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Key Messages

August 2017

Contents

Allen Combined Cycle Plant Water Source	4
Allen Combined Cycle Plant Solar Generation	5
Aquatic Plant Management.....	5
Bellefonte Nuclear Plant	6
Auction	6
Release of Bellefonte Sale Draft Environmental Assessment.....	6
Boone Dam.....	7
Browns Ferry Extended Power Uprate (EPU) Project.....	8
Clean Air–General	9
Carbon Dioxide (CO ₂)	9
Mercury Air Toxics Standard (MATS) – Supreme Court Decision	9
National Ambient Air Quality Standards (NAAQS)	10
Sulfur Dioxide and Nitrogen Oxides (SO ₂ & NO _x)	10
Clean Power Plan	11
Promoting Energy Independence and Economic Growth Executive Order – Impacts.....	11
Clean Power Plan – EPA 111(d).....	11
Coal Ash Storage.....	12
Closure Options	12
Coal Operations.....	13
Colbert Fossil Plant Groundwater.....	13
Cove at Blackberry Ridge	14
Cumberland Fossil Plant Coal Silo Collapse.....	14
Supporting Facts	14
Cybersecurity.....	15
Dam Safety	16
Drone Operations	17
Economic Development.....	17
FY2016 results	17
Effluent Limitations Guidelines	18

Energy Efficiency, Renewable and Distributed Generation.....	19
Grid Stability.....	20
Renewable Energy.....	20
Renewable Request for Information (RFI).....	21
Solar Projects.....	21
Solar Energy Transmission	22
Wind Energy Projects.....	23
EnergyRight® Solutions.....	24
Fiber*	25
Floating Cabins.....	26
Gallatin Fossil Plant.....	27
Dry Scrubbers	27
Offsite Groundwater Sampling	28
Gas Plant Conversions (Allen, Paradise)	28
Generation Portfolio.....	29
Integrated Resource Plan	30
Summary of the Recommended Planning Direction.....	31
Kingston Fossil Plant	33
Offsite Ash Disposal and Gypsum Landfill Permit Modification.....	33
Restoration and Compensation Determination Plan.....	33
Jacobs Engineering ash spill lawsuit* ..	34
Little Bear Creek Dam	34
Background	34
Long-Range Financial Plan*	35
Muscle Shoals Redevelopment	36
Auction Marketing Activities	36
Preparatory Work	36
TVA Auction Process	36
Nuclear	37
Capacity	37
Overall Performance	37
Ocoee and Recreation Interests	38
Legislation Details	38

Background.....	39	Board Vacancies	55
Pickwick Landing Dam.....	39	Executive Compensation	56
Rates	40	Executive Order to Reorganize the Executive Branch of the Federal Government*	56
2017 Rate Change Letter.....	40	Knoxville Office Complex – Potential Sale	56
Consumers’ Power Bills	41	President's Federal Spending Proposal for FY2018	57
Industrial Power Rates	41	Privatization.....	58
Strategic Pricing Plan.....	42	Winning Performance.....	59
Recreation – Economic Value	42	Watts Bar Unit 2.....	59
River System Operations.....	42	Watts Bar Nuclear Plant Work Environment	60
Role of Regulator.....	43	Appendix	61
Complaint Resolution Process	43	Clean Water – General	61
Pole Attachments	43	Safe Coal Ash Storage.....	61
Shawnee Fossil Plant	44	CCR Rule	63
Clean Air Equipment	44	Coal Ash Impoundment Closures Environmental Impact Statement.....	65
Small Modular Reactors	45	Recycling.....	65
Stakeholder Relations.....	45	Coal Combustion Residual Projects	66
Glasgow EPB.....	46	Bull Run Fossil Plant Coal Combustion Products	66
Supplier Diversity.....	48	Cumberland Fossil Plant.....	67
Tax Equivalent Payments	49	Gallatin Fossil Plant	67
Additional Information	49	Shawnee Fossil Plant.....	68
Transmission Reliability*.....	50		
Geomagnetic Disturbances*	50		
Vegetation Management.....	50		
TVA.....	53		
Overarching Messages	53		
FY2016 Performance	53		
FY 2017 Performance YTD.....	54		
Board Governance	54		

Allen Combined Cycle Plant Water Source

- TVA is required by the TVA Act to provide power at the lowest feasible price for all consumers in the Tennessee Valley. This mandate influences every decision we make, including the decision to replace Allen Fossil Plant with a cleaner natural gas-fueled power plant.
 - This decision will reduce carbon emissions and help keep rates lower by providing more flexibility in delivering power to the region.
- The new Allen Natural Gas Plant will use water to produce steam that turns the turbine and to keep plant equipment from overheating.
- Treated water to produce the steam will be purchased from Memphis Light, Gas and Water (MLGW), while five 1,250 gallons-per-minute on-site wells will provide water for cooling the natural gas plant.
 - Two wells will be used for normal operations and two wells will provide additional water during peak operation times. The fifth well will be a backup water supply.
- As a responsible steward of the environment, TVA commissioned the U.S. Geological Survey to study potential environmental impacts of the wells before proceeding with this option. The resulting study found on-site wells would not harm the aquifer.
 - Drilling wells for this \$1 billion state-of-the-art natural gas plant is a least-cost decision that will have the greatest benefit for all electric customers.
 - Numerous other major industries that operate in the Memphis area also use on-site wells that are permitted and regulated by the Shelby County Health Department.
 - Water for the plant, if purchased through MLGW, would come from the same Memphis Sand Aquifer, but at additional expense and increased costs to all Valley consumers for power generated by the gas plant.
- While the original plan was to use wastewater for cooling purposes, further analysis revealed an expensive treatment technology would be required to clean the wastewater at an additional \$9 million to \$23 million cost to consumers. There also would be continual treatment costs that also would be passed to consumers as part of the cost of power produced by the natural gas plant. Treating wastewater for the plant also would unnecessarily increase the risk of reduced plant operational reliability.
 - TVA considered using water from McKellar Lake and the Mississippi Alluvial Aquifer for cooling, but these options were rejected because of increased treatment costs and increased risk of reduced plant reliability.
- After reviewing results of the U.S. Geological Survey study, TVA is moving forward with the best option for consumers in a responsible manner that will be respectful of the Memphis Sand Aquifer and surrounding environment.
 - TVA applied for, and was granted, the required permits by the Shelby County Health Department, which regulates water wells.
 - TVA will recycle 99 percent of the water produced by the wells, as required by the permits granted to TVA, and the on-site wells will be inspected every year for compliance by the Shelby County Health Department.
 - To help TVA ensure the wells are properly installed in an environmentally safe and sound manner, we are using the same expert drillers that MLGW uses.

Allen Combined Cycle Plant Solar Generation

- The Allen project includes renewable energy – a 1-megawatt solar facility is being built there and is expected to begin operation this fall (2017).
- The solar facility will be the largest TVA-owned solar project in the service area, with 3,000 solar panels on three acres.
- This solar facility and 5 megawatts of biogas generation at the Allen site will produce enough renewable energy to power nearly 3,000 homes.

Aquatic Plant Management

NOTE: In 2014, TVA made an agreement with the Lake Guntersville Stakeholder Board (made up of outdoorsmen, homeowners, government entities, local officials, etc.) to endure the full cost of management fully for three years (2014-2016). During that period, the LGSB would work to secure long-term, sustainable funding for the program. Beginning in 2017, TVA is reducing funding by one-third each year until 2019, at which time the LGSB will have identified and secured the means to fund the program outright.

NOTE: On Feb. 24, 2017, Joe Hoagland and other TVA representatives met with 11 Guntersville stakeholder group members on the future path and alternative funding for weed management.

NOTE: TVA has historically provided weed control on its reservoirs, previously through federal funding and since 1999 through TVA power sales. TVA continues to provide weed treatment for recreation access to public facilities, such as ramps, swimming areas and public parks; but since 2010 has required property owners to pay for and schedule weed treatment near lake homes and commercial areas.

- Fisherman love aquatic plants, and the more the better—after all, they provide habitat for bass and for the species they feed on.
- But the truth is, too much of a good thing isn't always a good thing. When aquatic plants become obstructive, blocking access for recreational use including fishing, management is often a necessity.
- As with everything, it's a matter of finding a balance. TVA manages aquatic plants in small, developed public-access areas on its reservoirs on an as-needed basis when water use and/or access become seriously hindered.
- Management—when and if it is deemed necessary—will consist of the application of EPA-approved aquatic herbicides in nearshore areas where access is limited. If necessary, TVA will use a harvester to cut a lane into deeper water, and may also mow shorelines to increase public access. The TVA airboats you may see out on the lakes are surveying to determine where treatment is needed (contractors apply the treatment later).
- Invasive plants, such as milfoil and hydrilla, are the most likely to be managed as they are the most likely to grow out of control and block lake access in public areas. Hydrilla, for example, has been called the kudzu of the water—it can grow up to four inches per stem per day. Growing out of control, it can keep anglers from getting their boats on the lake—and crowd out fish life underwater. That's double jeopardy!
- When aggressive invasive plants are controlled, beneficial native species—both plant and fish life—are encouraged and the overall health of the lake is improved.

Bellefonte Nuclear Plant

Auction

- Nuclear Development, LLC submitted the winning bid of \$111 million at public auction for Bellefonte Nuclear Plant site on Nov. 14, 2016. A transition period of up to two years after the auction is allowed before closing of the sale is complete.
- TVA agrees to maintain the site until Nuclear Development, LLC takes possession.
- Base maintenance costs are estimated at approximately \$3 million per year, while required maintenance costs will be about \$6.5 million per year. The winning bidder also may pay TVA to perform additional NRC-required maintenance.
- We look forward to working with Nuclear Development, LLC to transition the property as seamlessly as possible.

Additional Information

- Selling the Bellefonte Nuclear Plant site was a transparent, competitive six month process.
- To participate in the auction, qualified bidders provided financial and economic investment information to TVA.
- Transfer of actual site title is deferred for up to two years to provide Nuclear Development, LLC time to conduct additional site planning activities and give TVA time to update associated environmental reviews.

Release of Bellefonte Sale Draft Environmental Assessment

- TVA has issued a draft Environmental Assessment to help determine if they should continue with its proposed action to complete the sale and transfer the site to Nuclear Development.
- TVA's proposed action is to complete the sale and transfer the site.
- TVA's review at this stage has not revealed environmental conditions that are substantially different from those previously assessed and nothing suggests that completing the two nuclear units on the site would result in potential environmental impacts that were not considered by TVA in all its previous studies when considering the BLN Property for nuclear use.
- Comments were provided during the public comment period and are being address in the final Environmental Assessment, which is expected to be released soon.

Background

- In May 2016, the TVA board of directors authorized the sale of the Bellefonte Nuclear Plant property including all real and personal property.
- The property was auctioned on Nov. 14, 2016, to Nuclear Development, LLC.
- The property occupies approximately 1,400 acres of the 1,600 acre Bellefonte Reservation in Jackson County, Alabama. TVA will either retain the Transmission Pole Yard Training Center or obtain permission from Nuclear Development, LLC to continue its use of the center. TVA is also retaining all shoreline property.

Boone Dam

Also see Dam Safety, Page 16

- The safety of the public and our employees and the quality of the repair work are our top priorities at Boone Dam.
- We have made good progress in the past two years. Construction of the composite seepage barrier is moving forward on schedule for completion by 2022 and within the initial estimated 5-7 year timeframe first announced in July 2015.
- As a precautionary measure, TVA temporarily stopped construction in April to assess the quality of the work, analyze the data, conduct exploratory drilling, and install more instruments.
- This has helped refine the project work plan and fine tune our path forward and enabled us to proceed with the work as safely, effectively and quickly as possible.
- Onsite construction work will ramp up next week as we begin scheduled construction of a rock and sand berm upstream of the earthen embankment.
- We also will start construction of a downstream berm in August. Work on this downstream berm was originally set to begin next year or later. Out of an abundance of caution, it was pushed ahead to begin this summer and provide additional strength to the dam as construction resumes.
- Since the start of the project, certain aspects of the repair work (i.e. workforce on site, grouting techniques, order and sequence of repair activities, etc.) were designed with the flexibility to be refined or modified as needed as new data are gathered.
- The temporary construction stoppage, resequencing of planned activities and other such refinements, are expected in these types of major construction projects and were anticipated in the estimated five-to-seven year timing of the Boone Project plan.
- The project remains on schedule and we will continue to monitor data to make any additional adjustments necessary to ensure the safety the public and quality of the repair.

Browns Ferry Extended Power Uprate (EPU) Project

- The Extended Power Uprate project at Browns Ferry Nuclear Plant is designed to gain regulatory approval to allow additional electricity to be generated by all three units.
- TVA's license amendment request to the Nuclear Regulatory Commission (NRC), submitted in September 2015, is in the final stages of a rigorous technical review.
- Gaining NRC approval will allow Browns Ferry to add 465 megawatts of electric generating capability across all three units, which will enable the site to serve an additional 280,000 homes in the Tennessee Valley.
- To prepare the plant for EPU conditions, TVA has installed numerous equipment upgrades and modifications on all three units and will continue to do so. In addition, the station's EPU team is revising procedures, processes and training to address EPU conditions.
- In October 2016, Browns Ferry's Extended Power Uprate (EPU) project team submitted the final response to the Nuclear Regulatory Commission's (NRC's) requests for additional information (RAIs), resolving all technical issues the NRC's technical reviewers had with the station's license amendment request (LAR) for EPU.
- The NRC's Advisory Council on Reactor Safeguards is scheduled to review our LAR at two Washington-based meetings in May and June, 2017.
- Pending NRC approval, EPU implementation is scheduled for completion in March 2019.

Clean Air–General

- A regional leader in improving air quality, TVA has reduced sulfur dioxide (SO₂) and nitrogen oxide (NO_x) emissions levels.
- From the 1970s to 2016, TVA invested more than \$6 billion in emission control equipment to improve air quality, achieving significant results.
- In addition to reducing emissions from coal-fired power plants, TVA is relying more on cleaner energy sources, including natural gas, nuclear and renewable generation.
- Because of emissions reductions by TVA and others, air quality in the Valley region is better than it has been since 1980.
- Transportation vehicles (including planes and boats) are the largest source of nitrogen oxide (NO_x) emissions in the Valley.
- Mercury emissions have been reduced approximately 65 percent since 2005.

Carbon Dioxide (CO₂)

- TVA has reduced carbon dioxide (CO₂) emissions by more than 30 percent from 2005 levels, and is on track to reduce emissions 60 percent by 2020 of what they were in 2005.
- TVA currently delivers electricity with a carbon content of about 1,100 lbs./MWh, and is on track to further improve this rate to around 700 lbs./MWh by 2020. This allows TVA to offer clean and affordable electricity, which helps the region attract and retain business, industry and good jobs.

Mercury Air Toxics Standard (MATS) – Supreme Court Decision

- The United States Supreme Court on June 29, 2015, ruled EPA must consider cost before deciding whether regulation of air toxics emitted by power plants is appropriate and necessary. The ruling sent the case back to the Washington, D.C. Circuit Court for additional proceedings.
- The Supreme Court's decision does not change TVA's Mercury and Air Toxics Standard (MATS) rule compliance strategy of fleet diversification and emissions controls because the MATS rule remains in effect, as-written. Neither the Supreme Court nor the EPA has indicated any change in direction for controlling hazardous air pollutants.
- TVA's steady, systematic reductions of air emissions benefit the health and comfort of the people of the Valley. During the past decade, TVA has invested in controls to meet standards and clean generation sources to meet customer needs for reliable and low-cost power.
- MATS was the first rule specifically aimed at curbing the emission of mercury and certain other toxic air pollution from coal- and oil-fired power plants. Power plants began complying with the rule in April 2015.
- Data from the U.S. Energy Information Administration issued in July 2016 shows 87.4 GW of coal capacity added pollution controls between December 2014 and April 2016, while 19.7 GW was retired during that time period.

