Description of document:	Central Intelligence Agency (CIA) Research Aid: China: The Coal Industry, November 1976
Requested date:	01-July-2015
Released date:	02-December-2015
Posted date:	04-January-2016
Source of document:	Freedom of Information Act Request Information and Privacy Coordinator Central Intelligence Agency Washington, D.C. 20505 Fax: 703-613-3007 Filing a FOIA Records Request Online

Central Intelligence Agency

Washington, D.C. 20505

2 December 2015

Reference: F-2015-02095

This is a final response to your 1 July 2015 Freedom of Information Act (FOIA) request for **"a copy of the following six CIA documents:**

1. **FDD-6440, World Press Treatment of the Use of Gas in Vietnam (translation), May 6, 1965.**
2. **Potential Implications of Trends in World Population, Food Production and Climate, August 1974.**
3. **A Study of Climatological Research as it Pertains to Intelligence Problems, August 1974.**
4. **China: The Coal Industry, November 1976.**
5. **Deception Maxims: Fact and Folklore, April 1980, XD-OSD/NA.**
6. **The Biological and Chemical Warfare Threat, January 1997."**

We processed your request in accordance with the FOIA, 5 U.S.C. § 552, as amended, and the CIA Information Act, 50 U.S.C. § 3141, as amended. Our processing included a search for records as described in our 22 July 2015 acceptance letter.

We completed a thorough search for records responsive to your request and located the enclosed three documents, consisting of 114 pages, which we determined are releasable to you in their entirety. Because you are entitled to the first 100 pages free, and the cost for the remaining pages is minimal, in accordance with our regulations, as a matter of administrative discretion, there is no charge for processing your request.

Sincerely,

Michael Lavergne

Michael Lavergne
Information and Privacy Coordinator

Enclosures

Research Aid

China: The Coal Industry

ER 76-10691
November 1976

This publication is prepared for the use of U.S. Government officials. The format, coverage and contents of the publication are designed to meet the specific requirements of those users. U.S. Government officials may obtain additional copies of this document directly or through liaison channels from the Central Intelligence Agency.

Non-U.S. Government users may obtain this along with similar CIA publications on a subscription basis by addressing inquiries to:

Document Expediting (DOCEX) Project
Exchange and Gift Division
Library of Congress
Washington, D.C. 20540

Non-U.S. Government users not interested in the DOCEX Project subscription service may purchase reproductions of specific publications on an individual basis from:

Photoduplication Service
Library of Congress
Washington, D.C. 20540

CHINA: THE COAL INDUSTRY

KEY FINDINGS

1. China is the world's third largest coal producer (behind the United States and Soviet Union) and accounts for roughly one-eighth of world coal production. Coal is by far China's most important source of energy, contributing two-thirds of the nation's primary energy production. Despite enormous reserves, development of the coal industry has been slow, and inadequate supply has become one of Peking's most troublesome economic problems.

2. This year, the severe earthquakes in northern China and a drift in coal development policy during the recent anti-Teng Hsiao-p'ing campaign will sharply limit coal production. These difficulties add to the industry's chronic problems of underinvestment, outdated technology, a low rate of mechanization in mining, and poor processing facilities.

3. China's coal industry appeared headed for a recovery in 1975, when output reached 427 million metric tons. The 9.8% increase over 1974 production was the best in 5 years, and well above the 6.9% growth rate in the past 10. Production in 1976, however, probably will be only a little above 440 million tons—3%-4% higher than the 1975 figure.

4. Current policies are unlikely to give the coal industry the boost it needs. Production is being emphasized in the media, but few new mines are being built. The surge in output in 1975 was due largely to more intensive exploitation of old mines—a policy ill suited to long-term expansion of the industry.

5. Peking's unwillingness to invest heavily in coal will continue to slow the industry's progress. Growth should, however, return to its prequake level by late 1977, and continued progress in the less ambitious programs can be expected. Among these are redressing the regional imbalance of coal production between North and South China and raising the output of the small mines segment of the industry.

DISCUSSION

Introduction

6. Peking is now paying a price for failing to modernize and expand the coal industry. Most of the major mines and much of the equipment date back to the period of heavy Soviet assistance in the 1950s. Growth since then has been erratic, despite the economy's heavy dependence on coal. This research aid analyzes the performance of the Chinese coal industry; recent trends in production, consumption, and trade; Peking's responses to developmental problems; and prospects for an extended recovery.

Reserves

7. China's coal reserves are among the largest in the world—roughly on a par with those of the United States and Soviet Union. Total reserves are estimated at 1,500 billion tons. At the present level of consumption and a 50% rate of recovery, these coal reserves are equivalent to more than 1,700 years of supply. Proved reserves are at least 80 billion tons—more than 90 years of supply.

8. Geographically, China's richest coal deposits are in northern China (see Table 1 and the map). According to a Chinese study, nearly three-fourths of the country's total reserves are in mountainous Shansi Province and the adjoining provinces of Hopeh, Honan, and Shensi. Other large deposits are in the northeastern provinces of Heilungkiang, Kirin, and Liaoning and in the Szechwan Basin in Central China. Reserves in extreme northwestern China are reported to be very promising, but they remain largely unexplored because of their remoteness.

