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BY THE COMPTROLLER GENERAL

**To The Senate Committee
On Energy And Natural Resources**
OF THE UNITED STATES

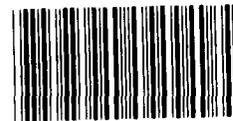
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**Less Regulatory Effort Needed To
Achieve Federal Coal Conversion Goals**

A major objective of Federal energy policy since 1974 has been to increase industrial coal use as boiler fuel in place of natural gas and imported oil. Now, however, the incentive to use coal has been strengthened as oil and gas prices have increased.

The prospects for voluntary conversion of existing utility powerplants to coal has improved. GAO identified 15 utility companies which are attempting to convert 51 existing boilers at 23 powerplants to coal, which could save about 235,000 barrels of oil per day by 1988. This savings equals about two-thirds of the savings potential of DOE's program for converting existing boilers. The conversion of most of the other powerplants in DOE's program is uncertain since they are opposed by the utility companies.

Coal is expected to be predominant among the fossil fuels chosen by electric utilities and other industrial companies for use in large new boilers. The electric utility industry projects that about 97 percent of its capacity additions through 1989 will use energy sources other than oil or gas. Yet, the depressed sales of large industrial boilers in recent years precludes verification of the fuel use trends of the remainder of industry.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-201144

The Honorable James A. McClure
Chairman, Committee on Energy and
Natural Resources
United States Senate

The Honorable Henry M. Jackson
Ranking Minority Member, Committee
on Energy and Natural Resources
United State Senate

As requested in the Committee's letter of March 26, 1980, this report reviews the implementation of the Powerplant and Industrial Fuel Use Act of 1978. The report describes the status and likely achievements of the Federal regulatory program to convert utility boilers to coal, and the prospects for the use of coal in large new industrial boilers as compared to oil or natural gas.

Comments were requested from the Department of Energy, but the Department decided not to provide us with official comments.

As arranged with your offices, we will not release this report until September 9, 1981, unless its contents are announced earlier. At that time we will send copies to interested parties and make copies available to others upon request.

A handwritten signature in cursive script that reads "Milton J. Fowler".

Acting Comptroller General
of the United States

D I G E S T

A major objective of Federal energy policy since 1974 has been to increase industrial use of coal and alternative fuels as boiler fuel in place of natural gas and imported oil. During the 1970s, two laws authorizing regulatory programs to carry out this policy were enacted--the Energy Supply and Environmental Coordination Act of 1974, and the Powerplant and Industrial Fuel Use Act of 1978. Their purposes are to cause industry to convert existing coal capable boilers from oil and natural gas to coal, and to limit the use of these fuels in existing and new boilers. The use of oil and natural gas as boiler fuel has been considered an inefficient use of these resources.

Now, however, the incentive to use coal or alternative fuels has been strengthened as oil and gas prices have increased, and utilities are making efforts to voluntarily convert existing boilers from oil or gas to coal. The Department of Energy has issued proposed regulations which would ease compliance with the Fuel Use Act and started to phase out the enforcement program to convert existing boilers. In recent action on the Federal budget for fiscal year 1982, the Congress amended FUA by replacing the enforcement program with a voluntary program for converting existing boilers. Congress also provided \$5 million for coal conversion activities--a reduction of \$26 million from the amount originally proposed.

GAO concluded that:

- For existing boilers, utility efforts to voluntarily convert to coal have reduced the need for regulation.
- For new boilers, increased oil and gas prices have reduced the need for regulating purchases.

UTILITY EFFORTS TO VOLUNTARILY CONVERT
EXISTING BOILERS HAVE OUTPACED THE
REGULATORY ENFORCEMENT PROGRAMS

The prospects for the voluntary conversion of existing utility powerplants has improved in recent years. As of June 1981, 15 utility companies were attempting to convert 51 existing boilers at 23 powerplants, which could save the equivalent of about 235,000 barrels of oil per day. If the companies receive the required regulatory approvals including air quality permits, these 23 powerplants will be converted to coal by 1988. The fuel savings achievable by these conversions equals about two-thirds of the savings which would occur if all boilers in the Economic Regulatory Administration's (ERA's) program were converted. (See pp. 11 to 15.)

As of June 1981, ERA's regulatory conversion program included 94 boilers at 43 powerplant sites--33 utility powerplants, 5 industrial sites, and 5 Federal facilities. As a result of ERA's emphasis on early accomplishments and utility efforts to voluntarily convert, the program focus changed from one designed to operate through enforcement actions to one designed to operate through regulatory assistance.

ERA has contributed to utility voluntary conversion efforts through, for example, its public testimony and issuance of proposed orders to prohibit the use of oil or natural gas. Utilities which are converting voluntarily have found the proposed orders useful because they are a prerequisite for obtaining permits to convert to coal earlier than would be possible if normal environmental review procedures were followed. The Environmental Protection Agency had issued 15 such permits as of June 1, 1981. These permits require immediate compliance with the national primary ambient air quality standards, but permit delayed compliance with State air quality plans. (See p. 14.)

In addition, companies which are converting to coal may receive other favorable environmental consideration. For example, they may not be required to meet the New Source Performance Standards or Prevention of Significant Deterioration rules which were authorized by amendments to the Clean Air Act. If these standards are applied to converting facilities, the costs of air quality compliance

would increase significantly, and the number of voluntary conversions would be reduced.

Electric utility companies were voluntarily attempting to convert 19 of the 33 powerplants included in the program. Of the remaining 14 powerplants, utility companies were opposed to the conversion of 8, and asserted that they were eligible for exemptions from the Fuel Use Act. Utilities were undecided about converting the other 6 powerplants. (See pp. 15 to 21.)

PROGRAM PROBLEMS

The conversion program has had the following problems:

- Contracting problems delayed completion of 16 Energy Supply and Environmental Coordination Act cases 1 to 2 years since 1979.
- The analysis being performed on Fuel Use Act cases was 4 to 6 months behind schedule.
- Not enough contractors had been hired to start analysis of four Fuel Use Act cases.
- ERA delayed the issuance of regulatory orders due to contracting problems.
- Contracting delays prevented ERA from obligating \$1 million of the \$23 million budgeted for fiscal year 1980 activities. (See pp. 9 to 11.)

GAO believes the timing of case completion was uncertain due to the history of repeated delays experienced with the conversion program. In January 1981, ERA decided to begin phasing out program activities by terminating portions of the analytic work being performed by contractors. No further enforcement actions were planned at that time, and ERA officials had not yet adopted a revised program plan to accommodate the \$5 million in budget authority recently approved by the Congress.

The potential for increasing the scope of the program has diminished as the age of existing boilers increases. For example, of 350 utility powerplants which could be considered for

conversion, 324 have converted, planned to convert, or are not likely conversion prospects because they are now over 25 years old. About half of the remaining 26 boilers are small, averaging less than 20 megawatts, and have been in service over 15 years. Only limited information was available on the conversion potential of the remainder of industry, but some companies are making conversions. GAO contacted 10 east coast companies and each had made conversion decisions; 6 of the companies had already converted or were planning to convert. The four companies taking no action stated that technical, economic, or environmental problems prevented conversion. (See pp. 15 and 16.)

INCREASED OIL AND GAS PRICES
HAVE REDUCED THE NEED FOR
REGULATING NEW BOILER PURCHASES

Since 1978 when the Fuel Use Act became law, oil and natural gas prices have risen substantially, increasing industry's incentive to use coal or alternative fuels in new boilers. The cost of oil used by electric utilities increased about 154 percent from 1978 through January 1981, and natural gas prices increased about 77 percent; but coal prices increased only 27 percent. On a comparative basis, oil was 3.8 times the cost of coal, and natural gas was 1.8 times the cost of coal by January 1981.