National Ambient Air Quality Standards (NAAQS)

- National Ambient Air Quality Standards (NAAQS) continue to become more stringent. However, with the improvement in regional air quality, the Valley region will likely meet these new, more restrictive standards.
- On Oct. 1, 2015, EPA finalized a new Ozone National Ambient Air Quality Standard (NAAQS) lowering the primary standard from 75 to 70 parts per billion (ppb), and also set the secondary standard at 70 ppb.
- NAAQS standards are set by EPA at levels to protect sensitive individuals such as those with asthma. The standards have become more stringent over time.
- Ozone is created by mixing NO_x and volatile organic compounds and is the key component of smog.
- Air quality data currently collected in the Valley region meets both existing and new standards.
- Between the 1970s and 2015, TVA invested over \$6 billion to improve air quality.
- TVA is installing additional air controls at the Gallatin and Shawnee fossil plants; retired Paradise coal units 1 and 2 and will replace them and Allen coal units 1-3, with natural gas; and is retiring Johnsonville fossil plant. TVA has retired John Sevier, Widows Creek and Colbert fossil plants. Taking these actions will further reduce emissions and continue to help improve the region's air quality.

Sulfur Dioxide and Nitrogen Oxides (SO₂ & NO_x)

- Through Calendar Year 2015, TVA-reduced SO₂ emissions are 97 percent below peak 1977 levels, and NO_x emissions are 92 percent below peak 1995 levels.

Clean Power Plan

Promoting Energy Independence and Economic Growth Executive Order – Impacts

- President Trump on March 28, 2017, signed an executive order calling for federal agencies to review existing agency actions that have the potential to “burden the development or use of domestically produced energy resources.”
- The order also instructs the EPA to review and suspend, revise or rescind the Clean Power Plan rule addressing greenhouse gas emissions from existing power plants, if appropriate. The order also seeks to put Clean Power Plan litigation on hold, pending EPA’s review.
- TVA is following this executive order and reviewing our agency actions. At the same time, we are confident our investments in a more-diverse generation system will deliver safe and reliable power at the lowest-feasible cost to the people of the Valley, as specified in the TVA Act of 1933.

Clean Power Plan – EPA 111(d)

- TVA is committed to providing low-cost, safe, reliable and cleaner electricity to the more than 9 million people we serve in the Valley.
- On Feb. 9, 2016, the Supreme Court suspended implementation of the Clean Power Plan until after the current litigation over the rule is decided.
 - The Clean Power Plan regulates carbon dioxide from existing power plants. A second rule regulates emissions from new fossil plants.
- The stay by the Supreme Court allows legal challenges to the Clean Power Plan to be heard by the U.S. Court of Appeals for the District of Columbia and, if further review is granted, before the Supreme Court itself.
- The stay did not impact TVA bringing Watts Bar Nuclear Unit 2 into commercial operation this year; beginning operation of newly installed controls on TVA’s Gallatin coal-fired plant; or constructing new, combined-cycle natural gas plants.

Additional Information

- TVA’s carbon dioxide emissions are more than 30 percent below 2005 levels due to closure of coal plants and investments in more renewable, natural gas and nuclear energy. Lower demand and energy efficiency measures also factor into lower carbon dioxide emission levels. We are on-path to reduce carbon dioxide emissions 60 percent by 2020.
- After studying the new regulations, we were pleased that the final rule would allow us to count Watts Bar Nuclear Plant Unit 2 as part of our compliance plan.
- We believe TVA’s 2015 Integrated Resource Plan positions us well for the future. Its flexibility allows us to meet new regulations and changing market conditions with decreasing carbon dioxide emissions.
- There is more work ahead. The Clean Power Plan is a complex rule that must be implemented through additional rulemaking by the states. This will take several years to finalize, so specific impacts will remain uncertain for some time.

Coal Ash Storage

- TVA is committed to protecting human health and the environment of lands, waters and nearby communities that adjoin TVA's coal plants.
- Both long-term monitoring and new monitoring continue to demonstrate healthy and productive waters and lands surrounding our plants.
- TVA takes a scientific approach and conducts risk assessments to ensure public and environmental health and safety.
 - About 35 percent of TVA's annual coal combustion products are repurposed for items such as blasting abrasives, roofing granules, cement and concrete applications and wallboard.
 - Since the mid-1990s, TVA has been sampling and reporting groundwater data to the appropriate state agencies. TVA has gone beyond requirements and implemented voluntary monitoring at units where it was not mandatory.
- TVA is using safe and secure coal combustible residuals, or CCR, practices to modernize its CCR management practices, convert to dry storage, and safely close impoundment areas.
- Beginning in 2009, TVA adopted a program to convert coal combustion residuals from wet impoundments to dry systems (lined landfills or beneficial reuse). This conversion program provides for the closure of all TVA wet handling facilities by 2022.
- At most locations, Closure-in-Place is more environmentally beneficial and less costly than Closure-by-Removal. This process removes water pressure by permanently covering the impoundment with an engineered waterproof cap to keep rain and other moisture out. The ash also is dewatered and stabilized to significantly reduce the risk of groundwater contamination and instability.
- The EPA's CCR Rule dovetails with TVA's existing efforts to close wet CCR facilities and convert them to dry systems across the TVA fleet.

Closure Options

- **Closure-in-Place** involves removing the water from the ash, stabilizing the CCR in place, and installing a water-proof cover system including soil and vegetation. This keeps new sources of water from mixing with the CCR and reduces risks of structural instability and groundwater contamination.
- **Closure-by-Removal** involves removing the water from the ash, digging up and removing the CCR material to a permitted, lined landfill off-site. The old landfill is then reshaped and filled. Closure-by-Removal is a more involved process that takes longer than Closure-in-Place, depending on the size of the impoundment area.

NOTE: For more information about coal ash and coal combustible residuals, please see the Appendix on page 61.

Coal Operations

- While coal will continue to be part of TVA's generating mix for years to come, key factors significantly impacting TVA's business and the cost of continuing to operate some of its coal plants are cheap natural gas, environmental regulations and changing power demands.
- TVA understands the impact of changes on local communities and employees and is committed to working with them through changes in our generating mix.
- At the same time, TVA must work within the current and future regulatory and market environments as it supplies reliable, low-cost and cleaner energy for the region.
- Like other commodities, the price of fuels that TVA uses to produce electricity rises and falls because of factors such as weather, regional and global economic conditions, and supply and demand. But, despite the reason for changes in fuel costs, TVA's goal is to generate electricity with the right fuel, at the right time and at the lowest-possible cost.
- To that end, TVA is diversifying its generating fleet to help provide greater rate stability and flexibility.

Colbert Fossil Plant Groundwater

- Together with the Alabama Department of Environmental Management (ADEM), TVA has identified groundwater at Colbert Fossil Plant that does not meet ADEM's groundwater protection standards. This water is localized entirely on the Colbert site property and poses no risk to public health. We will address this issue as we close the plant by removing the affected ponded water.
- Based on the groundwater flow monitoring, groundwater flows toward the river. Current groundwater monitoring shows the closest neighbor's private groundwater well meets both EPA and state of Alabama drinking water standards.
- ADEM landfill permits require TVA to conduct semi-annual groundwater monitoring at COF during the months of April and October. The groundwater monitoring program uses 25 on-site monitoring wells and one off-site private water well adjacent to plant property.
- Some onsite monitoring wells exceeded EPA drinking water levels for chemical constituents classified by it as Secondary drinking water standards. These nuisance chemicals, as EPA calls them, are classified as secondary drinking water standards since they generally cause color, odor, taste or cosmetic effects. Those chemicals are:
 - Iron – rusty color, metallic taste, reddish staining
 - Manganese – brown to black color, metallic taste, black staining
 - Sulfate – salty taste
- TVA's board decided in 2013 to retire the Colbert plant as part of efforts to diversify TVA's portfolio in the face of falling power sales and stringent environmental regulations.
- TVA is decommissioning the fossil plant and plans to demolish all five generating units at the site and return it to a brownfield state, which would prepare the site for potential commercial or industrial use.
- A gas plant remains on the site.

Cove at Blackberry Ridge

- Providing a permanent easement for water access rights along 145 feet of Watts Bar shoreline and 26a permit requested by Highlands Development Group is the right and fair action by TVA.
- TVA approved and then suspended the easement for several years while it reviewed and changed its land policies.
- Staff recommends TVA grant the easement as originally approved, like other projects at that time.
- The recommendation balances economic development and environmental stewardship.
- For its part, Highlands Development forfeits existing water access rights to 150 feet of shoreline, provides a 50-foot conservation buffer, and pays \$15,000 for shoreline stabilization.

Background

This agreement was first approved in 2008 under a “maintain and gain” policy that allowed exchange of land rights. TVA ended the policy when questions were raised about it being applied fairly. An OIG report found inconsistencies but also showed employees worked in good faith and the exchange property was at least as valuable as the easement property.)

Cumberland Fossil Plant Coal Silo Collapse

- After an extensive investigation into the Feb. 17 collapse of a coal silo at Cumberland Fossil Plant, TVA determined the collapse was caused by failure of a support weld that attached the lower section of the silo to the upper vertical section.
- TVA conducted a thorough investigation of the support welds on similar structures.
- Out of an abundance of caution, TVA cut out and replaced all the support welds on each silo for both units at Cumberland, and added additional supports to the silos.
- Unit 1 returned to service on Wednesday, April 12, 2017, after completion of required structural support welding work. Unit 2 was returned to service June 20.

Supporting Facts

- The collapse involved approximately 800 tons of coal.
- There were no injuries or fatalities.
- Unit 2 was taken offline shortly after the incident. Unit 1 was removed from service for inspections and maintenance.

Cybersecurity

- As the nation's largest public power provider and a significant part of the U.S. bulk electric system, TVA works around the clock to monitor and protect its critical cyber assets.
- Successful cybersecurity programs are company-wide efforts. Our employees are our first lines of defense, which is why we invest time and resources to educate them on recognizing and resisting cyber threats.
- TVA's critical systems are within a specialized, isolated network that is separate from corporate networks and inaccessible via the internet. This significant added level of security separates core assets from user computers and the internet.
- TVA also has a comprehensive cybersecurity program that proactively helps predict, protect, detect and respond to threats against its computer systems. We also perform continuous monitoring, penetration testing and vulnerability assessments.
- TVA partners with other government agencies, such as FBI, Department of Homeland Security and Department of Energy to stay abreast of emerging cyber threats. TVA adheres to the following Federal and industry regulatory standards:
 - North American Electric Reliability Corporation (NERC) Critical Infrastructure Protection (CIP) Standards
 - Nuclear Regulatory Commission (NRC) Cyber Security Requirements
 - Sarbanes-Oxley Act (SOX)
 - Federal Information Security Management Act (FISMA)
 - Federal Privacy Regulations

Dam Safety

- TVA has a long history of safely operating our dams across the Valley. TVA is collecting information to evaluate the overall health of its 49 dams, including seismic stability.
- With safety of employees and the public as its top priority, TVA's Dam Safety team and independent structural experts work to ensure TVA's 49 river dams, including many earthen structures, in its seven-state region conform to federal design, operation, maintenance and repair guidelines.
- TVA incorporates a system that includes monthly, biannual and annual inspections of its hydro facilities to identify any sign of erosion or any other issue that may cause concern.
- These inspections are part of a robust, comprehensive Dam Safety Program that also includes continuous electronic monitoring for vibrations, rigorous structural and geological assessments, and inspections that look not only at the surface of hydro structures, but also in the geology under and around the dams.
- This type of inspection helped identify an underlying issue at Boone Dam in October 2014, when a sinkhole was discovered at the base of the dam's earthen embankment and muddy water was identified seeping from the river bank below the dam.
- At [Pickwick Landing Reservoir](#), based on seismic analysis, TVA installed an early warning system to notify downstream residents in the unlikely event of an earthquake large enough to damage an earthen embankment at the dam. TVA has issued a draft Environmental Assessment that proposes how it will strengthen the dam to lessen potential harm in case of a severe earthquake and plans to start construction to upgrade the dam in 2017.
- At [Boone Reservoir](#), we have determined the cause of water and sediment seeping from the riverbank below the dam and proposed a remedy while continuously monitoring the dam to ensure its continued stability.
- Completion of the Boone Dam repair project is scheduled for the 2020-2022 timeframe. We will continue to keep community residents and businesses informed.
- At Little Bear Creek Dam near Russellville, Alabama, TVA Dam Safety engineers on April 5 located a small, muddy discharge seeping below the dam spillway. The dam remains stable and continues to be closely monitored.
- In 1936, the [Unified Development of the Tennessee River](#) plan outlined how TVA's dams would provide flood control, navigation and electricity for the region.
- We're celebrating the 80th anniversary of the plan with [a year long Built for the People series that looks at the 25 dams the plan inspired](#).

Drone Operations

- The operation of drones at a TVA facility, over TVA property or in support of TVA operations, may only be executed by a properly qualified and certified drone contractor.
- Operation of drones by other contractors or TVA employees at a TVA facility, over TVA property or in support of TVA operations, is prohibited.
- TVA business units must receive approval from TVA's UAV board prior to using a drone. The UAV board is composed of representatives from various TVA Business Units. TVA employees or contractors (other than the drone contractor) may participate in the drone activity as subject matter experts but may not operate or control the drone.
- All drone operators and operations must meet all applicable legal and regulatory requirements, and standard requirements described in the TVA Safety Manual and other applicable SPPs.

Economic Development

- Economic development is a core component of TVA's mission to serve the 9 million residents in the Valley.
- TVA works with local power companies, directly served customers and regional, state and local economic development agencies to bring quality jobs to the region and to keep them here.
- Together, in fiscal year 2016, we attracted and retained 72,100 jobs and \$8.3 Billion in capital investment.
- These 2016 results bring TVA's economic development contributions to more than 418,500 jobs and over \$49 billion in capital investments since 2009.
- In 2016, TVA was recognized by *Site Selection* magazine for the eleventh consecutive year as one of the Top 10 utilities in North America for economic development leadership and results.
- TVA's economic development work focuses on attracting new companies and investments to the Valley; engaging communities and industries to help foster growth; and serving with partners to prepare for economic growth.
- More than 248 companies were recruited to the region and/or expanded existing operations, contributing to the following job totals and business investments in 2016:

FY2016 results

Location	Jobs Attracted/Retained	Business Investment
Alabama	9,262 jobs	\$832 million
Kentucky	4,388 jobs	\$645 million
Middle Tennessee	21,064 jobs	\$2.8 billion
Mississippi	1,882 jobs	\$229 million
Northeast Valley	15,668 jobs	\$2.3 billion
Southeast Valley	11,844 jobs	\$573 million
West Tennessee	8,000 jobs	\$927 million

Effluent Limitations Guidelines

- On April 12, 2017, the Environmental Protection Agency (EPA) announced it will review and reconsider revisions to technology-based effluent limitations guidelines and standards.
- Energy generators around the country were preparing to comply with the rule that sets strict federal limits on the levels of metals in wastewater discharges from steam power plants. Plants were expected to comply with the rule between 2018 and 2023, depending on their Clean Water Act permit schedule.
 - The EPA also signed a stay of the rule's compliance deadlines for fly ash transport water, bottom ash transport water, and flue gas desulfurization (FGD) wastewater, among others. The administrative stay becomes effective when published in the Federal Register.
- Many of the rule's requirements could be complied with only by designing and installing major new technology at a cost of billions of dollars across the industry. Without a stay during the reconsideration, industry members would have been forced to continue expending funds for compliance with a rule that EPA may have decided to change.
- TVA's Environmental & Energy Policy staffs are determining how this and other EPA actions impact TVA's current and future business decisions. This information will be shared in the near future within TVA and with our LPC partners.