9. China's extensive coal reserves in the north are generally high in quality and concentrated in large deposits with thick seams. They are conducive to large, centralized mining operations and a high degree of mechanization. The historical pattern of China's development—influenced in part by the easy accessibility of coal in the north—has led to the rise of large industrial centers close to China's northern reserves, further enhancing their commercial value.

10. Reserves in China's southern provinces are considerably smaller, though still substantial. Unlike those in the north, however, these reserves are poor quality and widely scattered in small pockets. Much of the coal can only be feasibly

Table 1

China: Distribution of Estimated Coal Reserves by Coal Administrative Region[1]

	Billion Metric Tons	Percent
Total	**1,500.0**	**100.0**
Northeast	40.2	2.7
North	1,051.2	70.1
Northwest	280.7	18.7
Inner Mongolia	69.3	4.6
Southwest	49.2	3.3
Central South	56.3	3.7
East	22.4	1.5

1. Crossfield Chemicals, *The Chinese Coal Industry*, Warrington, England, 1961. In recent years, the Chinese have claimed that coal reserves in southern and extreme northwestern China have been found to be substantially larger than early studies indicated. Boundaries of coal administrative regions do not always coincide with those of political or other administrative subdivisions.

recovered through small, localized pits that minimize capital investment and transportation expenses. Peking is promoting increased use of this mining method as part of its efforts to reduce South China's historical dependence on northern coal.

11. Most of China's coal—an estimated 77%—is bituminous. About 19% is anthracite, and the remaining 4% is lignite. Reserves of coking coal—a vital raw material in the production of steel and in other metallurgical processes—appear adequate to meet at least China's near-term requirements. Much of the coking coal is poor quality, however, and requires considerable processing for conversion to coke. Major deposits of coking coal are in northeast China and the eastern provinces of Hopeh, Honan, and Anhwei. Some reserves also are scattered throughout the western provinces, stretching from the Inner Mongolia and Ningsia Regions in the north to Szechwan and Yunnan Provinces in the south. Only small amounts are in the coal rich provinces of Shansi and Shensi.

China's Coal Reserves and Coal Administrative Regions

Production

Growth in National Output

12. China's raw coal production reached an estimated 427 million tons in 1975[1]—the world's third largest output behind the United States and Soviet Union. China currently produces about 12% of the world's coal.

13. Growth in Chinese coal production has been generally sluggish over the past 10 years, averaging 6.9% annually. Year to year changes, however, have fluctuated widely (see Table 2), largely in step with the dominant political trends.

Table 2

China: Coal Production

	Million Metric Tons	Increase (Percent)
1965	220	7.8
1966	248	12.7
1967	190	-23.4
1968	205	7.9
1969	258	25.9
1970	310	20.2
1971	335	8.1
1972	357	6.6
1973	377	5.6
1974	389	3.2
1975	427	9.8

14. The erratic performance of the coal industry points up the disruptive role played by China's recurring political campaigns. The most recent are the Cultural Revolution in 1965-68, the anti-Lin Piao and anti-Confucius campaign in 1973-74, and the anti-Teng Hsiao-p'ing movement in 1976. While all industries have been hurt by these campaigns to some extent, labor intensive industries—such as coal—tend to be hit particularly hard. Campaigns are waged primarily to strengthen the hand of one faction within the Party leadership and often turn industries into political battlegrounds for control of labor. Production is lost as workers are required to attend rallies and indoctrination classes. Discipline is undermined by rapid shifts in the political winds, and by flareups between workers and the politically dogmatic cadre emplaced during the Cultural Revolution. The loss of control by local managers results in work slowdowns and further production losses.

15. The impact of political unrest on the performance of the coal industry was most evident in 1967-68, when activities connected with the Cultural Revolution cut deeply into production. In 1967, output dropped

1. For a discussion of the methodology for estimating China's coal production, see the Appendix.

dramatically—more than 23% below the previous year's production level. A reemphasis on modern economic development produced large increases in 1969-70 and a respectable showing in 1971. In the following three years, however, growth in the coal industry was sluggish, lagging behind that of most other important industries. The situation was severely aggravated by the disruptions of the anti-Lin Piao and anti-Confucius campaign, which led to a growth in output of only 3% in 1974. As a result, inadequate coal supply became an increasingly tight bottleneck, and a source of increasing concern to Peking. Such key industries as transportation, electric power, and steel have been hurt by the tight supply of coal.

16. A healthy increase in coal production in 1975 marked the beginning of an effort to pull the industry out of its slump. The jump of nearly 10% over 1974 output was the largest in five years. An unusually large number of provinces—17—reported early fulfillment of planned output quotas for the year, indicating that the rise was widespread.

17. The surge in coal production continued into the first part of 1976. Official statements claim that output in the first quarter was 13.6% higher than in the same period in 1975. By midyear, however, growth had slipped to about 7.6%[2], and at the end of eight months the announced increase was only 4.27%. The pronounced downturn strongly suggests that the political movement to "criticize" Teng Hsiao-p'ing has adversely affected coal production, and much of the momentum generated in 1975 has been lost. Earthquake damage to the K'ai-luan coal mines in late July also accounted for part of the latest skid in output growth and almost certainly will prohibit any further progress through the end of the year. Production in 1976 probably will amount to a little more than 440 million tons—only 3% or 4% more than 1975 output.

