew and sign a Secretarial Determination for the sale, lease, and transfer of high assay LEU for medical isotope production.

Organizational Chart

Office of Defense Nuclear Nonproliferation



NNSA Office of Naval Reactors

Supporting the DOE Mission

Strategic Plan Goal 2: Nuclear Security

Strengthen national security by maintaining and modernizing the nuclear stockpile and nuclear security infrastructure; reducing global nuclear threats; providing for nuclear propulsion; improving physical and cybersecurity; and strengthening key science, technology, and engineering capabilities.

Strategic Objective 7

Provide safe and effective integrated nuclear propulsion systems for the U.S. Navy.

Mission Statement

Naval Reactors is a joint Department of Energy/ Department of the Navy organization solely responsible for all naval nuclear propulsion work, beginning with reactor technology development, continuing through reactor operation, and ending with reactor plant disposal. Naval Reactors ensures the safe and reliable operation of reactor plants in nuclear-powered submarines and aircraft carriers (constituting over 40 percent of the Navy's major combatants), and fulfills the Navy's requirements for new and affordable nuclear propulsion plants that meet current and future national defense requirements, delivered on schedule and within budget.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$1,788,700,000
FY 2020 enacted	\$1,648,400,000
FY 2021 requested	\$1,684,000,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 246

History

In 1946, shortly after the end of World War II, Congress passed the Atomic Energy Act, which established the Atomic Energy Commission (AEC) to succeed the wartime Manhattan Project and gave it sole responsibility for developing atomic energy in the United States. At this time, Captain Hyman G. Rickover recognized the military implications of successfully harnessing atomic power for submarine propulsion and knew it would be necessary for the Navy to work with the AEC. By 1949, Captain Rickover had forged an agreement between the AEC and the Navy, and Rickover's new organization contracted with Westinghouse to develop a facilitythe Bettis Atomic Power Laboratory—to develop a pressurized-water reactor design. In 1950, Rickover contracted with General Electric to determine whether a liquid-metal reactor design, which General Electric was developing at the AEC's Knolls Atomic Power Laboratory, could be applied to naval propulsion.

The USS NAUTILUS, using the pressurized-water design, and the USS SEAWOLF, using the liquidmetal design, were built, tested, commissioned, and put to sea in 1955 and 1957, respectively. The USS SEAWOLF successfully operated at sea until the first refueling; experience demonstrated that pressurized-water technology was preferable for naval applications. The USS NAUTILUS became the basis for all subsequent U.S. nuclear-powered warship designs. In less than seven years, Captain Rickover obtained Congressional support to develop an industrial base in a new technology; pioneered new materials; designed, built, and operated a prototype reactor; established a training program; and took a nuclear-powered submarine to sea. The success and speed of development revolutionized naval warfare and has ensured America undersea and nuclear propulsion superiority ever since.

For more than 34 years, Admiral Rickover headed the Naval Nuclear Propulsion Program (the Program). Upon retirement in 1982, he left behind a tradition of technical excellence and an organization staffed by experienced professionals dedicated to designing, building, and operating naval nuclear propulsion plants safely, and in a manner that protects people and the environment. The result is a fleet of nuclear-powered warships unparalleled in capability, and a mature, highly disciplined infrastructure of Government and private organizations that continue to build on Admiral Rickover's legacy. In the 1970s, Government restructuring moved the Naval Nuclear Propulsion Program from the AEC to what became the Department of Energy. In 2000, the Program became a part of the newly formed NNSA within DOE. During these transitions, the Program retained its dual DOE/Navy responsibility, and has maintained its basic organization, responsibilities, and technical discipline.

A strong Navy is crucial to the security of the United States, a nation with world-wide interests that receives the vast majority of its trade and energy via trans-oceanic shipment. Navy warships are deployed around the world every day to provide a credible "forward presence," ready to respond wherever America's interests are threatened. Nuclear propulsion plays an essential role in this, providing the mobility, flexibility, and endurance that today's smaller Navy requires to meet a growing number of missions. Over 40 percent of the Navy's major combatants are nuclear-powered, including 70 submarines and 11 aircraft carriers.

Presidential Executive Order 12344 and Public Laws 98-525 and 106-65 set forth the total responsibility of Naval Reactors for all aspects of the Navy's nuclear propulsion, including research, design, construction, testing, operation, maintenance, and ultimate disposition of Naval nuclear propulsion plants. Naval Reactors' responsibility includes all related facilities, radiological controls, and environmental, safety, and health matters; as well as selection, training, and assignment of personnel. All of this work is accomplished by a lean network of dedicated research laboratories; nuclear-capable shipyards; equipment contractors and suppliers; and training facilities, which are centrally controlled by a small headquarters staff. The Director of Naval Reactors, Admiral James F. Caldwell, Jr., also serves as a Deputy Administrator in the National Nuclear Security Administration.

Naval Reactors maintains an outstanding record of over 167 million miles safely steamed on nuclear power. The Program currently operates 97 reactors and has accumulated over 7,200 reactor-years of operations. A leader in environmental protection, the Program has published annual environmental reports since the 1960s, which show that the Program has not had an adverse effect on human health or the quality of the environment. Because of the Program's demonstrated reliability, U.S. nuclear-powered warships are welcome in more than 150 ports of call in over 50 foreign countries and dependencies.

Since USS NAUTILUS (SSN 571) first signaled "Underway on nuclear power" in 1955, U.S. nuclearpowered ships have demonstrated their superiority in defending the country, from the start of the Cold War, to today's unconventional threats, and beyond to future advances that will ensure the dominance of American sea power well into the future.

Functions

By employing a small but high-performing technical base, the teams at Naval Reactors' four Program sites-the Bettis Atomic Power Laboratory in Pittsburgh; the Knolls Atomic Power Laboratory and Kesselring Site in upstate New York; and spent nuclear fuel facilities in Idaho-can perform the research and development, analysis, engineering, and testing needed to support today's fleet at sea and develop future nuclear-powered warships. Importantly, Naval Reactors' labs perform the technical evaluations that enable thorough assessment of emergent issues and delivery of timely responses that ensure nuclear safety and maximize operational flexibility. This technical base supports the nuclear-trained Navy sailors, who safely maintain and operate the 97 nuclear propulsion plants in the fleet around the globe. Industry-specific business conditions, external technological developments, and Department of Navy decisions all impact the performance of naval nuclear propulsion work. Naval nuclear propulsion work is an integrated effort involving the DOE and the Navy, which are full partners in the Program. Functions include:

Emergent Needs and Challenges of our Nuclear Fleet

Naval Reactors' first priority is support of today's fleet. Naval Reactors labs perform the technical evaluations that enable thorough assessment of approximately 4,000 emergent issues annually and deliver timely responses that ensure nuclear safety and maximize operational flexibility.

Design, Development, and Operational Oversight of Nuclear Propulsion Plants for Naval Vessels

Naval Reactors' Government-owned, contractoroperated laboratories, the Bettis Atomic Power Laboratory and the Knolls Atomic Power Laboratory, are predominately involved with the design, development, and operational oversight of nuclear propulsion plants for naval vessels. Through these laboratories, and through testing conducted at the Advanced Test Reactor located on the Idaho National Laboratory, the Program performs the following:

- Design, analysis, and testing of reactor plant components and systems.
- Development, testing, examination, and evaluation of nuclear fuel systems, materials, and manufacturing; and inspection methods necessary to ensure the continued safety and reliability of reactor plants in Navy warships.
- Testing, maintenance, and servicing at landbased prototype nuclear propulsion plants.
- Execute planned inactivations of shut down, land-based reactor plants in support of environmental cleanup goals.
- Radiological, environmental, and safety monitoring and ongoing cleanup of facilities necessary to protect people, minimize release of hazardous effluents to the environment, and comply with all applicable regulations.

Decontaminating and Decommissioning

Naval Reactors continues efforts to decontaminate and decommission (D&D) older facilities that have been in existence since the start of the Program in the early 1950s in an environmentally responsible and cost-effective manner.

Internal and External Reviews and Audits

Naval Reactors evaluates the effectiveness, relevance, and progress towards achieving its goals, objectives, and targets by conducting various internal and external reviews and audits. Naval Reactors Headquarters provides continuous oversight and direction for all elements of Program work. A dedicated Government Headquarters professional staff, expert in nuclear technology, makes all major technical decisions regarding design, procurement, operations, maintenance, training, and logistics. Headquarters engineers set standards and specifications for all Program work, while on-site Headquarters representatives monitor the work at the laboratories, prototypes, shipyards, and prime contractors.

Recent Organization Accomplishments

The Office of Naval Reactors recent significant organization accomplishments include:

Columbia-Class Submarine

The COLUMBIA-Class ballistic missile submarine is the Navy's number one acquisition priority. Naval Reactors is on track to support the start of ship construction in FY 2021 and is committed to delivering the 40+ year life-of-ship reactor core and the electric drive propulsion system necessary for the COLUMBIA-Class program. After extensive efforts, Naval Reactors witnessed completion of prototype manufacturing and integration of its electric drive system at Naval Surface Warfare Center - Philadelphia. Last year, the Navy began procuring long-lead material for the propulsion plant and manufacturing the life-of-ship reactor core. This year, Naval Reactors continues supporting oversight of the lead ship propulsion plant design, reactor component manufacturing, and safety analysis work required to support lead ship reactor testing.

Refueling Land-Based Prototype Reactor

The S8G Prototype, located at the Kesselring Site in West Milton, NY, was built in the late 1970s and serves as a critical operating nuclear reactor to train sailors and prototypically test reactor technologies. Its refueling overhaul began in September 2018, and will recapitalize the prototype for an additional 20 years of service to maintain vital research and testing capabilities and continue to train nuclear operators for the Navy's nuclear-powered fleet. The new reactor core for the prototype contains fuel assemblies built with COLUMBIA-Class technology, proving out production scale manufacturing for the COLUMBIA-Class reactor core. Newport News Shipbuilding, working with teams from other naval shipyards and local on-site trades, is the lead organization for completing the refueling overhaul of the S8G Prototype. The refueling overhaul is scheduled to complete in 2022 in order to return to training nuclear operators in 2023.

Spent Fuel Handling Recapitalization Project

The Spent Fuel Handling Recapitalization Project is designing and constructing the Naval Spent Fuel Handling Facility that will be located at the Naval Reactors Facility in Idaho. The facility is critical to the Program's mission to manage U.S. Navy spent nuclear fuel and support aircraft carrier and submarine fleet refueling and defueling requirements. This project will recapitalize the naval spent nuclear fuel handling capabilities (i.e., receipt, preparation, and packaging of naval spent nuclear fuel) of the more than 60-year old Expended Core Facility (ECF) and its support facilities. To date, the facility site location has been fully excavated, concrete placement to support the facility foundations has begun, and preparations for structural steel fabrication is underway.

Leadership Challenges

None.

Critical Events and Action Items None.

Organizational Chart

DEPUTY ADMINISTRATOR FOR NAVAL REACTORS

Deputy Administrator (U.S. Navy Flag Officer)

Principal Assistant Deputy Administrator (SES Position)

NNSA Office of Emergency Operations

Supporting the DOE Mission

Currently, the National Nuclear Security Administration (NNSA) bears principal responsibility for executing the Emergency Operations (NA-40) mission for itself and for the Department of Energy as a whole. The framework for discharging this responsibility comprises traditional emergency management functions within a framework that also incorporates Continuity of Operations/ Continuity of Government (COOP/COG) functions and operations. The emergency management functions include those that allow the Department and NNSA to prevent, prepare for, respond to, recover from, and mitigate the impacts of threats to life, property, and the environment, regardless of the cause. This is known as an all-hazards approach to address the concerns of a whole of community, both of which are considered fundamental in contemporary emergency management organizations. The COOP/COG perspective provides the framework for assessing, distributing, and sustaining organizational resilience that ensures uninterrupted performance and delivery of the Department's Essential Functions under any circumstance.

Mission Statement

The Office of Emergency Operations NA-40 will administer and direct the implementation and integration of emergency management programs across the Department.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$35,574,000
FY 2020 enacted	\$35,545,000
FY 2021 requested	\$36,000,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 50

History

The Department of Energy has had an office dedicated to emergency management since 1987. Although the office has been reorganized in a number of different Departmental elements since then, the fundamental missions and functions have remained unchanged—a comprehensive, consistent approach to planning, preparing, and responding to any emergency involving or affecting the Department or requiring assistance to other Federal, state, or local agencies. The Office of Emergency Operations became an NNSA program element with the establishment of the Administration via the NNSA Establishment Act in 2000. Effective emergency management requires seamless integration of a broad range of disparate professions and organizations to ensure effective and efficient preparation for and response to any large or catastrophic emergency. NA-40, the Office of Emergency Operations, is now guided by DOE Order 151.1D, Comprehensive Emergency Management System, approved in August 2016; and a significant number of additional orders and requirements, both external and internal to the Department, to provide the Department of Energy, including NNSA, policy for the development, management, and administration of DOE's Comprehensive Emergency Management System.

Functions

Pursuant to the recent realignment of the Office of Emergency Operations approved on December 3, 2019, the structure and function are as follows:

NA-41 Office of Policy

Develop, coordinate, issue, and administer all DOE and NNSA emergency management policy, technical guidance, and support.

NA-42 Office of Emergency Management Programs

Implement, manage, and coordinate readiness assurance, training, and exercise programs to ensure the Department is prepared to respond and recover from all-hazards emergencies.

NA-43 Office of Continuity Programs

Execute DOE and NNSA Continuity of Operations, Continuity of Government, and Enduring Constitutional Government programs to advance the National Continuity Policy.

NA-44 Office of the Consolidated Emergency Operations Center (CEOC)

Provide 24/7/365 operations and communications support for the NNSA Emergency Management Enterprise and Senior Leadership.

Recent Organization Accomplishments

NA-40's accomplishments are driven in large part by COVID-19. From the earliest recognition of the emergence and significance of the coronavirus, NA-40 has led the Department's response. NA-40 was out ahead in preparing the Department for the COVID-19 threat. More specifically:

- Six months prior to the World Health Organization's (WHO's) declaration of a global pandemic, NA-40 worked with the Department of Health and Human Services (HHS) to execute an interagency Crimson Contagion pandemic exercise. Engaging DOE's three PMEF partners (NA-10, NA-80, and DOE-OE) and DOE-AU, this exercise ensured the Department's readiness to accomplish its vital national security missions in the event of a global pandemic.
- Early January, NA-40 briefed the DOE Biological Event Monitoring Team.
- Mid-February, NA-40 activated the DOE UCS.
- Mid-February, NA-40 briefed the DOE Threat Working Group.
- Late February, NA-40 activated DOE's Unified Coordination Group (UCG) to bring DOE PMEF/ MEF partners together to communicate, coordinate, and take immediate actions to prepare for the COVID-19 impacts. During the preparations for the meeting, NA-40 discovered the Department lacked a formal Pandemic Plan. Accordingly, NA-40 led the effort to recommend and assist DOE-AU in drafting the DOE Pandemic Plan and formally coordinate it throughout DOE/ NNSA to ensure Departmental awareness, buyin, and Secretary's approval.
- During the February UCG meeting, NA-40 hosted HHS leadership to brief DOE/NNSA leadership on the Government's plan to

mitigate and respond to COVID-19. During that meeting, NA-40 unveiled the Senior Leadership Briefing (SLB), a product leveraged from the National Response Framework to provide daily situational awareness updates to DOE/NNSA leadership. This daily SLB provided the critical need for a Common Operating Picture across all headquarters elements, and is inclusive of labs, plants, and sites, their surrounding communities, and the interagency. Furthermore, during the mitigation and response phases of the crises, leadership trusted NA-40's EO judgement to protect worker safety and health, while ensuring national security missions endured.

Transitioning from response to recovery, NA-40 established and led the NNSA Recovery Working Group to ensure activities across NNSA program, functional, and field offices were coordinated and aligned with the White House's Guidelines for Reopening America. NA-40 engaged all NNSA elements in drafting NNSA's Recovery Plan, coordinated the plan throughout NNSA to ensure awareness and buy in and achieved NA-1's approval. Additionally, as there was no national standard for measuring a department's progress through the phases outlined in the national criteria, NA-40 worked closely with DOE's COVID-19 Response Lead and led the Team to develop methods to mine data and conduct the analysis for the Reopening Reporting Criteria "Stoplight Chart" for the Department. Throughout this crisis, the Stoplight Chart provided a standard methodology for DOE/NNSA leadership to measure where the Department is relative to the national criteria for reopening and significantly improved leadership decision-making for the safe return of our vital workforce.