Energy Efficiency, Renewable and Distributed Generation

- New technologies, changing consumer/business usage habits that include demand for cleaner and greener energy, evolving regulatory standards and emerging competition are driving changes in the traditional energy delivery model.
- The primary change for power generators in the coming years will involve renewable energy sources and energy efficiency as they continue to play an increasingly strong role in the country's energy future.
- As public power providers, TVA and its customers, much like investor-owned utilities around the country, are working to do what's right for ratepayers.
- Speaking for TVA, we have been diversifying our generating fleet for some time to use a more diverse portfolio of energy sources that will better serve our customers in a variety of future conditions with greater rate stability.
- Our 2015 Integrated Resource Plan (IRP) established renewable energy, energy efficiency and demand response as key resources in TVA's future energy mix.
- TVA's goal is to continue aligning our energy portfolio with demand and to use the right resource at the right time to ensure energy at the lowest-feasible price for our customers.
- As the largest public power provider in the United States, our priority continues to be least-cost planning. We recognize that our renewable energy, energy efficiency and demand response programs/products must add value and provide flexibility to be adjusted to meet future changing needs of consumers.
- To that end, we are working to improve our internal processes and capabilities, develop a structural framework and guiding principles, and to determine how to integrate Distributed Energy Resources, or DER, into our normal business planning processes.
- Distributed generation is being done in partnership with our local power companies, which are the distributors of electricity to homes and businesses throughout the Valley.
- We are working together to jointly decide how we can best prepare for the changing market together, adjusting our structures and processes accordingly.
- As our internal work matures beyond structure and processes, TVA and our distribution customers will collaborate to develop strategies that include delivery mechanisms and operational guidelines so that, together, we seamlessly respond to the Valley's evolving engagement in Distributed Energy Resources technologies.

Grid Stability

- There are several regions with high penetrations of renewable resources where we have learned important lessons, such as California, North Carolina and Germany. TVA has worked closely with these areas and around the Southeast to improve processes for connecting renewables to the grid.
- Integrating renewable generation presents a number of challenges, including maintaining voltage stability and frequency control, power quality, ramping and the need to carry additional resource reserves to account for variability. As generation resources become more distributed and intermittent, the need to extend secure communication networks for visibility and control becomes even more important in maintaining grid reliability.
- Because this is an industry-wide concern, our regulators are actively involved in identifying issues and creating policies to help close gaps and ensure grid stability through these changes.
- For example, NERC created a task force to identify and monitor grid challenges associated with high penetration of renewables and to serve in an advisory role to policy makers. In response, FERC has promulgated policies requiring certain voltage and frequency control capabilities for all new generators, including renewables, connecting to the grid.
- By working with other utilities and our regulators to apply lessons learned from others, we have high confidence our grid will remain reliable as we transition towards integrating larger amounts of renewable generation.
- As TVA transitioned away from coal to other resources, accelerated by the EPA Mercury and Air Toxics Standards (April 2015 compliance date with possible extensions of one or two years), TVA identified significant impacts to its transmission system that include overloaded transmission equipment, such as lines and transformers, caused by changes in power flow patterns and typically low-voltage issues caused by the loss of reactive power provided by the generator.
- As TVA moves toward a more diverse resource mix, TVA has invested \$360 million since 2011 and plans to invest an additional \$70 million through 2020 in upgrades to the transmission system to maintain grid reliability.

Renewable Energy

- Cost-effective, renewable energy is an important part of TVA's diverse portfolio of energy generating sources.
- TVA considers projects according to least-cost planning and as demand warrants.
- TVA has offered or installed more than 400 megawatts of solar capacity since 2011, and currently has more than 1,300 megawatts of wind and nearly 70 megawatts of biomass under contract.
- In 2016, TVA's renewable energy programs are placing greater focus on the distribution grid system and the increasingly important role of local power company partners.
- TVA's small-scale renewable program, offered through participating local power companies, has resulted in over 100 megawatts of renewable capacity, with more than 3,000 systems operating or approved across the region.

Renewable Request for Information (RFI)

- TVA issued a Request for Information on May 2, 2016, for renewable energy providers interested in a potential “sell-all” power purchase agreement with TVA. The RFI closed on June 30, 2016.
- TVA is interested in renewable resources located inside – or delivered to – the TVA service territory, with energy delivery beginning no later than Dec. 31, 2020.
- The information received through the RFI will be used by TVA’s planning processes.

Solar Projects

NextEra River Bend Solar Energy Purchase Agreement

- Cost-effective, renewable energy is an important part of TVA’s commitment to providing low-cost, reliable and cleaner energy from a variety of generating sources.
- The 20-year agreement with NextEra Energy Resources delivers 75 megawatts to the TVA system from the River Bend Solar Energy Center near Florence, Alabama’s largest solar energy facility.
- This clean energy is priced competitively with other TVA options for generation, and it is in a good location to support the transmission system.
- The project demonstrates TVA’s environmental commitment, supports continued diversification of TVA’s generating sources, and promotes economic prosperity in the region.

Silicon Ranch at Millington

- TVA awarded Silicon Ranch Corporation a power-purchase agreement for a 53-megawatt solar project at Naval Support Activity Mid-South in Millington.
- The solar array will be the largest in the state and provided power to TVA customers at cost-competitive rates for the next 20 years.
- The project will feature about 580,000 panels with a single-axis tracking system that will track the sun across its daily arc. The project will occupy more than 400 acres.
- Silicon Ranch is based in the TVA service area, in Nashville.
- This effort supports the Navy’s goals of increasing energy resiliency for their base operations and securing additional renewable energy to meet the mandates of various executive orders
- TVA plans to build the proposed Shelby-Millington Solar 161-kV Transmission Line from TVA’s existing Shelby 500-kV Substation located off Mudville Road in Millington to Silicon Ranch’s new Millington Solar 161-kV Substation in Millington.

Allen Combined Cycle Plant Solar Generation

- See Page 5, Allen Combined Cycle Plant Solar Generation

Solar Energy Transmission

- One of the more attractive advantages of solar is that it can be deployed efficiently within the Valley at locations no more remote than other traditional generation resources.
- Recent solar decisions made by TVA, such as River Bend, have been deployed in locations near transmission facilities with available transmission capacity. As a result, transmission expansion was not required, except for the relatively short connections to the grid. TVA has identified potential sites where transmission capacity and land suitable for solar development are available. There is no shortage of attractive solar sites in the Valley.
- TVA's decisions in the 2010-11 timeframe to contract for approximately 1,500 megawatts of remotely-located wind resources did not require any upgrades to the transmission system to acquire the power.
- TVA's renewable power decisions are based on balanced, least-cost principles.
- As such, the economics associated with medium sized blocks of renewable power (50 megawatts to 300 megawatts) do not drive large investment in transmission. Economics tend to drive renewables to locations with access to lower cost transmission. Obviously, demand for larger blocks of renewables (300 megawatts to 3500 megawatts) can drive more significant transmission build out, such as HVDC lines carrying wind from the west.
- There are processes in place, such as Interconnection and Transmission Service that ensure adequate transmission is being built for these resources. The role of transmission has always been to reliably deliver generation from where it is made, to where it is needed.
- And to answer the question of adequate transmission to handle increases in renewable generation, TVA continues to invest in its transmission capabilities.
- As TVA moves toward a more diverse resource mix, TVA has invested \$360 million since 2011 and plans to invest an additional \$70 million through 2020 in upgrades to the transmission system to maintain grid reliability.

Wind Energy Projects

- Cost-effective, renewable energy is an important part of TVA's diverse energy portfolio.
- TVA now has more than 1,200 megawatts of wind energy under contract.
- Utilities are gaining experience with wind power, and we will continue to consider wind and other resources in our power supply planning.
- TVA's renewable energy programs are placing greater focus on the distribution grid and the increasingly important role of our local power company partners.
- Last spring, TVA issued a Request for Information to learn more about renewable resources inside, or deliverable to, to the TVA region.
- TVA will use responses to the Request for Information to assess resources that can help balance its generating portfolio with clean, efficient and least-cost energy.

Clean Line

- TVA continues to consider wind, as well as other resources, in its power supply planning. At the same time, TVA is directed under the TVA Act of 1933 to deliver electricity at the lowest feasible rates.
- Clean Line Energy Partners is proposing a 700-mile transmission line to connect 4,000 megawatts of wind power with utilities in the mid-South and southeastern United States.
- TVA is studying the safety and reliability of interconnecting Clean Line to the TVA transmission system, as well as moving significant amounts of power across TVA's system to neighboring utilities.
- The TVA Act of 1933 directs TVA to provide power at the lowest feasible rates and the latest Integrated Resource Plan projects flat- to declining-power demand for the foreseeable future, so consideration for purchasing power from Clean Line would necessarily be made in the context of cost and need.

Crab Orchard Project

- Apex Clean Energy and Cumberland County officials announced Jan. 14, 2016, that Tennessee's largest wind farm will be located in Crab Orchard, near Crossville.
- The \$100 million project will include up to 23 wind turbines that will produce 71 megawatts of power each year.
- Apex Clean Energy has filed a transmission service interconnection request with TVA. However, the request doesn't mean TVA intends to purchase power from the wind farm, and TVA has not completed the engineering studies necessary to determine the feasibility of the proposed interconnection.
- TVA received an offer for a power purchase agreement from Apex through a Renewable Request for Information (RFI) that was opened May 2 to June 30, 2016.
- Should TVA receive a viable offer for a power purchase agreement, TVA will conduct a detailed assessment of the anticipated environmental impacts of the construction and operation of the windfarm.
- TVA will involve the public in the impact assessment.
- The wind farm could be operational by the end of 2017.

EnergyRight® Solutions

- Energy efficiency is a cost-effective, customer-engaging resource.
- Supporting energy efficiency is the right thing for TVA to do. It helps consumers save money, keeps the environment cleaner, and helps make energy costs more affordable.
- In fiscal year 2015, TVA and local power company partners achieved impressive results in energy efficiency:
 - Saved 412 gigawatt-hours through residential, business and industrial energy efficiency programs – enough energy to power 26,581 homes.
 - Helped homeowners invest \$68 million in energy efficiency improvements.
 - Provided \$38 million in incentives that benefitted homeowners, local power companies, businesses and industries in the Valley.
 - Created 728 jobs in the region
- For information on energy efficiency, including the new eScore™ program for homes, visit www.energyright.com.
- EnergyRight Solutions services are the toolkit for the local power companies to serve their customers and members. They enable local power companies to be the preferred provider of energy efficient solutions.
- EnergyRight Solutions programs are cost-effective and enhance our generation performance.
- The consumer benefits by living more comfortably, saving energy and saving money; the Valley benefits from having a cleaner environment; and, the economy benefits by increased competitiveness through lower rates and improved system reliability.

Fiber*

- Fiber is a vital part of TVA's modern communication infrastructure. Having a robust and extensive fiber network helps ensure reliable, real-time system information is shared between generating stations, substations and other facilities.
- TVA's strategic fiber initiative provides an upgrade to our telecommunications system. TVA plans to add approximately 3,500 miles of fiber to its system over the next 10 years to build a robust fiber backbone that will improve the reliability and resiliency of the transmission system while enabling the system to better accommodate distributed energy resources as they enter the market.
- The additional bandwidth will also support other TVA functions -- including information technology, emergency management and river operations.
- TVA's strategic fiber initiative also expands opportunities for economic development in direct support of TVA's mission of service to the people of the Valley.
 - Surplus "dark" fibers built into the network provide an opportunity for other companies to create or expand fiber-related services in the Valley and reach many of the region's underserved and unserved communities.
- With TVA's extensive network in place, local power companies and other service providers will be in a better position to expand broadband service into those communities that currently have limited access, if they choose to do so.
- Having access to a robust fiber network can improve lives in these communities through expanded business, healthcare and education opportunities.
- Alignment with our local power company partners is a critical step in creating a comprehensive and sustainable fiber network that benefits all Valley residents.
- TVA is not getting into the broadband business. Our fiber network was built to support power system needs, and our focus remains on our own operations.
- TVA has a long history of working with external parties (LPC's and commercial companies) with broadband service capabilities by providing access to surplus dark fibers on TVA's system.

Floating Cabins

- Legislation recently approved by Congress and signed by President Barak Obama gives the TVA board of directors authority to allow floating cabins (also known as floating houses) on the reservoirs it manages.
- This legislation affirms TVA's need to establish fair and reasonable health, safety and environmental standards and levy fees on floating cabin owners to ensure compliance.
- Under the legislation, existing floating cabins may remain on TVA-managed reservoirs for significant lengths of time if they continue to comply with new standards and meet fee requirements. TVA also may also establish guidance to prevent construction of new structures on its waters.
- TVA is continuing to work with interested parties, including floating cabin owners, on details of new standards and fees. The public will have the opportunity to comment on the proposed standards before they are finalized.

Additional information

- TVA remains committed to ensuring everyone has the ability to enjoy TVA-managed public lands and waters.
- The board's proposed 30-year "sunset clause" will be replaced with clear requirements for maintaining existing floating cabins, fair fees for the owners to ensure compliance and prohibition on any new floating cabin construction.
- TVA team members have been meeting with floating cabin/home owners and other interested parties to establish the framework of specific safety and environmental requirements. This work will continue in 2017.
- A permitting process will be developed that will be tied to complying with new standards that are being developed. Once those standards are finalized, owners will have a certain timeframe to fully comply with standards and fee requirements. Details, when developed, will be communicated to owners through local marinas and floating cabin associations.

Gallatin Fossil Plant

Dry Scrubbers

- The result of nearly 35 months of construction was seen when Unit 2, the last of the four dry scrubbers at Gallatin Fossil Plant, was placed into service Feb. 3, 2016.
- This \$730 million investment in clean air was completed on time and within the projected budget, allowing Gallatin to become compliant with the EPA MATS (Mercury and Air Toxics Standards) well before the April 16, 2016 deadline.
- The dry scrubbers remove up to 98 percent of sulfur dioxide (SO₂) from the exhaust flue.
 - The dry byproduct will be stored in a landfill that currently is being constructed on the Gallatin property as part of its commitment to dry storage of coal-combustion residuals across the fleet.
- A baffle system is being installed on the scrubbers in response to neighborhood concerns about the noise level from the Induced-Draft fans during start-up.
 - While the sound level is below city-regulated standards, the baffle system is being installed to maintain a good relationship with the neighborhood.
- The \$700,000 project will reduce sound levels by 10 decibels. With dry scrubber construction complete at Gallatin, the focus now turns to the selective catalytic reduction (SCR) additions. The \$370 million investment in this project will remove nitrogen oxide emissions from all four of the plant's generating units.
 - The first two SCRs are scheduled to become operational in the spring of 2017, and the final two SCRs are scheduled for completion in the fall of 2017.

Additional Information

- As part of the project, TVA built a new Cumberland River Aquatic Center on the side opposite the discharge channel from the original location of the aquatic facility.
- The Gallatin dry scrubber project started in 2011 with a design phase that lasted about a year. Ground was broken on the project in March of 2013.
- Units 4, 3 and 1 were placed online in April, June and November of 2015, respectively.
- As many as 1,300 construction workers were on site during the peak construction phase.

