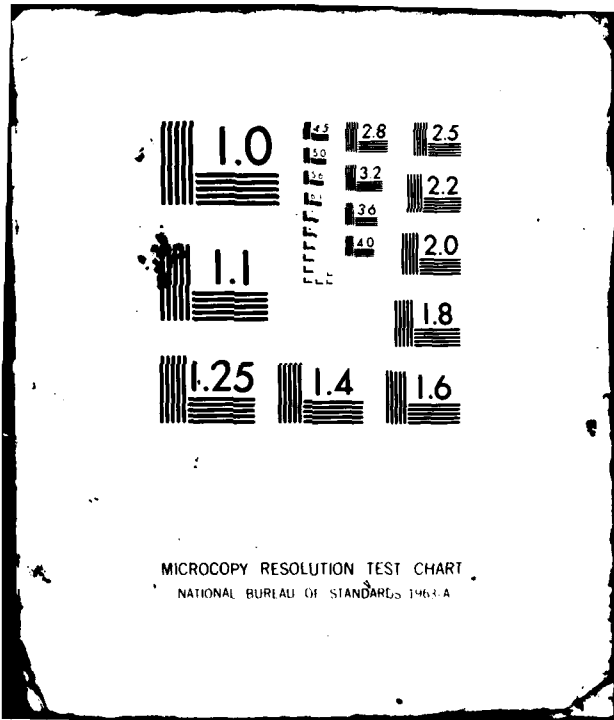


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'OFF-GAS' PROVISIONS OF THE POWERPLANT AND INDUSTRIAL FUEL USE --ETC(U)
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ENERGY AND MINERALS
DIVISION

B-205770

DECEMBER 15, 1981

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

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Dear Mr. Chairman:

Subject: "Off-Gas" Provisions of the Powerplant
and Industrial Fuel Use Act (EMD-82-25)

As part of our review of the Powerplant and Industrial Fuel Use Act (FUA), we surveyed electric utilities to determine the potential effects of FUA's prohibitions on natural gas use in electric utility boilers starting in 1990 (Section 301(a) of P.L. 95-620). Our review of FUA responded to the March 26, 1980, request of the former Chairman and now Ranking Minority Member of the Committee, Senator Jackson. The findings of our review of the FUA regulatory programs to convert existing boilers were contained in our September 8, 1980, report to the Committee, "Less Regulatory Effort Needed to Meet Federal Coal Conversion Goals" (EMD-81-71, Sept. 9, 1981.)

As agreed with your office, because the FUA prohibitions on electric utility natural gas use were repealed as part of the Omnibus Budget Reconciliation Act of 1981 (House Report 97-208, Sec. 1021), we prepared this letter summarizing our findings on FUA's "off-gas" provisions primarily for informational purposes. The "off-gas" provisions of FUA were designed to (1) conserve natural gas for uses other than the generation of electricity; (2) encourage the use of coal or other alternative fuels in place of natural gas; and (3) ensure natural gas availability for high priority purposes. The "off-gas" provisions also responded to the continuing trend of declining natural gas production. However, the utility industry maintained strong opposition to the off-gas provisions on the grounds that (1) the replacement of large portions of the generating capacity of natural gas-dependent utilities was beyond their financial capability, (2) the industry's plans already called for replacement of natural gas

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with other fuels on an orderly basis, and (3) implementation of the off-gas provisions would result in increased dependence on imported oil. Our survey of this area featured a questionnaire which was sent to natural gas-burning utilities to determine, in part, how each had planned to respond to FUA's natural gas prohibitions.

In general, the industry's replies signaled that the off-gas provisions could have become a regulatory quagmire due to the industry's proposed strategy of broadly applying for exemptions from the off-gas provisions. While the potential results of the off-gas provisions would have ultimately depended upon DOE's interpretation of FUA's exemption provisions, a large portion of the early industry response would likely have been to switch to residual oil if DOE did not grant exemptions. Since the effect of FUA's off-gas provisions would have depended upon the exemption process, it was not possible to project the number of natural gas-using boilers which would have been retired early, or the cost of replacing generating capacity.

SURVEY DEVELOPMENT AND SCOPE

The objectives of our questionnaire were to develop information which would (1) reveal utilities initial strategies for complying with the off-gas provisions, (2) provide data on the fuel-use changes which could have occurred, and (3) indicate the cost of compliance. To meet these objectives, we asked utility companies for a variety of operating and financial data on their current and projected operations with an emphasis on the relationship of these data to utility decisions on compliance with FUA. We also tested various aspects of the off-gas provisions for reasonableness including the years chosen as the base period for natural gas consumption and the FUA's unit by unit restriction on natural gas consumption. The questionnaire was pretested at nine natural gas-burning electric utility companies, and comments on the draft questionnaire were received from the Edison Electric Institute and the American Public Power Association.