18. The disruption to coal production and processing at K'ai-luan is a major setback to the industry. K'ai-luan is China's largest coal producing center, supplying more than 25 million tons—6% of national output—in 1975. Reports of damage indicate extensive flooding and loss of equipment—both underground mining equipment and aboveground processing facilities. Compounding the problem, China's already overburdened railroad system—which carries more coal than any other cargo—was also heavily damaged in the earthquake area. Peking has moved rapidly to restore production at the K'ai-luan mines and to raise output at other mines. These measures should reduce the impact of the earthquake on coal supply.

2. Two official claims for the first half output increases were received. On 12 July the New China News Agency (NCNA) reported that production was 7.6% above the first half of 1975. On 28 July the *Economic Reporter* claimed an 8.2% increase over 1975.

19. The effects of the earthquake on China's supply of coking coal will be more damaging. The K'ai-luan coal mines are one of China's major suppliers of coking coal, which in recent years has been in short supply. In 1975 the iron and steel industry used an estimated 90 million tons of coking coal to make 24 million tons of coke. The amount of coking coal mined at K'ai-luan is not known, but the disruption of production there undoubtedly will cut into the nation's supply of coking coal proportionately more deeply than the supply of other coals.

20. Efforts to raise national coal output will be constrained by slow growth in new mining capacity. Peking recently has publicized glowing statistics on growth in new capacity, partly to counterbalance the disappointing results in output.[3] Despite these claims, few new mines have been built, particularly in the major mining regions in northern China. New medium and large mines (100,000-1,000,000 tons of capacity) announced in the past two years are concentrated largely in the eastern provinces of Anhwei, Honan, and Shantung, in Ningsia Region in the northwest, and in the southern provinces of Szechwan, Kwangtung, and Kweichow. In all, only about 12 million tons in new mining capacity has been indentified since the end of 1974. This suggests that Peking is continuing to rely on the intensive development of old mines to provide most of the increases to capacity and production.

Regional Production

21. Nearly five-sixths of China's coal currently is produced in the northern and western parts of the country. Several factors, including the vast reserves and colder climates in these regions and the greater concentration of industry and economic infrastructure in the North, are responsible. China's six leading coal producing provinces—accounting for three-fifths of national output—are all in northern China. The only major producer outside this region is Anhwei Province—the most northern province among those traditionally grouped in the South (see Table 3).

22. South China is a coal-deficient region, dependent on coal shipments from the North to fulfill its consumption requirements. Despite this, the South is China's fastest growing coal producing region. Since 1965, coal output from the nine southern provinces has increased at an average yearly rate of about 9%, compared with a growth rate of less than 6.5% in the North and a national average rate of 6.9%.

3. For example, on 27 September 1976, the NCNA issued a claim that 32 new coalpits were put into operation between January and August and that production capacity added during this period was 34.77% more than capacity added during the same period in 1975. This figure carries little weight, because few additions to capacity may have occurred in 1975.

Small Mines

23. A large part of the growth in the coal industry in recent years is accounted for by small mines. These mines, which now number about 100,000, are

Table 3

China: Regional Coal Production[1]

Region	1965 Output (Million Metric Tons)	1965 Percent	1975 Output (Million Metric Tons)	1975 Percent
China	**220.0**	**100.0**	**427.0**	**100.0**
North	189.1	86.0	354.3	83.0
Shansi	34.7	15.8	66.0	15.5
Liaoning	....	....	56.0	13.1
Hopeh	21.5	9.8	43.0	10.1
Shantung	22.6	10.3	37.0	8.7
Heilungkiang	....	....	32.0	7.5
Honan	12.7	5.8	27.0	6.3
Kirin	....	....	15.0	3.5
Yunnan	....	....	15.0	3.5
Szechwan	....	....	13.0	3.0
Kweichow	....	....	10.0	2.3
Inner Mongolia	3.0	1.4	9.0	2.1
Kansu	....	....	8.5	2.0
Shensi	....	....	8.0	1.9
Ningsia	2.9	1.3	7.0	1.6
Tsinghai	....	....	4.2	1.0
Sinkiang	....	....	3.3	0.8
Tibet	....	....	0.3	0.1
South[2]	30.9	14.0	72.7	17.0
Anhwei	....	....	21.5	5.0
Kiangsi	....	....	11.0	2.6
Kwangtung	2.2	1.0	11.0	2.6
Hunan	2.9	1.3	10.0	2.3
Kiangsu	....	....	7.0	1.6
Hupeh	....	....	6.0	1.4
Kwangsi	....	....	3.5	0.8
Chekiang	....	....	1.5	0.4
Fukien	0.3	0.1	1.2	0.3

1. For the methodology for estimating national output in 1965 and 1975, see the Appendix. Provincial production estimates are based on information in Chinese press reports, particularly time series data on provincial and individual mine output.