Coal is expected to be predominant among the fossil fuels chosen for large new electric powerplants and industrial boilers. The electric utility industry projects that about 97 percent of the electrical generating capacity additions from 1980 through 1989 will use coal, nuclear power, or other energy sources rather than oil or natural gas.

Large boiler sales to other industries have been severely depressed in recent years; only 24 boilers with a capacity of 100 million British thermal units (Btu's) per hour or more were sold during 1980. The sales which have occurred show a trend away from oil or gas. Industry petitions for exemptions from the Fuel Use Act have corresponded to the low level of industrial boiler sales, but have also indicated some continuing interest in oil- and gas-fired boilers. (See pp. 27 to 30.)

Based on the fuel price changes and trends toward the purchase of new coal boilers, GAO believes that the need to regulate new boiler purchases has been reduced.

CONCLUSIONS

Industry decisions to voluntarily convert existing boilers to coal reduce the regulatory effort needed to achieve existing Federal coal conversion goals. In fact, if the 23 voluntary conversions are completed, about 235,000 barrels of oil per day will be saved, or about two-thirds of the savings potential of DOE's conversion program. In addition, industry efforts to convert existing boilers have benefited from the air quality compliance requirements and procedures which allow accelerated coal burning at converting facilities, and provide that conversions are not subject to certain air quality requirements which have been included in the Clean Air Act amendments since 1970. However, it is uncertain whether ERA's program for converting existing boilers could result in conversions which are opposed. Few enforcement actions have historically been taken in such situations, and companies opposed to conversion have been eligible for exemptions. Therefore, GAO believes that the Congressional actions to replace the regulatory enforcement program with a voluntary conversion program, and to reduce program funding were generally warranted.

In regard to new boilers, there is some evidence, primarily concerning electric utilities, that the preferred fossil fuel for new boiler purchases is coal rather than oil or gas. The relative price advantage which coal now has over oil and gas is the principal reason coal is preferred. Yet, the depressed sales of large industrial boilers during recent years precludes verification of the extent to which oil or gas will be chosen as fuel by other types of industrial companies. Consequently, the benefits of continued regulation of the fuels chosen for use in large new boilers are uncertain.

AGENCY COMMENTS

Written comments were requested from the Department of Energy on a draft of this report, but Department decided not to provide GAO with official comments.

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ABBREVIATIONS

Btu	British thermal unit
DOE	Department of Energy
EPA	Environmental Protection Agency
ERA	Economic Regulatory Administration
ESECA	Energy Supply and Environmental Coordination Act
FUA	Powerplant and Industrial Fuel Use Act
GAO	General Accounting Office
Mcf	Million cubic feet
OTA	Office of Technology Assessment
Tcf	Trillion cubic feet



CHAPTER 1

INTRODUCTION

Since 1945, much of the Nation's new utility electric-generating capacity has been fueled by oil or natural gas. In addition, about 400 powerplant boilers, mostly along the East coast, switched from coal to oil between 1968 and 1972. To help reduce U.S. dependence on imported oil (hence, the Nation's vulnerability to an oil embargo) and to conserve scarce domestic oil and gas, the Congress passed the Energy Supply and Environmental Coordination Act of 1974 and the Powerplant and Industrial Fuel Use Act of 1978 (FUA)--Public Laws 93-319 and 95-620, respectively. FUA was designed to accelerate industrial coal use in place of oil and gas. Together, these statutes direct that a regulatory approach be used to require the large-scale conversion of existing industrial boilers to coal if they are equipped to do so, and are intended to limit the use of oil and gas in new boilers. They were also designed to conserve scarce domestic oil and gas, which have been used in increasing amounts in industrial boilers since World War II.

Consumption of residual oil in industry increased from 2.53 million barrels of oil per day in 1972 to 3.07 million barrels of oil per day in 1977. Residual oil use has decreased since 1977 to 2.50 million barrels per day during 1980. During 1978, when FUA was passed, utilities and industry consumed the equivalent of 5.7 million barrels of oil and gas per day under boilers, or about 15 percent of total U.S. energy consumption.

Oil and gas use was to be reduced by the Energy Supply and Environmental Coordination Act (ESECA) program, but no existing powerplants had converted to coal under this program by the time the Congress began considering further legislation in 1977. In reviewing the ESECA program, congressional committees noted that there had been deficiencies in program management and that implementing the program was not easy. Our review of the program ^{1/} disclosed that (1) the site specific economic and environmental analyses which were required prior to issuing conversion orders were time consuming and expensive, and that (2) better coordination was required between the Federal Energy Administration (a Department of Energy predecessor agency) and the Environmental Protection Agency.

^{1/}Letter dated Sept. 16, 1977, to the Honorable Henry M. Jackson, Chairman, Committee on Energy and Natural Resources, U.S. Senate, from Elmer B. Staats, Comptroller General of the United States (EMD-77-66).

The Congress passed FUA in order to improve the regulatory program started under ESECA, and provided the Department of Energy (DOE) with revised authority to order the conversion of existing powerplants and major industrial installations capable of using coal. In addition, FUA

--prohibited the use of petroleum and natural gas in new electric powerplants and major industrial installations,

--limited increases in the amounts of oil or gas used in existing powerplants, and

--prohibited the use of natural gas in existing powerplants in 1990 or thereafter.

Exemptions from FUA provisions are available, but boiler owners requesting exemptions must document their eligibility. The Department of Energy's Economic Regulatory Administration (ERA) administers the program.

The FUA process for the conversion of existing boilers was recently amended as part of the Omnibus Budget Reconciliation Act of 1981, and these changes are further described on page 6. Briefly, the FUA was amended to change the regulatory enforcement program for converting existing boilers to a voluntary program, and to repeal the prohibitions on natural gas use starting in 1990. The 1990 prohibitions were replaced with an energy conservation program for electric utilities. The regulatory processes described in the section below were in effect during our review.

ERA REGULATORY PROCESSES

Two basic regulatory processes were being used for implementing ERA's program. One process applied to the conversion of existing boilers from oil or natural gas to coal. In this process, ERA identified convertible boilers, and the burden of proving that conversion was feasible was placed on ERA. The second regulatory process involved industry petitions to use oil and natural gas in new or existing facilities. If an industrial company wished to use oil or gas in a new boiler, or in an existing boiler subject to a prohibition order, it had to prove to ERA that certain circumstances warranted the use of these fuels. In this process, the burden of proving eligibility for any

one of the numerous FUA exemption categories is placed on industry. 1/ This process remains in effect.

The program for converting existing boilers from oil or natural gas to coal was administered through the ESECA and FUA authority to prohibit the use of oil or gas in existing boilers. 2/ ERA's use of this authority was discretionary. After ERA identified powerplants which appeared to be capable of using coal, it would issue a proposed prohibition order to the owner of the facility. This order notified the owner that ERA had started to consider the feasibility of conversion. After a public comment period, during which time the owner could inform ERA of exemptions for which the facility might be eligible, it could then issue a notice of intent to proceed. At this point, the company was provided another 3 months to identify exemptions for which the facility could qualify.