In parallel with providing the leadership and crisis management expertise for DOE/NNSA, NA-40 worked closely with the National Security Council to develop/write and evolve the current PPD-40 COOP/COG/ECG concept of operations into the new Federal Mission Resilience Strategy of Assess, Distribute, and Sustain.

NA-40 has recently initiated its required biennial Business Process Analysis—an integral underpinning of any organization's COOP/ COG responsibilities—and is contributing to the administration's ongoing efforts to update the Presidential Policy Directive (PPD-40) responsible for government-wide COOP/COG efforts, to be known as FMRS, the Federal Mission Resilience Strategy. NA-40 has also initiated a robust, ongoing Continuous Improvement Program to capture lessons learned and areas for improvement in the COVID-19 response, the longest sustained emergency operation in the organization's history.

Throughout the maximal telework environment necessitated by coronavirus, NA-40 continues to meet its steady state mission, to include several additional reporting requirements resulting from COVID-19, and has undertaken an invigorated effort to ensure the morale and welfare of its workforce is maintained. This includes increased communication between leadership and the workforce and the effective use of technology to ensure tasks are assigned, tracked, and completed in a decentralized environment.

Leadership Challenges

Based upon pandemic response lessons learned to date, workforce analysis, and imminent risk of an extended National Emergency lasting 18 months or longer, an urgent need for increased NA-40 staffing has been identified. In order to implement comprehensive and consistent Emergency Operations in accordance with PPD-8, HSPD-5, and DOE O 150.1D, NA-40 requires increasing capacity and capability of the NA-40 federal workforce by authorizing hiring of the following new FTEs series: Program Management, Management Analysis, and Supervisory Plans & Operations.

When the National Defense Authorization Act for Fiscal Year 2000 created the NNSA, language within the Act necessitated the movement of Emergency Operations into NNSA because of its Counterterrorism and Incident Response responsibilities. The Act failed to address or reassign emergency operations responsibilities elsewhere within the Department, leaving the Office of Emergency Operations as the sole emergency operations entity. Over time this structure has created confusion regarding NA-40's authority for the Emergency Management Enterprise at DOE and its labs, plants, and sites. Efforts to address the issue have recently been undertaken but as yet remain unresolved.

Critical Events and Action Items

The most critical actions undertaken by NA-40 during any transition are to ensure essential functions continue uninterrupted. This is accomplished by a well-trained workforce equipped with sufficient knowledge, skills, abilities, and resources to plan, prepare, and respond to a spectrum of all hazards emergencies. NA-40 provides the critical coordination element in the planning actions and support for National Security Special Events (e.g., Inauguration) in close collaboration with Departmental and Interagency mission partners. **Organizational Chart**





NNSA Office of Safety, Infrastructure, and Operations

Supporting the DOE Mission

NNSA requires specialized and mission-enabling infrastructure to support all of its national security missions. The NNSA Office of Safety, Infrastructure and Operations (NA-50) is the programmatic owner for operating, maintaining, and recapitalizing infrastructure that is the backbone of the NNSA laboratories, plants, and sites.

NNSA's missions require safe, reliable, resilient, and modern infrastructure to meet immediate and longterm needs. The Associate Administrator for Safety, Infrastructure and Operations provides support to the NNSA Administrator and Principal Deputy Administrator for all functions and operations related to safety, infrastructure, and enterprise stewardship. The Associate Administrator serves as the principal strategy driver and coordinator for safety infrastructure and enterprise stewardship, and is responsible for operational safety across the NNSA enterprise.

Mission Statement

Enable safe operations, ensure effective infrastructure, and provide enterprise services to meet the 21st Century Nuclear Security Enterprise (NSE) needs. To carry out this mission, this office has responsibility for the programs, policies, processes, and procedures for assuring effective integration of activities and implementation of programs across the NNSA's NSE and with other programs and staff offices in the NNSA, including the Office of the NNSA Administrator.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$2,012,179,000
FY 2020 enacted	\$1,949,627,000
FY 2021 requested	\$ 2,763,354,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 117

History

NNSA established NA-50 in January 2015. The Office was created from three existing organizations whose principal functions related to safety policy, oversight, and line management execution; infrastructure planning and execution; and nuclear materials management. While NNSA Field Office management focuses on the local contractor oversight, NNSA centralizes certain managerial functions at its corporate level in NA-50, including those for safety; infrastructure; nuclear materials transportation; environment and sustainability; and nuclear materials management. This includes managing the responses to operational nuclear safety issues identified by the Defense Nuclear Facilities Safety Board; Office of Health, Safety, and Security; or other organizations.

Safe, reliable, resilient, and modern infrastructure at NNSA's national laboratories and production plants is absolutely essential for vital national security missions and the well-being of the workforce. NNSA's infrastructure is extensive, complex, and, in many critical areas, several decades old. Sixty percent of NNSA's facilities are beyond their life expectancy and nearly forty percent are in poor condition. Many of the enterprise's critical utility, safety, and support systems are failing.

Given competing priorities, the resources available to maintain NNSA's infrastructure have historically not kept pace with growing needs. NNSA's total deferred maintenance on fixed assets (real property) stood at \$4.8 billion at the end of Fiscal Year (FY) 2019. In the FY 2018, Congress directed NA-50 to establish the Infrastructure Modernization Initiative to reduce deferred maintenance by 30 percent by 2025, implement a new, increased, minor construction limit of \$20 million, dispose of process-contaminated facilities under \$50 million, and streamline execution of non-nuclear construction under \$100 million.

In addition to addressing deferred maintenance, NA-50 is also focused on reducing the risk aging infrastructure poses to our workers, the environment, and the mission. Accordingly, we are deploying a new, science-based infrastructure stewardship approach that focuses on data-driven, risk-informed decision-making using innovative infrastructure tools and metrics to better assess conditions and prioritize investments. NA-50 requested a higher percentage of funding for Recapitalization and Maintenance projects between FY 2015 and FY 2020. These funding increases have been essential to decreasing deferred maintenance, arresting the declining state of infrastructure, increasing productivity, improving safety, eliminating costly compensatory measures, and shrinking the NNSA footprint through the disposition of unneeded facilities.

NA-50 is the steward of the Nuclear Materials Management and Safeguards System (NMMSS), the Nation's official nuclear materials accounting and tracking system. Operated in partnership with the Nuclear Regulatory Commission, NMMSS inventories, tracks, and accounts for all uranium, plutonium, and lesser accountable nuclear materials across government and commercial entities. NMMSS records, tracks, and reconciles peaceful use obligations placed on nuclear materials under nuclear cooperation agreements with trading partners. NMMSS also tracks and ensures compliance with presidential declarations removing nuclear materials from military use. NMMSS is also responsible for international safeguards reporting to the International Atomic Energy Agency (IAEA) for U.S. facilities selected for monitoring.

Functions

Safety

Supports the effective development and consistent implementation of safety programs and requirements across the nuclear security enterprise, to include federal nuclear safety responsibilities and execution of worker safety and health programs. The Office supports the NNSA Chief of Defense Nuclear Safety (CDNS), the Cognizant Secretarial Office for Safety, and the Central Technical Authority in executing their functions assigned by NNSA and DOE directives. Safety functions include supporting senior NNSA leadership on issues involving nuclear safety policy, requirements, guidance, and expectations; concurring on relief from requirements; and reviewing nuclear safety matters.

Infrastructure

Maintains, operates, and modernizes the NNSA infrastructure in a safe, secure, and costeffective manner to support program results while maximizing return on investment and reducing enterprise risk. The program also plans, prioritizes, and constructs state-of-the-art facilities, infrastructure, and scientific tools. Furthermore, the program will reduce deferred maintenance; execute recapitalization projects to improve the condition and extend the design life of structures, capabilities, and systems to meet program demands; decrease operating costs for old, inefficient facilities by replacing them with new, more efficient facilities.

Enterprise Stewardship

Provides nuclear and hazardous materials packaging, nuclear material, and environmental stewardship services; and integrates nuclear material management activities across DOE/ NNSA programs. The Office manages NNSA's environmental, sustainability, and waste management activities to meet or exceed environmental and waste management compliance and sustainability requirements. The Office also provides corporate support to the management of utilities (i.e., electricity, water, and natural gas) at NNSA sites to enable reliable, resilient, efficient, and secure energy and water to meet current and future mission requirements. Provides programmatic management and regulatory compliance oversight for packaging and transportation of materials of national security interest and other radioactive materials owned and/or controlled by NNSA to ensure the safety and protection of the workers, the public, and the environment.

Structured Problem Solving

NA-50 is continuously improving by adopting and integrating Structured Problem Solving into our business practices. Also known as "A3 problem solving," this technique is famous for fitting an entire problem, analysis, and all related materials onto one 11x17 sheet of paper. This approach is a comprehensive, user-driven approach to solving problems. By improving individual problem solving capability, this tool promotes collaboration and allows NA-50 to attain the ultimate goal of creating an organization capable of solving problems in a way that is sustainable and long-lasting.

Recent Organization Accomplishments

Supported NNSA and DOE in the tracking and logistic support to meet PPE needs across the Enterprise during Covid-19 Pandemic response through the establishment of a PPE Coordination Team.

Working with other HQ Offices and Field Offices, NA-50 led the effort which resulted in the Deputy Secretary approving the Accreditation of NNSA Technical Qualification Program across the NNSA Enterprise on September 17, 2020.

Review and approval of 8 safety basis submittals via the Safety Basis Review Team program since FY 2018.

Developed and implemented the Safety Roadmap for the NNSA, enhancing the safety posture of the enterprise and fostering continuous improvement. This Roadmap includes processes and tools supporting risk informed decision making including an initiative to employ data analytics as well as a corporate program to support field offices in the review of safety basis documents.

Completed over 288 recapitalization projects since fiscal year 2015.

Executed 33 construction projects greater than \$10 million using our new congressionally approved \$20 million minor construction threshold.

Since receiving new process-contaminated disposition authority, NA-50 demolished six additional process contaminated facilities and one large-scale process-contaminated disposition at Los Alamos National Laboratory Building 46-001.

Completed a study of over 31,000 items of nuclear material with no identified disposition pathway. Defined plausible dispositioning options based on existing capabilities and identified a timeline for development of replacement or new capabilities to ensure complete lifecycle management of materials in accordance with DOE/NNSA missions.

Issued first ever NNSA Radioactive Waste Management program plan that defines NA-50's vision, goals, and identifies the principle and framework under which NNSA manages its radioactive waste management activities across the Enterprise to ensure that work is conducted in a safe, secure, and cost effective manner.

Through successful collaborations with DOE Office of Environmental Management and the Carlsbad Field Office, significant progress made in reducing Transuranic (TRU) waste inventories at Los Alamos National Laboratory within the constraints of COVID-19 safety requirements. During 2020, a total of 42 offsite shipments were successfully completed to Waste Isolation Pilot Plant—the Nation's only deep geologic long-lived radioactive waste repository.

Released draft NNSA Long-Term Stewardship Program Strategic Plan, which is a high-level Plan for lasting environmental stewardship of NNSA sites across the nuclear security enterprise. The draft Plan was briefed to key NNSA constituents, including Tribal Nations and state regulators, and is currently undergoing external review.

Leadership Challenges

COVID-19 Pandemic Response

The full extent of COVID's impact on our mission work is currently unknown, but impacts are being realized. There have been some positive impacts, including completion of some projects ahead of schedule. NA-50 leadership is preparing a safe return of our workforce to full pre-pandemic physical capacity in a phased approach while maintaining remote work capabilities where it makes sense to do so.

Aging Infrastructure

The NNSA infrastructure is large, old, and in poor condition. Many facilities and systems are well beyond useful life, and obsolescence limits maintenance and repair options. Sixty percent of NNSA's facilities are beyond their life expectancy and nearly forty percent are in poor condition. Further, excess facilities pose safety and programmatic risks. Excessive deferred maintenance increases the risk of building and building system outages; leads to substandard working conditions; and elevates operational and safety risks. Much of the supporting and general purpose infrastructure such as utilities, safety systems, laboratory spaces, manufacturing shops, and office space is in need of greater attention.

Environmental Compliance and Long-Term Stewardship

Sustained investments are needed to maintain safe and environmentally compliant operations. The DOE cleanup experience has made clear that complete restoration to levels acceptable for residential or unrestricted use cannot be accomplished at many of the sites across the nuclear security enterprise. Many of the residual hazards at NNSA sites are likely to persist for many generations. Consequently, long-term stewardship (LTS) activities are needed at these sites to ensure that the selected remedies remain protective for current and future generations.

Waste Isolation Pilot Plant (WIPP)

NNSA continues to reduce its existing and newlygenerated radioactive waste inventory at its sites by focusing on expedited characterization and certification of the waste, as well as regular offsite shipments of the waste to the WIPP other disposal sites across the nation. It estimated that by 2041, NNSA will be largest generator of TRU waste within the DOE. Several challenges exist in the de-inventory and shipment of waste to the WIPP, including:

- 1. Competition with the Office of Environmental Management and other stakeholders for shipment of waste to WIPP.
- 2. Ensuring there are sufficient resources and equipment necessary to support NNSA's plutonium pit production mission.
- 3. Los Alamos National Laboratory and the Savannah River Site must develop storage and staging contingency plans for any long-term shutdown at WIPP.
- 4. Ensuring the continued availability of WIPP to dispose of TRU waste for the next 50+ years.
- 5. The new WIPP requirements, established after the 2014 WIPP shutdown, have lengthened the time to certify containers.
- 6. Prioritizing the long-overdue infrastructure upgrades at WIPP against the planned shipping scope and schedule.

Contractor Oversight

NNSA recently updated Supplemental Directive (SD) 226.1C, *Site Governance Systems*, which emphasizes strategic partnering and alignment between functional, program and site office within NNSA and

the M&O partners. It adjusts the paradigm by which NNSA administers its contractor oversight functions. This SD establishes the NNSA Site Governance Model as the framework that the Federal Government and NNSA's contractor partners work within to help ensure effective mission performance and operational excellence.

Safety Oversight

As NNSA's work continues to increase in scope and complexity, the information and requirements it manages are a coupled and multipart system, where cause and effect are difficult to foresee. At the same time, its sum total of experience of safety professionals is decreasing. In fact, 40 percent of NNSA's workforce is eligible to retire within the next five years. With the expanding complexities of a 21st Century Nuclear Security Enterprise, NNSA needs to equip its current and future workforce with modern safety tools that add value and efficiencies. The Safety Analytics, Forecasting & Evaluation Reporting (SAFER) project is key tool that will help provide new insights in information gathering to ensure we are measuring what matters for future workforce. The SAFER project is a software solution that is developing enhanced data capabilities to help data sharing, management, trending, and analysis. SAFER promotes NNSA's move from data owners to highly effective data users and consumers. In the short term, SAFER will help us maximize the use of operational data to improve situational awareness and allow for efficient, risk-focused oversight activities. NNSA safety professionals, both in the field and the safety functional office, will increasingly have more transparent access to data, putting them in the best position to make decisions to improve safety performance. The long-term outcome of SAFER is a decision-making support tool that will provide the specified decision makers with data which, when considered alongside the input of safety professionals, will best leverage NNSA safety oversight resources and support safety oversight decisions.

Critical Events and Action Items

3-month events (January – March 2021)

Develop a Congressional Report on Operational Efficiencies, specifically for lessons learned during COVID-19 that can be applied permanently across NNSA to improve the efficiency and resiliency of the NNSA for the long-term. Execute our first ever "option to purchase" a facility for Y-12 National Security Complex's production development mission work.

Finalize a contract for the Safety Analytics, Forecasting & Evaluation Reporting project platform, which will be used to procure innovative software that integrates departmental operational databases to allow managers and front line personnel to holistically manage safety risks and plan and deploy resources to support accomplishment of NNSA's mission.