Table 3

China: Regional Coal Production
(Continued)

2. The South consists of the provinces in eastern China that Peking refers to as "the nine provinces south of the Yangtze." Anhwei, Kiangsu, and Hupeh are actually divided by the Yangtze but are included in this group by the Chinese.

The increase in the share of output contributed by the southern provinces between 1965 and 1975 is based on a 27 December 1973 Peking NCNA announcement that coal output in these provinces in 1973 was more than twice 1965 production—equivalent to a rate of growth of at least 9% per year. National output increased at an annual rate of 7% during the same period.

The Kaplan-Moorsteen formula can be used to find an index for the ratio of 1975 to 1965 output in the southern provinces. In the tabulation below, national output serves as a benchmark series for extrapolating this index.

	Benchmark series (Million Metric Tons)	Extrapolating Index	Final Index
1965	220	100	100
1973	377	200	200
1975	427	....	235
	Percent		
Average annual rate of growth 1965-73	0.07	0.09	

A final index (KM_{75}) can be derived by finding

$$KM_{75} = \left(\frac{1+\alpha}{1+\beta}\right)^2 \left(\frac{E_{75}}{E_{73}}\right) KM_{73}, \text{ where:}$$

α = the average annual rate of growth between benchmarks of the series to be derived.

β = the average annual rate of growth between benchmarks of the national output series.

E_{75}/E_{73} = ratio of the index to be extrapolated from the benchmark series.

Therefore,

$$KM_{75} = \left(\frac{1+0.09}{1+0.07}\right)^2 \left(\frac{427}{377}\right) 200 = 235$$

Output in South China in 1965 is therefore 1/2.35 times output in the South in 1975.

usually small open pits or shafts producing less than 1,000 tons of coal a year. The largest mines in this category may produce up to 100,000 tons of coal annually. Many of the small mines, however, are not even operated year round. Most are financed and operated at the local level, by either counties, communes, or production brigades.

24. Small mines use highly labor intensive methods to extract coal from deposits too small or poor in quality to be mined efficiently with modern methods. In addition to saving scarce capital, they reduce dependency on China's overburdened transport system by serving largely localized consumption needs. Small mines also add quickly to production, normally requiring less than a year to design, build, and put into operation.

25. An estimated 120 million tons of coal was produced by small mines in 1975, accounting for 28% of national output (see Table 4). This share is up sharply from 1965, when small mines contributed only 15% of total production. Since 1965, small mines production has expanded at an average annual rate of 13.8%, compared with a growth rate of 5.1% in the modern mining sector.

Table 4

China: Small Coal Mine Production

	Million Metric Tons	Percent of Total
1965	33	15
1966	38	15
1967	35	18
1968	40	20
1969	58	22
1970	75	24
1971	85	25
1972	96	27
1973	106	28
1974	110	28
1975	120	28

26. The proliferation of small mines has been most rapid in coal-deficient southern China, accounting for much of the recent growth there. Reserves in this region are well suited for small mining methods, which have been strongly promoted by Peking to reduce the need for shipping coal from the North. According to a recent Chinese broadcast, small mine output in South China in 1975 was 9.4 times 1965 output, equivalent to an average annual increase of 25% during the 10-year span.

Coal Mining Equipment

27. One of the basic problems confronting the Chinese coal industry is a low rate of mechanization. China produces most of its own coal mining equipment. Development of the equipment industry has had a low priority, however, primarily because of the abundant supply of human labor. Competing needs elsewhere in the economy—particularly for raw materials—have also retarded the equipment industry's development. A prime concern is the nation's short supply of high-quality

steel capable of withstanding intense pressure and heat. Machinery made from inferior steel lacks durability and requires frequent repair and replacement. An inadequate supply of rubber, used extensively for belt conveyors, is another problem.

28. Few plants in China specialize exclusively in the production of coal mining equipment. Most plants produce a wide array of small machinery and tools that can be used in many different mining and construction activities. The equipment most common in domestic production includes drills, small power shovels, scrapers, winches, hoists, loaders, and carrying cars. Some air compressors, water pumps, and excavators also are produced, and, in recent years, the Chinese have begun making magnetic separating and filtering equipment and hydraulic coal lifting systems. The domestic equipment is supplemented by imports, which consist largely of more sophisticated coal mining equipment (see the section on Foreign Trade).

Development Problems and Policy

29. As China's major energy source, the coal industry normally enjoys a high priority in national economic planning. In recent years, however, Peking has tried to raise coal production with minimal outlays to afford higher investment in petroleum and other areas. To save money, the Chinese have forgone extensive modernization, stressed intensive exploitation of old mines rather than starting new mines, and promoted small, locally funded mines.

30. This policy is responsible for the sluggish performance of the coal industry in past years. While coal output has increased an average of less than 7% a year since 1970, overall industrial production has expanded at an annual rate of nearly 10%. As a result, persistent coal shortages have plagued industries dependent on coal. These industries include some of the nation's most important, such as steel and electric power. In numerous cases, plants have had to limit or stagger hours of operation to conserve fuel. Coal shortages have also created bottlenecks in transportation, still heavily dependent on coal.