Offsite Groundwater Sampling

- TVA monitors and performs tests at its Gallatin Fossil Plant intake and outfall according to its water discharge permits. Results are in compliance and indicate the health of the river above and below the plant is not impacted by TVA operations.
- Numerous TVA studies found healthy ecosystems in the Cumberland River adjacent to the plant and observed no harm to the environment resulting from TVA's operations at Gallatin. In addition, almost all of TVA's groundwater monitoring data results is well within applicable groundwater protection standards.
 - A few higher readings were found at Gallatin near an old ash pond that has not been used since 1970 and that is now covered with vegetation. This area is not near the existing private wells along Odoms Bend Road.
- Our investigations to-date haven't identified impacts to local sources of drinking water and we are continuing with our investigations to confirm this.
- Tennessee Department of Environment & Conservation also has sampled groundwater at three offsite private residential wells near TVA's Gallatin Fossil Plant.
- The results of the state's private well sample show that no chemical constituents exceed drinking water standards, including the general chromium standard.
- TDEC also has identified two constituents that are very low in concentration, but above what they have identified as levels normally seen in ground water. They are:
 - Boron levels, which are not a drinking water concern, as confirmed by TDEC.
 - Hexavalent Chromium, which is slightly above the draft criteria that EPA proposed in 2010, but has not finalized.
- TDEC plans to retest the wells to ensure accuracy of information. TVA supports the state's decision to retest all of the wells to confirm these low readings and we believe this data should be compared against existing background levels in the area.

Gas Plant Conversions (Allen, Paradise)

- Moving toward an optimized generation fleet that relies more on cleaner energy sources like nuclear, natural gas, hydro and other renewable resources is an important part of improving our operational performance.
- TVA has been working for several years toward this balanced portfolio because it provides greater flexibility to generate cleaner energy more efficiently from a variety of fuel sources.
- In August 2014, TVA announced plans to invest up to \$975 million to replace all three units at the Allen Fossil Plant in Memphis with a combined-cycle gas plant.
- The Allen gas plant, now more than 75 percent complete, will be the seventh combined-cycle gas plant TVA has added to its power portfolio since 2007.
- This plant will help meet load and manage costs as fuel prices fluctuate. It also will help meet TVA's stewardship standards for air and water quality.
- TVA also invested about \$1 billion to replace two coal units at Paradise Fossil Plant near Bowling Green, Kentucky, with a cleaner, more efficient natural combined cycle natural gas plant.
- The 1,025 MW Paradise Combined Cycle plant came online in April 7, 2017. Paradise Units 1 and 2 were retired April 16, 2017.

Generation Portfolio

- I will agree that each fuel type used in generating energy has its own strengths and weaknesses. But overall, when looking comprehensively at a generating system, it only makes sense to invest in a diverse portfolio.
- Let's take a look at what we are doing at TVA.
- In FY2015, TVA's generation portfolio was 33 percent nuclear, 29 percent coal, 18 percent natural gas, 9 percent hydro, 3 percent wind and solar, and 7 percent energy efficiency with a total capacity of 171,000 gigawatt-hours.
- By FY 2026, our generation portfolio is estimated to be 38 percent nuclear, 15 percent coal, 24 percent natural gas, 9 percent hydro, 3 percent wind and solar, and 11 percent energy efficiency with a capacity of 178,000 gigawatt-hours.
- Our move to a more diverse portfolio allows us to shift our generating assets to the lowest-cost fuel. Like other commodities, the price of fuels that TVA uses to produce electricity rises and falls because of factors such as weather, regional and global economic conditions, and supply and demand.
- These fuel cost savings are passed to our distribution and direct-served customers because our fuel costs are strictly pass-through – TVA makes no money on the cost of fuels.
- Despite the reason for changes in fuel costs, TVA's goal is to generate electricity with the right fuel, at the right time and at the lowest-possible cost.
- This least-cost planning allows us to save our customers and their ratepayers money.
 - We forecast the amount of energy that will likely be needed during the next month, then we take advantage of TVA's diverse generation portfolio to provide the power our local power company and direct-serve customers need in the most cost-efficient way possible.
 - Because forecasts are never perfect, TVA collects or refunds the difference between the forecast and actual fuel expenses over a couple months. Doing this provides a more stable fuel cost for LPCs that distribute electricity to the more than 9 million people who live and work in the Valley.
- We at TVA have a legal mandate under the TVA Act of 1933 to work for the betterment of the people of the Tennessee Valley. We also are required to sell power "at rates as low as are feasible." So, in addition to effectively managing fuel costs, TVA offers a number of energy efficiency programs and tips to help consumers wisely use energy.

Integrated Resource Plan

- The Integrated Resource Plan is TVA's long-term "roadmap" for the region's energy future. It provides broad guidelines and decision-making flexibility for TVA. The IRP is like a compass, not a GPS, in that it provides a broad direction and not a direct route
- The IRP is a power planning roadmap to 2033. It examines a variety of economic, regulatory and market-driven scenarios and strategies – both within and outside TVA's control – to help TVA respond to changing energy demands while continuing to provide reliable power at the lowest possible cost.
- In an effort to treat all resources fairly, TVA developed an innovative modeling process that treats energy efficiency as a resource. While TVA recognizes the process may need to be further refined, we successfully demonstrated energy efficiency can be treated as a resource with other types of generation.
- The IRP was developed with input from the public and contributions from a working group of stakeholders from local power companies, environmental organizations and other public and private entities with a vested interest. TVA conducted an extensive public outreach that included a series of open meetings around the Valley.
- TVA updated its IRP because of dramatic changes in the utility industry. Such changes include abundant lower-cost natural gas, decreased cost of renewable generation, decreased demand and an increased focus on energy efficiency efforts.
- The IRP identifies:
 - A need for new capacity in every scenario.
 - A need for new natural gas capacity in every scenario – as early as 2020 in some cases.
 - There is no immediate need for new base load resources (facilities that generate electricity 24-hours-a-day, every day) after the completion of Watts Bar Nuclear Plant Unit 2 and power uprates at Browns Ferry Nuclear Plant.
 - There will be an increase in the use of cost-effective, energy efficiency and renewable energy levels.
- The recommendations in the IRP meet the dual objectives of ensuring flexibility in our energy sources while providing guidance on least-cost power options. The plan also reinforces the importance that TVA power remains reliable, affordable and sustainable.
- A copy of the IRP, accompanying Supplemental Environmental Impact Statement, and response to public comments has been posted at www.tva.com/irp.

Summary of the Recommended Planning Direction

- **Coal:** Announced plans to retire units at Allen, Johnsonville and Paradise. Evaluate the potential retirement of Shawnee Fossil Plant in the mid-2020s if additional environmental controls are required. Consider retirements of fully controlled units if cost-effective.
- **Nuclear:** Complete Watts Bar Nuclear Plant Unit 2 and pursue additional power uprates at all three Browns Ferry units by 2023. Continue work on Small Modular Reactors as part of technology innovation efforts and look at cost-sharing opportunities to make them more cost-effective for our ratepayers.
- **Hydro:** Pursue an additional 50 MW of hydro capacity at TVA facilities and consider additional hydro opportunities, where feasible.
- **Demand Response:** Add between 450 MW and 575 MW of demand reduction by 2023 and similar amounts by 2033, dependent on availability and cost of this customer-owned resource.
- **Energy Efficiency:** Achieve savings between 900 MW and 1,300 MW by 2023 and between 2,000, and 2,800 MW by 2033. Work with our local power company partners to refine delivery mechanisms, program designs and program efficiencies with the goal of lowering total cost and increasing deliveries of efficiency programs.
- **Solar:** Add between 150 MW and 800 MW of large-scale solar by 2023, and between 3,150 and 3,800 MW of large-scale solar by 2033. The trajectory and timing of solar additions will be very dependent on pricing, performance and integration costs.
- **Wind:** Add between 500 MW and 1,750 MW by 2033, dependent on pricing, performance and integration costs. Given the variability of wind selections, evaluate accelerating wind deliveries into the first 10 years of the plan if operational characteristics and pricing result in lower-cost options.
- **Natural Gas (Combustion Turbine and Combined Cycle):** Add between 700 MW and 2,300 MW by 2023 and between 3,900 MW and 5,500 MW by 2033. The key determinants of future natural gas needs are trajectories on natural gas pricing, and energy efficiency and renewable energy pricing and availability.

Additional Information about the IRP Process

- TVA developed various scenarios that could impact future power requirements based on a number of factors outside of TVA's control, including economic growth, inflation, fuel prices and the regulatory environment. Those scenarios were then used to assess strategies that focus on:
 - Current goals
 - Emphasis on emission targets
 - Reliance on power purchases
 - Maximizing energy efficiency or renewable energy
- The scenarios did not attempt to predict the future; they only described future uncertainties for which TVA should be prepared.
- Planning strategies were developed to address the business decisions that TVA can control, such as nuclear expansion, idling of coal-fired plants or expansion of the energy efficiency and demand response programs.
- By being able to model all of the potential resources together we can draw good conclusions about how each of the resource options fit together. One very important finding from the IRP is that all of the resources are needed to ensure we have the lowest-cost plan for TVA's future.
- Each planning strategy was analyzed in each of the different scenarios to create a matrix of 20-year portfolio options for TVA to consider. Each portfolio described how a particular strategy performed under a certain scenario.
- Portfolios were then ranked according to cost, risk and strategic factors (such as environmental and economic impacts) that should be considered when selecting preferred planning strategies for the draft plan.
- Implementing the recommendations from the IRP will require close cooperation between TVA, local stakeholders, our local power companies and Valley electric customers. We also will continue to monitor key developments in the marketplace.

Kingston Fossil Plant

Offsite Ash Disposal and Gypsum Landfill Permit Modification

- The peninsula landfill at the Kingston Fossil Plant was permitted to receive only gypsum, a coal combustion byproduct.
- Dry fly ash generated by the plant was stored onsite in a permitted temporary storage area also known as the “ball field.”
- During fall 2014, TVA applied to the state of Tennessee for a major permit modification of the landfill to allow disposal of dry fly ash. The state approved TVA’s permit application in September 2015.
- The approval of the permit modification allows TVA to continue storing coal combustion residuals on-site at Kingston Fossil Plant, as intended. This also ensures the plant can continue operating as an asset into the future for Roane County and TVA.
 - If the state had not approved TVA’s permit application, TVA had planned to haul it off-site to a state-permitted disposal facility.

Restoration and Compensation Determination Plan

- Following the Kingston ash spill, a natural resource damage assessment (NRDA) was completed to evaluate alternatives to restore resources to pre-spill conditions. This is in addition to the recovery efforts of the ash spill managed under EPA and TDEC Orders.
- In addition to implementing the Swan Pond work, TVA’s NRDA settlement includes a \$750,000 cash payment for additional restoration outside the Swan Pond area. Restoration activities could include projects, such as conservation easements, land acquisition, stream-bank restoration or the creation of new recreational fishing/boating access.
- The EPA said in March 2017 that environmental data collected from 2009 to 2015 shows that fish, insects, sediment quality, tree swallow colonies and other parts of the ecosystem have returned to the conditions that existed before Jan. 22, 2008, when the failure of an impoundment at the TVA plant released 5.4 million cubic yards of coal ash sludge into the Emory River and nearby countryside.
- The cleanup was done in three phases over six years, under the guidance of the federal Superfund law. The total cost of the cleanup was approximately \$1.134 billion.
- According to the EPA, the approach has been effective, and annual monitoring of the river system will continue for up to 30 years to make sure that risks associated with the residual ash remain low and any concentrations of metals related to the ash decline with time.
- TVA will have to continue long-term monitoring and maintenance of the ash disposal cell in compliance with permit requirements.

Jacobs Engineering ash spill lawsuit*

- Recently, there have been several media stories about lawsuits filed by workers from the Kingston ash spill site.
- The lawsuits were filed against Jacobs Engineering, a contractor involved in the Kingston site clean-up.
- TVA is not a party in the lawsuits.
- It is not appropriate for TVA to comment on the lawsuits, and any inquiries we receive will be referred to Jacobs Engineering.
- TVA committed to leaving the Kingston Ash Spill site as good as or better than before the spill and we met our commitment.

Little Bear Creek Dam

- At Little Bear Creek Dam near Russellville, Alabama, TVA Dam Safety engineers on April 5 located a small, muddy discharge seeping below the dam spillway. The dam remains stable and continues to be closely monitored. As a precaution and to help with inspections, the reservoir water level was lowered to the normal winter pool level of 608 feet.
- To allow for some recreational use, provide additional data, and give owners of docks or boats an opportunity to make necessary accommodations, TVA in June 2017 slowly raised the lake level to 615 feet, which is about 5 feet below normal summer pool.
- The refill rate depends on rainfall and runoff, but could potentially be reached by late July with normal rainfall (approximately 4 to 5 inches per month) and runoff (approximately 3 to 3.5 inches). The Little Bear Creek watershed averages 5 inches of rainfall in May, 3.8 inches in June and 3.9 inches in July
- We also are keeping the public informed with regular updates on the TVA website (<https://www.tva.com/Energy/Our-Power-System/Hydroelectric/Little-Bear-Creek-Reservoir>).

Background

- TVA Dam Safety engineers on April 5 located a small, muddy discharge seeping below the Little Bear Creek dam spillway near Russellville, Alabama. The dam remains stable and will continue to be closely monitored.
- Little Bear Creek Dam is one of four dams that provide flood damage reduction, recreational opportunities and water supply in northwest Alabama. The others are Bear Creek, Upper Bear Creek and Cedar Creek.
- The Bear Creek area is popular with all types of boaters, including canoeists and kayakers. This scenic area is also popular for fishing, picnicking, birdwatching and sightseeing.
 - Little Bear Creek Dam was completed in 1975.
 - The dam is 84 feet high and 2,425 feet long.
 - Little Bear Creek Dam is not a hydroelectric facility. It has no power generators and produces no electricity.
 - Little Bear Creek Reservoir extends eight miles upstream from the dam.
- The reservoir has a flood-storage capacity of 29,000 acre-feet.

Long-Range Financial Plan*

- After working collaboratively with our local power company partners and getting approval from the TVA Board, TVA introduced a long-range financial plan in 2013.
- The plan aimed to:
 - Reduce operations and maintenance (O&M) spend
 - Ensure continued 99.999 percent reliability
 - Solidify the performance of our assets
 - Diversify and optimize our generation portfolio to reduce fuel costs
 - Reduce debt
- The plan required additional revenue in terms of rate increases, mostly to account for the capital investments and a significant construction plan.
- The majority of TVA customers said they preferred smaller, incremental rate increases that gave them more predictability for planning – rather than less frequent, but larger, increases.
- TVA took this feedback into account and built the long-range financial plan around small – approximately 1.5 percent – annual rate increases over a 10-year period to reduce debt while also making the necessary investments in the power system.
- We are now almost halfway through our 10-year financial plan.
- During the first five years, we focused on gaining efficiencies in our business as well as completing a construction plan with \$16 billion in investments to large capital projects.
- We have executed this first part of the plan well.
- We cut \$800 million in O&M expenses and reduced fuel costs by over \$1 billion – for a total of nearly \$2 billion in savings.
- As we move into the second half of our plan, the next five years will focus on debt reduction.
- Reducing debt is important, because debt-servicing costs are part of our rates. If we reduce debt, we can lower rates.
- In the next two years, having a clearer picture of the current plan's results and trajectory, TVA will begin working with customers on an update to the long-range financial plan using a transparent and collaborative process.

Muscle Shoals Redevelopment

Auction Marketing Activities

- The TVA board of directors has declared 1,000 acres of the Muscle Shoals Reservation to be surplus to TVA's needs and has authorized the sale of this property to allow private use and redevelopment.
- In keeping with the TVA Act of 1933, TVA is marketing the property for auction and expects to sell the property as market conditions warrant.
 - The minimum bid will be set at \$3.6 million. This value is expected to place the property in a favorable position with potential bidders.
- TVA has engaged CBRE real estate services to market approximately 900 acres of surplus property located on the Muscle Shoals Reservation.
- CBRE began marketing activities in March 2017.
- Upon a qualified, prospective purchaser being obtained, an auction would be scheduled for August 2017. Information on how to qualify to bid will be made available closer to when an auction date has been scheduled.
 - CBRE will use email blasts, a special web site (muscleshoalscbre.com), and place signage on the property for marketing purposes. Additionally, ads will be run in the local paper advertising the sale and future auction of the property.
- The property will be sold to the qualified bidder offering the highest bid.
 - Two parcels totaling approximately 12 acres were previously auctioned in August 2015 – the TVA Community Credit Union property and a flood control levee to the City of Muscle Shoals.
- The winning bidder will be required to execute a sales contract that outlines the terms and conditions for closing on the property. Closing will be contingent upon a future release by the Alabama Department of Environmental Management from an existing environmental permit.