Organizational Chart



Associate Administrator for Safety, Infrastructure, and Operations

NNSA Office of Defense Nuclear Security

Supporting the DOE Mission

The Office of Defense Nuclear Security (NA-70) is responsible for the development and implementation of the National Nuclear Security Administration's (NNSA) security program to enable NNSA's nuclear security enterprise (NSE) missions. NA-70, in conjunction with field office and contract partner partners, provides protection for NNSA personnel, facilities, nuclear weapons, and materials from a full spectrum of threats—ranging from minor security incidents to acts of terrorism—at its national laboratories, production plants, processing facilities, and the Nevada National Security Site (NNSS).

Mission Statement

NA-70 leads, develops, and implements the NNSA's security program to enable the NSE missions by protecting materials, information, and people.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$2,012,179,000
FY 2020 enacted	\$1,949,627,000
FY 2021 requested	\$ 2,763,354,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 92

History

The Office of Defense Nuclear Security was established by the 1999 NNSA Act (Sec 3232 [50 U.S.C. 2422]), and is headed by the Chief, Defense Nuclear Security (CDNS), who is appointed by the Secretary from among candidates recommended by the Administrator. The CDNS reports to the Administrator and is responsible for the development and implementation of security programs for NNSA—including the protection, control, and accounting of materials—and for

physical and cyber security for all NNSA facilities. NA-70 has undergone several organizational alignment changes since its creation. Cyber security authority was delegated by the CDNS to the NNSA Office of Information Management and Chief Information Officer (NA-IM), and is funded and managed by that office. To augment the office of the CDNS. NNSA established an Office of Associate Administrator for Defense Nuclear Security. This was initially a separate office, though under the policy direction of the CDNS. Eventually, the CDNS came to serve simultaneously as the Associate Administrator for Defense Nuclear Security. The CDNS is also designated as the Chief Security Officer (CSO) for NNSA, under a Secretarial security reform initiative that has established CSOs for each of the Under Secretaries, and a forum in which the CSOs routinely collaborate on common issues.

Functions

Security Operations and Programmatic Planning (NA-71)

Establishes the operational direction of the NNSA security program, evaluates the execution of the field security programs, and ensures line management evaluation programs are rigorous and provide high confidence that contractor security programs are operating in an effective manner. Develops implementing guidance that clarifies or elaborates on Departmental security requirements, specifically: establishes training requirements; assessment and implementation standards; and criteria for security programs. Coordinates the Planning, Programming, Budgeting, and Evaluation process for NA-70 with the Office of Management and Budget (NA-MB); coordinates the development and issuance of the NA-70 Strategic Plan; Multi-year Program Plan; Programmatic Goals and Objective; and similar overarching programmatic guidance. Manages the full spectrum of security functions to successfully execute specific operational security matters within the NNSA Headquarters (HQ) office.

Personnel and Facilities Clearance and Classification (NA-74)

Implements the personnel security access authorization (security clearance) program for NNSA field sites. Manages the Facility Clearance Program for NNSA sites and NNSA HQ (Washington, DC, and Germantown, MD, offices). Oversees the NSE-wide Classification and Controlled Information Program (CCIP), which includes the management, oversight, and assessment of the CCIP; and classification, declassification, and trans-classification of NNSA information. Manages Homeland Security Presidential Directive 12 (HSPD-12) sponsorship for non-Management and Operating NNSA support service contractors, as well as adjudication for all HSPD-12 cards.

Recent Organization Accomplishments

Security Management Improvement Program

The Security Management Improvement Program (SMIP) was designed to help NNSA security leadership assess HQ- and field-level performance in an effort to help drive continuous improvement across all elements of NA-70. Phase I of SMIP was completed in December 2018 and consisted of an inwardly focused review of federal program management, with emphasis on improving the integration of the federal team's program management and oversight of the Safeguards and Security program by improving processes and practices and ensuring alignment with Department of Energy (DOE) and NNSA governance requirements. Phase II of SMIP, which included a successful proof of concept pilot at the Nevada Field Office, began in January 2019. In Phase II, the focus shifted to collecting field-oriented performance data and engaging Field and HQ federal staff to identify and address barriers to more effective oversight.

Device Assembly Facility Argus Installation Project at the NNSS

The Device Assembly Facility (DAF) Argus project was completed under budget and on schedule. DAF Argus works in conjunction with the Entry Guard Station Expansion and other legacy completed projects. The Argus security system replaced the aging Process Equipment Control Operating System in the DAF. Argus is the NNSA standard security system to integrate access control, intrusion detection, and video assessment of alarms for protection of high-consequence assets. Installation of Argus was necessary to support the DAF complex, which is a critical facility within the NNSA NSE designed for the staging of special nuclear material (SNM). Completion of this project provided the security required to protect SNM.

Counter Unmanned Aircraft System Implementation

Among the National Nuclear Security Administration's (NNSA) top security priorities, NA-70 is focused on addressing the threat posed by unmanned aircraft systems (UASs) and the need for effective countermeasures. NNSA's first counter unmanned aircraft system (CUAS) platform, the first within the DOE, was deployed at the Los Alamos National Laboratory (LANL) in December 2017. Operational testing was completed on September 30, 2018, and full operational capability was achieved on October 31, 2018. Remaining Category I facilities are actively working to implement the CUAS platform. NA-70 continues to work closely with Departmental security counterparts and interagency partners, including the Department of Homeland Security, the Federal Aviation Administration (FAA), the Department of Defense (DOD), the Department of Justice, and appropriate Congressional stakeholders to maintain an effective CUAS capability. In August 2018, the FAA declared NNSA's CUAS Concept of Operations, deployment plan, and integrated project team approach the "gold standard," to be emulated by the interagency.

Center for Security Technology, Analysis, Response, and Testing Portal

The Center for Security Technology, Analysis, Response, and Testing (CSTART) has developed a comprehensive online portal to help NNSA significantly improve its ability to share critical information across the spectrum of the physical security program. Some of the topical areas included within the portal are protective forces training/exercises, information protection, security systems/technology, emerging threats, and human reliability programs. The information-sharing will focus on lessons learned/best practices, selfassessment guides, "how-to" videos, training curriculum, and a wealth of other day-to-day practical information vital to the goal of focusing the NNSA security community on continuous improvement. CSTART staff are also working with DOD nuclear security personnel to identify opportunities for the portal to contribute to ongoing and future security program collaboration and harmonization initiatives.

Personnel and Facility Clearances and Classification

This office provided oversight of a classification program that reviewed 30,000 documents for public release and more than 500,000 documents to support litigation. Additionally, NA-74 successfully trained approximately 1,000 federal and contractor HQ staff who have access to classified email the procedures to portion mark email to ensure compliance with Executive Orders and federal requirements. The office also implemented a Department-wide clearance adjudication and processing tracking system, reducing risk, building resiliency, and creating a common operating environment for all of the adjudication offices.

Leadership Challenges

Caerus

NA-70 is pursuing replacement command control and display equipment, project name Caerus, to address issues including cyber security, future extensibility, and ease of sustainment of the Argus system. NA-70 is viewing the requirements from three angles (formal policy, users, leadership). NA-70 is actively working to complete the final requirements document by Q1 FY 2021.

Design Basis Threat Implementation

The Design Basis Threat (DBT) policy establishes the baseline threat characterization against which the NA-70 security program is developed and implemented. The DBT draws on information from a variety of sources, including the intelligence community's Nuclear Security Threat Capabilities Assessment. The 2016 update to the DBT required NA-70 to assess its security posture and make appropriate adjustments. NA-70, in coordination with NNSA Management and Operating contractors, developed an implementation plan, to include scheduled completion of the analysis by December 2020. Risk is managed by making decisions regarding priorities and consequences. NA-70 must balance alignment of implementation schedules with current NNSA mission priorities to ensure the mission is not hindered and any required changes are appropriately resourced.

Security Infrastructure Revitalization Program

The Security Infrastructure Revitalization Program (SIRP) addresses the security systems across the

NNSA and is a primary driver to support NSE physical security system upgrades and life cycle management at each NNSA site, plant, and lab. SIRP project requirements were derived from the data obtained during development of the 10-year Refresh Plan, a detailed condition assessment completed at each NNSA facility. The condition assessment identified the oldest systems and systems with the highest risk for failure, and assessed these systems' contributions to the overall security posture. The risk values derived during the condition assessment surveys were used to establish a baseline, and then to show reduction in risk as a result of proposed upgrades. This provided a method for comparing various upgrade options, which supports cost-effective implementation decisions across the enterprise.

Responding and Adapting to Trusted Workforce Initiatives

NA-74 worked with DOE to develop policy and implementation plans for the constantly changing investigative and adjudicative landscape. As the government moves to a more real-time vetting and adjudication model, NA-74 and the Department will continue to adapt in response to the changing landscape.

Critical Events and Action Items

Three-month events

NA-70 expects that the Y-12 National Security Complex West End Protected Area Reduction project will reach Critical Decision 2/3.

The CSTART online portal will become operational. This portal will help NNSA significantly improve its ability to share critical information across the spectrum of the physical security program.

NA-70 is leveraging a multi-year contract that the Marine Corps previously established with Heckler & Koch (H&K) to centrally procure M27 Infantry Automatic Rifles. The first order was received by the Pantex Plant in September and the remaining four sites will receive M27s by end of CY 2020.

DBT analysis is on schedule to be completed in December 2020.

Organizational Chart



NNSA Office of Counterterrorism and Counterproliferation

Supporting the DOE Mission

Among the three Mission Priorities identified in the NNSA Strategic Vision, the Office of Counterterrorism and Counterproliferation (CTCP/ NA-80) contributes directly to Mission Priority #2: Reduce global nuclear security threats and strengthen the nuclear enterprise. Additionally, CTCP is responsible for executing the Department's Primary Mission Essential Function (PMEF) #2, Respond to Nuclear Incidents, as well as Mission Essential Function (MEF) #1, Nuclear Incident Response; MEF #6, Nuclear Counterterrorism; and MEF #11, Nuclear Forensics (shared with the Office of Defense Nuclear Nonproliferation [DNN]).

Mission Statement

CTCP is responsible for countering nuclear terrorism and nuclear proliferation and responding to nuclear incidents and accidents domestically and internationally. CTCP missions include both national security and public health and safety disciplines. Specific CTCP mission pillars include providing scientific understanding of nuclear threat devices and potential terrorist and proliferant state nuclear capabilities; informing U.S. policies, regulations, and interagency and international partners on terrorist and proliferant state nuclear threats; sustaining Nuclear Emergency Support Team (NEST) readiness to respond to nuclear and radiological incidents and accidents at home and overseas; and providing targeted training to domestic and international partners to improve capabilities to respond effectively to nuclear and radiological events and threats.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$283,611,000
FY 2020 enacted	\$336,550,000
FY 2021 requested	\$341,513,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 58

History

The Office of the Deputy Under Secretary for Counterterrorism was established in 2003 to coordinate counterterrorism activities within NNSA and to be the Department's principal point of contact with other U.S. Government agencies and foreign governments on counterterrorism matters. Through two reorganizations since then, the CTCP mission has expanded to include the Department's nuclear incident response capabilities, broader international engagements, and technical advisors to the U.S. interagency, including Department of Defense (DoD) combatant commands. CTCP was solely responsible for nuclear forensics and counterproliferation until these portfolios were realigned to DNN in FY 2021.

NNSA's core expertise in nuclear science is central to the national effort to deter, detect, defeat, and attribute a terrorist nuclear or radiological attack. NNSA's counterterrorism programs play a crucial role in homeland security. DOE and other agencies rely on the national laboratories' knowledge of nuclear weapon design to identify novel and unconventional nuclear threats; support the design and testing of radiation detection systems; field capabilities to characterize and defeat terrorist nuclear devices; and evaluate the safeguards and security of nuclear facilities globally. NEST teams provide the nation's last line of defense to locate, identify, and defeat a nuclear device, as well as provide consequence management support in the event of a radiological release.

NNSA works with foreign governments to develop emergency management programs and infrastructure to reduce the risk of radiological and nuclear threats and to mitigate the consequences of a nuclear accident or incident. In collaboration with other agencies, NNSA is expanding the overseas capacity to detect and interdict nuclear materials in transit. CTCP makes diverse contributions to U.S. and global nuclear security, including:

- Protecting access to nuclear weapons expertise and design information.
- Ensuring U.S. interagency awareness of the technical aspects of the improvised nuclear device (IND) threat.
- Building an integrated radiation detection and interdiction capability with law enforcement partners.
- Maintaining counter-weapons of mass destruction (C-WMD), radiological/nuclear consequence management, and operational nuclear forensics capabilities.
- Supporting nuclear incident response capacitybuilding with state, local, and international partners.
- Supporting a nuclear security enterprise that provides unparalleled scientific expertise across the homeland and national security spectrum.

Functions

The following CTCP responsibilities derive from a body of legal statutes, presidential policies, and international agreements.

Nuclear Incident Policy and Cooperation

Assist international and domestic partners through training, exercises, and workshops to develop robust emergency preparedness and response capacity to respond to nuclear and radiological incidents.

Advance USG nuclear-related strategic objectives for nuclear and radiological emergency preparedness and response.

Nuclear Threat Science

Protect sensitive nuclear weapon design information from unauthorized disclosure and discovery by adversaries.

Provide NNSA's specialized technical knowledge concerning nuclear threat devices and proliferant state capabilities to interagency partners and members of the National Security Council (NSC) staff to inform U.S. nuclear counterterrorism priorities, requirements, and activities. Conduct nuclear threat reduction activities with key international allies, including classified technical and policy exchanges.

Nuclear Incident Response

Ensure NEST readiness to respond to nuclear and radiological incidents and accidents domestically and internationally by fulfilling all personnel, equipment, and training requirements.

Maintain NEST capabilities to respond to accidents involving U.S. nuclear weapons and to incidents involving a lost or stolen U.S. nuclear weapon.

Deliver timely, technically sound decision support to incident management partners across the continuum of nuclear and radiological incident response.

Harness existing technologies, develop new capabilities, and prepare for future innovations to continuously improve NEST response operations and expand applicability of NEST expertise to all C-WMD, nuclear weapon accident response, and public health and safety missions.

Sustain specialized capabilities, which are strategically prepositioned throughout the United States, to rapidly search for, characterize, and defeat WMD devices.

Protect major public events (e.g., Presidential Inauguration, Super Bowl, etc.) and support C-WMD activities.

Supplement NNSA's capacity to characterize the radiation environment following a nuclear incident by working with federal, state, and local partners.

Recent Organization Accomplishments

Despite constraints imposed by COVID-19, CTCP accomplished the following over the preceding several years:

 Three new Aerial Measuring System (AMS) fixed-wing aircraft were integrated into NEST operations and training in December 2019. Additionally, COVID-related event cancellations allowed the recapitalization of an additional \$1.7M worth of NEST equipment.
- NEST supported real-world deployment requirements while continuing to hone operational readiness through participation in exercises and joint drills, as well as execution of numerous small-footprint and virtual training venues. CTCP supported 25 scheduled operations, 18 unscheduled responses, and 23 drills and exercises. Operational highlights include NEST support to the Republican National Convention and NEST's Accident Response Group's (ARG) support of DoD and the NNSA Office of Stockpile Management.
- In July 2020, NEST provided support to NASA for the launch of the Mars 2020 Perseverance Rover to ensure the protection of public health and safety in the event of a launch anomaly. NEST supported NASA with 25 personnel at the Radiological Controls Center and with field monitoring teams to rapidly respond in case of a launch area accident. Finally, NEST provided additional remote technical support from the national laboratories.
- NEST continued to test and field new tools for Federal Bureau of Investigation (FBI) regional teams as part of the NNSA-FBI "Capability Forward" initiative.
- Since 2016, CTCP has conducted 122 WMDrelated trainings and table top exercises on emergency preparedness and response to radiological and nuclear emergencies worldwide. These trainings were attended by 6,072 participants, including both domestic and international partners.
- Since the inception of the International Atomic Energy Agency's Emergency Preparedness and Response Standards Committee in September 2015, CTCP has served as the chair, guiding policy, standards, and developments in emergency preparedness and response for implementation by Member States worldwide.
- In 2020 CTCP continued work on a Joint Urban Radiological Dispersal Device (RDD) Experiment in partnership with Israel, Canada, and the United Kingdom. These tests will establish the baseline data needed to define the design parameters for the tests at Israel's urban setting facility.
- Disposition and Forensic Evidence Analysis Team (DFEAT) and DOE Forensics Operations (DFO) procedures and capabilities originally designed to characterize interdicted nuclear devices and debris were rapidly modified to support a wide range of contingency planning efforts for an NSCled denuclearization initiative.