31. The exceptionally poor year in 1974, when coal output increased by 3%, finally moved Peking to address the growing problem of coal shortages. In January 1975 the Ministry of Coal was reestablished under the direction of Minister Hsu Chin-chiang. Although Hsu died in July 1976, during his brief tenure the coal industry was elevated to a high level of national attention. In October and November

of last year, a National Conference on Coal Mining convened in Peking to publicize new goals for the industry. In a keynote address, Coal Minister Hsu urged workers to "accelerate the development of the coal mining industry" on all fronts, including (1) tapping the potential of existing mines, (2) completing mines under construction as soon as possible, (3) continuing to develop small mines, and (4) building several large new coal mining centers.

32. None of the measures proposed at the Conference is new, and Peking's willingness to back them up with badly needed funds for coal extraction and processing equipment is not yet evident. Even so, their announcement alone shows an increased awareness of the need to raise coal supply. Even without a heavy flow of investment, Peking's policy shift, aided by an absence of major disruptions, succeeded in effecting a sharp upturn in production in late 1975 and early 1976.

33. The direction to coal policy and impetus to production provided by the National Coal Conference appear to have been largely lost in the recent political campaign denouncing the policies of former acting premier Teng Hsiao-p'ing. Instigators of the movement criticized Teng and his followers for trying to control production activities at the national rather than local level and for relying on imported rather than domestically produced equipment and raw materials. While not necessarily closing the door on continued trade expansion and emphasis on economic production, this strategy appeared to neglect pressing needs for greater mechanization and improved technology in areas that have lagged behind the general economy—coal, for example.

34. The decline in the rate of growth of coal output since the first quarter reflects the recent drift in coal policy and points to greater problems ahead. The situation is considerably worsened by the earthquake damage to K'ai-luan. Because the K'ai-luan mines were among China's most heavily mechanized, the financial burden of repairing and replacing equipment will be particularly severe. Also, most of the K'ai-luan coal was processed at local facilities, all heavily damaged in the earthquake. The costs of rebuilding these facilities and replacing damaged equipment—both above and under ground—will cut deeply into funds that otherwise might be invested in the expansion of China's coal producing capacity.

35. While the earthquakes have severely set back progress in the coal industry, they may have helped restore the focus of coal policy. Early indications suggest that Peking is again strongly emphasizing the need for greater coal production. The major effort to resume operations at K'ai-luan and increase output

at other mines is evidence of the renewed stress. In response, several mines are already reporting increased productivity, and production has resumed in six of the eight K'ai-luan mines. The first load was lifted out of the Ma-ch'iao-k'ou colliery amid extensive publicity on 7 August—10 days after the earthquake.

36. Despite Peking's intent to minimize the loss in coal output due to the earthquakes, the Chinese have not shed their reluctance to invest heavily in modernizing the industry. Mining remains inefficient from the low rate of mechanization, and coal quality still suffers from the lack of proper processing and beneficiation facilities. Modernization is essential if the industry is to achieve an acceptable long-term rate of growth and meet the future requirements of its consumers. Resources for investment are limited, however, and any acceleration of investment in the coal industry will require the diversion of funds from other areas.

Consumption

Share of Primary Energy

37. Coal accounts for about two-thirds of the primary energy produced and consumed in China. In contrast, coal contributes about one-third of the Soviet Union's primary energy production and use and about one-fourth of the energy produced and one-fifth of the energy consumed in the United States. Although its share has been declining steadily in China in past years, coal is still by far the nation's most important source of fuel (see Table 5).

Table 5

China: Primary Energy Production

	1965		1970		1975	
	Million Metric Tons[1]	Percent	Million Metric Tons[1]	Percent	Million Metric Tons[1]	Percent
Total	**199.7**	**100**	**305.5**	**100**	**473.7**	**100**
Coal	169.4	85	233.0	76	317.6	67
Crude oil	14.0	7	37.0	12	96.9	20
Natural gas	12.3	6	27.6	9	46.0	10
Hydroelectricity	4.0	2	7.9	3	13.2	3

1. In coal equivalents. A standard coal equivalent has a calorific value of 7,000 kilocalories per kilogram. The following coefficients were used to convert energy into coal equivalents: coal (metric tons) 0.8 for large mine output and 0.6 for small mine output; crude oil (metric tons) 1.3; natural gas (1,000 cubic meters) 1.33; and hydroelectricity (1,000 kilowatt-hours), 0.44.

38. Coal contributes a slightly higher share of China's energy consumption than its share of production because of the relatively larger volume of petroleum exports (see Table 6). In 1975, China's net petroleum exports amounted to more than 10% of national crude oil production, while net exports of coal were less than 1% of total coal output.

Table 6

China: Primary Energy Consumption, 1975

	Million Metric Tons[1]	Percent
Total	**461.6**	**100**
Coal	315.6	68
Crude oil	86.8	19
Natural gas	46.0	10
Hydroelectricity	13.2	3

1. In coal equivalents.

39. In terms of standard coal equivalents (7,000 kilocalories per kilogram of coal), the growth of China's coal supply has been even slower than figures for raw coal output indicate. Since 1965, growth of total coal supply in standard equivalents has averaged only 6.5% per year, while raw coal production has averaged an annual increase of 6.9%. The discrepancy results from an increasing share being contributed by small mines, whose output yields a smaller calorific value than does large mine production. As a result the quality of Chinese coal has dropped from an average calorific value of 5,400 kilocalories per kilogram in 1965 to 5,200 kilocalories per kilogram in 1975. The increasingly poor quality of Chinese raw coal accentuates the nation's need for more and better equipped processing facilities.