Our questionnaire provided broad coverage of the electric utilities affected by FUA's off-gas provisions. The questionnaire was sent to 182 utilities identified as having used gas during 1978 according to reports prepared by the Energy Information Administration and the National Coal Association. ^{1/} These 182 utilities consumed over 98 percent of the natural

^{1/} "Cost and Quality of Fuel for Electric Utility Plants - 1978," Energy Information Administration, U.S. Department of Energy, July 1979. "Steam Electric Plant Factors," National Coal Association, 1979.

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gas consumed by the electric utility industry during 1976. Responses were received from 144 of the 182 utilities, a 79 percent response rate. The utilities that responded to our questionnaire consumed approximately 89 percent of the 3.68 trillion cubic feet (tcf) of natural gas used to generate electricity during 1980.

Natural gas was used to generate about 12 percent of the electric power produced in the United States during 1980. Of the total installed gas-fired generating capacity, approximately 91 percent is located in areas served by member companies of the Electric Reliability Council of Texas and the Southwest Power Pool.

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SURVEY RESULTS

Of the 144 utilities that responded to our questionnaire, 31 stated that the off-gas provisions would have no effect on their operations or future fuel choices. These companies generally noted that (1) natural gas composed a very small portion of their current and projected fuel requirements, (2) they expected to easily qualify for FUA exemptions if needed, or (3) they expected to rely entirely on fuels other than natural gas for generating electric power by 1990. Our analysis concentrated on the remaining 113 utilities which noted that the off-gas provisions would have affected their plans or operations.

These 113 utilities were located in nine electric reliability council areas of the United States. Enclosures I through IV contain pertinent background information on these utilities such as

- the distribution and type of ownership of these utilities throughout the United States (enclosure I),
- a map of the reliability council areas (enclosure II),
- the distribution of gas-fired generating capacity of the United States (enclosure III), and
- the amount of natural gas consumed during 1960 by these utilities (enclosure IV).

Over half, or 60 of the 113 utilities included in our analysis responded that compliance with FUA's off-gas provisions presented difficulties (see enclosure V). These companies used over 70 percent of the natural gas consumed by electric utilities during 1980. Fifty of the 60 companies were located in the Southwest Powerpool area, Texas, and the Western Systems Coordinating Council area.

Other companies (53 of 113) stated that compliance would be uncertain or easy. Of these, 19 said that compliance would be uncertain, 15 said compliance would be somewhat easy, and 19 said compliance would be very easy. The companies that said compliance would be somewhat or very easy generally relied on natural gas for a relatively small portion of their generating capacity, owned dual-fired boilers, which had the capability to use residual oil, or indicated that they expected to qualify for FUA exemptions.

Some of the companies that said compliance with the off-gas provisions presented difficulties explained that financing the added generating capacity to replace their gas-fired capacity was beyond their financial capability, and that their financial resources were directed at coal and nuclear capacity additions which will be needed to accommodate load growth and to replace units due to retire. They viewed their construction programs as being in consonance with the FUA's objectives, but believed that their plans for gradual replacement of natural gas burning boilers were financially prudent.

The industry's initial strategy for complying with the off-gas provisions--seeking exemptions and converting to residual oil use--was not surprising in light of the compliance difficulty expressed by companies in heavy natural gas using areas. The following table shows the actions which the 113 utilities thought would be "very likely" to occur in response to the off-gas provisions.

<u>Type of Compliance Action</u>	<u>"Very Likely" Compliance Action in Megawatts (note a)</u>
Substitute oil for gas	64,340
Seek permanent exemptions	44,239
Seek temporary exemptions	41,939
Replace gas-fired units early	104
Replace gas-fired units retired on schedule	5,968
Use system compliance option (note b)	12,397

a/Includes generating capacity which is capable of using other fuels, but which was currently gas fired at the time of our survey.

b/The System Compliance Option of FUA permitted utility companies to propose systemwide plans for reducing their natural gas use which, if approved by ERA, would have exempted them from compliance with the specific prohibitions of the act regarding natural gas use.

The categories above are not exclusive; utility companies usually cited that more than one type of action was very likely for their generating units. For example, one company responded that for its gas-fired units, it would request permanent exemptions, temporary exemptions, and substitute oil for natural gas. In explaining their reply in a followup phone call, company officials stated that they would first request both permanent exemptions and temporary exemptions for their gas-burning units. If these exemptions were not granted by DOE, the units would be switched to residual oil. The utilities we surveyed reported that as much as 414,000 barrels of oil per day could be consumed in place of natural gas as a result of the off-gas provisions. In addition, four companies which were over 75 percent dependent on natural gas for fuel added that, in their view, compliance with the off-gas provisions would be impossible, and that they therefore would attempt to obtain the repeal of the off-gas provisions. Because such a large portion of the industry expected to apply for exemptions from the off-gas provisions, it was not possible to determine the potential for additional generating capacity construction, or the extent to which natural gas-fired boilers would be retired early.