- In cooperation with the United Kingdom and France, CTCP supported the execution of an operational nuclear counterterrorism exercise hosted in France in September 2019, and hosted a trilateral exchange with senior leaders in the United States in December 2018, improving each government's understanding of information security policies and process improvements.
- Completed three technical assessments for the NSC's Integrated Nuclear Security Strategy to inform USG engagements with foreign partners on nuclear security.
- In support of the C-WMD mission, CTCP increased confidence and accuracy in predictive modeling capabilities through completion of experimental validation campaigns and ongoing characterization of new energetic disablement tools.

Leadership Challenges

CTCP faces the following high-level challenges:

Secure Office Space and Classified Communications

CTCP activities are hampered by the insufficiency of both secure office space and secure mobile communications capabilities.

Current Part-Time/Volunteer Staffing Model

The limited availability of technical experts for training, drills, exercises, and operational response is straining the current part-time/volunteer staffing model used throughout the nuclear security enterprise to sustain deployable NEST teams and Home Teams.

Critical Events and Action Items

Critical events or actions that will take place within the first 3 months of the next Presidential term:

Nuclear Weapon Accident/Incident Exercise (NUWAIX)-21 Senior Leader Seminar—February 17, 2021.

In partnership with the IAEA, conduct training for Member States on nuclear safety for major public events and on medical response to nuclear emergencies.

Organizational Chart



Office of Counterterrorism and Counterproliferation

NNSA Office of External Affairs

Supporting the DOE Mission

The NNSA Office of External Affairs consists of teams of highly trained, security cleared, congressional affairs, intergovernmental affairs, and public affairs specialists who work to effectively communicate, promote, and defend NNSA's mission, goals, and budget. By building sustainable relationships with federal, state, tribal, and local stakeholders, and promoting strong engagement with the public through the media and social networks, NNSA's Office of External Affairs supports NNSA's entire nuclear security enterprise and promotes the President's nuclear security agenda.

Mission Statement

To effectively communicate, promote, and defend the mission, goals, and budget of NNSA through proactive outreach and sustainable relationship building with federal, state, tribal, and local stakeholders, and with the public through the media.

Budget

The NNSA Office of External Affairs budget is funded through the NNSA Federal Salaries and Expenses account. The budget below reflects the amount that was allotted to the office from the NNSA Office of Management and Budget.

Fiscal Year	Budget
FY 2019 enacted	\$4,312,000
FY 2020 enacted	\$3,492,000
FY 2021 requested	\$3,535,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 21

History

The NNSA Office of External Affairs was created in 2011 as part of an NNSA reorganization. This brought key external communications offices together into one agency-level, associate administrator-led office.

Functions

NNSA's Office of External Affairs has three distinct offices and one program: the Offices of Congressional Affairs, Public Affairs, and Intergovernmental Affairs; and the Nuclear Emergency Communications Program, which handles external and strategic communications on behalf of NNSA.

Office of Congressional Affairs (NA-EA-10, CA)

The Office of Congressional Affairs provides oversight, management, and direction of legislative strategies in connection with NNSA's policy and program initiatives, and ensures that NNSA's positions are properly communicated with Congress. CA provides advice and guidance to NNSA leadership on policy issues and Members' interests and concerns, and facilitates accurate and timely responses to Congress.

Office of Public Affairs (NA-EA-20, PA)

The Office of Public Affairs is the principal point of contact for NNSA with the news media and the general public. It is responsible for ensuring that the public is informed about NNSA's activities. Its functions include communicating NNSA messaging, policies, initiatives, and information to the news media and the general public; managing and coordinating public affairs activities for NNSA headquarters, field offices and sites, including NNSA laboratories; serving as the primary spokesperson for NNSA; responding to requests for information from the public and the news media; arranging interviews with the news media; preparing written press releases about NNSA activities and sharing NNSA highlights with the news media and the general public; managing NNSA's public-facing digital presence on Energy.gov and social media; and producing multimedia content that tells the story of NNSA to a general public audience.

Office of Intergovernmental Affairs (NA-EA-30, IGA)

The Office of Intergovernmental Affairs maintains ongoing communications with governors, state legislators, tribal officials, and local officials across the country. IGA proactively engages stakeholders to ensure that their views are considered as part of NNSA's decision-making process. IGA also communicates routinely with all relevant stakeholders on NNSA announcements, initiatives, proposals, and grants, and assures appropriate follow-up.

Nuclear Emergency Communications Program

This program was established within NNSA's Office of External Affairs in September 2019 as a result of a realignment of functions from the NNSA Office of Emergency Operations. It is aligned to the NNSA Office of External Affairs front office. This program helps to ensure that NNSA provides effective communications in the event of a radiological or nuclear emergency. It does so by executing readiness and training programs that provide response officials (e.g., public information officers) with the necessary background and experience to operate in an emergency environment.

Recent Organization Accomplishments

Defended NNSA's FY2021 President's Budget Request during three budget hearings in FY 2020 (HASC-SF, HEWD, SASC)

Received key authorizations called for in the 2018 Nuclear Posture Review.

Developed an outreach communications plan that included media advisories, news releases, social media campaigns, and pitching to media, which included garnering earned media interviews and coverage leading up to two NNSA virtual job fairs.

Pitched and secured two Associated Press articles garnering wide/extensive nationwide coverage for NNSA:

- NNSA Administrator Summer Tour: visits to the nuclear security enterprise.
- NNSA hosting of Special Presidential Envoy for Arms Control (SPEAC), Ambassador Billingslea.

Pitched and secured CBS TV exclusive one-on-one media interview with the NNSA Administrator, yielding primetime TV coverage while she visited the National Security Site and the National Atomic Testing Museum. Contained negative media coverage as a result of cesium release event where NNSA deployed an ongoing rotation of public information officers over a period of many months.

Leadership Challenges

Balancing proactive outreach strategy with workload related to increasing interest and requests for information (i.e., due principally to the modernization efforts that are ongoing) from congressional, state, tribal, and local stakeholders.

Ensuring proper involvement of NNSA Office of External Affairs in activities that have external communications requirements led by other NNSA offices.

Critical Events and Action Items

Ensuring enactment of FY 2021 appropriations or budget anomalies for a potential long-term continuing resolution.

Preparing for the roll-out of FY 2022 President's Budget Request.

Supporting leadership engagements with congressional stakeholders.

Assisting with NNSA virtual job fairs: January 27 and March 30, 2021.

Supporting the Nuclear Deterrence Summit: February 9-11, 2021.

Organizational Chart

Office of External Affairs



NNSA Office of Management and Budget

Supporting the DOE Mission

NNSA's Management and Budget (NA-MB) supports DOE's mission by resourcing the Nuclear Security Enterprise.

Mission Statement

Management and Budget provides timely, costeffective, and efficient administrative and financial support for the NNSA federal staff, including federal salaries and expenses (FSE).

Budget

Fiscal Year	Budget	
FY 2019 enacted	\$410,000,000	
FY 2020 enacted	\$434,700,000	
FY 2021 requested	\$454,000,000	

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 240 FTEs and 22 overseas attachés representing the Department.

History

The position of Associate Administrator for Management and Administration was established with the creation of NNSA in 2000. In 2011, the functions of acquisitions and project management, plus information technology and cybersecurity, moved to separate NNSA organizations. At that time, the office name was changed to Management and Budget.

Functions

Audits and Internal Affairs

Provides effective NNSA-wide coordination for all Inspector General (IG) and Government Accountability Office (GAO) audit activities. Coordinates responses to IG and GAO recommendations and coordinates NNSA's activities to track corrective actions. Coordinates actions to address IG Management Referrals and provides an audit/investigative capability for fact finding, validation, and program evaluation services related to areas of management concern.

Human Resources

Works as a strategic partner with senior leaders to deliver human resources policies, procedures, practices, and workforce planning strategies that facilitate effective program management, foster sound human capital management, and provide for an accountability system that adheres to merit system principles.

Business Services

Manages, coordinates, and provides acquisition planning and support; office space and logistics; employee concern program contact; and quality management consultation at Headquarters. Provides travel policy and administration and implements Quality Management Systems Assessments throughout the NNSA complex. The Office serves as the primary interface between NNSA and the DOE Headquarters offices regarding NNSA administrative services for the National Capital Region.

Learning and Career Management (LCM)

Works as a strategic partner across NNSA to advance the development of talent, leadership, employee training, career development, and succession planning policies and programs. Cultivates a healthy work culture that empowers employees, strengthens employee engagement, leverages diversity, and promotes inclusion through corporate strategic initiatives. Builds educational partnerships to recruit, train, and retain a world-class workforce for the 21st century, and builds a cadre of professionals to lead America's Nuclear Security Enterprise.

International Operations

Oversees the management, administration, and implementation of NNSA and Departmental policies, procedures, and systems pertaining to the agencies' overseas offices at U.S. Embassies. Serves as the NNSA point of contact to the Department of State Office of Overseas Employment, and represents DOE and NNSA interests in intra- and inter-agency overseas issues.

Resource and Matrix

Provides direct support to program and field offices to implement all aspects of the corporate Planning, Programming, Budgeting, and Evaluation (PPBE) system by ensuring that offices are staffed with experts to implement standardized PPBE processes. Manages requests and communicates with the programs and field offices for prioritization of tasking and staffing work requests. Coordinates with other NA-MB staff to successfully integrate PPBE products and ensure availability of support for financial integration, budget, and cost estimating activities.

Corporate Budget

Manages, directs, supports, and oversees activities to assure integrity, quality, and compliance of products associated with NNSA's PPBE processes; works closely with Resource and Matrix Teams to assure consistent financial practices throughout NNSA; and works with other MB Teams throughout the PPBE cycle in either a lead or supporting role to facilitate integration of NNSA information and products.

Business Systems and Integration

Uses information technology and business processes to improve PPBE capabilities of NNSA. This includes improving the financial integration of NNSA data by developing a common data reporting framework, a common work breakdown structure, and common cost elements. The team also leverages information technology and financial standardization to support the planning and programming parts of PPBE.

Financial Performance

Manages, directs, and supports activities to assure the effective financial management stewardship and financial integrity of the programs, activities, and resources at NNSA. Serves by developing and implementing NNSA policies and systems in the areas of accounting and financial management; financial and accounting systems; and other financial performance activities.

Programming, Analysis, and Evaluation (PA&E)

PA&E leads the NNSA programming process to develop the Administrators Preliminary Decision Memo documenting NNSA resource request to the

DOE Secretary for the Future Years Nuclear Security Program (FYNSP). PA&E also provides decision support to Program Offices, including DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets,* analyses of alternatives, and other studies, including business case analysis.

NNSA Executive Secretariat

Manages correspondence for the NNSA Administrator and reports to Congress. The Executive Secretariat also serves as the NNSA Headquarters Classified Document Control Station, coordinates conference management, and manages internal NNSA communications to employees.

Recent Organization Accomplishments

FY 2022 Budget Build

Successful, on-time delivery of a draft FY 2022-2026 Programming budget that has been transmitted to the Office of Management and Budget (OMB) through DOE-CFO. NNSA also implemented a new Nuclear Weapons Council interagency planning process in building this budget.

Helped NNSA Achieve Highest Staffing Levels since 2013

NNSA's core weapons and non-proliferation budget has increased 84 percent from 2009-2020, while federal staffing levels have decreased 10 percent over that same time period. NNSA is working to increase its staffing numbers after many years of decline. NNSA will end FY 2020 with about 1,747 employees on board, excluding Naval Reactors and the Office of Secure Transportation. This will be the highest end of year on-board strength since 2013.

PPBE Realignment

Successfully implemented the realignment of NNSA's PPBE functions and products to be colocated within NA-MB. The resultant synergy across the newly realigned teams has reduced stovepipes in knowledge and communication; enhanced timeliness and consistency of budget products; increased responsiveness to internal and external requests; and achieved budget all major budget milestones.

Overseas Presence Advisory Board (OPAB) New Charter

Successfully executed a new OPAB Charter in FY 2020 that created a Board comprised of DOE and NNSA senior leadership to manage DOE's overseas program, including selection of attachés and whether NNSA or DOE International Affairs is lead responsibility for a specific country. NA-MB is responsible for all operational issues for both DOE and NNSA attachés in 18 countries.

In the 2019 Best Places to Work in Government report, NNSA's training and development ranked in the top 15 percent of all Federal Government agencies

In FY 2020, LCM processed over 1,075 training requests. Established the Nuclear Security Enterprise Educational Partnership Consortium and expanded the Minority Servicing Institutions Partnership Program to include 33 minority servicing institutions, 11 laboratory and plant partners, 2 non-profits, and 13 consortia.

Developed Common Work Breakdown Structure (WBS)

Implemented a common WBS for all NNSA Management and Operating (M&O) partners and programs with data collection to begin at the start of FY 2021.

Leadership Challenges

Support the federal workforce in a continued COVID-19 environment and prepare for the return of federal staff when conditions allow

Recruit, train, and retain Federal employees.

Manage the logistics for a new transition team.

Critical Events and Action Items

3-month events

Operate under a budget continuing resolution impeding NNSA's modernization programs.

Prepare budget materials or adjustments to align with new Administration priorities.

Hire and deploy overseas attaches to priority countries by end of first quarter FY 2021.

Monitor COVID-19 costs, budget impacts, and return of federal work force.

6-month events

Plan and support execution of M&O contract transitions.

Delivery of the FY 2022-2026 Budget to Congress on February 1, 2021.

12-month events

Increase NNSA Federal staff to 1,943 FTEs by September 30, 2021.

Maintain clean opinion on financial statement audit.

Complete renovation of approximately 22,000 square feet of secure space to increase occupancy and modernize office environment.

Organizational Chart

Office of Management and Budget



NNSA Office of Acquisition and Project Management

Supporting the DOE Mission

The Office of Acquisition and Project Management (NA-APM) enables NNSA to accomplish defense, nonproliferation and counterterrorism, emergency operations, and security missions at the best value to the taxpayer through contract placement, and administration and capital construction project management. NA-APM awards all contracts, financial assistance instruments, and Inter-Agency Agreements on behalf of NNSA. The majority of NNSA's procurement funds are obligated on Management and Operating (M&O) contracts at seven major sites on DOE/NNSA's behalf. Over 90% of NNSA's budget is spent via contract.

NA-APM oversees all construction projects over the minor construction limit (currently \$20 million) and ensures disciplined, upfront project planning to establish objective performance measures that demonstrate achievement of program objectives within approved cost, schedule, and performance parameters. Projects include complex, first-of-a-kind nuclear facilities that are of profound importance to national security. NA-APM's work spans the entirety of NNSA's national security mission and saves taxpayer funds by providing Federal oversight and contractor accountability while delivering missioncritical projects on schedule and on budget.

Mission Statement

Safe, Quality Construction on Budget. Timely, Best Value Acquisition Solutions.

Budget

NA-APM funding is included in the Office of the NNSA Administrator.

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 187

History

NNSA created NA-APM in 2011 to bring discipline to NNSA acquisition and project management and address the longstanding project management challenges identified by internal and external stakeholders. Establishing an independent, integrated acquisition and project management organization, separate from the requirements owner and resource sponsor, is in line with practices in other federal agencies and the private sector. It allows for the systemic implementation of policies, practices, and procedures for delivering best value acquisition and capital asset project solutions, while maximizing available resources. NA-APM was designed to ensure that best value acquisition plans are developed, and to perform the necessary critical evaluation of a project's cost estimating; design and technical maturity; requirements definition; and change control for the Under Secretary for Nuclear Security (Administrator) and associated Program Offices. NA-APM provides independent dedicated acquisition, project management, and oversight that aligns contract incentives with taxpayer interests; provides clear lines of authority and accountability for federal and contractor personnel; manages assigned projects within the original scope and cost baselines, ensuring completed projects meet mission requirements; improves cost and schedule performance; and strengthens cost estimating, and alternative assessments and evaluation.