ERA then analyzed the feasibility of converting the facility to coal and reached three basic conclusions before issuing a final prohibition order. ERA had to show that (1) the powerplant had the technical capability to use coal without substantial modification or reduction in rated capacity, (2) the conversion was financially feasible, and (3) the conversion was environmentally acceptable. Reaching these conclusions required documentation and analysis; ERA had hired contractors to perform these analyses. ERA also had to evaluate any requests for exemptions before a final prohibition order could be issued, and had to defend its position in court if a company filed suit to prevent enforcement. Once a final order was issued, a company would have had the option of converting to coal or any fuels besides oil and natural gas, or ceasing to operate the boilers.

1/These regulatory processes apply to large industrial boilers and several other types of power generators which consume 100 million Btu's of fuel per hour or more, or multiple units located at a single site if, in combination, they consume 250 million Btu's per hour or more.

2/The FUA process is described above. The ESECA process is similar in that the burden of proving the feasibility of conversion was placed on ERA. The criteria for proving conversion feasibility differ under ESECA, and the process requires EPA participation and State acquiescence. ERA has administered the ESECA cases started prior to the enactment of FUA, and any additional facilities included in the conversion program since that time were subject to FUA provisions.

Once ERA issued a proposed prohibition order, the company receiving the order could apply to the Environmental Protection Agency (EPA) for a permit allowing coal burning in advance of the date when the facility would achieve full compliance with the applicable State air quality plan. However, powerplant emissions had to meet national primary air quality standards, and public health had to be judged to be adequately protected. In addition, facilities which received Federal conversion orders were not required to comply with the EPA's New Source Performance Standards, and may not have been affected by the Prevention of Significant Deterioration rules which were authorized by amendments of the Clean Air Act since 1970. ^{1/} These standards and rules could significantly increase the costs of conversion.

The basic steps for obtaining exemptions from the FUA prohibitions to use oil or natural gas in new boilers are comparatively straightforward. Firms initiate the process by petitioning ERA for an exemption and submitting evidence showing that the firm qualifies for the exemption.

ERA reviews the evidence, publishes its preliminary findings for public comment, and then decides to grant or deny the exemptions. Both temporary and permanent exemptions can be granted by ERA if a company demonstrates, for example, that certain physical, economic, environmental, or legal factors preclude the use of coal or another alternative to oil or natural gas. An exemption can also be obtained if the company is faced with an emergency situation, if synthetic fuels or cogeneration will be used, if the public interest would be served, or if certain local restrictions prevent the use of alternatives to oil or natural gas. When granting exemptions, ERA may impose reasonable terms and conditions such as those considered necessary to ensure compliance.

OBJECTIVES, SCOPE, AND METHODOLOGY

We made this review based on a March 26, 1980, request from the former Chairman, and now Senior Minority Member, of the Senate Committee on Energy and Natural Resources. As agreed, the primary objectives of our review were to identify (1) the status and likely achievements of the FUA program, (2) the adequacy of the regulations implementing the program and their consistency with congressional intent, and (3) any improvements which could result in more timely program implementation.

^{1/}See Section 111 (a)(8), 113(d)(5)(A)(i), and 163(c)(1)(A) of the Clean Air Act.

Because final regulations have been in effect for a relatively short period of time, our assessment of FUA's effectiveness was somewhat limited. The act became law November 9, 1978, and final regulations were published during 1980. While our major information-gathering efforts neared completion about October 1980, final regulatory actions had been taken to convert only one existing powerplant since FUA was passed, and no major exemption petitions had been processed completely under the final regulations. Only nine exemptions had been granted to industrial companies planning to build new fuel-burning facilities as of October 30, 1980. Consequently, the actual burden of obtaining exemptions from the act could not be assessed. Our November 21, 1980, report on coal conversion activities included a review of the most complex exemption petition completed by ERA during 1980 under its proposed and interim regulations. 1/

Program status

Our review of the conversion of existing boilers to coal concentrated on the progress of the regulatory program for converting utility boilers. We identified the status of the regulatory program through interviews with ERA officials and a review of ERA records. This work included a review of the timing of ERA contract studies of the environmental, technical, and financial circumstances of each conversion included in the program. We intended to identify ERA's progress toward final regulatory actions. As a result, we did not perform an in-depth examination of the contracting problems which have delayed the program. The actions taken by utility companies to convert to coal were also included in our review. We identified the actions of 14 utility companies in our September 21, 1980, report and further detail on the scope of our work at these companies is included in that report. 1/ For the remaining utility companies included in ERA's regulatory program, we reviewed company correspondence and other information concerning the status of the proposed conversions maintained by ERA and discussed conversion status as needed with company officials.

Our coverage of the conversion of existing industrial boilers was limited as was the emphasis ERA has given to these areas. At the time of our review, ERA was performing a survey of the industrial boiler market to identify the potential for industrial conversions and update the 1974 Federal survey of industrial boilers. We limited our work in this area to discussions with ERA officials and 10 industrial companies to determine if voluntary conversion decisions were being made.

1/U.S. General Accounting Office, "Financial and Regulatory Aspects of Converting Oil-Fired Utility Boilers to Coal," EMD-81-31, Nov. 21, 1980.

Our review of the FUA prohibitions on the purchase of new oil and gas boilers concentrated on an assessment of the need for regulatory action. We attempted to determine the extent to which industry has been and can be expected to purchase new oil- or gas-fired boilers. We reviewed (1) the orders for boilers as currently projected by the electric utility industry, (2) the boiler orders reported to ERA by the boiler manufacturing industry, (3) estimates of the fuel-saving potential of FUA, and (4) literature describing expected fuel use trends. (See app. I.)

Review of regulations

In reviewing the FUA regulations, we compared the major provisions of the act with the final regulations, and reviewed the changes made in the proposed regulations to reduce the regulatory burden. We concentrated our regulatory review on the broad powers claimed by ERA under FUA.

We identified three major regulatory positions taken by ERA in the final FUA regulations which have been referred to our Office of the General Counsel for its review to determine if congressional intent was followed. These included (1) ERA's requirement that petitioners for certain exemptions may be required to consider conservation measures on a broad basis to reduce potential oil or gas use, (2) ERA's position that it may impose environmental control measures beyond those required by other Federal environmental laws, and (3) ERA's position of not necessarily considering a permanent exemption as permanent. The FUA terms and conditions authority (Sections 214 and 314) is the principal basis upon which ERA adopted these positions. The results of our review of these regulatory positions will be reported separately.

Program improvements

The fuels conversion program has recently been revised through budget and legislative changes, and further regulatory changes have been proposed. On June 5, 1981, Congress reduced funding for ERA's coal conversion activities for fiscal year 1982 from the original request of \$31 million to \$5 million. 1/ Congress also amended FUA to change to a voluntary program for converting existing boilers as part of the fiscal year 1982 Federal budget decisions. This revised program provides, in part, for Federal action based upon the requests of companies that wish to convert voluntarily; prohibition orders will no

1/P.L. 97-12, Supplemental Appropriations and Recission Act, 1981, June 5, 1981.

longer be issued to utilities opposed to conversion. In addition, companies that no longer wish to participate in the current FUA program can withdraw. ERA has also proposed new regulations for implementing FUA which should reduce both the cost of administering the regulatory program, and industry's compliance burden.

We believe the changes in program activities resulting from these decisions is generally warranted, based on our review. Consequently, we are making no specific recommendations at this time.