Preparatory Work

- TVA is developing plans to relocate the Customer and Transmission Service Centers from the sale. Different relocation scenarios are being evaluated.
- TVA has worked with the Northwest Alabama Cooperative District to develop a comprehensive master plan for the land, and with Muscle Shoals and Sheffield to adopt Governance and Management Plans for adoption by the cooperative district.
- TVA also requested and obtained annexation into the corporate city limits of Muscle Shoals and Sheffield for the land.

TVA Auction Process

- The TVA Act requires that TVA publicly advertise the auction sale of any property before it is sold.
- When TVA property is sold at an auction, a sales contract is signed by the winning bidder which outlines the terms and conditions of closing on the property.

Nuclear

- TVA is committed to the safe operation of our nuclear plants and excellent performance throughout the nuclear program.
- TVA nuclear plants are a key source of safe, reliable, low-cost, and clean electricity for the Valley, meeting the electric needs of more than 4.5 million homes.
- Watts Bar Nuclear Plant Unit 2 officially entered commercial operation Oct. 19, being brought online the right way – safely and with quality.
- TVA’s Integrated Resource Plan indicates that TVA will not need an additional large generating plant for the next 20 years.
- As a result, TVA auctioned the Bellefonte site Nov. 14 near Hollywood, Alabama, so the property can be put to better use for the area.
- TVA also is exploring the development of small modular reactors. This technology may offer potential improvements in safety and security, reduced construction time, less capital expenditure, and lower financing costs than larger reactors.

Capacity

- TVA is experienced at managing multi-unit sites and has successfully transitioned to dual-unit operation of its Watts Bar Nuclear Plant. TVA received the operating license from the NRC on Oct. 22, 2015.
- The unit is the first nuclear generation of the 21st Century in the U.S., producing low-cost and carbon-free electricity.
- TVA remains interested in the potential future construction and operation of multiple small modular reactors at the Clinch River site in Oak Ridge, Tennessee.
- TVA also has notified the Nuclear Regulatory Commission of its decision to suspend development of Bellefonte Nuclear Plant. This supports alignment with Integrated Resource Plan assessments of no immediate need for additional baseload generation sources.
- The TVA board of directors has voted to change the status of Bellefonte to TVA surplus property. TVA is following its standard surplus property disposal process and will be selling the 1,600-acre Bellefonte site at public auction to qualified bidders.

Overall Performance

- TVA is committed to nuclear power as a key source of low-cost, carbon-free electricity in a balanced generating mix.
- Safe operation of our nuclear plants is TVA’s top priority and fulfills a commitment to protect the health and safety of the public.
- With improved operations, all TVA nuclear units are under normal regulatory oversight.
- Our goal is to build on the improvements we’ve made and accept nothing less than operational excellence in all our nuclear units.
- We appreciate the dedicated efforts of employees to ensure safety and improve performance.

Ocoee and Recreation Interests

- TVA understands the importance of the Ocoee River and its impact on economic development to the local community. Economic development is a key part of TVA's mission.
- Whitewater Recreation on the Ocoee River is poised to continue for the foreseeable future under a new partnership between the Ocoee River Outfitter Association, state of Tennessee, US Forest Service and TVA. The groups are working together to ensure that whitewater rafting continues into 2019 and beyond.
- The partnership recognizes the Ocoee region as a major destination for river rafters and outdoor enthusiasts from around the world that provides an economic engine for the region. In 2012, visitor spending related to whitewater rafting trips on the Ocoee River generated approximately \$43.83 million in economic activity (University of Tennessee, 2012 Study).
- The region benefits from an estimated 600 jobs, and \$3.57 million annually in state, federal and local taxes per year across the 30-county region as a result of visitor spending on whitewater rafting on the Ocoee River (University of Tennessee, 2012 Study).
- TVA is conducting an environmental review that includes opportunities for public input and comment.

Legislation Details

- To support the new partnership and to ensure recreational use of the Ocoee for years to come, Tennessee Governor Bill Haslam on May 17 signed legislation passed by the Tennessee General Assembly to establish the Ocoee River Recreational and Economic Development Fund.
- This legislation builds a new infrastructure to help promote the recreational use of Tennessee's world famous Ocoee River. The measure updates interagency agreements and a commercial-use permitting program administered by Tennessee State Parks.
- This legislation gives the Tennessee Department of Environment and Conservation (TDEC) full regulatory authority over the Ocoee River Management Zone to encourage economic growth and to support recreational water releases. The Ocoee River Management Zone formerly was owned by TVA and the U.S. Forest Service, with management provided by the TDEC through agreements with the agencies.
- This legislation creates the Ocoee River Recreation and Economic Development Fund (ORREDF). The fund supports management of the area by the Tennessee State Parks, with commercial outfitters paying a portion of the revenues generated to cover the state's expenses such as site maintenance, emergency response, law enforcement and traffic management.
- ORREDF simplifies the business environment for rafting businesses by consolidating three existing fees owed by Polk County, TDEC and TVA into one management fee that will be paid into the trust fund created by the legislation.
- The bill also establishes an 11-member ORREDF board made up of interested parties in Southeast Tennessee, as well as state government, to allocate money from the fund to reimburse TDEC for management, build new infrastructure and to promote the region.

Background

- The Ocoee River, which is recognized by outdoor enthusiasts as one of the best whitewater rafting locations in the world, was the kayaking venue for the 1996 Summer Olympics based in Atlanta, Georgia.
- The whitewater industry generates about \$44 million in economic activity to the Southeast Tennessee area according to a study conducted by the University of Tennessee five years ago (2012).
- In 1983, Congress passed a law enabling a contract between the state of Tennessee and TVA to provide reliable recreational releases from the Ocoee No. 2 Power Project for 116 days per year. That contract will expire in March 2019, with the last recreational release in October 2018.

Pickwick Landing Dam

Also see Dam Safety, Page 16

- TVA has issued a draft Environmental Assessment that proposes how it will strengthen the dam to lessen potential harm in case of a severe earthquake.
- Upgrades will be made to both the upstream and downstream sides of the earthen embankment. Berms will be constructed along the toe of each side of the embankment and areas of extended fill would be placed in select locations.
- TVA does not propose to change its operation of the reservoir during construction (i.e., lake levels would continue to follow the existing seasonal patterns).
- Construction is planned to start in late 2017 and end in late 2021.
- TVA has a long history of operating our dams across the Valley. They have performed well.
- TVA is in the process of evaluating its 49 dams to collect information about the overall health of the dams, including seismic stability.
- The analysis at Pickwick Landing showed that, in a large seismic event, the south embankment dam has the potential for significant damage, such that the Dam Safety team determined it is necessary to take immediate action to mitigate the risks to the public downstream.
- TVA installed an early warning system to notify downstream-residents in the unlikely event of an earthquake that is large enough to damage the dam's south earthen embankment.
- TVA also worked with local Emergency Management Agencies, media and other stakeholders to raise awareness of the alert system and educate the Pickwick community, using informational materials, public meetings and exhibits at local venues.

Additional Information

- The concrete portion of the dam was evaluated in 2015. No concrete dam in the U.S. has failed in a seismic event. Downstream risks in the unlikely event of an earthquake are limited to the few miles downstream of Pickwick Dam and do not include Savannah, Tennessee. Flooding at Savannah would be similar to previous floods.

Rates

- The TVA Act calls for power rates that are to be as low as feasible while providing sufficient revenue to operate the business safely and efficiently.
- This includes paying for the costs of operations, maintenance and administration of TVA's power system; the service on TVA's debt; TVA's tax equivalent payments to states and counties; and TVA's provisions for reserve funds and other operations.

2017 Rate Change Letter

- TVA began working with local power companies on its long-term pricing strategy, the Strategic Pricing Plan, in the fall of 2013.
- Since that time, TVA has collaborated with our local power company partners to refine the details of that strategy.
- We implemented a rate change in 2015 to better align rates with the actual costs of producing power.
- We are continuing to focus on that alignment with a rate change recommendation expected to go before the TVA board in February 2018.
- This rate change will modify how TVA structures its rates, but will be revenue neutral to TVA – meaning we will not collect additional funds through this process. We are simply changing how we calculate rates to better reflect energy costs.
- For local power companies, the rate change is expected to have minimal impacts. However, there may be minor increases or decreases in monthly bills compared to current rates.
- TVA will help customers understand and plan for any such changes.
- The 2018 rate change letter will be posted online Aug. 9, 2017.
- TVA will incorporate local power company feedback into its final rate change proposal before taking it to the TVA board in February 2018.
- If approved, the rate change will be effective Oct. 1, 2018.

Consumers' Power Bills

- TVA's goal is to generate electricity with the right fuel, at the right time and at the lowest-possible cost for LPCs that distribute electricity to the more than 9 million people who live and work in the Valley.
- TVA understands the cost of electricity affects everyone, especially when the weather is extremely hot or extremely cold.
- Having low-cost electricity is important, which is why TVA continually works to keep its power rates among the lowest in the nation.
- The price of fuels that TVA uses to produce electricity rises and falls because of factors such as weather, regional and global economic conditions, and supply and demand.
- But, despite the reason for fuel cost fluctuations, we work hard to manage fuel expenses and we take advantage of TVA's diverse generation portfolio to provide the power our local power company and direct-serve customers need in the most cost-efficient way possible.
- TVA also offers a number of programs to help consumers to wisely use energy. Information about these programs, and general tips for reducing energy use, is provided on TVA's website at www.energyright.com.

Industrial Power Rates

- Our goal at TVA is to help attract and retain jobs in the region through competitively priced energy, innovative energy solutions and exceptional service.
- TVA's competitive industrial rates are a primary tool for attracting jobs to the region and keeping them here for the 9 million people of the Valley.
- We understand the importance to companies' ability to manage the costs of their manufacturing operations. That's why we're committed to keeping electricity rates competitive and providing reliable power from a diverse generation mix.
- TVA's average industrial rates are in the top (best) quartile, making TVA rates some of the lowest among the Top-100 utilities in the country and TVA's regional peers.
- A modest rate adjustment for fiscal year 2017 supports TVA's long-range financial plan, which helps ensure safe, clean, reliable power for the region.
- The modest rate adjustment aligns with customers' desire for smaller and more predictable adjustments. This increase is, on average, less than the rate of inflation.
- Our commitment to affordable and competitive rates also is why we have programs to encourage qualifying companies to make long-term commitments to stay and invest in the Valley region. This strategy retains and adds quality jobs in our local and regional economies.

Strategic Pricing Plan

- The Strategic Pricing Plan is a collaborative effort by TVA, local power companies, the Tennessee Valley Public Power Association, and the Tennessee Valley Industrial Committee to provide clear, long-term direction for power rates.
- These groups worked together to develop rate structure changes that ensure fair and competitive rates for the region's industries and the 9 million residents of the Valley.
- One goal of the Strategic Pricing Plan is to ensure competitive industrial rates, which help attract investment and jobs to the Valley.

Recreation – Economic Value

- Recreation is one of many benefits to the region from TVA's operation of the Tennessee River system.
- Recreation also is an important factor in the region's economy.
- University of Tennessee researchers assessed the economic value of recreation made possible by the 49 TVA reservoirs across the Valley.
- The researchers conducted detailed surveys of three reservoirs that provide a cross-section of the system.
- Extrapolated to the entire reservoir system, the data suggests that spending by property owners and those who use the reservoirs has an economic impact of almost \$12 billion a year.
- It also generates almost a billion dollars in state and local taxes each year, and it creates more than 130,000 jobs.
- On average, the nearly \$12 billion amounts to a million dollars of economic activity each year for every mile of shoreline along the Tennessee River and the tributaries.

River System Operations

- Flood control was one of the priorities TVA was created to address in 1933; and flood control continues to be a critical TVA responsibility, as recent conditions have shown.
- TVA works with the Corps of Engineers and other river management teams to reduce flood risk and ensure the safe movement of water through the Tennessee River system into the Ohio and Mississippi river systems.
- When flooding is likely, TVA holds back as much water as possible to reduce the downstream flood crest. This helps protect public safety and reduce property damage, although not all flooding can be eliminated.
- TVA's River Forecast Center is staffed 24/7 to manage the entire river system, according to established policies, to provide multiple benefits to the Valley.
- The River Forecast Team works to ensure continued flood control, river navigation, and water quality while also supporting the recreation and economic development value of our 49 reservoirs.

Role of Regulator

- TVA is charged with the regulatory responsibility and oversight of the 154 local power companies (LPCs) that it serves.
- At the request of the TVA board of directors, TVA completed a comprehensive review of key regulatory areas to clarify and update TVA's regulatory model that:
 - Enhanced the process in which TVA conducts a review of LPCs' local rate adjustment requests,
 - Clarified guidance on the appropriate use of electric system revenue; and
 - Updated the framework for LPCs' service practice policies for deposits, termination of service, billing and information to consumers to provide alignment and consistency across the Valley.

Complaint Resolution Process

- TVA has addressed ratepayer complaints for many years. However, there are opportunities to improve the current process to make it more transparent to LPCs, ratepayers and other regulatory entities.
- After conducting a benchmark review of regulatory entities with complaint-resolution processes, TVA and Mississippi LPCs worked together to develop a refined process that is currently being piloted.
- Refinements to the process include multiple avenues for filing a complaint and an online system to track complaints and provide reporting.
- A Valley-wide process, expected to be implemented in calendar year 2017, will be developed using results of the pilot.

Pole Attachments

- TVA regulates rates that local power companies charge to ensure local systems operate for the benefit of electric system ratepayers while keeping power rates as low as feasible.
- Because outside companies that offer cable, broadband, telephone and other information services are interested in attaching their wires to power poles owned by local utilities, in 2016 the TVA board of directors approved a methodology for pole attachment fees to ensure fair treatment of electric system ratepayers.
 - The total cost of pole ownership is to be allocated to attaching parties, based on the space needed. Each party shares in the cost and maintenance of the poles.
 - This means ratepayers don't subsidize third parties that use LPC assets.
- TVA has established a maximum valley pole attachment rate of \$36 for a one-foot attacher that LPCs may charge attaching parties. This rate was based on an analysis of all 154 LPCs pole rates using a standard 50 percent depreciation rate.
 - LPCs will continue to use actual data; including actual depreciation. However, the LPC calculated rate will be subject to the established maximum rate.
- This approach uses fair and reasonable measures to mitigate the impact of TVA's full cost recovery methodology on some LPCs and normalize depreciation for the assets.
- TVA may modify this approach and/or take other reasonable measures to ensure an accurate approach and effective accounting for LPC rates.

Shawnee Fossil Plant

Clean Air Equipment

- TVA's board of directors voted Dec. 30, 2014, to install environmental controls on units 1 and 4 at TVA's [Shawnee Fossil Plant](#) near Paducah, Kentucky. Units 2 and 3, and units 5 through 9, already have sufficient controls to meet Environmental Protection Agency regulatory clean air standards and are not affected by this decision.
- The environmental controls will reduce NO_x emissions by approximately 90 percent and SO₂ emissions by approximately 96 percent.
- Installation of the controls on units 1 and 4 will assist TVA in fulfilling its [air quality goals and commitments](#), while also meeting electricity demand and minimizing costs to TVA customers. The additional controls, which will reduce nitrogen oxide and sulfur dioxide emissions, will be installed before Dec. 31, 2017, at an estimated cost of \$185 million to \$215 million. A more accurate budget estimate will be available once design work is complete.
- Selective Catalytic Reduction (SCR) systems reduce nitrogen oxide (NO_x) emissions and scrubbers reduce sulfur dioxide (SO₂) emissions. Without the environmental controls, Shawnee units 1 and 4 would need to be retired.
- Initial engineering indicates controls could be configured to fit within the footprint of the existing plant infrastructure and avoid the potential for impacts on most natural resources.