Functions

NNSA's missions require an industrial and laboratory infrastructure that is secure and able to meet immediate and long-term operational needs. NA-APM provides the corporate integration for the development and execution of NNSA's facilities management policies and programs and project management systems. Similar to the roles and responsibilities of integrated acquisition and project management organizations in other federal agencies, NA-APM ensures NNSA implements federal acquisition and project management policies and regulations. NNSA, as a semiautonomous agency, has its own procurement authority through the Administrator to the Senior Procurement Executive (SPE) in NA-APM. NA-APM works closely with the DOE SPE to ensure consistency across the Department. NA-APM's Federal Project Directors (FPDs) lead all capital asset line item projects from completion of Analysis of

Alternatives (AoA) through Critical Decision (CD)-4, *Approve Project Completion*.

Recent Organization Accomplishments

Delivered \$2.0B of projects 3.5% under budget through improvement in staff capability; firm requirements documentation before setting baseline; refined tracking and project oversight; clear lines of authority and responsibility; rigorous change order discipline, and independent oversight and review.

The \$6.5B Uranium Processing Facility (UPF) has remained on budget and schedule for seven consecutive years. Three of the seven subprojects have completed, all on or under budget and schedule (\$150M combined value). Over 1,000 construction workers are continuously on-site in Oak Ridge, TN, with the workforce expected to peak at near 2,000.

Tracking \$1.03B baselined scope on Chemistry & Metallurgy Replacement Project under budget/ ahead of schedule for four years.

MOX Contract (\$5B+) was terminated, laid-up, and a settlement reached within 13 months.

The Exascale Class Computing Cooling (E3CE) project at Los Alamos obtained CD-4, *Approve Project Completion*, 10 months ahead of schedule and \$20M under budget.

The Expand Electrical Distribution System (EEDS) project at LLNL reached CD-4, *Approve Project Completion*, five months early and \$1M under budget. The project provides redundant underground power between Western's Livermore Substation (WLS), Lawrence Livermore National Laboratory, and Sandia-California.

Device Assembly Facility (DAF) Argus Installation – Interior Protection Project obtained CD-4, *Approve Project Completion*, 5 months ahead of the schedule and \$4M under budget. The project replaced the PECOS in the DAF with Argus components, including Argus Field Panels and Remote Access Panels, reducing fire loading and facilitating future DAF maintenance.

The Digital Infrastructure Capability Expansion (DICE) project at Los Alamos achieved CD-0, *Mission Need Approval.* With the expansion of networking and communications capabilities on the campus, the DICE project will play a critical role in meeting new digital infrastructure demands.

The Small Business Administration (SBA) awarded the DOE an "A" grade for its Fiscal Year (FY) 2019 small business and socio-economic contracting achievement. The Agency substantially exceeded its goals in prime small business procurement and subcontracting, while also surpassing its goals for graded socio-economic contracting.

Leadership Challenges

Staffing

Insufficient staffing remains the priority issue. Authorized billets have grown from 175 in 2016 to 187 in 2020, while the project portfolio has grown from \$5B to \$22B over the same period. The success in delivering projects on time and on budget has contributed to the growth of funding appropriated for NNSA's infrastructure recapitalization. To continue this positive trend, NA-APM must increase quality federal staffing to meet the growth in construction.

Acquisition Strategy

NA-APM is diversifying NNSA's contracting methods to accomplish capital asset line item projects, which requires adoption and creation of new policies, processes, people, and culture. Rather than defaulting to cost reimbursement efforts via M&O contracts, alternative contracting agencies, including the U.S. Army Corps of Engineers and the Tennessee Valley Authority, are being used. Firm-fixed price, design-build contracts have been let, and independent contract line items within the broader M&O contract have also been established. Additionally, cost-savings incentives have been added to M&O contracts. Identifying the proper, non-nuclear projects that would benefit from an alternate approach and ensuring that all stakeholders understand the benefits and new processes takes leadership engagement and education.

Requirements Development

The early and definitive statement of requirements for capital line item projects is essential to project success. To improve the probability of success, NA-APM now leads projects from conceptual design forward, but establishing firm technical requirements for unique projects; requiring multiyear technology development and maturation; and having a stable and predictable budget remains a critical risk factor to on-time/on-budget delivery.

Critical Events and Action Items

As a capital asset (construction or major item of equipment) progresses through the various Critical Decision (CD) phases, NNSA's program managers are responsible for the mission need, requirements, alternative selection, and budgeting, while NA-APM develops the acquisition plan and executes the project decision, construction, or assembly in accordance with the terms and conditions of the contract. The following major events are expected in early 2021:

- Los Alamos Plutonium Pit Production Project (LAP4) – Approve Analysis of Alternatives and Cost Range (CD-1)
- Pantex High Explosive Synthesis, Formulation, and Production (HESFP) – Approve Analysis of Alternatives and Cost Range (CD-1)
- Savannah River Plutonium Processing Facility (SRPPF) – Approve Analysis of Alternatives and Cost Range (CD-1)
- Y-12 West End Protected Area Reduction (WEPAR)

 Approve Performance Baseline and Approve Start of Construction (CD-2/3)
- Y-12/Pantex Management and Operations (M&O) Contract – Receive proposals

Organizational Chart



Office of Acquisition and Project Management

NNSA Office of the General Counsel

Supporting the DOE Mission

The NNSA Office of the General Counsel (NA-GC) is responsible for providing legal advice to all NNSA elements worldwide, and is responsible for providing legal program direction, policy, and oversight to NNSA's legal offices throughout the United States.

Mission Statement

NA-GC attorneys are responsible for providing legal advice on a wide variety of complex issues to facilitate achievement of the NNSA's national security mission, in compliance with all pertinent laws and regulations. The office also jointly manages the Freedom of Information Act (FOIA) and Privacy Act (PA) programs for NNSA, and ensures that NNSA fulfills its obligations under the National Environmental Policy Act (NEPA) by providing NEPA Compliance Officers and policy for NNSA. The NNSA Procurement Legal Team (PLT) has been organized to attain a single legal voice for NNSA on procurement legal matters and establish single points of contact (POCs) on procurement legal issues for our NNSA clients. The PLT provides legal advice and counsel to clients throughout the NNSA procurement community regarding contracts, financial assistance agreements, interagency agreements, and other business transactions.

Budget

NA-GC funding is included in the Federal Salaries and Expenses budget line.

Fiscal Year	Budget
FY 2019 enacted	\$856,529
FY 2020 enacted	\$648,971
FY 2021 requested	Not yet provided to NA-GC.

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 40

History

The NNSA Office of the General Counsel was reorganized in 2012, incorporating the Office of Chief Counsel at the former Albuquerque Operations Complex, and creating a unified Headquarters Office with staff located both in the National Capital Region and Albuquerque. An additional reorganization, involving the FOIA/PA program and the NEPA program, was accomplished in 2014.

Functions

The General Counsel is the chief legal officer of the National Nuclear Security Administration [Section 3217 of the National Defense Authorization Act for Fiscal Year 2000, Public Law 106-65, as amended (50 U.S.C. 2407)]. As Chief Legal Officer, the General Counsel advises the Administrator on various legalities attendant to the Administrator's program decisions and on a variety of legal matters, including the implications of proposed legislation and relevant laws, executive orders, and court decisions, and the binding decisions of third-party judicial and administrative appellate bodies. The General Counsel is the chief promulgator of NNSA's legal program policies.

Recent Organization Accomplishments

Pit Production NEPA strategy.

Settlement of MOX lawsuits.

Strategy for the settlement of plutonium removal lawsuit with South Carolina.

Award of the Management and Operations Contract for the Los Alamos National Laboratory without protest.

Leadership Challenges

Leadership transition.

Defense of the Pit Production NEPA strategy.

Critical Events and Action Items

Expected: Appointment of new General Counsel (NA-GC-1)

Organizational Chart



NNSA Office of the General Counsel (Complex-Wide)

NNSA Office of the Associate Administrator for Information Management and Chief Information Officer

Supporting the DOE Mission

The Office of the Associate Administrator for Information Management and Chief Information Officer (NA-IM) leverages new and existing technologies to assist and protect the DOE/ NNSA nuclear mission in an increasingly complex and hostile cyber environment. NA-IM provides cybersecurity for all DOE Classified systems as well as the NNSA mission unclassified environments and provides the enterprise Secret level networks for all of NNSA.

Due to NNSA's vital mission, NA-IM implemented a risk management approach to developing IT applications and networks to ensure that cybersecurity is an integral component of the IT fabric of the agency. NA-IM enhances the information management of the nuclear security enterprise through an effective mix of technology, policy, and risk management practices.

Mission Statement

NA-IM strives to be a mission partner that enables the NNSA to accomplish its strategic goals and objectives through the delivery of secure, agile, and risk-informed information technology (IT) and cybersecurity solutions.

Budget

Fiscal Year	Budget	
FY 2019 enacted	\$221,200,000	
FY 2020 enacted	\$300,000,000	
FY 2021 requested	\$375,500,000	

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 35

History

As the principal IT advisory organization to the NNSA Administrator, NA-IM is charged with operating across the NNSA nuclear weapons complex to create, communicate, and execute an integrated IT vision as well as provide cybersecurity not contained within the physical boundary of nuclear weapons developed by Defense Programs.

NA-IM ensures and enables the availability of a secure infrastructure for mission activities and information sharing for the NNSA and its partners. NA-IM orchestrates, provides, and directs cybersecurity across the NNSA enterprise, and to its mission partners. The Office manages the IT portfolio, federal IT investments, services, and projects in alignment with the Administration and Departmental strategies, as well as other national policy drivers. NA-IM is guided by statutes and federal guidance and is responsible for developing and governing appropriate policy for NNSA IT and Cybersecurity.

Functions

NA-IM is the principal organization for federal information management, IT, and complexwide cybersecurity for the NNSA. NA-IM has the responsibility to ensure the availability of a secure infrastructure for mission support, the data contained in the networks, and information sharing for the nuclear security enterprise. The Office manages federal IT investments, services, and projects, and oversees NNSA's IT portfolio in accordance with the Office of Management and Budget. NA-IM is responsible for all aspects of cybersecurity across NNSA, including, but not limited to: policy, planning, and budgeting; assessment of performance; federal and congressional reporting; continuous monitoring; risk management; instilling the next generation

of cybersecurity and technology tradecraft; and the daily operations of classified and unclassified networks and systems. The Office coordinates with the DOE Office of the Chief Information Officer (DOE OCIO) on IT and cybersecurity solutions providing protection for DOE information and information assets. The Office also connects agency efforts and ensures close collaboration with the Intelligence Community and Department of Defense on technology and mission integration issues to ensure service delivery continually meets the dynamic requirements of NNSA's mission programs.

Recent Organization Accomplishments

Completed the Phase I implementation of Classified Infrastructure Improvement Project.

Implemented Phase I of the IT Modernization Project working closely with the Department and element CIOs and IT Managers.

Developed and implemented services and solutions to provide operational connectivity during the COVID-19 pandemic.

Leadership Challenges

Ensuring that NA-IM is involved in IT and Cybersecurity matters across the NNSA Enterprise. When NA-IM is not included in early planning activities, NA-IM loses the ability to apply broad risk management methodologies to harden the cyber posture of the Department as a whole.

Recruiting and retaining qualified IT cybersecurity talent remains a top concern for NA-IM. The competitive, growing field and length of the hiring process, as well as the current pay band structure, is increasing difficult. NA-IM must foster a culture that prioritizes an adaptive, agile workforce in order to meet mission requirements in the rapidly evolving IT and Cybersecurity environment.

Cybersecurity and Information assurance on mission software, hardware, and networks is constantly challenged by numerous malicious actors.

Ensuring coordination and alignment of agency priorities together with Administration and NNSA goals and mission requirements.

Critical Events and Action Items

Procurements. Forward planning of future procurements of M&O support services contracts that will impact cyber and IT across the enterprise.

Classified Infrastructure. Continuing modernization plans and activities for NNSA classified infrastructure and enhancements.

Classified Networks. Operations, maintenance, and modernization of classified collateral networks, including supporting exercises and engagement activity with external partner organizations.

Organizational Chart



Office of the Associate Administrator for Information Management and Chief Information Officer

NNSA Kansas City Field Office

Supporting the DOE Mission

The Kansas City Field Office (KCFO) oversees a multibillion dollar contract at the state-of-the-art Kansas City National Security Campus (KCNSC) in Kansas City, MO. The KCNSC, managed and operated by Honeywell FM&T, manufactures and procures about 80 percent of non-nuclear weapon components of the nuclear stockpile, including electronic, mechanical and engineered materials. The KCNSC also develops field-ready engineering solutions for other governments' national security missions; supports Secure Transportation and emergency response activities in New Mexico; and manages the Supply Chain Management Center (SCMC), which was created to more effectively manage about \$4 billion of annual purchasing across NNSA and many DOE sites. The KCFO provides day-to-day oversight for contractor operations to ensure mission success. Honeywell Federal Manufacturing & Technologies now has more than 5,000 employees in Kansas City and Albuquerque, New Mexico.

Mission Statement

The Kansas City Field Office, in cooperation with our stakeholders, is entrusted by the NNSA and the public to manage the resources of the KCNSC in an effective and efficient manner that will: accomplish the mission of the NNSA; comply with laws and regulations; value our employees and their contributions; minimize risk to the public and the environment while providing a safe and secure working environment; protect NNSA facilities and resources; identify, document, and measure processes to assure the quality of products and services to fulfill customer requirements; continually improve all processes, products, and services; and maintain the public trust and foster positive relations with our neighbors and the community.

The Kansas City Field Office, the onsite federal presence, executes the NNSA and other customer missions and provides day-to-day oversight for contractor operations to ensure mission success. The Field Office ensures compliance with laws and regulations and works closely with the M&O contractor to ensure safe, secure, and cost effective performance. KCFO oversees the contractor's budget process and funding priorities. In the public arena, KCFO staff interacts with federal, state and local governments and remains responsible and accountable to stakeholders. The Kansas City Field Office uses a unique system of oversight called the Kansas City Governance Model. This model, developed by Honeywell and NNSA, applies best-inclass commercial standards in managing operations, transforming business functions, and delivering mission results. It is a mutual operating model that maximizes trust, cooperation, and opportunity.

Budget

Kansas City Field Office Budget.

Fiscal Year	Budget
FY 2019 enacted	\$7,600,000
FY 2020 enacted	\$7,580,000
FY 2021 requested	\$7,630,000

Kansas City National Security Campus Budget.

Fiscal Year	Budget	
FY 2019 enacted	\$753,950,000	
FY 2020 enacted	\$1,013,000,000	
FY 2021 requested	\$1,199,000,000	

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 38

History

The KCFO began in 1949, along with the Kansas City Plant, when the Atomic Energy Commission selected the Bendix Corporation to manufacture parts. The first part produced at the Kansas City Plant was an ordinary machined bushing and was a forerunner to the highly sophisticated and complicated components built in the years that followed. James Stowers was the first manager of the Kansas City Field Office. In the mid-1960s, the KCFO grew to almost 150 employees and the Kansas City Plant had about 8,300 employees. Over time, both numbers have considerably lowered to the 38 federal and the more than 5,000 contractor employees working today at the LEED Gold facility and three leased office spaces in Kansas and Missouri.

Functions

The KCFO is responsible for many functional areas that support the NNSA's mission. In addition to overseeing the various weapons missions that include performing inspections and audits, the functional areas also include communicating with internal and external stakeholders; administering the M&O contract; providing financial administration support; ensuring federal employees receive human resources support; and working with regulators on permits and compliance. The unique public/private partnership governance model changed the focus of the KCFO from transactionbased oversight to system-based oversight, resulting in more effective use of resources. Specific KCFO functions include the following:

Security (physical and cyber)

Includes management oversight of security risks, physical security information, personnel security, and protective force.

Information technology

Includes planning and executing effective processes for IT project management and service delivery.