Distribution of Coal Consumption

40. The industrial sector is China's most important consumer of coal, accounting for an estimated 56% of total coal consumption—65%, including coal used to produce electric power. About 25% of the coal supply is used by the household sector, 6% in transportation, and the remaining 4% is consumed by the government and other services (see Table 7).

Table 7

China: Coal Consumption

	Percent of Total Supply
Industry	56
Electric power	9
Transportation	6
Household	25
Other	4

41. Several discernible trends have affected the pattern of coal consumption in recent years. The most prominent is the steady rise in the share of coal supply allocated to industry. The impressive though erratic growth of China's industrial sector since the mid-1960s has sharply raised fuel requirements in industry, which are met primarily by coal. The importance of coal to further industrial expansion and its role as a brake on past development were directly responsible for the measures taken in late 1975 to step up coal production. To minimize the impact of an inadequate coal supply on industrial performance, Peking also has diverted coal into industry from other sectors, expended considerable effort devising methods of conserving fuel in production activities, and increased the use of petroleum.

42. One of the key industrial consumers of coal is the steel industry. In 1975 the steel industry used an estimated 90 million tons of coking coal to make 24 million tons of coke. Both figures are up about 100% from the amounts used annually in the late 1960s. The shortages of coking coal resulting from the earthquake damage to K'ai-luan, however, will have a serious impact on the steel industry. According to one estimate, enough coking coal was mined at K'ai-luan to support the production of 10 million tons of steel—about 40% of China's output. As a result of this loss, steel production will sag, and Peking probably will be forced to buy more steel abroad.

43. Industries other than steel will be hurt considerably less by the disruption to K'ai-luan production, except for those in areas dependent upon K'ai-luan as a direct source of fuel. The most important of these is Shanghai—the center of China's second largest industrial area, behind Manchuria. According to reports, industrial operations in Shanghai have been cut back as a result of the supply loss. In response, the city has sent hundreds of technicians and personnel to K'ai-luan to hasten its recovery and also is trucking in coal from other areas to satisfy more urgent needs.

44. China's electric power and transportation depend heavily on coal, largely because of the predominence of thermal powerplants and the railroads. In both areas, however, a dramatic rise in the use of petroleum has occurred in recent years. In 1969, petroleum was used to fuel only about 5% of China's thermal powerplants and to move about 10% of the nation's rail freight. Now, more than 20% of China's 24 million kilowatts of thermal power generating capacity is oil fired, and nearly 25% of the rail freight is moved by diesel powered locomotives.

45. The share of coal allocated to the household sector has steadily declined in parallel with the rising use in industry. At 25%, however, the proportion of coal consumed by the household sector is still extremely large. In contrast, less than 2% of the US coal supply is used by households.

46. In the few areas where it is available, natural gas is being used to replace coal as a household fuel. This change is particularly true in Szechwan Province, where nearly all of China's natural gas is produced. In many other areas, the Chinese rely heavily on locally produced coal from small mines for their home heating and cooking needs. This coal is frequently too poor in quality to be used efficiently in industry.

Foreign Trade

Equipment Imports

47. A surge in contracts to purchase foreign coal mining equipment in 1973 and 1974 has provided a steady stream of imports in recent years. At least US $116 million in major contracts was signed for in 1973-74 (see Table 8). Most of this equipment has now been delivered, however, and additional purchases are needed soon to continue modernizing the industry. Since 1974 the Chinese have continued to purchase large numbers of spare parts for mining machinery and to buy bulldozers and other excavation equipment used in both mining and construction. Negotiations for large mining machinery also have continued, but no new major orders have been placed.

48. China's preference for the long-wall mining method has given the United Kingdom an advantage in selling fully mechanized coal face equipment. The British use this method extensively in their own country, while the United States employs the room and pillar method in most underground mines. Much of the equipment purchased from the United States is for open pit mining—a technique the Chinese appear interested in expanding. Most of the smaller orders involving excavating, leveling, tamping, and boring machinery; steel tubing; and spare parts are obtained from Japan.

Coal Exports

49. China continues to export less than 1% of its coal production. The largest customer is North Korea, which purchases some 2 million tons of Chinese coking coal annually. Japan is second, importing 330,000 tons of anthracite and

Table 8

China: Foreign Coal Equipment Purchases

Supplier	Date Sold	Equipment	Million US $
Total			**116**
Poland	1972-73	Coal mining machinery	18
	Mar 1974	Coal mining machinery	7
United Kingdom			
Gullick-Dobson	Jun 1973	Long-wall roof supports, shearers, conveyers, signaling and other electrical equipment	13
Dowty Mining	Jul 1973	Roof and ground support equipment, coal cutters, conveyors, signaling equipment, cables, mathanometers	30
Dowty Mining	Dec 1973	Mining machinery for working seams less than 1 meter thick	5
West Germany			
Hemscheidtwerk GHH-Sterkrade	Oct 1973	Mechanized coal face equipment	14
AEG-Telefunken	Mar 1974	Mechanized coal face equipment	8
United States			
Bucyrus Erie	Dec 1973	Electric shovels, blasting drills	20
Reed Tool	Jan 1974	Rock bits	1

120,000 tons of steam coal from China in 1975. In addition, China regularly exports coking coal to North Vietnam, Pakistan, and Hong Kong and coke to Romania. Several other countries—most in Southeast Asia—also have purchased small quantities of Chinese coal in recent years.