CHAPTER 2

UTILITY EFFORTS TO VOLUNTARILY CONVERT

EXISTING BOILERS HAVE OUTPACED ERA'S

REGULATORY ENFORCEMENT PROGRAM

We identified 15 utility companies that were attempting or planning to convert 23 powerplants which could save about 235,000 barrels of oil per day; 20 of these powerplants were included in ERA's conversion program. With ERA's program focused on attaining early accomplishments and with the increasing number of voluntary conversion efforts by electric utilities, the regulatory program evolved from one designed to operate through enforcement actions to regulatory assistance. For example, ERA has helped utilities with their conversion plans by using the Fuel Use Act and Clean Air Act authority to attain air quality compliance approvals at an earlier date than otherwise possible.

The regulatory conversion program was proceeding at a slow pace, had been delayed by contracting problems, and was being outpaced by utility efforts to voluntarily convert to coal. Since 1979, contracting problems had delayed the completion of 18 of the 32 active coal conversion cases from 6 months to 2 years. No conversions had been completed through enforcement actions. It was also uncertain when ERA would begin to take such actions because case completions have historically been delayed.

The prospects for final regulatory action further declined following recent DOE and congressional action. In January 1981, ERA began to curtail program activities as part of the administration's efforts to reduce the cost of Government operations. On June 3, 1981, the Congress provided \$5 million in budget authority for continuing conversion program activities during fiscal year 1982. This amount is a \$26-million reduction from the \$31 million originally requested for conducting the fiscal year 1982 operations. As of August 3, 1981, ERA officials had not yet decided how the fiscal year 1982 funds would be spent.

ERA's program for converting existing boilers to coal included 43 powerplant sites as of June 1980, as shown in the following table.

Table 1

<u>Program</u>	<u>Groups receiving proposed conversion orders</u>	<u>Number of boilers covered</u>	<u>Number of powerplant sites covered</u>
ESECA	Utilities	33	<u>a/14</u>
	Industry	7	4
FUA	Utilities	41	19
	Industry	2	1
	Federal facilities	<u>11</u>	<u>5</u>
Total		<u>94</u>	<u>a/43</u>

a/These statistics do not include the Brayton Point powerplant (units 1, 2, and 3) owned by New England Power Company, which was issued a final regulatory order in June 1980. The company began burning coal in 1979 and plans to complete the conversion during 1981.

Since the conversion program started, it has been focused on the conversion of the country's largest boilers, those owned by electric utility companies. Industrial boiler conversions have received little attention in comparison. ERA officials said they did not intend to finalize the proposed orders issued to Federal agencies because they were issued to emphasize the importance of conversion for those making Federal budgeting decisions. Also, ERA had taken no further action on five utility powerplants which had received proposed prohibition orders because three of these were being converted to coal by the companies, and the other two were not practical to convert.

CONTRACTING PROBLEMS HAVE DELAYED THE PROGRAM

Various contracting problems have delayed the required analyses for the powerplants covered by the conversion program. None of the active ESECA cases were on schedule; 1/

1/ERA was proceeding with the regulatory process for 12 of the 14 utility powerplants and 4 industrial facilities included in the ESECA program. Although two other utility powerplants had received proposed ESECA prohibition orders, these cases were not being pursued by ERA because the conversions did not appear to be practicable.

these delays ranged from 1 to 2 years as a result of ERA's actions to change contractors. ERA officials said that three contractors, hired before 1979 to perform analyses of the ESECA cases, did not have sufficient funding to properly complete the assigned studies and that contract management problems contributed to poor contractor performance on the ESECA cases. The analyses were restarted by new contractors between September 1979 and October 1980.

Contracting delays have also affected the FUA cases. ERA had originally started FUA case analyses by hiring national laboratories to perform a limited number of the complex cases. But, due to delays of 16 to 21 months in awarding 4 key contracts, the workload of the national laboratories was expanded.

The delays in awarding these contracts were caused by a variety of factors, including choices between multiple contract awards vs. multi-year awards, the extent of minority-owned small business participation, adherence to Source Evaluation Board procedures, resolving a protest of the engineering analysis procurement request by the American Consulting Engineers Council, time required for internal review by ERA's General Counsel, and consideration of contractor conflicts of interest. Because three of these contracts were not awarded prior to September 30, 1980, approximately \$1 million of the \$23 million budgeted for ERA's fiscal year 1980 fuels conversion activities was not obligated.

Of the 16 active FUA cases, 9 were assigned to national laboratories for analysis. 1/ The national laboratories had been assigned three additional cases which had not yet been started, and four cases were unassigned for 8 to 10 months due to the delays in hiring contractors as described above. ERA officials said they had also delayed the issuance of additional proposed prohibition orders until the contractors that were needed to perform the required analyses were hired.

ERA budget documents showed that the ESECA cases and several FUA cases were scheduled for completion during fiscal year 1982. These estimates reflect further case completion delays. The budget documents stated that the FUA case completions may be delayed by voluntary conversion commitments by utility companies. We believe the case length is uncertain due to the history of delays in the program and the fact that few final enforcement actions have taken place since the conversion program was started under ESECA in 1974.

1/Due to voluntary conversion efforts, the 16 active FUA cases did not include 3 Federal facilities and 4 utility powerplants which had been issued proposed prohibitions orders.

Before 1978, 12 enforcement actions were completed under the ESECA program. However, the powerplants subject to these actions were already burning coal on a regular basis; the enforcement actions were taken primarily to prevent the partial use of natural gas. Several other enforcement actions were attempted under ESECA, but the concurrence of the State Governor could not be obtained. Consequently, these powerplants were not converted to coal.

REGULATORY ACTIONS CAN BE REDUCED
FOR CERTAIN VOLUNTARY CONVERSIONS

We have identified 23 powerplant conversions (including 51 boilers) that 15 utilities are attempting to complete, 19 of which are covered by proposed FUA or ESECA prohibition orders. ERA has finalized prohibition orders on only the Brayton Point powerplant and may not publish the results of any of the contract analyses performed on the other powerplants included in the program during fiscal year 1981, according to the program phase-out plan adopted in February 1981. No enforcement actions were planned. Those companies now attempting to convert to coal are listed below.

Table 2

<u>Company/Powerplant</u>	<u>Type of conversion order</u>
New England Power Company: Brayton Point 1,2,3 (note a) Salem Harbor 1,2,3	ESECA FUA
Virginia Electric and Power Company: Chesterfield 3,4,5,6 (note a) Portsmouth 3,4 (note a) Possum Point 3,4 Yorktown 1,2	ESECA ESECA FUA (b)
St. Joseph Power and Light Company: Lake Road 5,6 (note a)	ESECA
Consolidated Edison Company: Ravenswood 3 Arthur Kill 2,3	FUA FUA
Public Service Electric and Gas Company: Burlington 7 Bergen 1,2 Hudson 1	FUA FUA (b)
Savannah Electric and Power Company: Effingham 1	FUA
Baltimore Gas and Electric Company: C.P. Crane 1,2 Brandon Shores 1	ESECA FUA
Delmarva Power and Light Company: Edge Moor 3,4	ESECA
Holyoke Water Power Company: Mt. Tom 1 (note c)	ESECA
Central Maine Power Company: Mason 3,4,5	(b)
Atlantic City Electric Company: Deepwater 7,8,9	FUA on #8
Orange and Rockland Utilities, Inc.: Lovett 4,5	FUA
Public Service Company of New Hampshire: Schiller 4,5,6	FUA

<u>Company/Powerplant</u>	<u>Type of conversion order</u>
Tampa Electric Company: F.J. Gannon 1,2,3,4	FUA
Tucson Electric Company: Irvington 1,2,3,4	FUA

a/Coal burning commenced at these stations before October 1980.

b/These powerplants are not included in ERA's conversion program.

c/A subsidiary of Northeast Utilities Company.