Environment, Safety and Health

Includes regulatory permits and compliance as well as industrial hygiene, radiation protection, and emergency preparedness.

Facilities Management

Includes the Roof Asset Management Program, utilities, and leased office spaces.

Weapon Quality Assurance

Includes Quality Index of M&O contractor's performance, Quality Improvement initiatives and Quality Assurance surveys.

Weapons Programs/Nuclear Nonproliferation

Includes Performance Evaluation Measurement Plan (PEMP), Performance Evaluation Report (PER), and M&O Oversight.

Strategic Partnership Project

Includes ensuring work complies with DOE Order 481.1, offsets operational/overhead costs for Work for Others customers and NNSA, and helps maintain critical NNSA capabilities.

KCNSC New Mexico Operations

Includes PEMP and PER, support cost validations, QA support of KCNSC New Mexico Operations, and support of NA-20 and NA-80 missions.

Contract Administration/Procurement

Includes Supply Chain Management Center, contract administration, M&O purchasing oversight, and PEMP/PER schedules.

Human Capital Management

Includes site strategic activities, performance management, technical training programs, Individual Development Plans, employee development, Employee Concerns Program, and equal employment and diversity.

Finance and Business Administration

Field Office program direction budget execution, review of M&O internal controls oversight, IG/GAO audit coordination, M&O financial assessments and validations, and M&O budget development and planning oversight.

Public and congressional affairs

Includes internal/external communications, oversight of M&O communications activities, liaison with Headquarters External Affairs.

Records Management and Disposition

Includes physical records, electronic records, Vital Records, and FOIA research and support.

Legal

Includes contractor litigation support.

Recent Organization Accomplishments

M&O Contract

The NNSA recently approved the first one-year option of the multi-billion dollar M&O contract

for Honeywell FM&T which began Oct. 1, 2020. In 2015, NNSA awarded a multi-billion dollar five-year contract with five one-year options valued at \$4.584 billion.

SCMC Cost Savings

Under KCFO leadership, the KCNSC has led the Nuclear Security Enterprise to save money by consolidating contracts through the SCMC to buy commodities for multiple sites. Cost savings generated by SCMC strategic sourcing tools surpassed the \$1 billion mark in August 2020. The SCMC, managed by Honeywell Federal Manufacturing & Technologies (FM&T), was created in 2006 to more effectively manage \$4 billion of annual purchasing across National Nuclear Security Administration (NNSA) and later DOE Environmental Management and Office of Science sites. The SCMC works with DOE contractors to combine their purchasing power to award multi-site commodity agreements for operating supplies; information technology; transportation and logistics; and services. The most visible savings have been generated through one of SCMC's eSourcing, a proposal portal where requirements are placed online for a reverse auction that drives down the purchase price.

Bannister Federal Complex Disposition

Construction on private industrial buildings began in late 2020 for the former Bannister Federal Complex site, which the DOE/NNSA successfully transferred in November 2017 to a private developer for demolition, remediation, and redevelopment. This 227-acre transfer saved the federal government \$500 million in estimated remediation and demolition costs and contributed to the continued resurgence of the economically depressed south Kansas City area, and served as a template for future property disposition challenges. While initial cost projections and indicators from normal property disposition tools led to a conclusion that the Bannister property would remain undeveloped after departure of its Government occupants, the Bannister Disposition Team's efforts overcame these obstacles and secured a future for the site with substantial cost savings to the Government. In 2013, the DOE/NNSA moved its Kansas City operations from the World War II era Bannister Federal Complex to the newly built Kansas City National Security Campus.

ISO Certification

This year, the KCFO successfully completed another annual ISO audit to maintain ISO certification, the only NNSA field office to have this distinction. The certification is one of the contributing factors to KCNSC operating like a commercial facility.

Modern, State-of-the Art Campus

The KCNSC is an award-winning, state-of-the-art LEED (Leadership in Energy and Environmental Design) Gold manufacturing and engineering facility. The modern campus reduces our footprint by 50 percent and reduces costs by \$150 million annually. The building was part of a strategy that included a unique lease agreement for the facility. The GSA, acting as the government's broker, signed the lease agreement with CenterPoint Zimmer LLC, for the \$687 million campus in June 2010. Construction was completed in 2012 and the largest industrial move in the United States completed in 2014. The new campus exemplifies NNSA's mission to transform into a more cost-effective, energyefficient, adaptive, and sustainable model while supporting the nuclear deterrent.

Leadership Challenges

Managing Change

Managing change is the biggest challenge at the Kansas City Field Office. KCFO leadership works with KCNSC leadership to develop solutions to the ever-evolving landscape which includes dealing with workforce challenges; managing infrastructure needs; responding to unforeseen situations such as COVID-19; handling new and emerging life extension programs through different development phases; and addressing key stakeholders. Here are just a few challenges related to change:

- Doubled workforce in 4 years; 63 percent of employees with less than 5 years of service at KCNSC.
- Facility designed for smaller workload scope; executing short-term plans but need long-term solution.
- Partnership with Design Agencies critical to producing manufacturable designs and maintaining scope/schedule.
- Supply chain management critical to success with 70 percent of products outsourced; suppliers have similar growing pains.

- Technology maturation has dramatically reduced the time, cost, risk, required infrastructure, and hazard of the processes to develop, produce, and test the next generation of deterrent capabilities.
- Showcased agility throughout COVID-19 response by successfully accomplishing Mission Critical scope, partnered with industry for COVID solutions, and maintained safe operations.

Response to the COVID-19 pandemic

The most significant leadership challenge in 2020 has been our response to the COVID-19 pandemic. In a short period of time, KCNSC went from fully operational to mission critical, which meant a continual series of meetings, planning sessions, and communications with Headquarters, KCNSC, KCFO leadership, other NSE sites, suppliers, other government agencies, and our defense customers to ensure a safe and orderly transition through the different stages. Key mission activities related to stockpile stewardship and modernization. and key infrastructure and reestablishment of production capabilities were identified based on national security needs. We also maintained all processes, systems, and facilities in safe and secure configurations. We continued to perform required checks, inspections, surveillances, and time-critical mission-essential work while securing the site and maintaining mission capabilities. As of June 15, 2020, the site is in limited operations with an estimated return to full operational status in midsummer.

At KCFO, meetings with federal staff were held daily throughout the height of the pandemic to manage accountability and transmit important information about changing operations and health and safety guidelines. All federal staff teleworked during the height of the pandemic. On June 1, 2020, KCFO federal employees began an A and B schedule for employees.

Meeting Commitments

Most of the work done at KCNSC has been on schedule and without issues, but some areas need special focus to keep roadblocks from developing. Those areas include our long-term infrastructure needs, our negative trends in weapon quality metric performance, and meeting post FPU production requirements.

Infrastructure Needs

Our KCFO team is working with KCNSC on our infrastructure needs. When KCNSC was designed in the 2008-2010 timeframe, workload forecasts included only one program in production and one program in development. Today KCNSC has three programs in production and two programs in development. Current mitigation efforts should help the site meet increased workload and capacity demands. For example, KCNSC is now using three work shifts to support capacity. Long-term planning includes the recent issuance of a Request for Information to better understand what opportunities lie in the Kansas City area for a potential campus consolidation. A Strategic Infrastructure for Nonnuclear Components Planning study stemming from NNSA Headquarter is expected to identify and analyze strategies for meeting the long-term infrastructure requirements at Kansas City to support the weapons mission. We have leased three office spaces, two in Missouri and one in Kansas. Tenant improvements recently began at Building 23 at the newly leased 275,000 square foot light manufacturing facility as the first effort to expand manufacturing space and capabilities.

Communications with Stakeholders

The KCFO leadership asked KCNSC to establish a customer engagement group to ensure that we are communicating with all of our stakeholders in a timely, accurate manner. This has resulted in significantly increased attention to keeping stakeholders informed about our progress and any delays in order to improve output. KCNSC and KCFO leadership have been holding Partnership meetings, which have resulted in a better understanding of what is going well and what is not. In addition to the customer engagement group, we also have been looking at how to better implement the governance framework outlined in the Strategic Vision, Strategic Integrated Roadmap, and our Governance and Management (G&M) Framework. We are moving forward with training and other ideas to ensure all employees understand their roles and responsibilities; ensure a culture of risk management is incorporated; and determine how we can work with the entire Enterprise as a team rather than operating separately.

Critical Events and Action Items

None.

Organizational Chart

Kansas City Field Office



NNSA Los Alamos Field Office

Supporting the DOE Mission

The Los Alamos Field Office (NA-LA) oversees operations at Los Alamos National Laboratory and manages the contract with Triad National Security, LLC (Triad). Los Alamos National Laboratory (LANL) is a National Nuclear Security Administration (NNSA) laboratory within the Department of Energy (DOE), supporting each element of DOE's missions in nuclear, energy, and environmental challenges through transformative science and technology.

Mission Statement

LANL is a government-owned, contractor-operated federally funded research and development center. LANL solves national security challenges through simultaneous excellence in nuclear security; mission-focused science, technology, and engineering; operations and community relations.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$2,752M
FY 2020 enacted	\$3,003M
FY 2021 requested	\$3,400M

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 9,600 FTEs

Overview

Los Alamos National Laboratory (LANL) is a premier national security science laboratory whose primary mission is supporting the strategic nuclear deterrent. This mission includes ensuring the safety and reliability of the U.S. deterrent, and providing nonproliferation and counterproliferation solutions.

LANL supports national priorities for ensuring the safety, security, and reliability of the stockpile, and relies on the unique science capabilities developed through the

Stockpile Stewardship Program. LANL is the

designer of and is responsible for the majority of the nation's nuclear weapons stockpile. It also serves as NNSA's Center of Excellence for plutonium, and provides essential uranium research and development, while providing NNSA's plutonium and detonator manufacturing capability.

LANL also supports NNSA's nonproliferation and counterproliferation missions and emerging threats to national security. LANL is a primary source of technical intelligence on foreign nuclear programs, supports reducing the threat from weapons of mass destruction (including unconventional weapons and Emergency Response), and supports international efforts in nonproliferation. LANL provides space surveillance capabilities; operates the nation's only criticality experimental facility; works on emerging threats, including the strengthening of the national infrastructure against attack via cyber, surveillance, and security countermeasures; and supports war fighter needs.

LANL serves the nation, conducting long-term, national security-inspired innovation, enabling transformational mission impacts and breakthrough scientific discoveries. LANL contributes to DOE's energy security mission, with particular strength in sustainable nuclear energy, efforts to mitigate impacts of energy demand growth, and materials and concepts for clean energy.

Functions

NA-LA is responsible for:

- Program Direction & Contract Management
- Oversight
- Assessment and Approvals
- Project Management
- Integrated Safety Management
- Employee Concerns
- Fire Protection
- Criticality Safety
- Nuclear Safety
- Worker Safety & Health

This enables LANL to excel in the following areas:

- National Security Science
- Weapons Design and Engineering

- Plutonium Research, Development and Manufacturing
- Research-Driven Supercomputing
- Broader National Security Missions

Recent Organization Accomplishments

A new contractor, Triad National Security, LLC, was awarded the contract to run LANL in November 2018. Triad is less than two years into the contract and consists of a partnership between three main non-profit institutions: Battelle Memorial Institute, the University of California, and the Texas A&M University System. In this time, accomplishments include:

- Through the contract transition, Triad maintained the ongoing modernization of the stockpile and continuous support to the active stockpile with no interruption and no loss of capability or expertise.
- Delivering a comprehensive, executable plan to the NNSA to establish the capability to build 30 plutonium pits per year at LANL.
- Beginning to execute the above plan, to include nuclear operations infrastructure, human capital, technology, and procurement & installation of equipment.
- Establishing a regular cadence of safe shipment of nuclear waste to WIPP.
- Beginning to reverse the organization's imperfect record on safety, and evolving the organization's safety culture into one of continuous learning and improvement.
- Beginning to modernize the site's aging infrastructure through use of modular building, repurposing of space, new construction, and working with NNSA and local entities to propose new solutions, including teleworking and offsite leases.
- Triad has leveraged its parent companies, which includes two top university systems: the University of California and the Texas A&M University System to maintain and strengthen its expertise in all aspects of science and engineering which underpin its role as a national security laboratory. Notable scientific contributions outside the weapons program range from powering the new Mars Perseverance rover for NASA to developing a potential HIV vaccine.

 Establishing close working relationships to align with federal customers, and developing trust with the local entities to build support for hiring pipelines, partnering on environmental challenges, and infrastructure needs.

• Restoring national capability to produce plutonium pits for the nuclear deterrent.

This capability was originally met by the Rocky Flats facility in Colorado, which closed in the early 1990's. Subsequently, a limited production of pits was executed at LANL in the 2000's. In 2018, the NNSA made a decision to enable the manufacturing of at least 30 pits per year at LANL's PF-4 Plutonium Facility and another 50 pits per year at the Savannah River Site (SRS) using the partially constructed MOX Facility. LANL is in the process of re-establishing a reliable production capability for the desired weapons system in repurposed space in PF-4. This is a multi-year effort, relying on a highly-trained workforce, dedicated facilities as well as technical expertise. In parallel with this effort, LANL is also responsible for assisting SRS in standing up its own capability.

An associated challenge is the disposal of the nuclear waste that is generated by this mission. Currently, the waste is shipped to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, NM. Nuclear waste disposal continues to be a fragile system, reliant on regulatory and environmental permitting frameworks across both federal and state agencies.

- Ensuring the United States' nuclear stockpile continues to be safe, secure, and reliable without nuclear testing. This is LANL's solemn responsibility to the nation: to assess, using the most advanced scientific expertise, the safety, security and reliability of our stockpile. This is a continuing challenge, and one that LANL has met every year, but one that cannot rely on complacency or outdated scientific tools. This expertise in turn also allows the USA to combat the global threat to our security and works closely with other agencies to leverage our nuclear weapons expertise in assessing the threat from other entities.
- Maintaining the deep, foundational scientific and engineering base on which national security depends: LANL must ensure it can attract and retain the best and brightest minds to dedicate their careers to world-class science

in support of national security. This includes maintaining our competitiveness in fields such as high-performance computing and computational science, accelerator science and technology, nuclear physics and radiochemistry, materials science, and high explosives. Without continued planning and investment in world-class scientific tools, often requiring multi-decadal strategies, the USA cannot maintain its pre-eminence.

 Revitalizing the aging nuclear enterprise infrastructure: LANL has begun this effort, but this will take many years to complete. In previous decades, there has been very little in the way of resources to fund the Decontamination and Decommissioning (D&D) of aging, often contaminated buildings. As an example, at the heart of LANL's campus is the 1950's era Chemistry and Metallurgy Research facility, largely vacated because of the discovery of a seismic fault line under its foundation, and contaminated from many years of nuclear research during the cold war years. At half a million square feet, safely demolishing this building, along with others, will be a challenge. LANL is encouraged by efforts in recent years to address this aging infrastructure problem, but it will take a serious investment to reverse course.

Critical Events and Action Items

LANL needs full support in the FY21 President's Budget Request to stay on schedule for the activities and projects associated with re-establishing the capability to produce plutonium pits.

Organizational Chart



NNSA Livermore Field Office

Supporting the DOE Mission

The DOE's NNSA core mission pillars are to maintain a safe, secure, and effective nuclear deterrent; reduce global nuclear security threats and strengthen the nuclear enterprise; provide safe and effective integrated nuclear propulsion systems to the Navy; strengthen key science, technology, and engineering capabilities; and to modernize the national security infrastructure. To accomplish this mission, the Livermore Field Office (LFO) must maintain crosscutting capabilities that enable each mission pillar including advancing world-class science, technology, and engineering (ST&E); supporting our people; and developing a management culture that operates a safe and secure enterprise in an efficient manner.

Mission Statement

In support of the overall NNSA mission, LFO has been tasked with providing management and oversight of the operations at Lawrence Livermore National Laboratory (LLNL). Our role includes responsibilities within the following four broad areas:

Program Enablement and Integration

Program enablement and integration works to ensure laboratory facilities, site operations, and people are positioned to successfully execute the variety of DOE/NNSA and other agency programs and projects conducted at the site.