Additional Information

- The environmental control units are part of TVA's agreement with the Environmental Protection Agency and a consent decree with the states of Kentucky, Tennessee, Alabama and North Carolina, and three environmental advocacy groups, including the Sierra Club.
- More than 175 full-time contract workers are employed currently on the construction site. That's in addition to the more than 250 full-time TVA employees who run the plant.
- Units 1 and 4 each generate 134 MW. All nine Shawnee units have a total generating capacity of 1,206 MW. Units 2, 3 and 5-9 are not affected by this project.
- Shawnee's relatively small units provide flexibility to the overall power system because they can more easily serve load when demand fluctuates.
- Coal remains an important part of TVA's overall generation mix.

Small Modular Reactors

- TVA is [committed to nuclear power](#) as a key source of low-cost, carbon-free electricity within a balanced energy generation mix.
- Small modular reactors, or SMRs, are a next-generation nuclear technology with potential for improved safety and increased flexibility in terms of deployment timing and locations.
- Supporting SMR development is consistent with TVA's technology innovation mission.
- TVA continues to work with the Department of Energy and is in discussions to determine the path forward that is best for the people of the Tennessee Valley.
- TVA submitted an early site permit application to the Nuclear Regulatory Commission on May 12, 2016, for potential future construction and operation of multiple SMR units at its Clinch River Site in Oak Ridge, Tennessee.
- An early site permit application addresses site safety, environmental and emergency preparedness requirements common to any proposed SMR design and would be valid for up to 20 years.
- The project has a great deal of flexibility at this early stage and, by moving forward with an early site permit application, TVA will be ready to implement whatever decision is in the best interests of those we serve.

Stakeholder Relations

- As we work to carry out TVA's mission, we want to hear and understand the diverse views and priorities of people across the region.
- TVA's board of directors established two formal advisory groups – the Regional Energy Resource Council to gather input on energy issues, and the Regional Resource Stewardship Council for perspective on natural resource stewardship proposals.
- These groups include TVA customers, environmental interests, economic developers, consumers, business and community interests, and the academic community.
- TVA has reached out to others who can provide perspectives on specific projects, such as the Integrated Resource Plan working group and the renewable and energy efficiency information exchanges.
- TVA appreciates stakeholder participation and insight.

Glasgow EPB

- TVA has regulatory responsibility and oversight of the 154 local power companies it serves.
- Section 10 of the TVA Act authorizes the TVA board of directors to regulate local power companies in carrying out the purposes of the Act through contract terms and conditions, and rules and regulations.
- We also have responsibility to listen to all of the residents of the Valley.
- The electric power industry is undergoing significant change. TVA and its customers are responding to these changes by partnering together to define the long-term direction for rates and pricing in the Valley.
- To help TVA's customers make more informed decisions on energy usage and lower their monthly bills, which can lower the overall cost of serving the Valley, the TVA board approved changes to the wholesale rate structure in October 2015 to more accurately reflect how costs are incurred at different times of the day and year.
- Glasgow Electric Plant Board (EPB) recently implemented changes to their retail rates to effectively pass through the wholesale cost of power from TVA. We stand by the decision to support that rate request. However, we do recognize these changes have impacted all customers differently, and, although justified in aggregate, the fairness of these changes may depend on an individual customer's perspective.
- On Monday, Aug. 22, 2016, the Glasgow EPB board requested an alternative rate design and, at their meeting on Sept. 27, the Glasgow EPB board of directors approved an alternative rate structure.
- The rate structure was formally submitted to TVA for review and, as we committed, we expedited the review process. The alternative rate structure was approved and documentation put in place to allow GEPB to begin offering it to consumers on Oct. 1.

Legal Relationship with Glasgow EPB

- One of the primary objectives of the TVA Act of 1933 is for power to be sold at rates as low as feasible. As of January 2016, TVA's average price of electricity ranks 35th in the top 100 utilities across the country, with average Valley residential rates among the lowest in the nation.
- Since 1960, Glasgow Electric Plant Board has had an electric service supply contract with TVA. A provision of this contract is TVA's regulatory authority over retail rates for Glasgow EPB customers – meaning, it is TVA's role as regulator to ensure that retail rates reflect the cost to produce and deliver power, and are shared fairly and equitably among all customers.
- In January 2016, Glasgow EPB changed their rate structure to provide consumers the opportunity to achieve electric bill savings.
- This included Glasgow EPB's investment in metering and communications systems that enable more accurate pricing of electricity.
- An integral part of these and future changes is to better align rates with the underlying cost of supplying electricity. Much of TVA's and Glasgow EPB's costs are fixed; like most delivery companies, Glasgow has increased their customer charges to be less dependent on energy sales.
- From a regulatory perspective, Glasgow EPB's rates are:
 - Based on the cost to produce and deliver electricity
 - Reflective of the wholesale rates charged by TVA
 - Being administered consistently to all customers
- Other local power companies inside and outside the Tennessee Valley are also implementing new retail rates in response to changes in the electric power industry.

TVA anticipates that local power companies delivering TVA power will continue to adjust their rates to offer customers an opportunity to better control their electric bills.

Supplier Diversity

- Delivering on TVA's mission of service is best achieved when welcoming a diversity of thought, background and experience. That's why we value diversity in our employees and everyone we work with, including suppliers.
- In seeking to do business with firms that offer exceptional products and services at competitive prices, we welcome businesses of all types – small, minority-owned, woman-owned, veteran-owned, service-disabled veteran-owned, and those located in historically underutilized business (HUB) zones, among others.
- TVA's goal is to maintain a competitive, diverse supplier base that is reflective of the Tennessee Valley region.
- Some of the ways we work to fulfill our diversity commitment include:
 - Inviting small and diverse businesses to participate in competitive bidding opportunities
 - Promoting partnerships and subcontracting relationships to aid business development
 - Offering small and diverse businesses support services, including guidance through the inquiry and bid process
 - Encouraging our large prime suppliers to mirror TVA's diversity commitment
 - Engaging in outreach initiatives to identify suppliers, including building partnerships with business development organizations, government agencies, distributor partners and congressional offices
- TVA actively sets and tracks our supplier diversity goals, and works to ensure small, diverse businesses participate in TVA direct-contract and subcontracting opportunities.
- Of the total amount of money that TVA spent with suppliers in fiscal year 2016:
 - Small businesses – 26.3 percent (\$1.05 billion)
 - Diverse businesses – 11 percent (\$439 million)
 - Valley businesses – 79 percent (\$3.2 billion)
- In fiscal year 2017, TVA's goals for supplier-spending are:
 - Small businesses – 26.5 percent
 - Diverse businesses – 11 percent
 - Valley businesses – 80 percent
- Companies interested in providing materials or services to TVA should register on the [TVA Supplier Connections Portal](http://supplier.tva.gov/) (http://supplier.tva.gov/). More information about supplier opportunities is available by clicking the "[Doing Business with TVA](#)" link on the TVA webpage (www.tva.gov).

Tax Equivalent Payments

- TVA pays 5 percent of its gross proceeds from the sale of power to the states and counties where it carries out power operations or has power property previously subject to state and local taxes.
- TVA's tax equivalent payments for fiscal year 2017 are based on revenues from 2016 and are estimated to total about \$517 million.
- Payments are made to the seven TVA states and Illinois, where TVA has coal reserves. The amount each state receives is based on the proportion of TVA power sales and power assets in that state.
- The payments are redistributed by the states under their own formulas; TVA has no role in how states and counties redistribute their payments.
- Payments help fund many state and local government initiatives, including schools, fire departments, other emergency response agencies, community investments in tourism and recreation, and human service organizations.

Additional Information

- For fiscal years 2016 and 2015, tax equivalency payments were:

State	2016	2015
Alabama	\$94,212,514	\$102,627,153
Georgia	\$8,905,128	\$9,105,551
Illinois	\$401,132	\$433,599
Kentucky	\$35,058,929	\$32,438,527
Mississippi	\$40,327,128	\$39,132,192
North Carolina	\$2,834,666	\$2,953,884
Tennessee	\$351,819,427	\$353,978,314
Virginia	\$1,283,622	\$1,327,893
Total	\$534,842,546	\$541,997,113

Transmission Reliability*

Also see Grid Stability, Page 20; Solar Energy Transmission, Page 22

- The region's economy runs on electricity and TVA ensures power is delivered safely, reliably and efficiently.
- TVA employees work year-round to help ensure that generating plants operate safely and reliably to meet the region's power needs, even in extreme weather.
- Since 2000, TVA customers have enjoyed 99.999 percent reliability in power delivery.
- TVA also strives to be a good neighbor to Valley residents. TVA, working with local power companies, invests in improvements in the transmission system to ensure it remains safe, secure and reliable.
- Vegetation management is part of what it takes to deliver electricity safely and reliably.
- We keep transmission rights-of-way clear to keep people safe, and to help ensure reliable service.
- And, TVA employees conduct thorough environmental reviews, communicate project information, and seek public input while performing work necessary to provide safe, reliable energy at rates as low as feasible.

Geomagnetic Disturbances*

- TVA takes geomagnetic disturbances and electromagnetic pulses seriously. TVA is fully compliant with regulatory standards and continues to work with industry entities on additional mitigations/solutions.
- TVA has completed a geomagnetic disturbance risk analysis and replaced susceptible equipment.
- TVA has procedures in place to maintain system reliability for when we receive advance notification of a storm by the National Oceanic and Atmospheric Administration, or NOAA. These procedures, which are continually enhanced as knowledge is developed from industry research, will provide graduated responses to all levels of storms.
- TVA actively works to help mitigate impacts with industry partners Electric Power Research Institute, or EPRI; other utilities; Department of Energy; and, the Energy Industries Council.

Vegetation Management

- Vegetation management is part of what it takes to deliver electricity safely and reliable.
- We keep [transmission](#) rights-of-way clear to keep people safe, and to help ensure service reliability to our customers.
- Grasses and non-woody shrubs are permitted below transmission lines, and low-growing vegetation is permitted in the border zone between the power lines and the edge of the right of way.
- Between May and September, TVA uses EPA-approved herbicides on woody vegetation (not grasses or shrubs) in the rights-of-way to allow more compatible species to become established near power lines.
 - In the spring, property owners along rights of way that are scheduled for herbicide treatment that summer will be notified by mail.

Vegetation Management Program Environmental Review

- To ensure TVA manages its transmission rights of way in the safest possible manner and that electric service is not disrupted by outages on its transmission lines, TVA must control the vegetation on its transmission rights-of-way.
- TVA is developing an Environmental Impact Statement to examine the potential environmental impacts of various vegetation management practices along its transmission line right of way.
- TVA expects to issue a draft EIS during the summer 2018 and will seek public comment.
- For more information about the study, please see <http://www.TVA.com/nepa>.
- TVA anticipates studying several alternatives, including:
 - Continue current practices (no action alternative), where TVA's ROW management personnel have discretion to manage the risk associated with vegetation growth that otherwise would be cleared;
 - Integrated vegetation management (IVM) practices with a wire zone / border zone approach, where TVA sets objectives, identifies compatible and incompatible vegetation, and implements the most appropriate methods to achieve the established objectives; and
 - A border-to-border approach where TVA would remove all vegetation except the low-growing vegetation for the width of the easement (both wire and border zones), subject to the availability of financial resources. TVA ROWs would take on the appearance and characteristics of natural meadows, which promote flowering by keeping woody stem counts low.

NOTE: The wire zone is the area directly under the transmission line and between the outermost conductors. The border zone is the area between the wire zone and the edge of the right of way.

- TVA will draft an Environmental Impact Statement that will be released for public comment. TVA expects the draft to be available in 2018 and anticipates holding public meetings.
- TVA plans to follow current vegetation management practices until the environmental review is completed, unless otherwise mandated by the district court.

Vegetation Management Lawsuit

- On March 1, 2017, TVA filed a motion in U.S. District Court for the Eastern District of Tennessee (Knoxville) consenting to a judgment in the plaintiffs' favor in *Sherwood v. TVA*.
- TVA would consent to a judgment stating that TVA's implementation of the 15-foot rule "violated the National Environmental Policy Act," or NEPA.
- It was never TVA's intent to violate NEPA requirements; however we recognize that the appropriate environmental review was not conducted.
- Although TVA voluntarily suspended the use of the 15-foot rule in December of 2014, TVA would also consent to an injunction precluding further implementation of the 15-foot rule until it prepares and publishes an EIS.
- In order to facilitate resolution of this litigation, TVA will prepare a programmatic EIS to address the management of vegetation on TVA's more than 16,000 miles of transmission line. TVA filed a Notice of Intent to conduct an EIS on January 23, 2017.
- It is always TVA's intent to ensure public safety and be good stewards of the environment and we will continue to maintain transmission rights of way in a safe, reliable, responsible manner.
- On July 31, 2017, the court issued an Injunction Order that outlines the vegetation maintenance practices that TVA will adhere to until the EIS is completed. A copy of the Injunction is available at tva.com/row.
- TVA will implement the vegetation management practices contained in the injunction while the vegetation management EIS is in progress. The EIS is scheduled to be completed in spring 2019.

TVA

Overarching Messages

- TVA strives to be a trusted public partner as we carry out our mission of service to make life better in the Tennessee Valley region.
- TVA is working to keep its power rates among the lowest in the nation.
 - We are making sound investments in a diversified portfolio so the region's power supply is reliable, cleaner and at the lowest feasible cost to consumers.
 - We are stewards of the region's natural resources, and we help bring jobs here to make the Tennessee Valley a better place to live.
- We work closely with customers, and we value public participation and input as we work to serve the region with reliable, low-cost and cleaner energy.
- TVA has a strong sustainable environmental track record. We expect air emissions to continue to decline, especially carbon dioxide, which is anticipated to drop 40 percent below 2005 levels by 2020.

FY2016 Performance

- TVA's mission is to serve the people of the Tennessee Valley region to make life better. In fiscal year 2016:
 - Fuel and purchased-power expense was below budget and \$300 million less than FY 2015.
 - Rates continued to become more competitive, with industrial rates at top quartile.
 - TVA invested almost \$3 billion in the power system while increasing debt less than \$100 million.
 - Performance improved across the generating fleet, and Watts Bar Nuclear Plant Unit 2 prepared for commercial operation.
 - Reliability in delivering energy to customers reached 99.999 percent for the 17th consecutive year.
 - Air quality continued to improve; carbon emissions were down 30 percent from 2005 levels.
 - TVA and partners in economic development attracted or retained more than 72,000 jobs and \$8.3 billion in capital investment in the region.

FY 2017 Performance YTD

- Financial results so far this fiscal year show that TVA continues to operate more efficiently and keep power rates low.
- TVA's overall effective power rate is 5 percent below the FY2012 level.
- Net income for the first two quarters of FY2017 was \$313 million. This was \$32 million, or 11 percent, higher than in the same period last year.
- Operating revenues for the first two quarters of the year were \$242 million, or 5 percent higher than in the same period last year.
- Operating and maintenance expenses were flat, as was interest expense.
- With mild winter weather, sales were down about 7 percent in the second quarter, compared to the same period last year.
- TVA's more diverse generation fleet is helping TVA to provide low-cost energy in a reliable and efficient manner.