Four of the powerplants are now burning coal although certain additional regulatory approvals are required. In addition, the companies listed above have taken one or more of the following actions to initiate the conversion process:

- Completed or are in the process of completing studies of engineering, financing, or environmental compliance.
- Initiated the regulatory permitting processes.
- Notified or reached general agreement with their State authorities and EPA on the financial and environmental conditions of conversions.
- Requested or have received temporary air quality variances to test burn coal or high-sulphur oil.
- Started coal burning and/or ordered emissions control equipment to complete the conversion.

Completion of these conversions would save the equivalent of about 235,000 barrels of oil per day.

Eight companies are beyond the initial planning stage and have received major regulatory approvals or agreements. The New England Power Company is burning coal at two of the three boilers being converted at Brayton Point. The Virginia Electric and Power Company has been burning coal at its Portsmouth and Chesterfield powerplants, and is planning to burn coal at its Possum Point and Yorktown powerplants before 1984. Also, Baltimore Gas and Electric Company expects to burn coal at C.P. Crane during 1981 and is committed to coal use at its Brandon Shores station when

it begins operation in 1984. In addition, the Northeast Utilities Company has reached agreements with the principal State authorities required for the conversion of the Mt. Tom powerplant and the Federal Energy Regulatory Commission has approved the Mt. Tom conversion financing plan. ERA has also received letters from the Atlantic City Electric Company and the Central Maine Power Company stating that the conversions of their Deepwater powerplant (units 7 and 9) and Mason powerplants are scheduled.

ERA activities have played a role in advancing the voluntary conversion efforts of some companies as evidenced in the following examples. The Public Utilities Commission of New Hampshire stated that ERA's testimony at its September 4, 1979, public hearing on the proposed conversion of Schiller provided "invaluable input" on conversion feasibility, cost, and environmental regulation. Subsequently, the Commission ordered Schiller's conversion. Also, Savannah Electric and Power Company officials had indicated to ERA officials that a proposed prohibition order could assist in obtaining final conversion agreements for its Effingham powerplant. Following issuance of the proposed order, on November 14, 1979, the State of Georgia's Department of Natural Resources approved the conversion and issued a construction permit for the project on December 13, 1979. During March 1981, the company began a \$24-million construction project for the conversion, which it expects to complete in May 1982.

The conversion program has also facilitated conversions to coal through the use of the regulatory authority to allow delayed compliance with air quality regulations. Once a proposed conversion order has been issued, the Environmental Protection Agency can issue an order permitting coal burning prior to the time a facility owner achieves full compliance with State air quality plans if national primary ambient air quality standards are met, and if full compliance with the State air quality standards is scheduled. Since the conversion program started, the Environmental Protection Agency has issued Delayed Compliance Orders on 15 utility powerplants, and two additional requests for such orders were under review as of June 1, 1981. Without the use of this procedure, utilities would be required to delay coal burning until all the emissions control equipment necessary to achieve full compliance is installed. Such delays, which would be several years, reduce the financial benefits of conversions and could preclude voluntary utility action in certain cases.

In addition, the utilities which have received conversion orders are generally permitted to convert to coal without complying with EPA's New Source Performance Standards and may not be affected by the Prevention of Significant Deterioration rules. (See p. 4.) If these standards and rules were applied to converting facilities, the costs of air quality compliance could increase sharply. For example, the application of the New Source Performance Standards would require the use of the best available pollution control

technology, which means scrubbers. Officials of the utility companies we contacted stated that they would not be in favor of conversion if scrubbers must be purchased, due to their high cost.

While Federal air quality rules generally relax control requirements in conversion cases, the States may require powerplants to meet standards which necessitate the use of scrubbers. Some States' air quality plans are more restrictive than the Federal standards but may be modified to accommodate coal conversions without the use of scrubbers. Each utility desiring to convert to coal must develop a plan which shows that air quality will be maintained at acceptable levels upon conversion. Should agreement be reached on an acceptable conversion plan which results in emissions in excess of the approved State plan, the plan must be revised and approved by the Environmental Protection Agency.

Reaching such decisions is not easy and is time-consuming. Successful conversion efforts are often dependent upon the willingness of State officials to consider changes in State air quality plans, and utilities must demonstrate that the use of coal will provide for the achievement of State air quality goals. Revisions of State air quality plans can also affect the potential for future industrial growth. Industrial companies may object to a coal conversion which could affect their future expansion plans; neighboring States may object to the increased emissions caused by nearby conversions; and citizens may object to conversions due to concern for their health and welfare.

POTENTIAL FOR ADDITIONAL CONVERSIONS IS UNCERTAIN

It is uncertain whether the ESECA or FUA regulatory enforcement processes could have resulted in powerplant conversions which are currently opposed due to financial, environmental, or other feasibility problems. No such cases have been completed, and companies opposed to conversion were eligible for a variety of exemptions if environmental circumstances, financial conditions or other practical considerations preclude conversion. Currently, there are eight powerplants with ESECA- and FUA-proposed prohibition orders that the utilities are opposed to converting, and six others which the utilities are studying or are willing to convert if favorable financial or environmental arrangements can be made.

Although ERA has identified other utility powerplants which are candidates for FUA proposed prohibition orders, the number of additional viable candidates is small and is decreasing as time passes. For example, of the 350 powerplant boilers listed by ICF, Inc., in its 1979 survey ^{1/} to identify the universe of utility

^{1/}"Listing of coal capable powerplants by ICF Inc.," published as part of a report by the President's Commission on Coal, Mar. 3, 1980.

powerplants which could be considered for conversion, about 120 (1) are included in ERA's program, (2) are planning to convert, or (3) have already converted. Also, 204 were placed in service before 1955 and are 25 or more years old. Due to their age, these powerplants do not have sufficient remaining useful life to be considered likely conversion prospects. ERA had considered, or planned to consider, the conversion potential of about half of the remaining 26 boilers. The other boilers located at eight powerplants are small, average less than 20 megawatts in size, and have been in service for over 15 years.

ERA officials stated that the number of convertible boilers could possibly be expanded somewhat by considering boilers which were originally designed to burn coal, but which have never burned coal. ERA's program has concentrated on the most likely conversion candidates, those which have previous coal-burning experience.

The potential for industrial conversion is uncertain. ERA was conducting a comprehensive survey of industrial boilers to assess the potential for conversion, and the results are expected to be published in late 1981. ERA officials stated that they had made phone calls to 70 industrial companies which indicated the companies were making decisions on conversion. However, no statistics were available from ERA on these industry decisions. We contacted 10 East coast industrial companies that own boilers which could burn coal; each has made the conversions they believe were cost beneficial. Of the 10 companies, 6 had made or were planning conversion to coal or wood by 1982, which would save a total of about 14,000 barrels of oil per day. The four companies taking no action stated that technical, economic, or environmental problems prevented conversion.

Some utility conversions are opposed

Officials of six utility companies are opposed to the conversion of the following eight powerplants because they believe that (1) the conversions are not cost effective, (2) the conversions are potentially impractical, or (3) the costs may adversely affect their companies' financial condition.

Table 3

<u>Company/Powerplant/Unit</u>	<u>Conversion order</u>
Canal Electric Company: Canal 1	FUA
Long Island Lighting Company: Northport 1,2,3,4 Port Jefferson 3,4 E.F. Barrett 1,2	FUA ESECA FUA
United Illuminating Company: Bridgeport Harbor 3	FUA
Georgia Power Company: McManus 1,2	ESECA
Baltimore Gas and Electric Company: Riverside 4,5	ESECA
Detroit Edison Company: St. Clair 5	ESECA

Of the powerplants listed above, ERA was not attempting to complete the regulatory process for the McManus and St. Clair powerplants as discussed on page 18.