50. The Japanese repeatedly have expressed interest in increasing coal purchases from China. Japan is especially interested in coking coal, which the Chinese have not sold to them since 1969. Despite this potential market, Chinese coal exports will continue to grow slowly. Domestic needs have been growing faster than coal output and will absorb future increases in production. The lost coal production and damage to transport facilities due to the earthquakes also will sharply limit China's ability and willingness to export coal in the next 6 to 12 months. Since exports are so small a percentage of total production, however, the Chinese probably will meet their current export commitments despite the earthquake damage.

APPENDIX

METHODOLOGY FOR ESTIMATING CHINESE COAL OUTPUT

The interrelationship of Chinese production claims has enabled us to compile a complete series of coal output estimates for recent years. In calculating the 1975 production estimate, three different claims were used to establish a link with the official figure for 1949 output recorded in ***Ten Great Years***. Estimates for coal production in recent years and the sources of their derivation are shown in Table 9.

Other Evidence on Coal Output in 1975

Data from a number of other sources can be used as a check on our estimate for 1975 coal production. In general, these sources support the calculation that output increased to 427 million tons.

Provincial Increases: 1975 over 1965

First, Peking recently broadcast increases in coal output from 1965 to 1975 for nine individual provinces.* These increases, expressed as ratios of 1975 production to 1965 production, are summarized as shown.

Province	1975 Output/1965 Output
Fukien	4.7
Honan	2.13
Hopeh	2
Hunan	3.4
Inner Mongolia	3
Kwangtung	5
Ningsia	2.4
Shansi	1.9
Shantung	1.64

These nine provinces account for nearly 50% of national coal production. The average ratio of 1975 to 1965 output for the group, weighted by each province's share of national output, is 2.05. Since the Chinese are nationally inclined to highlight production increases that are generally high in their broadcasts, this 2.05 ratio of 1975 to 1965 output compares favorably with our estimate, which yields a ratio of 1.94.

Consideration of the major producers alone in this group produces an average increase that conforms even more closely with our estimate. These major producers are Shansi, Hopeh, Shantung, and Honan, which collectively produce more than 40% of China's coal. The weighted average ratio of 1975 to 1965 output for these four provinces is 1.89—very close to our 1.94 ratio.

* For estimated coal output, by province, in 1975, see Table 3.

Table 9

China: Coal Output

	Output (Million Metric Tons)	Percent Increase over Previous Year
1949[1]	32.43	
1965[2]	220	
1970[3]	310	
1971[4]	335	8.1
1972[5]	357	6.6
1973[6]	377	5.6
1974[7]	389	3.2
1975[8]	427	9.8

1. Official figure from State Statistical Bureau, ***Ten Great Years***, Peking, 1960, p.95.
2. Derived from output in 1970 and Peking's statement that China's coal output in 1970 exceeded that in 1965 by more than 41% (FBIS, 31 Oct 1973, p. B11).
3. Derived from output in 1972 and Peking's statement that coal production increased more than 15% from 1970 to 1972 (FBIS, 31 Oct 1973, p. B11).
4. Derived from the statement that output in 1971 was more than 8% higher than the previous year (***Jen-min jih-pao***, 29 Nov 1971).
5. Derived from Hanoi's statement that China's coal output in 1972 was 11 times output in 1949 (***Quan Doi Nhan Dan***, 1 Oct 1973).
6. Derived from our estimate for small mine production in 1965 (33 million tons) and the statement that output of small mines in 1973 increased 220% over that in 1965, and constituted 28% of total coal production in 1973 (NCNA (Chinese), Peking, 23 Oct 1974).

   small mine output = 33 x 3.2 = 105.6 million tons.

   national output = 105.6 / 0.28 = 377 million tons.
7. Derived from the statement that in 1974 Shansi Province produced more than twice the amount of coal produced by China in 1949 and accounted for one-sixth of national production (NCNA (English), 24 Dec 1974).

   Shansi output = 32.43 x 2 = 64.9 million tons.

   national output = 64.9 x 6 = 389 million tons.
8. Derived from the statement that "during the nine years and more since the beginning of the Cultural Revolution, the annual increase in coal output averaged 77% above that in the 1949-65 period," (NCNA (English), Peking, 1 Dec 1975). Coal output increased an average of 11.7 million tons a year between 1949 and 1965. Growing at a rate 77% higher--or 20.7 million tons a year--since 1965, output reached 427 million tons in 1975.

   average increase, 1949-65 =(220-32.43) / 16 = 11.7 million tons per year.

   average increase, 1965-75 = 11.7 x 1.77 = 20.7 million tons per year.

   total increase, 1965-75 = 20.7 x 10 = 207 million tons.

   national output, 1975 = 220 + 207 = 427 million tons.