In addition to these overall observations, several specific features of the off-gas provisions were reviewed in our survey. These included the use of 1974 to 1976 as the base period for computing natural gas consumption, and the restrictions on natural gas use on a unit by unit basis. A total of 67 of the 113 companies said that the 1974-76 time period was not representative of their historical natural gas usage. According to additional comments of the companies and our followup telephone conversations, the base period did not reflect historical gas consumption because of natural gas curtailments during that period caused by shortages, or because the companies were completely dependent on natural gas and needed to consume more natural gas than used during the 1974-76 period to accommodate electric load growth.

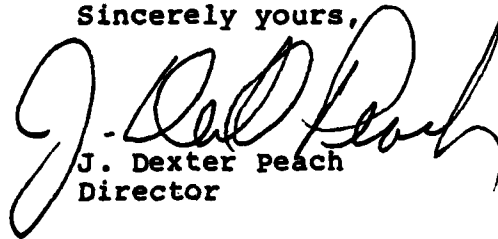
The unit basis for restricting natural gas use appeared to result in inefficient fuel use. As a result of the unit restrictions, utilities were precluded from increasing their natural gas use in any single unit beyond that amount consumed by the unit during the base period. Utilities reported that this reduced their ability to shift fuel among available units to attain maximum efficiencies. Of the 113 utility responses, 58 companies replied that they would shift natural gas use among their available units if not restricted to the base period natural gas consumption levels on a unit by unit basis. Of these 58, 24 stated that such a shift would reduce residual oil use by an estimated 22,000 barrels of oil per day. However, a large portion of this potential savings was already being achieved because the companies had obtained temporary FUA exemptions to use natural gas as they desired as part of the "gas for oil" program administered by DOE.

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We continue to have concern for future natural gas supply levels because annual natural gas production continues to exceed reserve additions. FUA's off-gas provisions may not have provided a satisfactory solution for preserving natural gas supply availability, but other Federal policies and programs can help avoid future shortages, and deal with any shortages which develop. Consequently, we plan continued coverage of this critical energy issue area.

We are sending a copy of this report to Senator Jackson.