Completion of these regulatory cases may or may not have resulted in conversion. In order to issue final FUA prohibition orders, ERA had to develop information which shows that (1) the powerplants had the technical capability to use coal without substantial modification or reduction in rated capacity, (2) the conversions were financially feasible, and (3) the conversions were environmentally acceptable. In addition, ERA had to evaluate any requests for exemptions before completing the regulatory process, and further litigation was possible. There are too many variables to predict the outcome of such a process. In addition, there is little historical basis for predicting the outcome of the regulatory process for conversions which are opposed. No enforcement actions have been completed in such circumstances.

The burden of proof which was placed upon ERA under both ESECA and FUA was substantial in several of these cases. For example, the Long Island Lighting Company has stated that converting its Northport powerplant is infeasible, because the boilers are not currently coal capable and, because at the minimum conversion cost of \$1.2 billion, the powerplant is not a cost-effective conversion. The company has stated that it will "resist vigorously" all efforts to proceed with a final prohibition order. Under the company's

present plans, oil use at Northport would decline 70 percent by 1990 if its four other powerplant projects are completed along with the conversion of Port Jefferson or E.F. Barrett powerplants. However, the Company also believes that the conversion of these two powerplants is not economically beneficial. In response to the proposed prohibition order, Long Island Lighting had proposed to ERA that the feasibility of coal/water mixtures be demonstrated at Northport as a DOE demonstration project.

The Canal Electric Company stated that the Canal powerplant is not technically capable of burning coal and that without major physical modifications, coal burning would reduce the rated capacity of the powerplant to 45 percent. ^{1/} In addition, the Company has stated that it would not be able to raise sufficient capital for conversion for at least 8 years. On October 28, 1980, the company challenged ERA's preliminary finding of technical capability and requested that the proposed prohibition order be withdrawn.

The United Illuminating Company has stated that the situation at Bridgeport Harbor may justify permanent exemptions due to the lack of an alternative fuel supply, site conditions, and inability to comply with the applicable environmental requirements. However, the company provided ERA with a plan under which the powerplant could be converted contingent, in part, on a Federal grant to cover the costs of conversion. The company believes it cannot afford to convert this powerplant. It also appears that the conversion would require scrubbers under Connecticut air quality regulations, which would substantially increase the costs of conversion.

The Baltimore Gas and Electric Company and the Georgia Power Company oppose converting the Riverside and McManus powerplants because their expected usage is low. Officials of Baltimore Gas and Electric stated that their future plans are to use Riverside at less than 20 percent of capacity, that the powerplant is located in a non-attainment area, and that there is little room for new precipitators. Company officials stated that the powerplant would probably be retired if prohibited from burning oil. Similarly, Georgia Power Company has stated that the use of the McManus

^{1/}The Stone and Webster Engineering Corp., in a June 1980 conversion feasibility report prepared for Canal Electric Company, stated that provisions were made for coal firing in the original design of the Canal powerplant. But experience with coal-fired powerplants during the past 15 years indicates that the original boiler design parameters are inadequate for operation at continuous maximum rating when burning coal. The report also states that the maximum boiler design rating could be achieved if converted to coal, but that boiler modifications would be required since the boiler was essentially designed for oil firing.

powerplant was reduced to 7 percent of rated capacity during 1979 and that this pattern would continue because nuclear and coal-fired powerplants were providing the majority of the power required. Even if Federal grants for covering conversion expenses were offered, company officials have stated that the conversion of McManus is not desirable due to its low level of use.

ERA officials said they had intended to proceed with the regulatory process for each of these powerplants except the Georgia Power Company's McManus powerplant and Detroit Edison's St. Clair powerplant unit number 5. Coal is presently being burned at six other boilers at the St. Clair powerplant, and conversion of unit 5 would require separate facilities and high-sulphur coal because the boiler is designed differently than the other units at the powerplant. ERA documents state that the Detroit Edison Company is opposed to conversion and indicates that the powerplant location near the Canadian border makes the area's environmental quality an international issue.

Other utilities are undecided

Six utilities were undecided about the conversion of the following powerplants because their studies have not been completed or because financial or air quality compliance questions are not resolved.

Table 4

<u>Company/Powerplant/Unit</u>	<u>Type of conversion order</u>
Jersey Central Power and Light: Sayreville 4,5	FUA
Baltimore Gas and Electric Company: Wagner 1,2	ESECA
Central Hudson Gas and Electric Company: Danskammer 3, 4	ESECA
Niagara Mohawk Power: Albany 1,2,3,4	ESECA
Philadelphia Electric Company: Cromby 2	ESECA
Commonwealth Edison: Collins 4,5	FUA

Of these possible conversions, one is clearly doubtful at this time. The conversion of Jersey Central Power and Light's Sayreville powerplant cannot be completed due to the economic condition of its parent company. Jersey Central Power and Light is a subsidiary of General Public Utilities Corporation, the holding company whose financial condition is extremely weak due to the problems associated with the Three Mile Island nuclear powerplant. The FUA regulatory process could not solve this financial problem, and further conversion progress is dependent upon the financial recovery of the utility system.

ERA's success in completing prohibition orders and conversions of powerplants to coal depended, to a great degree, upon the agreement of utility management and local and State agencies which must issue the permits and approvals for coal burning. To improve the prospects for agreement among these groups, ERA had been studying each proposed conversion based on a variety of coal-burning assumptions tailored to each specific powerplant and locality so that a range of conversion options could be presented for the consideration of these parties. ERA officials thought that this strategy could succeed because it would open for discussion the possible ways in which conversion could be completed in an acceptable manner. For example, Commonwealth Edison, located in Chicago, Illinois, has

agreed that the conversion of its Collins powerplant would be economically beneficial if low-sulphur Western coal is used, but the State of Illinois has insisted that Illinois coal of a higher sulphur content be used to increase employment in the State's coal mining areas. Commonwealth Edison opposes high-sulphur coal use because it would require the installation of scrubbers, which are estimated to increase the conversion cost by about \$170 million. ERA officials believed that the FUA studies of these and other options and a final prohibition order could cause this issue to be resolved at the State level.

CONCLUSIONS

ERA's program to convert existing boilers has accomplished little and has not shown if it could be effective when utilities do not act voluntarily. Only one powerplant has been ordered to convert since 1979, but this powerplant had been burning coal voluntarily before the final regulatory order was issued. The lengthy regulatory process which has been delayed by ERA contracting problems is the main reason that ERA has not taken enforcement actions since 1979. It is also uncertain whether ERA actions would cause any conversions which have been opposed because few enforcement actions have been taken, leaving little basis for judging the likelihood of success in such situations, and because companies which are opposed to conversion may have been eligible for exemptions.

The conversions being undertaken by electric utilities go a long way toward implementing the desired Federal policy as expressed in ESECA and FUA. While regulatory approvals are necessary for completing the conversions that utilities are attempting, they would save the equivalent of about 235,000 barrels of oil per day by 1988. This amount equals about two thirds of the savings available if all the powerplants which have received regulatory orders converted to coal. Also, indications show that other industries are making conversions although the extent of their actions is uncertain.