The generally smaller variance in output growth among major coal producing provinces and their greater contributions to national production make the performance of these provinces more important for estimating and predictive purposes. Large percentage gains—out of line with the national growth path—are more easily achieved in provinces with small base outputs, such as those in South China.

Provincial Increases: 1975 over 1974

A second group of provincial claims indicates the increases in 1975 outputs over 1974 outputs. Yearend percentage increases were announced for 11 provinces, accounting for roughly 50% of China's coal output. These increases are summarized as shown.

Province	Increase in 1975 over 1974 (Percent)
Anhwei	32
Honan	17.4
Hopeh	12.2
Hunan	10
Inner Mongolia	10.6
Kiangsi	11.5
Kwangsi	24
Ningsia	26.5
Shansi	11.4
Szechwan	22
Tsinghai	9.2

Again, the largest gains were generally associated with the smaller producing provinces. Of the four provinces registering gains higher than 20%, only Anhwei is a major producer. In addition, many increases, such as that in Anhwei, were inflated by unusually low production levels in 1974, which in some cases were even lower than 1973 production.

The weighted average of the provincial claims, above, is 15.3%—considerably higher than the 9.8% yielded by our estimates. The figures are not irreconcilable, however, since provincial increases noted in the media normally exceed the national average—especially for periods as short as a year. The pattern of coal output claims broadcast during the first quarter of 1976 illustrates this well. Although the Chinese announced that national output increased 13.6% over the first quarter of 1975, claims for individual provinces during the period ran as high as 87.5% in Kiangsu and 62% in Kweichow. Claimed increases for 10 provinces,* accounting for about 46% of national output, yielded a weighted average increase of 21.3%, well above the 13.6% actual increase.

For the first quarter of 1976, the average provincial increase is 57% higher than the actual announced increase. Discounting the average provincial increase of 15.3%

* The 10 provinces and their announced increases in coal output for part or all of the first quarter of 1976 are Heilungkiang (14.6%), Honan (21.44%), Inner Mongolia (24.4%), Kiangsi (24.78%), Kiangsu (87.5%), Kwangtung (30%), Kweichow (62%), Ningsia (9.5%), Shansi (7%), and Yunnan (15.6%).

registered in 1975 by this same factor produces an approximation of a national increase of 15.3/1.57=9.9%, suggesting that our estimated 9.8% increase is consistent with the generally higher provincial increases reported last year.

Of the provinces for which no yearend percentage increases were reported, six were announced to have fulfilled their annual plans early. These six—Heilungkiang, Kansu, Kirin, Kwangtung, Kweichow, and Shantung—account for about 27% of national production. A mid-year increase of 5.4% also was announced for Liaoning Province, which produces about 13% of China's coal. If a 6% increase over 1974 output is assumed for the group claiming early plan fulfillment, a 5% increase for the year ascribed to Liaoning Province, and a 2% increase assumed for the remaining 10% of China's coal producers, the result is a weighted average increase of slightly more than 10% in national production in 1975—very close to our figure of 9.8%.

Early Fulfillment of 1975 National Plan

A third indication that our 1975 coal output estimate is fairly accurate is Peking's December 1975 claim that in the first 10 months of the year "coal output was 6.2% above plan."* A 9.8% increase for the year over 1974 implies a growth target near 3.6% for 1975. In light of the industry's poor performance in 1974—when growth in output was estimated at less than 4%—and Peking's inclination to set goals low enough to be met frequently, this target appears reasonable.

National Trend

A final check on our 1975 coal production estimate is to consider its consistency with the sequence of recent national coal output claims released by the Chinese. These claims were that

- coal mines have overfulfilled state plans for the first quarter of 1975, and output was 6% higher than the same period in 1974;**
- the output target for the first half of 1975 was fulfilled ahead of schedule, and output surpassed that of the same period in 1974 by a "considerable margin;"***

* NCNA (English), Peking, 1 Dec 1975.

** NCNA (Chinese), Peking, 5 Apr 1975.

*** NCNA (English), Peking, 3 Jul 1975.

- China overfulfilled its coal production plans for the first three quarters of 1975, and output topped the state quota by 5.6%;*

- China hit an all-time high for coal production in the first 10 months of 1975, and output was 6.2% above plan;** and

- coal output increased 13.6% during the first quarter of 1976 over the same period of 1975.***

This series of quarterly claims seems to indicate a steady increase in coal output between the first quarter of 1975 and the first quarter of 1976. The sharpest increase probably was from the second to third quarter of 1975. Assuming that the 6% rate of increase continued through the first half of 1975, coal output must have been 12%-14% higher in the final two quarters to reach 427 tons by yearend. This conclusion appears reasonable in light of the 13.6% increase reported for the first quarter of 1976 and therefore is consistent with our estimate of a 9.8% increase in national coal production in 1975.

* NCNA (English), Peking, 2 Nov 1975.

** NCNA (English), Peking, 1 Dec 1975.

*** *The Economic Reporter*, Hong Kong, 21 Apr 1976.