Board Governance

- Bylaws of the TVA board of directors ensure the board can continue to work effectively as directors' terms end and new directors join the board.
- In keeping with its bylaws, the board in February elected Richard Howorth of Oxford, Mississippi, as chair. He assumed chair duties May 19, 2017, and will serve as chair of the board of directors for the next two years.
- Chair Howorth's selection helps ensure continuity as new members become acclimated to their policy role and learn more about the mission and work of TVA.
- The term of former chair V. Lynn Evans ended May 18, 2017. She will continue to serve as a member of the board until a successor is confirmed by the U.S. Senate, or until Congress adjourns at the end of the calendar year.
- The board of directors has nine members. Each director is nominated by the president of the United States for a term of up to five years, upon confirmation by the U.S. Senate.
- Up to five new members could be named to the board by the end of 2017.
- Lynn Evans succeeded Chair Joe Ritch, who completed his term on the board in early January, as did directors Pete Mahurin and Mike McWherter.
- Director Howorth joined the board in 2011 and began his second term in December 2015. During his time on the board, he has served on all five board committees – External Relations, People and Performance, Nuclear Oversight, Finance, Rates and Portfolio and Audit, and Risk and Regulation.

Board Vacancies

- The Section 2 of the TVA Act specifies board operation during vacancies:
 - IN GENERAL– A member of the Board shall serve a term of 5 years. A member of the Board whose term has expired may continue to serve after the member's term has expired until the date on which a successor takes office, except that the member shall not serve beyond the end of the session of Congress in which the term of the member expires.
 - VACANCIES – A member appointed to fill a vacancy on the Board occurring before the expiration of the term for which the predecessor of the member was appointed shall be appointed for the remainder of that term.
 - QUORUM – IN GENERAL – Five of the members of the Board shall constitute a quorum for the transaction of business.
 - QUORUM – VACANCIES – A vacancy on the Board shall not impair the power of the Board to act.
- Board By-laws:
 - Section 1.5 Quorum; Vote Required for Action. In accordance with the provisions of Section 2(e) of the TVA Act, five of the members of the Board shall constitute a quorum for the transaction of business. Except as otherwise provided in these Bylaws or required by law, the vote of a majority of the members either physically present or participating by remote attendance in accordance with Section 1.4 of these Bylaws shall be the act of the Board of Directors.
 - Section 1.6 Vacancies. In the event that vacancies cause the Board to have fewer than five members for any period of time, during any such period of time the members in office may, as a Board without a quorum, continue to exercise those powers of the Board which are necessary to assure continuity of operations of the Corporation along the lines established while the Corporation was guided by a quorum of the Board, but shall not have the authority to direct the Corporation into new areas of activity, to embark on new programs, or to change the Corporation's existing direction.

Executive Compensation

- TVA pays for performance that helps achieve its mission of service to the Valley.
- Competitive, performance-based pay is essential to attracting and retaining a diverse, talented workforce that enables TVA to deliver reliable, affordable energy.
- The TVA Act specifies pay be based on prevailing compensation for similar positions, in the public and private sectors, and that it consider education, experience, recruitment needs and other factors.
- TVA targets most executive pay at the market median; some highly specialized executive positions may be targeted at a higher level.
- The TVA board uses an independent compensation firm for comparative data on compensation for the CEO and executives reporting to the CEO.
- Benchmarking for other positions is managed by the TVA Compensation & Benefits staff.
- Like programs at other utilities, Winning Performance is at-risk, performance-based incentive pay that employees earn by achieving goals aligned to TVA's mission.

Executive Order to Reorganize the Executive Branch of the Federal Government*

- As a corporate agency of the United States, TVA has a responsibility to support Executive Branch actions.
- On April 12, 2017, the Office of Management and Budget (OMB) issued a memorandum to federal agencies regarding the hiring freeze Presidential memorandum issued in January, and the executive order to reorganize the executive branch issued in March.
 - In March 2017 President Donald Trump issued a directive instructing the Office of Management and Budget to develop a comprehensive plan to reorganize the executive branch.
 - That Executive Order directs the heads of each federal agency in the executive branch to provide to OMB a proposed plan for their agency to “improve efficiency, effectiveness, and accountability,” including possible reorganization if considered appropriate, within 180 days.
- The most-recent OMB memorandum provides guidance on fulfilling the requirements of these executive orders while also aligning those initiatives with the federal budget and performance-planning processes.
- We have a good story to tell – we have a long-term financial plan and have seen results from working that plan - we've reduced O&M spending by \$800 million and fuel costs by \$1 billion, kept power rates low and increased capital investments in our assets while holding debt flat.
- In June, we submitted a summary of our draft Agency Reform Plan and our Plan to Maximize Employee Performance to OMB.
- We will submit the full Agency Reform Plan to OMB in September.

Knoxville Office Complex – Potential Sale

- TVA announced June 8, 2017, that Knoxville operations will remain in the Knoxville Office Complex West Tower.

- TVA previously had announced (2016) it would evaluate an option to sell the KOC and Summer Place Complex, and lease a build-to-suit building on the Summer Place Complex location.
- Upon review, TVA has determined the build-to-suit option is not in the company's best interest. As a result, TVA plans to remain in the KOC and consolidate, as feasible, functions and employees in the area.
- TVA is developing a detailed project plan to consolidate functions and employees from the East Tower and Knoxville region into the West Tower of the KOC.
- The areas expected to be included in this plan are the KOC, Summer Place Complex and other offices within a 50-mile radius of Knoxville, including the Singleton, Greenway, Lenoir City, Norris Walnut Orchard and Norris Engineering Lab facilities.
- These decisions are subject to completing the appropriate environmental reviews. In September 2016, TVA published a draft environmental assessment discussing the build-to-suit building. TVA will revise the assessment to reflect this new direction as the Agency's preferred alternative. Information gained during the additional environmental review could shape the final decision and project implementation.
- More information will be shared as plans are developed and finalized.
- Additional information is available in the Wednesday, June 7, TVA Today article "[TVA Knoxville operations to remain in KOC West Tower.](#)"

President's Federal Spending Proposal for FY2018

- TVA has a long-range financial plan and is committed to taking the necessary steps to ensure we continue our mission of service to the Tennessee Valley.
- TVA is meeting the plan to date and is on track to fulfill its FY23 commitments and targets.
- On May 23, 2017, President Donald Trump's federal spending proposal included a discussion of TVA's "preliminary budget plan" for FY 2018.
- Information included in the president's budget reflects the TVA board of directors-approved budget for FY17 and its projections for FY18, and is consistent with information TVA has publicly shared.
- The TVA board of directors will approve the FY18 budget in August 2017.

Privatization

- TVA is a corporate agency of the federal government and is subject to the direction of the president and the U.S. Congress. TVA's mission is to improve the lives of those in the Tennessee Valley through a focus on the generation of low-cost, cleaner, reliable energy, environmental stewardship of the public lands and waters we manage, and creating economic development opportunities in partnership with state and local agencies.
- Although a part of the federal government, TVA receives no taxpayer dollars and funds all of its operations, including those associated with non-energy missions, through the sale of electricity.
- TVA remains focused on executing its long-term business plan for improved financial and operational performance.
- This plan was put into place working with the Office of Management and Budget following the OMB's review of TVA that was facilitated by a study conducted by the independent, third-party firm Lazard, which specializes in utility financial and operational matters.
- Since the completion of the OMB review, TVA's financial and operation positions has further improved, including strong performance in FY16:
 - Fuel and purchased power expense was down more than \$300 million in FY 2016 from FY 2015, and below budget.
 - Debt and other financing obligations at the end of 2016 were \$776 million below budget.
 - Invested nearly \$3 billion in the power system in 2016, while debt increased by less than \$100 million.
 - Clean air equipment at Gallatin (Tennessee) and Shawnee (Kentucky) Fossil Plants.
 - New natural gas plants at Paradise (Kentucky) and Allen (Memphis, Tennessee).
 - Watts Bar Unit 2 construction and completion.
 - Browns Ferry Nuclear Plant up-rates.
 - Investments in the transmission system.
 - Industrial rates remained in the top quartile.
 - Improved performance across the generating fleet.
 - Achieved 99.999 percent reliability for the 17th consecutive year.
 - Improved customer loyalty from 67 percent in 2015 to just under 75 percent in 2016.
 - Reduced carbon dioxide (CO₂) emissions by 30 percent from 2005 levels. TVA is on a path to decrease CO₂ by more than 60 percent by 2020.
 - With its partners, TVA attracted and retained more than 72,000 jobs and \$8.3 billion in capital investment.
- We believe the steps taken over the past four years have improved TVA's sustainable financial position without sacrificing its ability to maintain TVA's mission to serve the people of the Tennessee Valley. However, TVA will fully cooperate should an additional review be requested by the Administration or Congress.

Winning Performance

- Like employees at other utilities, TVA employees can earn a performance incentive when they meet or exceed specific, pre-determined business goals.
- Business goals include financial and operational measures, such as power plant performance, transmission reliability, environmental responsibility, and economic development.
- This pay is “at risk,” meaning it must be earned each year. It is awarded only if the goals for that year are met. This encourages all employees to work together.
- Winning Performance measures are tracked on scorecards throughout the year:
 - Corporate Multiplier-measures that track TVA’s overall corporate performance as it aligns with our strategic imperatives
 - Business-measures that track operational performance across TVA at the strategic business unit and business unit levels. This portion of the scorecard is weighted 60 percent for enterprise-wide performance and 40 percent for SBU/BU performance
- At the end of the fiscal year, the TVA board of directors makes a qualitative assessment of TVA’s overall performance, as defined by the Corporate Multiplier-measures and determines a multiplier within a range of 0 to 1. That number, multiplied by a scorecard’s final payout percentage, determines the final award to be paid.
- Fiscal year-end results and Winning Performance payout calculations are audited in October, and the TVA board reviews results and assigns a corporate multiplier at its November board meeting.
- Once audits are completed and Winning Performance is approved, and following the release of TVA’s 10-K, Winning Performance payouts are issued – typically in late November or early December.

Watts Bar Unit 2

- TVA’s Watts Bar Nuclear Plant Unit 2 was shut down Thursday, March 23, 2017. Licensed plant operators took timely and appropriate action and plant safety systems responded as designed. There were no public or nuclear safety concerns at any time and the reactor was placed in a safe, stable condition.
- The shutdown followed an issue with non-nuclear related condenser equipment that supports the Unit 2 turbines.
- We are evaluating the unit’s condenser, a three-story-high heat exchanger, to determine the cause of the shutdown and identify necessary repairs.
- Because of the tight space inside the condenser, the logistics of doing this work must be planned to protect the safety of workers and key equipment components. The unit is expected to return to service this summer
- Watts Bar Unit 2 began commercial operation Oct. 19, 2016, following a comprehensive Power Ascension Testing program to ensure safe, high-quality operation of the plant. The NRC issued the operating license for Unit 2 on Oct. 22, 2015.

Watts Bar Nuclear Plant Work Environment

- TVA remains committed to improving the work environment at Watts Bar Nuclear Plant so that each employee is encouraged, and feels free, to raise nuclear safety and other concerns without fear of retaliation.
- Employees continue to state that they are willing to raise concerns related to nuclear safety, which was noted by the NRC in its inspection report. We appreciate our employees' commitment to nuclear safety, and are working to make sure they understand they are fully supported when it comes to raising safety issues.
- Watts Bar is continuing to work on building and improving trust among employees that if and when they raise any concerns, leaders will respectfully take actions to help resolve the issue.
- Watts Bar's action steps have resulted in some improvement in the work environment, but we have more work to do in building trust across the site. We are listening to employee feedback, and we are very committed to continued improvement.

Watts Bar Nuclear Plant OIG Report

- TVA leadership takes the issue of the work environment at Watts Bar Nuclear Plant very seriously and takes full responsibility for the site's work environment.
- TVA is committed to fostering and sustaining the safety conscious work environment TVA employees deserve and the public expects.
- We have worked with employees to develop corrective actions and have taken more than 100 actions specifically aimed at improving the Watts Bar work environment.
- We do not believe the conclusions of the OIG's report represent the current work culture at Watts Bar.
- The latest NRC report, issued in March, agrees that progress is being made, although the NRC and TVA also agree that TVA still has work to do.
- We are committed to improving the work environment so that it reflects the commitment of our employees to keep safety as their overriding priority.

Additional Information

- On March 22, 2016, TVA requested a public meeting met with the Nuclear Regulatory Commission to provide an update on the Watts Bar work environment.
- On March 23, 2016, the NRC issued TVA a "Chilled Work Environment Letter" that noted the existence of a chilled work environment at Watts Bar.
- On April 22, TVA submitted its response to the NRC, addressing the NRC's inquiries and highlighting current and upcoming actions to improve the work environment across the site.
- The response also included an in-depth assessment of work environment issues
- The safe operation of Watts Bar and all of our facilities is TVA's overriding priority.
- Employees must feel free to raise any concern that helps protect their own safety as well as the public we serve.

Appendix

Clean Water – General

- TVA is responsible for the maintenance of the Tennessee Valley river and reservoir system for the benefit of all stakeholders.
- TVA maintains a robust environmental assessment program at all of our power plants including groundwater, surface water and ecological monitoring.
- Some monitoring activities are voluntary and others are in conjunction with existing permits, but each is conducted to ensure that the area in and around our facilities is protective of people and the environment.
- As regulations change we continue to update and modify our environmental monitoring and assessment activities.
- TVA routinely:
 - Collects and evaluates up-to-date information on water quality and ecological trends;
 - Assesses the causes of and identifies remedies for any pollution;
 - Minimizes downstream impacts of hydroelectric power operations by maintaining minimum flows and aerating reservoir releases;
 - Conducts research on water quality problems and solutions, and demonstrates new and improved management technologies;
 - Analyzes fish tissues collected from TVA reservoirs and major tributary streams for contaminants (such as pesticides and metals.)

Safe Coal Ash Storage

- As our coal plants served customers' needs over the decades, the residual ash was managed in onsite impoundments and landfills.
- TVA is committed to safe and secure CCR management protecting human health and the environment including the adjoining lands, waters and nearby communities.
- TVA is modernizing its CCR management practices, converting to dry storage, and safely closing impoundments and other disposal sites.
- The EPA's CCR Rule dovetails with TVA's existing efforts to close wet CCR facilities and convert them to dry systems across the TVA fleet.
- TVA will continue to monitor groundwater, surface waters and ecosystems for decades to ensure these facilities are safe and protect nearby communities and the environment. Should our efforts fail to protect people and the environment, TVA will fix the issue.
- TVA takes a scientific approach in decisions using groundwater standards as a key guide and conducting risk assessments to ensure public and environmental health and safety.
- TVA will continue to share timely information - good or bad - with the public, our communities and regulators, and to make decisions transparently including stakeholders.
- TVA is committed to ensuring healthy drinking water sources and productive natural environments while we provide low-cost, reliable and cleaner electricity to the TVA region.