CHAPTER 3

INCREASED OIL AND GAS PRICES

HAVE REDUCED THE NEED FOR

REGULATING NEW BOILER PURCHASES

Increases in the price of oil and natural gas diminish the economic incentive for using these fuels in large industrial boilers. According to studies by the Office of Technology Assessment (OTA), EPA, and DOE, the use of coal is now favored for use in large new boilers rather than higher cost oil or natural gas. To further illustrate this trend, the electric utility industry reports that only 3.1 percent of the generating capacity to be added between 1980 and 1989 will be oil or gas fired.

The major boiler manufacturers also expect that large industrial boiler purchasers will be ordering few oil- or gas-fired boilers. However, industrial boiler sales were depressed during 1979 and 1980, so the strength of industry's shift to coal or alternative fuels may not be clearly revealed by the sales statistics. Industry petitions for exemptions from FUA to use oil or gas in new boilers have also been at low levels. Consequently, we believe it would be speculative to estimate the extent that industry, other than electric utilities, would choose oil- or gas-fired boilers absent FUA regulation.

ECONOMIC RATIONALE FOR NEW BOILER REGULATION HAS CHANGED

Fossil fuel price changes since FUA became law have reduced the projected benefits of regulating fuel choices for new boilers. The price of oil and natural gas has risen substantially compared to the price of coal since April 1979, when DOE projected that FUA's regulation of new boilers might reduce oil and natural gas use by the equivalent of 350,000 barrels per day. DOE's efforts during 1980 to analyze the effects of the increased oil and gas prices on industrial boiler sales indicate that the program impact on oil imports cannot be measured with the usual statistical techniques. DOE and industry spokesmen appear to be in general agreement that continued FUA regulation of new boiler purchases will have a negligible effect on industry and utility fuel choices.

An original premise of Federal regulation of boiler fuel choices was that industry, influenced by energy costs, would often choose oil or gas as fuel rather than coal. ESECA provided the first step in the Federal coal emphasis by authorizing the Federal Energy Administration to regulate conversion to coal. When this act was passed, both oil and natural gas prices were

federally controlled below world market prices. In addition, the cost of burning coal had risen substantially in the early 1970s following passage of the Clean Air Act with its requirements for pollution controls.

By 1978, when FUA became law, the fuels pricing picture had changed. Both oil and natural gas exceeded the cost of coal and raised the expectation that coal use would increase. The House Committee on Interstate and Foreign Commerce observed in its July 1977 report 1/ on the proposed FUA that many boiler owners and purchasers were already choosing coal. However, according to the committee, the program was designed to reach those who had not yet decided to use coal or alternate fuels.

In April 1979, DOE estimated that the maximum effect of FUA would be to increase coal consumption 129 million tons per year, or the equivalent of about 460,000 barrels of oil per day. 2/ DOE also noted that

--about half of this savings could be expected by 1985;

--about 77 percent of the facilities using coal due to the program by 1990 would be new boilers rather than converted boilers;

--about 68 percent of the fuel savings would be natural gas; the remaining 32 percent would be oil savings.

DOE also noted that FUA could be expected to increase coal consumption 7 percent by 1985 (72 million tons) and slightly more than 10 percent by 1990.

DOE also noted that the need for any fuels conversion program was questionable in view of the past and expected changes in oil and gas prices. However, DOE stated that if there were no program, (1) increased coal use could be expected to take place over a longer period of time, (2) less natural gas would be available for high-priority users, and (3) more imported oil would be used in the short and long run. But, if significantly increased natural gas supplies became available, DOE stated that its use would be an alternative to FUA and that the Congress could consider altering the act.

The cost of oil and gas has increased sharply in relation to the cost of coal since FUA was passed in 1978 as evidenced by the electric utility fuel costs which are shown below. The cost of oil

1/House Report 95-496, Part IV.

2/Department of Energy, "Final Environmental Impact Statement, Fuel Use Act," Apr. 1979.

used by electric utilities increased about 154 percent from 1978 through January 1981, and natural gas prices increased 77 percent, but coal prices increased only 27 percent. On a comparative basis, oil was 3.8 times the cost of coal, and natural gas was 1.8 times the cost of coal by January 1981.

Table 5

Cost of Fossil Fuels Delivered to
Electric Utility Plants (note a)

Average fuel prices in cents per million Btu's

<u>Year</u>	<u>Coal</u>	<u>Residual oil</u>	<u>Natural gas</u>
1973	40.5	78.8	33.8
1974	71.0	191.0	48.1
1975	81.4	201.4	75.4
1976	84.8	195.9	103.4
1977	94.7	220.4	130.0
1978	111.6	212.3	143.8
1979	122.4	299.7	175.4
1980	135.2	427.9	189.3
1981 (note b)	142.3	540.2	254.1

a/Source: Department of Energy, Energy Information Administration, "Monthly Energy Review," May 1981.

b/1981 costs for January.

These pricing changes have reduced the expected impact of the FUA prohibitions on the use of oil and gas in new boilers. The latest macro-economic analysis of FUA was performed for ERA by EIA and published during October 1979. It showed FUA may reduce oil and gas use by 250,000 barrels of oil per day for industrial installations by 1990, but result in "negligible" import savings. However, ERA now maintains that the assumptions used in its 1979 analysis were unrealistic, and that it was apparent that the "usefulness of aggregate analysis were limited" for projecting FUA's effects. ERA's March 1, 1980, report on FUA activities states that DOE's analysis of new facilities data

"* * * tends to support the conclusion that economics, conservation and the market place, not FUA, have forced industry to evaluate alternative fuels in depth and those choices now often coincide with the goals of FUA."

ELECTRIC UTILITIES PROJECT THAT
COAL OR NUCLEAR POWERPLANTS
ARE PREFERRED

Electric utilities are expected to use a wide variety of options, other than oil and gas, during the 1980s to meet increases in electric power demand. According to the National Electric Reliability Council, the major options for meeting the increasing demand for electricity are nuclear energy and coal. The industry's reliance on these two options are reflected in the projections for new powerplant additions as shown in the following table.

Table 6

Primary Energy Sources for
New Generating Units, 1980-89 (note a)

	<u>Megawatts of capacity (note b)</u>	<u>Percent</u>
Coal	136,319	53.4
Nuclear	92,743	36.3
Hydro	15,050	5.9
Oil	6,531	2.6
Wood or refuse	1,836	.7
Geothermal	1,582	.6
Natural gas	1,154	.5
Wind	38	-
Total	<u>255,253</u>	<u>100.0</u>

a/Based on an April 1980 report of the National Electric Reliability Council to DOE, and adjusted to note the use of coal in the Brandon Shores powerplant of the Baltimore Gas and Electric Company rather than oil or gas originally reported.

b/This table does not include 4,237 megawatts of capacity for which the specific primary energy source was not identified.

The projections above present a sharp contrast to the actual powerplants placed in service between 1973 and 1978. During that time period, 107,455 megawatts of fossil-fueled, electric-generating capacity were constructed, and 47,532 megawatts, or 44 percent, of the capacity was designed to use oil or gas as the primary fuel. However, from 1980 through 1989, the coal-fired capacity additions of 136,319 megawatts are projected to represent 94.7 percent of the fossil-fueled additions. Just 5.3 percent of the future fossil powerplant capacity additions are projected to be oil- or gas-fired.