Core Federal Oversight

Core federal oversight focuses on risk-based, required activities associated with nuclear, radiological, and other high hazard operations; site/cyber security; worker safety and health; environmental planning and protection (e.g. National Environmental Policy Act compliance); and radioactive waste management.

Contract Management and Contractor Evaluation

Contract management and contractor evaluation includes day-to-day administration of the management and operations (M&O) contract, as well as periodic evaluation of contractor performance.

Site Stewardship

As the site owner, LFO ensures the effective stewardship of site facilities, infrastructure, land, and intellectual capital, in addition to coordination of site activities with external agencies, local governments, and neighboring communities.

Budget

The LFO program direction budget includes travel, training, support services, space and occupancy, and other related expenses.

Fiscal Year	Budget	
FY 2019 enacted	\$2,585,248	
FY 2020 enacted	\$5,169,770*	
FY 2021 requested	\$1,958,043	

* In FY20, a new DP secure workspace construction project (\$2M) was initiated for LFO (Building 311) as well as a "class 3" estimate for a new LFO federal building (\$350K).

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 80

History

LLNL was established in 1952. Under the Atomic Energy Commission, federal oversight was managed by the San Francisco Operations Office, which later became known as the Oakland Operations Office under DOE. By 1995, this office had a staff of over 400 federal employees and managed all four DOE facilities in California: LLNL, Lawrence Berkeley National Laboratory, Stanford Linear Accelerator Center, and the Energy Technology Engineering Center in southern California. The Oakland Operations Office maintained a small federal staff on the LLNL site, including weapons program managers, security specialists, project managers, and environmental managers. This core staff was transferred into the new NNSA organization in 2000, along with key staff supporting contract

management, legal, business, and administrative functions. Initially, this NNSA office consisted of over 110 federal employees and was called the Livermore Site Office; the name was changed to the Livermore Field Office in 2013.

Functions

The LFO is responsible for providing management and oversight of the operations at LLNL. The partnership governance model changed the focus from transaction-based oversight to systembased oversight, resulting in a more effective use of resources. Specific LFO functions include the following:

Security (physical and cyber)

Includes oversight of contractor security programs to assure that security risks to personnel, property, and information and materials including special nuclear materials are adequately managed based on compliance with requirements and contractual performance expectations.

Environment, Safety and Health

Includes environmental regulatory permitting and compliance; Employee Concerns Program; Operating Experience; Injury and Illness Reporting; Packaging and Transportation; Accident Investigation; Federal Employee Occupational Safety and Health (FEOSH); and oversight of contractor Worker Safety and Health such as industrial hygiene and radiation protection.

Nuclear Safety

Includes management and oversight of nuclear facility safety basis, system engineering, configuration management, criticality safety, and startup/restart authorizations. Facilities Management/Maintenance and Operations: Includes oversight of the management of utilities and infrastructure, nuclear facility maintenance, and conduct of operations.

Emergency Preparedness/Continuity of Operations

Implements the emergency preparedness and continuity of operations programs for LFO and oversees the contractor programs.

Site Sustainability, Infrastructure, and Utility Planning

Includes planning for future infrastructure and utility needs, energy and water management, supporting federal sustainability goals and implementing strategies, and contract representation for third-party financed and direct agency contracts.

Project Management

Includes oversight of construction projects and removal of surplus facilities as well as decontamination and decommissioning projects.

Waste Management

Includes obtaining federal agreements and permits and the packaging and transportation of waste.

Weapon Quality Assurance

Includes Quality Index of M&O contractor's performance, quality Improvement initiatives and quality assurance surveys.

Program Activities

Includes oversight of the Defense Programs, Defense Nuclear Nonproliferation, Counterterrorism, Counterproliferation, and Department of Energy program work.

Strategic Partnership Program

Includes ensuring work complies with DOE Order 481.1, *Strategic Partnership Projects [Formerly Known as Work for Others (Non-Department of Energy Funded Work)]*; offsets operational/overhead costs for Strategic Partnership Project customers and NNSA; and helps maintain critical NNSA capabilities.

Contract Administration

Administration of the M&O contract, development and management of the Strategic Performance Evaluation Measurement Plan, development of the year-end Performance Evaluation Report, and periodic performance assessments throughout the year.

Human Capital Management

Includes site strategic activities, performance management, employee development and training, equal employment and diversity.

Finance and Business Administration

Field Office program direction budget execution, review of M&O internal controls oversight, IG/GAO audit coordination, M&O financial assessments and validations, and M&O budget execution oversight.

Public affairs

Includes internal/external communications.

Records Management and Disposition

Includes physical and electronic records, Vital Records, and Freedom of Information Act request research and support.

Legal

Includes management of the ethics program and all internal and external legal matters, oversight of the M&O legal management program and other legal activities.

Recent Organization Accomplishments

Succession Planning

The LFO leadership team is executing a Succession Strategy with the following near term objectives: managing a significant number of expected retirements in the coming years; communicating new opportunities; promoting and facilitating employee development consistent with needed capabilities; and establishing hiring priorities based on gaps in capabilities. The long term goals are to meet mission and work load projections and planning; achieve employee development and engagement aligned with mission needs; and assure continuity of operations and the long-term viability of LFO and the LLNL.

Employee Development & Engagement

The LFO leadership team improved employee knowledge of the nuclear security enterprise through the development of a nuclear weapons training course and partnered with DTRA for delivery of training, including extensive training on nuclear testing, stockpile, and stewardship and site visits of the nuclear security complex. LFO has also initiated a Science and Technology speaker series in partnership with Lawrence Livermore National Security, LLC (LLNS) and made the monthly lectures offered by the Center for Global Security Research available to all employees. The Employee Engagement and Empowerment Team (E Team) was established by employees with the support of management in 2020. The E Team is an employee-led initiative that works cooperatively with management to improve the LFO workplace.

Building 311 Facility Improvements

Construction has begun on the Office of Defense Programs (DP) Secure Workspace project in 2020 and this follows the completion of a multi-phase facility improvement project that was aimed at improving LFO employee productivity, retention and recruitment. A class 3 estimate has been initiated for a new federal building.

Collaboration and Exascale

Approved the development and procurement of an Exascale class computer system and collaborated with DOE Office of Science to share costs. DOE has a long history of supporting high-end computing system acquisitions through the DOE Advanced Scientific Computing Research and NNSA Advanced Simulation and Computing programs. With the Exascale Computing Project, the two programs jointly fund a coordinated multi-lab effort to avoid duplication, maximize efficiency, and drive significant new efforts in terms of application readiness; hardware and software co-design; and workforce development. The El Capitan Exascale system will be delivered to LLNL and will support the NNSA Stockpile Stewardship Program starting in 2023.

Decontamination and Decommissioning (D&D)

Executed a Memorandum of Agreement with DOE Environmental Management to initiate D&D at LLNL. Building 280 D&D is planned to begin in late 2020.

LFO Governance

The LFO improved oversight by developing and implementing a joint assessment program with LLNS and recently completed implementation of the next generation Issues Tracking System for improved integration and utilization of the Contractor Assurance System.

Lawrence Livermore Solar Center

The 3.3 MW Lawrence Livermore Solar Center represents DOE/NNSA's largest purchase of solar power from an onsite facility and the first in the western region. LFO is in Year 5 of a twenty-year power purchase contract through Western Area Power Administration. At peak production, the facility provides 5% of the LLNL electrical demand and is interconnected behind the meter adding resilience to the power supply.

Leadership Challenges

COVID 19 pandemic and related restrictions

Maintaining the ability to meet major NNSA milestones and deliverables while protecting our workforce.

Employee recruitment and attrition

Maintaining core capabilities in an environment of high attrition rates. Over 30% of LFO employees are retirement eligible in 2020; this increases to 45% in 2023. LLNS similarly faces high rates of attrition and challenges with recruitment and retention in certain fields. The difficulty in recruiting is due to the high cost of living in the San Francisco (SF) Bay Area and competitive hiring from SF Bay Area agencies and employers.

Organizational Chart



Need to continue to modernize the LLNL infrastructure, including utilities, facilities, and equipment, to ensure the site can provide necessary capabilities to accomplish the increasing NNSA mission responsibilities.

Security Clearances

Although the time necessary to receive required security clearances has improved and is approaching the goal (80 days for a Q clearance), it remains a challenge impacting both federal and contractor employees and potentially accomplishment of the mission.

Improving Governance

Need to continue to implement and maintain the partnership governance model as a permanent way of doing business for LFO and its M&O partner, consistent with the DOE Governance and Management Implementation Plan.

Critical Events and Action Items

NA-1 Approval of the Publication Draft Site-wide Environmental Impact Statement (SWEIS) for the Continued Operation of LLNL – March/April 2021.



NNSA Nevada Field Office

Supporting the DOE Mission

Goal 2: Nuclear Security

Strategic Objective 4

Maintain the safety, security, and effectiveness of the nation's nuclear deterrent without nuclear testing.

Strategic Objective 5

Strengthen key science, technology, and engineering capabilities and modernize the national security infrastructure.

Strategic Objective 6

Reduce global nuclear security threats.

Goal 3: Management and Performance

Strategic Objective 9

Manage assets in a sustainable manner that supports the DOE mission.

Strategic Objective 10

Effectively manage projects, financial assistance agreements, contracts, and contractor performance.

Strategic Objective 11

Operate the DOE enterprise safely, securely, and efficiently.

Strategic Objective 12

Attract, train, and retain the best federal workforce to meet future mission needs.

Mission Statement

The Nevada Field Office (NFO) provides direction, oversight, and performance evaluation of the Management and Operating (M&O) contract at the Nevada National Security Site (NNSS) in Las Vegas, Nevada, and associated facilities located in North Las Vegas, Nevada; Albuquerque and Los Alamos, New Mexico; Joint Base Andrews, Maryland; Nellis Air Force Base, Nevada; San Diego and Santa Barbara, California; and New York. NFO is one of seven NNSA Field Offices.

The NNSS is a government-owned, contractoroperated facility that supports high-hazard operations, testing, and training, supporting Stockpile Stewardship, Defense Nuclear Nonproliferation, Emergency Response, National Security, Counterterrorism and Counterproliferation for DOE, NNSA, and many other government agencies. The site provides diagnostics and instrumentation; data analysis; materials staging; research test beds for nuclear high-hazard activities, including the nation's primary criticality experiments platforms and chemical release test beds; and lowlevel radioactive waste material disposition. The site manages security category I materials and facilities and nuclear safety hazard category 2 and 3 nuclear facilities and operations.

Budget

Fiscal Year	Budget	
FY 2019 enacted	\$522,922,000	
FY 2020 enacted	\$617,649,000	
FY 2021 requested	\$858,178,000	

*Does not include SPP funding

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 78

History

The NNSS, formerly the Nevada Test Site, was established by President Truman on December 18, 1950 as the United States on-continent site for lower-yield atmospheric nuclear testing. Eventually, testing in the Pacific Ocean was halted and the nuclear weapons testing program moved to the NNSS; located 65 miles northwest of Las Vegas, Nevada. When the United States nuclear weapons testing program ended in 1992, the site had recorded a total of 928 nuclear tests. As a nation, 1,054 total nuclear tests were conducted by the United States. With the end of nuclear testing, the mission of the site evolved to a unique and indispensable extension of the national laboratories' experimental capabilities in support of the Stockpile Stewardship Program, as well as other important national security missions (nonproliferation, counterterrorism, etc.).

In 1996, two physics experimental programs were located at NNSS to help understand the effects of aging on plutonium. The first was highexplosive shock physics, or subcritical experiments, conducted at a facility nearly 1,000 feet underground, the U1a Complex. The second was high-speed (eight kilometers per second or 17,895 mph) impact experiments on plutonium using a two-stage gas gun, the Joint Actinide Shock Physics Experimental Research (JASPER) Facility. The site has become the nation's leader in National Security with respect to nuclear/ radiological testing, training, and emergency response. NNSS has evolved into supporting a wide-range of other government agencies through the Strategic Partnership Program (formerly Work-for-Others) umbrella. In addition to on-going environmental cleanup of historic nuclear research and testing areas on NNSS, non-defense research, development, and training activities are conducted in cooperation with universities, industries, and other federal agencies

Functions

NFO/NNSS activities support the following efforts:

- Stockpile Stewardship (NA-10)
- Non-Proliferation support (NA-20)
- National Emergency Response (NA-40)
- Infrastructure Modernization (NA-50)
- Counterterrorism and Counterproliferation (NA-80)
- Nuclear Security of Category I (security) facility (NA-70)
- Low-Level Radioactive Waste Disposal [Environmental Management (EM)]
- Legacy clean-up (EM)
- Underground Test Area Groundwater Assessment (EM)
- Strategic Partnership Programs/Strategic Intelligence Partnership Programs

Recent Organization Accomplishments

Argus Security System

The Argus security system was successfully installed at the Device Assembly Facility (DAF) as part of NNSA's enterprise security modernization program. Argus is NNSA's recommended enterprise security system and integrates access control, intrusion detection, and video assessment of alarms to protect and control high-consequence assets. The DAF Argus project was a multi-year line-item project which was completed this year ahead of schedule and under budget. In August 2020, the Associate Administrator for Defense Nuclear Security (NA-70) certified the system for operation.

Stockpile Stewardship Program

The Stockpile Stewardship program at the NNSS assists in the monitoring of the nation's nuclear stockpile through assessments of the safety, security, reliability, and effectiveness of nuclear weapon systems. These assessments rely, in part, on information obtained from the execution of subcritical experiments (SCE). SCEs provide data on the behavior and aging of special nuclear material without creating nuclear yield. The SCE program has been an essential element of the NNSA Stockpile Stewardship Program since underground nuclear testing was terminated in the early 1990s. Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL) have successfully led and safely conducted 45 SCEs and 9 confirmatory experiments underground at the NNSS since 1997. Recent SCEs are the Lamarck confirmatory in 2018, Ediza in 2019, and Iris confirmatory and Nightshade A SCE in 2020. The NNSS stands ready to conduct up to 3 SCEs in 2021. The future plans for this important program include the creation of new diagnostic machines and expanded test beds at the underground facility on the NNSS. The Stockpile Stewardship Program ensures scientists have the critical data needed to verify the stockpile viability.

Source Physics Experiments

The Source Physics Experiments (SPE) nuclear test detection program, sponsored by NNSA, is a series of underground chemical explosions at testbeds adjacent to historic nuclear tests at the NNSS. SPE collects data to develop and validate physics-based computer models. SPE is carried out in multiple phases: six experiments in granite (Phase I, 2011–2016) and four experiments in alluvium (Phase II, 2018–2019). The experiments are executed in partnership with NNSS, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories, and the University of Nevada-Reno.

Emergency Communication Network

The DOE Emergency Communications Network (ECN) was modernized and the infrastructure optimized by moving the ECN infrastructure from the Remote Sensing Laboratory at Nellis Air Force Base to the Switch Las Vegas 9 Data Center Facility, both located in Las Vegas, Nevada. The scope of work included acquisition planning for Switch facilities; leased communications bandwidth; installation services for core network routing and data services infrastructure; and testing, evaluation and accreditation. The project was completed in late FY 2020 ahead of schedule and under budget.

Remote Sensing Laboratory Aviation Program

The Remote Sensing Laboratory Aviation program replaced three aging aircraft with three new special mission twin engine turboprop aircraft customized for the emergency response mission. These new aircraft incorporate mission system modifications and installations providing increased effectiveness and efficiencies in support of critical NNSA missions including aerial surveillance for radiological threats before or during major events, and the capability to conduct safe and rapid wide-area surveys of locations compromised by a radiological or nuclear incident. The acquisition, system integration, and operational deployment was conducted on schedule and under budget.

Mercury Modernization - Building 1 Project

The first new office building constructed in Mercury at the NNSS in 20 years and part of a new NNSS building program to transform Mercury into a smaller, more efficient and capable operations center that reduces risk and cost; saves energy; enables future missions; and supports a 21st Century workforce, Mercury Building 1 (23-460) was successfully completed on time and within budget. An excellent example of the type of administrative building that is needed to support the NNSA mission, major elements of the Mercury Building 1 design will be used at other sites to enhance mission capabilities across the enterprise.