General Talking Points

- TVA maintains a robust environmental assessment program, including groundwater, surface water and ecological monitoring, at all our power plants.
- Both long-term monitoring and new monitoring continue to demonstrate healthy and productive waters and lands surrounding our plants sites.
- TVA takes a scientific approach in decisions using groundwater standards as a key guide and conducting risk assessments to ensure public and environmental health and safety.
- TVA has become an expert in coal ash research and management as an outcome of the Kingston ash spill and has shared that knowledge with federal and state regulators.
- According to EPA, the data continues to reflect no adverse effects to the ecological community from the Kingston spill, the ash remaining in the river system or the capped in place closed ash impoundment. The ecosystem is thriving and local groundwater and drinking water was not impacted and there is no measurable risk to human health.
- Years of biological/ecological monitoring adjacent to TVA's plants and the detailed human health and environmental analyses for the Kingston ash spill show no real risks to human health or the environment from TVA's current CCR activities.
- We have a website where the public can monitor the status of our projects; <https://www.tva.com/Environment/Environmental-Stewardship/Coal-Combustion-Residuals>
- In accordance with our permits, TVA inspects as part of routine maintenance its dikes and addresses any evidence of abnormal moisture. We report inspection results to the state.
- We have a sophisticated ash impoundment monitoring center with 7,000 sensors that provide real-time data on stability to our staff.
 - About 35 percent of TVA's annual coal combustion products are repurposed for items such as blasting abrasives, roofing granules, cement and concrete applications and wallboard.
 - Beginning in 2009, TVA adopted a program to convert coal combustion residuals (CCR) management from wet impoundments to dry systems (lined landfills or beneficial reuse). This conversion program provides for the closure of all TVA wet handling facilities by 2022.
 - Since the mid-1990s, TVA has been sampling and reporting groundwater data to the appropriate state agencies. TVA has gone beyond requirements and implemented voluntary monitoring at units where it was not mandatory.
 - The surface water and other site-specific monitoring data show that water quality in the lakes and rivers near TVA power plants are not adversely affected by our ash impoundments.

CCR Rule

Regulations/Regulators

- We are working with our regulators to ensure our practices meet or exceed state and federal regulations.
- In 2015, EPA finalized a new rule governing handling, disposal and monitoring of CCR.

EPA's CCR Rule Messages

- The CCR Rule allows utilities to close a unit by leaving the CCR in place or removing it.
 - EPA has deemed both closure methods to be protective of human health and the environment if properly done.
 - EPA acknowledges that most sites will not close by removal "given the expense and difficulty of such an operation."
 - The key issue is removing the downward water pressure or hydraulic head in impoundments to reduce risk of instability or groundwater contamination.
- TVA uses groundwater standards as our guide and conducts risk assessments as a key tool in decision making to ensure public and environmental health and safety.
- EPA determined that almost all impoundments could be closed within five years absent "unpredictable or variable conditions." TVA has incorporated that timeframe into its closure planning scheduling.
- In its June 21, 2016, letter summarizing its review of TVA's Programmatic EIS, EPA rated it "LO" (lack of objection), the highest rating EPA can give an EIS.

Tennessee – TDEC Unilateral Order

- In addition to EPA's CCR Rule, TVA is working with the Tennessee Department of Environment & Conservation (TDEC) to meet the requirements of the state's unilateral order related to CCR management and disposal in Tennessee. The order establishes an investigation process for fossil plants in state, followed by a remediation decision, including the closure method, for each impoundment.
- Shortly after EPA finalized its CCR Rule, Tennessee issued a Commissioner's Order in August 2015 which provides:
 - a means by which TVA can satisfy the state as it works to comply with the federal CCR rule; and
 - a process for TDEC to oversee TVA's investigation of CCR units and, if necessary, implement corrective actions to remediate any unacceptable risks at seven of TVA's eight coal plants in Tennessee.
- The order does not allege that TVA is violating CCR regulatory requirements nor does it assess TVA penalties.
- However, the TDEC order goes beyond overseeing implementation of the CCR rule by requiring TVA to assess CCR risks on a plant wide basis at Allen, Cumberland, Johnsonville, Kingston, Bull Run, John Sevier, and Watts Bar Fossil Plants.
- Gallatin Fossil Plant is not covered because it is subject to an ongoing TDEC enforcement action alleging unpermitted discharges from ash management units.

Kentucky – See Plant site for project specifics

- The KY Dept. of Environmental Quality staff works with TVA to ensure we are meeting state regulatory requirements at our Shawnee and Paradise Fossil Plants. TVA has multiple projects underway at each plant including converting from wet ash storage to dry and closing existing coal ash facilities.

Alabama – See Plant site for projects specifics

- TVA works closely with the Ala. Dept. of Environmental Management (ADEM) to meet the requirements of a consent decree at its Colbert Fossil Plant. The plant ceased operations in 2016 and is undergoing decommissioning and closure of its CCR and related facilities. Widow's Creek Fossil Plant also is in the process of being decommissioned and its CCR facilities closed in compliance with state requirements.

CCR Closure Options

- **Closure-in-Place** involves removing the water from the ash, stabilizing the CCR in place, and installing a water-proof cover system including soil and vegetation. This keeps new sources of water from mixing with the CCRs and reduces risks of structural instability and groundwater contamination.
- Closure-in-place encompasses a number of options that includes consolidation within an impoundment to moving CCR from its original location to another onsite location.
- Closure-in-place allows us to manage and monitor the material very closely and avoids potential environmental justice issues associated with removal of the material to another off-site location.
- At most locations, Closure-in-Place is more environmentally beneficial than Closure-by-Removal, largely because it has significantly less transportation-related impacts and is quicker and less costly. (Use site-specific transportation numbers)
- **Closure-by-Removal** involves removing the water from the ash, digging up and moving the CCR material to a permitted, lined landfill off-site and reshaping and filling the old site. Closure-by-Removal is expected to take longer than Closure-in-Place depending on the size of the impoundment.
- Closure-by-Removal always is more costly compared to Closure-in-Place. Estimates range in the hundreds of millions to billions of dollars more to remove and ship to another location. In July 2016, TVA released a Programmatic Environmental Impact Statement that reviews the impacts of closing coal ash impoundments across its system and specifically for 10 impoundments at six plants over the next five years.
 - The preferred closure method for the sites is the closure-in-place method. This process will remove water pressure by permanently covering the impoundment with an engineered waterproof cap to keep rain and other moisture out, dewatering, and stabilizing the ash thereby significantly reducing the risk of groundwater contamination and instability. If at any point this method is not effective, TVA will adopt other closure options.

Coal Ash Impoundment Closures Environmental Impact Statement

- TVA works to protect the region's natural resources, and has concluded an extensive environmental review on how best to manage coal ash impoundments across the system at 10 coal-plant sites.
- This review included a great deal of public input in consideration of two options for storage – closure in place and closure by removal.
- The result of the environmental review shows dewatering – and permanently and safely capping and closing in place – the impoundments at the 10 sites is the best method. However, if at any time we learn it is not the best solution, we will use other options.
- TVA's decision to permanently and safely store coal ash and other coal combustion residuals (CCR) in-place supports our goal to eliminate all wet ash storage at coal plants system-wide while meeting all federal and state requirements.
 - Digging up the ash and moving it elsewhere would have more potential environmental and safety impacts, and would add significant costs for ratepayers.
 - The rules for how we will permanently and safely cap and close-in-place are written and interpreted by the Environmental Protection Agency.
- TVA is ahead of industry peers in converting all its wet CCR to dry storage. It completed (in June 2016) an Environmental Impact Statement and is actively working with the Tennessee Department of Environmental & Conservation (TDEC) to ensure full compliance with state requirements for implementing EPA's CCR rule. Oversight by TDEC will help reduce uncertainty with implementing the rules in Tennessee.
- The Final Environmental Impact Statement received EPA's best rating, and federal, state and local agencies and governments raised no objection.

Recycling

- In alignment with EPA's support for beneficial use of coal combustion residuals in products such as gypsum board, about 35 percent of TVA's coal combustion products each year are repurposed for items such as blasting abrasives, roofing granules, cement and concrete applications, and wallboard.
- Revenue from 1.4 million tons of coal combustion products is close to \$6 million each year.

Coal Combustion Residual Projects

- TVA has committed up to \$2 billion to convert all of its ash and gypsum impoundments to dry storage over an eight- to 10-year period.
- All TVA wet CCR facilities currently are in the planning-and-design phase for conversion.
 - A major step in dry ash conversion was completed June 8, 2016, at Gallatin Fossil plant, when the North Rail Loop (NRL) Landfill within the Gallatin Fossil Plant property began accepting waste.
 - Dry conversion of gypsum and fly ash was completed at Kingston Fossil Plant in 2012, with bottom ash dewatering planned for calendar year 2016. An Environmental Assessment is underway.
 - Conversion to dry fly ash was completed at Bull Run Fossil Plant in the early 1980s, and gypsum and bottom ash dewatering construction also is complete. Dewatering at Cumberland, Gallatin and Paradise fossil plants is planned.
 - As part of TVA's commitment to convert all coal ash management from wet to dry storage, new landfills at Cumberland, Paradise and Shawnee fossil plants are in various stages of planning or engineering.
 - Closure construction is underway at the John Sevier Fossil Plant dry ash stack and the Widows Creek Fossil Plant gypsum storage facility.

Bull Run Fossil Plant Coal Combustion Products

- TVA is committed to converting the storage of coal combustion by-products from a wet to dry system.
- Because Bull Run Fossil Plant has limited capacity for additional CCR storage onsite, TVA is building a mechanical dewatering facility to convert from sluicing bottom ash and gypsum into wet disposal areas, to a dry stack basis.
 - Fly ash generated at Bull Run has been handled and stored on a dry basis since the early 1980s.
- TVA evaluated numerous sites for suitability as a new storage area that would meet TVA's needs and objectives. On Nov 30, 2016, TVA published a final environmental impact statement to address long-term disposal of CCR from Bull Run.
- In the EIS, TVA proposes to expand its capacity for managing CCR at Bull Run by constructing a new landfill on TVA property adjacent to the plant site.
- The EIS also considered hauling the CCR to a permitted landfill off site, and a "No Action" Alternative under which TVA would not seek additional disposal options for CCR at Bull Run.
- This commitment to convert CCR management from a wet system to dry supports TVA's energy future and environmental stewardship commitments as outlined in the 2015 Integrated Resource Plan.
- This project and final EIS are independent of the proposed CCR impoundment closure project recently completed at Bull Run Fossil Plant.

Bull Run Coal Combustion Products Additional Information

- TVA provided opportunities for the public and agencies input into the proposed action throughout the decision making process.
- All public and agency comments received on the draft EIS have been addressed in Appendix A of the Final EIS.
- A copy of the Final EIS may be obtained online at <https://www.tva.com/nepa>.
- Alternatives to using TVA property adjacent to Bull Run for a new ash storage area are addressed in the EIS.
- The EIS also considers a “No Action” Alternative under which TVA would not seek additional disposal options for CCR at Bull Run.

Cumberland Fossil Plant

- TVA is committed to protecting public health and the environment. We operate all our generating plants, including Cumberland, with this in mind.
- In 2015, Environmental Protection Agency issued a comprehensive rule regulating coal ash disposal at power plants. TVA is fully complying with this rule.
- As part of that rule, EPA decided to continue to regulate coal ash as being non-hazardous. In addition to the EPA Rule, Tennessee Department of Environment and Conservation issued a comprehensive order to TVA further regulating its CCR management activities, including TVA’s compliance with the EPA rule, at TVA plants in Tennessee, including Cumberland Fossil Plant.
- In 2009, TVA began to convert all of its wet coal ash management facilities to dry storage at a potential cost of \$1.5 billion to \$2 billion, and TVA has been actively working to meet that commitment.

Additional Information

- The Southern Environmental Law Center has filed notice that it intends to sue TVA in federal court. The lawsuit is on behalf of the Tennessee chapter of Sierra Club over alleged violations of the Clean Water Act at TVA’s Cumberland Fossil Plant.

Gallatin Fossil Plant

- TVA is committed to providing safe, clean, reliable and low-cost power. We are working toward a more diverse portfolio of generating assets with less environmental impact. Also we are in the process of converting wet CCR storage to dry systems across the fleet.
 - TVA operates its ash management areas according to EPA guidelines and within applicable state permits, and we continuously monitor groundwater at ash storage sites. We are working with the Tennessee Department of Environmental Conservation to create an Environmental Assessment Report that includes information from a comprehensive water monitoring program at each of our Tennessee plants including Gallatin.
- A major step in dry ash conversion was completed at Gallatin Fossil plant on June 8, 2016, when the North Rail Loop Landfill, located within the Gallatin Fossil Plant property, began accepting waste.
- TVA is in the process of dewatering the existing active wet-pond ash management system.

Shawnee Fossil Plant

- TVA has completed an Environmental Assessment (EA) for construction of a new dewatering facility that would remove the bottom ash waste stream for coal combustion residuals (CCR) at the Shawnee Fossil Plant (SHF).
- A Finding of No Significant Impact (FONSI) was issued Sept. 15, 2016.
- Five alternatives were considered. Two were eliminated from consideration for environmental and engineering reasons, leaving three alternatives under consideration.
 - Alternative A – No action alternative. TVA would not construct the Process Dewatering Facility at Shawnee. TVA would continue to dispose of wet bottom ash in on-site ponds.
 - Alternative B – Construction/operation of process dewatering facility utilizing a continuous or “once through” system. Under this alternative, the discharge from the dewatering facility would be routed to an approved impoundment and then discharged through the existing Kentucky Pollution Discharge Elimination System (KPDES) discharge point.
 - Alternative C – Process dewatering system with a recirculated bottom ash sluice stream. TVA would construct the same process dewatering facility as described under Alternative B and under Phase 2 would add a recirculation system.
 - The eliminated options are described in the EA.
- Neither Alternative B nor C has significant impacts; therefore, the FONSI is issued for both Alternatives B and C.
- TVA’s preferred alternative, and the one it is inclined to implement, is Alternative C – construction of a dewatering facility with a recirculation system.
- Alternative B – a dewatering facility with a “once through” system and no recirculation – if implemented would discharge the water through the existing Kentucky Pollution Discharge Elimination System (KPDES) discharge point.
- The dewatering facility would create dry products for transporting to an onsite special waste landfill.
- All activity related to the proposed alternative (construction and operation) would take place on the Shawnee Fossil Plant site.
- The final Environmental Assessment is available online at tva.com/nepa.

Index

Alabama Department of Environmental Management.....	13	EPA	9, 10, 11, 13, 27, 28, 33, 50, 65, 67
Allen Combined Cycle Plant Solar Generation	5	Executive Compensation	56
Allen Combined Cycle Plant Water Source..	4	floating cabins.....	26
Allen Fossil Plant.....	4	Glasgow EPB	46, 47
Allen Natural Gas Plant.....	4	Groundwater	28
Bellefonte Nuclear Plant.....	6	historically underutilized business	48
board of directors	26, 37, 44, 45, 46, 59	Integrated Resource Plan... 11, 30, 37, 45, 66	
Bull Run Fossil Plant Coal Combustion Products.....	66	Kingston Fossil Plant	33, 66
carbon dioxide	9, 11, 53	Knoxville Office Complex – Potential Sale .	56
Carbon Dioxide.....	9	Memphis Sand Aquifer	4
Chilled Work Environment.....	60	Mercury Air Toxics Standard (MATS)	9
Clean Line	23	Muscle Shoals Redevelopment	36
Clean Power Plan.....	11	National Ambient Air Quality Standards (NAAQS)	10
coal.....	9, 10, 11, 13, 27, 32, 33, 49, 67, 68	Nuclear Regulatory Commission ...	15, 37, 45, 60
Coal Ash Impoundment Closure	65	performance incentive	59
coal combustion products.....	65	Pickwick Landing Dam	39
Colbert Fossil Plant	13	Pole Attachments	43
Compensation	33, 56	renewable energy	20, 21, 23, 30, 31, 32
Crab Orchard.....	23	Shawnee Fossil Plant	31, 44, 68
Cumberland Fossil Plant	67	Shelby County Health Department	4
Cumberland River Aquatic Center.....	27	Sulfur Dioxide and Nitrogen Oxides (SO ₂ & NO _x).....	10
cyber.....	15	tax equivalent payments.....	40
Dam Safety.....	16, 39	Tennessee Department of Environment & Conservation	28
dry scrubbers.....	27	U.S. Geological Survey	4
Economic development.....	17, 38	Vegetation Management Program Review .	51
EIS.....	66, 67	Watts Bar Nuclear Plant	11, 30, 31, 37, 53, 60
energy efficiency	24, 30, 31, 32, 45	Winning Performance	56, 59
EnergyRight Solutions.....	24		