These projected capacity additions are based on a growth rate which may not be realized. An average annual growth rate of 4.2 percent was projected by the Regional Electric Reliability Councils in its report to DOE. The DOE review of these projections concluded that such a growth rate is well within the range of recorded experience, but is higher than can now reasonably be expected. ^{1/} A 2.06-percent growth rate was projected by DOE for 1980 to 1983. If the lower growth rate is experienced, utility companies can be expected to defer some of the capacity additions described above. The capacity additions may also be lower than projected as a result of regulatory and construction delays. Yet, the point of this discussion remains the same; electric utilities can be expected to depend upon coal or nuclear power for future base-load electricity generation.

When utility oil and gas use, in combination, will be reduced significantly remains uncertain because of the following major factors which are expected to affect oil and gas use:

- The increased demand for electricity.
- The extent of powerplant construction cancellations and delays.
- The number of existing boilers that have or will convert from oil or gas to coal.
- The effect of the Fuel Use Act's 1990 prohibitions on natural gas use by electric utilities.

For example, the National Electric Reliability Council projected that by 1989, total oil and gas use could decrease from the equivalent of about 3 million barrels of oil per day to about 2.5 million barrels per day. But, the Council also cautioned that if the prohibitions on natural gas use are strictly enforced, and new plants are cancelled or delayed because they are not required, or because of regulatory delays, oil use will surely increase. The Fuel Use Act prohibitions on building new oil- and gas-fired generating capacity were not cited as a factor influencing utility fuel choices because coal-fired generation is already less expensive than oil or gas. DOE's analyses are in general agreement with the Reliability Council's outlook on the use of coal in new powerplants.

^{1/}Economic Regulatory Administration, "Electric Power Supply and Demand for the Contiguous United States 1980-1989, June 1980.

Others believe that FUA prohibitions on constructing new oil- and gas-fired boilers will generally not influence future utility powerplant choices. These sources include 10 major utility companies which we interviewed, and reports of the American Gas Association, the Edison Electric Institute, the Office of Technology Assessment, the Congressional Budget Office, the former Council of Economic Advisors, the Department of Energy, and the Environmental Protection Agency. Their observations were based on the view that for large fossil-fueled utility powerplants, the economic advantages of using coal rather than oil or gas are clearly demonstrated despite the increased costs of environmental compliance.

FUEL CHOICES FOR NEW INDUSTRIAL BOILERS IS NOT CLEAR

Industrial boiler sales from 1977 through 1980 show that coal and alternative fuels are increasingly preferred over oil or natural gas. But, the extent of that preference cannot be verified due to the small number of boiler orders in recent years. An average of about 400 large industrial boilers was sold each year from 1970 to 1976, ^{1/} but only 94 large boilers were sold during 1979 and 1980. Of these, 69 were designed to use coal or fuels other than oil or natural gas, and the remainder were designed to use oil or gas. The 25 boilers designed to use oil or natural gas composed only 11 percent of the total boiler capacity of 33,400 million Btu's per hour sold those years. ERA activity under FUA was also low. ERA notified 10 companies that their proposed oil and gas boiler purchases may need an exemption from the FUA prohibitions. In addition, industrial companies which petitioned ERA for FUA exemptions proposed to use mixtures in 21 boilers; only 3 companies proposed oil or gas as the primary fuel.

The following table shows (1) industrial boiler trends toward coal or other alternatives to oil and gas and (2) the decline of industrial boiler sales from 1977 through 1980.

^{1/}Large industrial boilers are considered to be those of 100 million Btu's per hour or larger, as defined by FUA.

Table 8

<u>Year</u>	<u>Fuel choice</u>	<u>Number of boilers</u>	<u>Boiler capacity</u> (million Btu's/hr)	<u>Percent of orders by year</u>
1977	oil	46	9,441	28
	gas	24	4,142	12
	alt. fuel (note a)	<u>76</u>	<u>20,018</u>	<u>60</u>
	Total	<u>146</u>	<u>33,601</u>	<u>100</u>
1978	oil	50	7,560	25
	gas	27	4,172	13
	alt. fuel	<u>69</u>	<u>18,935</u>	<u>62</u>
	Total	<u>146</u>	<u>30,667</u>	<u>100</u>
1979	oil	21	3,061	14
	gas	1	120	1
	alt. fuel	<u>48</u>	<u>18,046</u>	<u>85</u>
	Total	<u>70</u>	<u>21,227</u>	<u>100</u>
1980	oil	0	0	0
	gas	b/3	652	5
	alt. fuel	<u>21</u>	<u>11,515</u>	<u>95</u>
	Total	<u>24</u>	<u>12,167</u>	<u>100</u>

a/The principal alternative fuels to oil and gas chosen during the 4 year period were coal, wood, or black licquer.

b/These 3 boilers were sold to boiler rental companies and did not require exemptions from FUA.

Source: Economic Regulatory Administration.

Orders for large boilers from January to June 30, 1981 show similar trends. 1/ Coal was chosen as fuel for 10 of the 25 large new boilers ordered during this time, natural gas was chosen for 7, oil for 1, and other alternative fuels for the remaining 7.

Due to the sharp decline in boiler sales since 1977, we do not believe these statistics confirm, with certainty, the

1/As reported to DOE on EIA Form 97 by the boiler manufacturing industry. DOE had not yet received reports for this time period from two boiler manufacturers.

extent to which coal or other alternative fuels are now favored by industry. DOE and boiler manufacturers attributed the decline in boiler sales to rising oil and gas prices, increasing capital costs, high interest costs, and various Federal legislation such as the Clean Air Act Amendments of 1977 and FUA. However, officials of each group stated that due to rising oil and gas prices, they expect coal to be an increasingly preferred industrial fuel in the future.

ERA regulatory actions on proposed boiler purchases correspond to the low level of boiler purchases. ERA conducts two major activities related to new boiler purchases: it advises potential purchasers of the FUA prohibitions on the use of oil and gas, and reviews industry's petitions for exemptions from FUA. ERA is advised of proposed boiler orders through reports required from the boiler manufacturers which identify companies that order boilers, and the type of boiler they intend to purchase. If a boiler manufacturer reports an oil- or gas-fired boiler order, ERA notifies the purchasing company of FUA's compliance requirements.

Only 10 companies had been notified of FUA requirements based on proposed orders of oil- or gas-fired boilers through June 1981. These companies had ordered 14 boilers with an average size of 252 million Btu's per hour. Oil was the proposed fuel for 11 of these boilers, oil or gas was chosen for 2 others, and a mixture of blast furnace gas and residual oil or natural gas was proposed for the remaining boiler.

ERA has also received fewer petitions for exemptions from FUA than had been expected. The following table shows the number of major exemption petitions accepted by ERA as of January 1981 for new large industrial powerplants.

Table 7

<u>Type of exemption</u>	<u>Number of petitioners</u>
Emergency	1
Temporary synthetic fuels	1
Cogeneration	1
Temporary public interest	2
Cost	3
Mixtures	<u>13</u>
Total	<u>21</u>

Those companies which have proposed to use mixtures plan facilities which will depend on fuels other than oil or natural gas for about 75 percent of their fuel requirements.

CONCLUSIONS

The value of continuing to regulate the fuels chosen for use in large new boilers is uncertain. There is some evidence, primarily concerning electric utilities, that the preferred fossil fuel for new boiler purchases is coal rather than oil or gas. The relative price advantage which coal now has over oil and gas is the principal reason coal is preferred. Yet, the depressed sales of large industrial boilers during recent years precludes verification of the extent to which oil or gas will be chosen as fuel by other types of industrial companies. Consequently, the benefits of continued regulation of the fuels chosen for use in large new boilers are uncertain.

AGENCY COMMENTS

Comments were requested from the Department of Energy on a draft of this report. The Department decided not to provide us with official comments.

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