Storm Area 51

In September 2019, NFO worked with local law enforcement; NNSA HQ and Field Offices; and other federal agencies to successfully manage the Storm Area 51 event. NFO prepared for the potential of 40,000 participants attempting to "storm" Area 51 through the NNSS. The security enterprise quickly came together, deploying 60 security police officers from across the DOE complex to support NNSS assets. During the three-day event, approximately 170 vehicles and over 300 people approached NNSS boundaries. Due to the pre-planning and close coordination with local, State, and Federal partners, there were no accidents or injuries and no trespassers. Mission impact to the site was minimal and normal operations were quickly resumed. The operation would not have been successful without the excellent relationship and strong coordination between NNSA program, functional, and field offices; the M&O partner; and local and Federal government agencies.

Leadership Challenges

Line item projects associated with the Enhanced Capability for Subcritical Experiments are the Advanced Sources and Detectors (ASD) project and the U1a Capabilities Enhancement Project (UCEP). These coupled projects are the most important activities occurring at the NNSS over the next 5 years and will support stockpile stewardship and stockpile certification for decades to come. Successful execution requires coordination between the Defense Program office; the NNSS M&O contractor; three National Laboratories; four NNSA Field Offices; the safety and security functional offices; and the NNSA Office of Acquisition and Program Management. The NFO in conjunction with the NNSS M&O contractor must successfully orchestrate all of these disparate organizations to ensure that safety, security, and infrastructure combine to support the science and mission priorities of the NA-10 Program Office.

Critical skills hiring and retention.

Modify, approve, and implement multiple nuclear safety bases in conjunction with completing start-up activities to support the national security program schedules/deliverables.

Continue focus on operational excellence between NNSS facilities/assets, the National Security Laboratories (LANL, LLNL, and SNL), and the respective NNSA Field Offices.

Enhance collaborative working relationships and communications between DOE/NNSA and the state of Nevada.

Critical Events and Action Items

None.

Organizational Chart



Nevada Field Office

NNSA Production Office

Supporting the DOE Mission

The NNSA Production Office (NA-NPO) ensures the safe, secure, and cost-effective management and operations of the Pantex Plant (Pantex) in Amarillo, Texas; and the Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee. Pantex handles nuclear weapons surveillance and life extension programs; weapons dismantlement; the development, testing, and fabrication of high explosive components; and storage and surveillance of plutonium pits. Y-12 is responsible for uranium storage; processing and manufacturing operation; the production of uranium feedstock for the U.S. nuclear navy; and supports international nuclear nonproliferation programs. NA-NPO administers the Management and Operating contract for the Y-12 National Security Complex in Oak Ridge, Tennessee (a government-owned, contractoroperated dedicated production facility), and the Pantex Plant in Amarillo, Texas (a governmentowned, contractor-operated production facility).

Mission Statement

Execute effective contract management and oversight to safely and securely maintain the nuclear weapons stockpile for the nuclear security enterprise; provide enriched uranium for naval, research, and isotope production reactors; and support nonproliferation activities to reduce the global nuclear threat.

Budget

Fiscal Year	Budget	NPO Budget
FY 2019 enacted	\$2,700,000,000	\$2,200,000
FY 2020 enacted	\$2,800,000,000	\$2,300,000
FY 2021 requested	\$3,200,000,000	\$2,300,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 134

History

NA-NPO was established in June 2012 when NNSA combined two independent NNSA site offices to report to a single Field Office Manager. This combination allowed NA-NPO to consolidate federal functions and operate under NA-NPO processes prior to the transition to the single consolidated contract on June 1, 2014.

Functions

- Vital factory oversight of high hazard nuclear & chemical operations
- Emergency Management Oversight
- Environment Management System Oversight
- Environmental Permit Approvals
- Fire Protection Program Oversight
- Human Reliability Program Certifications
- Interagency Memorandums of Understanding
- Nuclear Explosive Safety Oversight
- Federal Employee Occupational Safety & Health Occupational Safety & Health Oversight
- Occurrence Reporting Oversight
- Packaging & Transportation Oversight
- Price Anderson Amendment Act Program
- Program Oversight
- Quality Assurance Federal Implementation and Program Oversight
- Quality Assurance Issues Management
- Radiation Protection Oversight
- Safeguards & Security Oversight
- Safety Basis Oversight and Approvals
- Safety System Oversight Program Oversight
- Training & Qualifications
- Business, Legal, and Public Affairs

Recent Organization Accomplishments

Completed the W76-2 Program of Record, one of NNSA's top priorities, thus providing the U.S. Navy with a low-yield, sea-launched ballistic missile warhead capability.

Completed the B61-12 Life Extension Program's First Production Capability Unit.

Completed the W88 Alt 370 First Production Capability Unit disassembly and inspection.

Effectively managed nuclear weapons programs and strategic partnership project missions through the COVID-19 response.

Completed successful Binary Vacuum Arc Re-melt (VAR) Secondary Electrode Melt in the Development VAR.

Developed a corrective action plan that significantly improved the execution of the Pantex Safety Basis.

Supported the development of the Zero Based Budget, which aligns the out-years funding requests with requirements.

Ensured effective oversight with regard to the implementation of the Nuclear Quality Assurance for use in weapon and weapon related structures, systems, and components that serve a nuclear safety function.

Maintained progress and achieved milestones on several key Y-12 projects including the West End Protected Area Reduction, Beta 2 concrete retrofits, and both the Fire Station and Emergency Operations Center construction projects.

Completed 50-year sprinkler replacements at Y-12, thus ensuring those facilities continue to meet fire protection requirements.

Continued to make significant progress in advancing Y-12's Lithium Strategy including the development of lithium production technologies, processes, and equipment.

Continued demolition and removal of older facilities at Pantex, thus further reducing the site footprint.

Leadership Challenges

Pantex/Y-12 Contract competition and transition by September 30, 2021.

Reconstituting full production capabilities for Binary at Y-12.

Managing the fragility of Lithium processing facility and capabilities at Y-12.

Costs and risks associated with the Uranium Processing Facility construction with interfaces through the contract and turnover to the future Management & Operating contractor.

Fragility of High Explosive (HE) supply and HE modernization at Pantex.

Executing the significant infrastructure investment portfolio at Pantex and Y-12.

Critical Events and Action Items

None.

Organizational Chart


Sandia Field Office

Supporting the DOE Mission

The Sandia Field Office (NA-SN) oversees operations at Sandia National Laboratories (Sandia) and manages the contract with National Technology and Engineering Solutions of Sandia (NTESS). Keeping the U.S. nuclear stockpile safe, secure, and effective is a major part of Sandia's work as a multidisciplinary national security engineering laboratory. Sandia's role has evolved to address the additional complex threats facing our country. Meeting the nation's security challenges will require readiness, excellence in engineering, and rapid innovation.

Sandia carries out research and development in:

Nuclear Weapons

Supporting U.S. deterrence policy by helping sustain, modernize, and secure the nuclear arsenal.

National Security Programs

Providing advanced defense, deterrent, and intelligence technology and analysis to strengthen our nation's defenders.

Defense Nuclear Nonproliferation

Developing systems to monitor emerging threats; protecting nuclear assets and materials; and addressing nuclear emergency response and nonproliferation worldwide.

Energy & Homeland Security

Ensuring stable energy resources; protecting the grid and physical infrastructure; and helping protect the nation against nuclear, radiological, chemical, and biological threats.

Advanced Science & Technology

Fundamental science to promote national security, economic competitiveness, and improved quality of life.

Sandia's science, technology, and engineering foundations enable its unique mission. The laboratory's highly specialized research staff is at the forefront of innovation, collaborating with universities and companies, and performing multidisciplinary science and engineering research programs with significant impact on U.S. security. Sandia's staff of approximately 14,000 includes more than 6,500 employees with advanced degrees.

Mission Statement

The Sandia Field Office (NA-SN) oversees operations at Sandia National Laboratories (Sandia) and manages the contract with National Technology and Engineering Solutions of Sandia (NTESS). Sandia is a government-owned, contractor-operated federally funded research and development center. Sandia accomplishes critical tasks that are integral to the National Nuclear Security Administration mission including the development, testing, and production of specialized nonnuclear components and quality assurance and systems engineering for the nation's nuclear weapons program. This is accomplished through basic and applied scientific research, systems engineering, experiments, assessments, analysis, and certification activities. Sandia operates facilities in Albuquerque, New Mexico; at a second lab in Livermore, California; and at other sites including Carlsbad, New Mexico; Las Vegas and Tonopah, Nevada; Amarillo, Texas; and Kauai, Hawaii.

NA-SN is also responsible for security, safety, emergency management, facilities management, and supply purchases for the tenants of the NNSA Albuquerque Complex. The current NNSA Albuquerque Complex houses approximately 1,100 federal and contractor employees and consists of 25 buildings. The majority of federal employees at the Albuquerque Complex are functionally aligned to NNSA Headquarters.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$8,300,000
FY 2020 enacted	\$9,000,000
FY 2021 request	\$7,600,000

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 89

History

The Kirtland Area Office was established in January 1999 and reported to the DOE's Albuquerque Operations Office. In 2002, the National Nuclear Security Administration was established and the office was renamed the Sandia Site Office. The office was renamed the Sandia Field Office in 2012.

Functions

The Sandia Field Office Functions, Responsibilities and Authorities (FRA) for Safety Management, 2019, lists the following Field Office Functions:

- Program Direction
 - Contract Management
- Oversight
- Assessment and Approvals
- Project Management
- Integrated Safety Management
- Employee Concerns Program
- Fire Protection
- Criticality Safety
- Nuclear Safety
- Worker Safety & Health

Recent Organization Accomplishments

Since the start of the COVID-19 pandemic, displayed outstanding leadership in support of the nuclear enterprise and the overall national response to the pandemic

Successfully supported the W88 Alteration (ALT) 370 and B61-12 Life Extension Program (LEP) First Production Capability Unit (FPCU) builds at Pantex, enabling NNSA to achieve FPCU and reduce risk to the First Production Unit (FPU) and follow-on rate production.

Successfully integrated the W87-1 program into the Ground Based Strategic Deterrent (GBSD) Flight Test matrix to achieve a significant cost avoidance.

Obtained important experimental nuclear sciences data by advancing pulsed power experimental capabilities. These pulsed power capabilities enabled the first Plutonium (Pu) experiment using the new Stripline geometry on the Z facility. Led the integration of operational payloads onto Department of Defense satellites for the spacebased nuclear detonation detection program, and effectively supported two GPS launches of the Global Burst Detector payloads despite COVID-19 restrictions.

Completed an assessment of critical utility-scale electrical components in response to Executive Order 13920, which called for securing the U.S. bulk-power system.

Provided rapid geotechnical assessments to the DOE Office of Fossil Energy in response to the Presidential Directive to fill the U.S. Strategic Petroleum Reserve, mitigating national economic impacts during the pandemic.

Successfully conducted a high visibility hypersonic flight test that demonstrated the technology, highlighting its tremendous potential as a future U.S. mission capability

Leadership Challenges

Maintain continuity of operations during the COVID-19 pandemic.

Modernize Sandia's infrastructure by implementing innovative solutions and cutting edge tools.

Recruit and retain the best and brightest for critical skills such as Computer Science, Cybersecurity, Computer Engineering, Electrical Engineering, and Mechanical Engineering.

Critical Events and Action Items

The NNSA Albuquerque Complex Project construction will be complete July 28, 2021. Move in will be complete on February 26, 2022.

Organizational Chart



Sandia Field Office

NNSA Savannah River Field Office

Supporting the DOE Mission

The Savannah River Field Office (SRFO) enables NNSA to meet its mission of enhancing national security through its support of three major mission areas in addition to other provided support. First, SRS provides tritium to support the nuclear weapons stockpile and is the only source of tritium in the Nation for this purpose. Second, SRS supports NNSA's nonproliferation mission through surplus plutonium disposition. Third, the 2018 Nuclear Posture Review called upon NNSA to produce 80 plutonium pits per year during 2030 to support the Nation's nuclear weapons stockpile. To implement this objective, NNSA and the Department of Defense approved of a two-site solution for pit production to include the production of at least 50 pits per year during 2030 at SRS and at least 30 pits per year during 2026 at Los Alamos National Laboratory.

Mission Statement

The mission of the Savannah River Field Office is to administer the Management and Operating (M&O) contract for NNSA's Savannah River Site activities, acting as the risk acceptance agent for NNSA. This includes: 1) directing, overseeing, and evaluating the work and business systems of the M&O contractor; 2) overseeing, managing, and executing NNSA programs; 3) ensuring the safe, secure, and environmentally responsible operation of facilities under the purview of NNSA; and 4) planning for the long-term viability of the site.

Budget

Fiscal Year	Budget
FY 2019 enacted	\$587,363,000
FY 2020 enacted	\$964,250,000
FY 2021 requested	\$1,092,790,000

Note: includes only weapons and nonproliferation activities

Human Resources

FY 2020 authorized full-time equivalents (FTEs): 46

History

SRS has its roots in a letter from President Harry Truman, dated August 1950, that authorized private industry to locate, design, build, and operate a new facility to produce tritium and plutonium needed to create the Nation's nuclear weapons. Between 1953 and 1988, SRS produced and extracted tritium and produced about 36 metric tons of plutonium. At the end of the Cold War, SRS' tritium production reactors were shut down and the Tritium Extraction Facility (TEF) was built to support the tritium production mission.

Functions

SRFO performs the following functions:

Operations

Nuclear safety, maintenance, conduct of operations, technical training, operational oversight.

Business

Contract administration and evaluation; performance assurance; cost estimation; financial management and oversight; risk management; personal property management; quality assurance; records management; directives.

Security

Cyber security, physical security, secure transportation, classification, badging, barriers, emergency management, information and technology (IT).

Environment, safety, and health

Environmental programs; air and water quality; safety assurance; fire protection; waste management; industrial safety; radiological protection.

Programs

Weapons quality, small projects, packaging, program liaisons, science and technology

Recent Organization Accomplishments

Met an accelerated shipping request for the DoD despite the many challenges posed by the pandemic, and has not missed any mission deliverable to the Department of Defense. Obtained Critical Decision (CD)-1 for the Major System Acquisition Line Item for the Tritium Finishing Facility (TFF).

Completed the Tritium Facilities Security Risk Assessment to allow implementation of the Design Basis Threat directive.

Initiated preliminary Tritium Finishing Facility design and executed contract for the site prep work.

Completed conceptual vulnerability analysis and design of security for the proposed Savannah River Plutonium Professing Facility (p-SRPPF).

Completed p-SRPPF Conceptual Design packages for all process and balance of plant systems.

Completed the Environmental Impact Statement required to repurpose Mixed Oxide Fuel Fabrication Facility to p-SRPPF.

Repackaged and shipped one metric ton of plutonium from South Carolina to meet a court order by January 2020.

Completed modifications in K Area to optimize removal of plutonium from South Carolina and began optimized downblending.

Infectious Disease Response Team formed to actively management SRS response to the COVID-19 pandemic over the past six months.

Leadership Challenges

Need to increase staffing levels to properly maintain facility oversight, meet future increased production needs; NNSA leadership required to increase FTEs from 45 to 108.

Dramatically increased workload due to 3 concurrent line item projects.

Lack of IT system that integrates with rest of NNSA complex and provides for enhanced collaboration.

COVID-related disruptions and case management.

Operational reliability in aging infrastructure.

Attrition and knowledge transfer.

Cost sharing and resource utilization between DOE-EM and NNSA at SRS.

Contract rebid and separation of SRNL contract.

SRS M&O contract expires September 30, 2021, with an option to extend performance through September 30, 2022. DOE is preparing the acquisition package for a follow-on contract to be awarded by DOE-Environmental Management. NNSA must ensure ongoing work is not impacted during the process of awarding a new contract and transitioning performance to the new contractor.

Critical Events and Action Items

Approval of p-SRPPF CD-1 package; will be submitted for review and approval by the end of December 2020. Schedule includes NNSA reviewing and approving of CD-1 package during the second quarter of FY2021.

Implement countermeasures for known high security risks in tritium.

Completion of MOX Termination.

Obtain CD and cost estimate for a new administration building to address increased staffing needs.

Organizational Chart