Sincerely yours,



J. Dexter Peach
Director

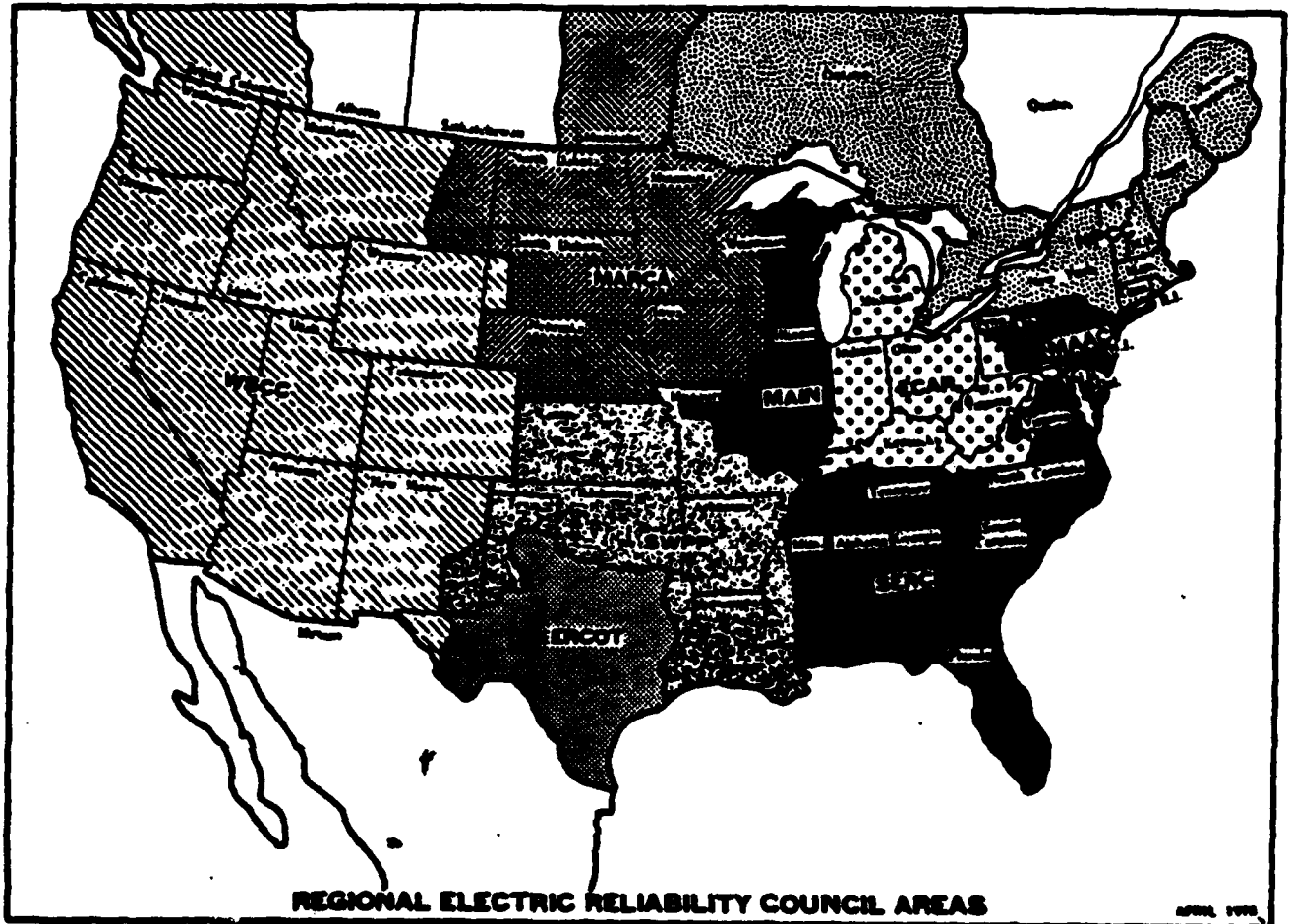
Enclosures - 5

OWNERSHIP AND DISTRIBUTION OF THE UTILITIES
RESPONDING TO GAO QUESTIONNAIRE

Reliability council area (note a)	Ownership			Total
	<u>Investor</u>	<u>Public</u>	<u>Co-operative</u>	
ECAR	3	2		5
ERCOT	5	4	2	11
MAAC	4	1		5
MAIN	4	3		7
MARCA	9	6		15
NPCC	6	1		7
SERC	7	6	1	14
SPP	19	10	2	31
WSCC	<u>12</u>	<u>4</u>	<u>2</u>	<u>18</u>
Total	<u>69</u>	<u>37</u>	<u>7</u>	<u>113</u>

a/See Attachment II for reference to the reliability areas.

National Electric Reliability Council Areas



- ECAR—East Central Area Reliability Coordination Agreement**
- MAIN—Mid-American Interpool Network**
- MAAC—Mid-Atlantic Area Council**
- MARCA—Mid-Continent Area Reliability Coordination Agreement**
- NPCC—Northeast Power Coordinating Council**
- SERC—Southeastern Electric Reliability Council**
- SWPP—Southwest Power Pool**
- ERCOT—Electric Reliability Council of Texas**
- WSCC—Western Systems Coordinating Council**

Source: Energy Information Administration

DISTRIBUTION OF GAS-FIRED GENERATING CAPACITY IN THE U.S.
 (Summer 1980)
 (note a)

<u>Reliability council area</u>	<u>Steam</u>	<u>Combustion turbine</u>	<u>Combined cycle</u>	<u>Total gas-fired</u>	<u>Percent of total capacity</u>
ECAR	143	1,048	0	1191	1
ERCOT	30,901	1,352	162	32,415	76
MAAC	0	254	0	254	1
MAIN	358	630	0	988	2
MARCA	208	46	0	254	1
NPCC	0	30	0	30	0.05
SERC	184	51	30	256	0.2
SPP	20,016	817	1,134	21,967	43
WSCC	2,020	478	118	2,616	3
Total	<u>53,830</u>	<u>4,706</u>	<u>1,444</u>	<u>59,971</u>	11

a/According to the July 1980 report to the National Electric Reliability Council.

NATURAL GAS USED DURING 1980 BY 113 ELECTRIC UTILITIES
INCLUDED IN GAO'S SURVEY

<u>Reliability council</u> <u>area</u>	<u>Consumption</u> <u>in MCF</u>
ECAR	7,228
ERCOT	1,020,246
MAAC	98,650
MAIN	13,579
MARCA	74,887
NPCC	126,438
SERC	161,406
SPP	1,182,769
WSCC	<u>593,221</u>
Total	a/ <u>3,278,424</u>

a/According to DOE's May 1981 "Monthly Energy Report," electric utilities consumed 3,681,595 million cubic feet of natural gas during 1980.

ENCLOSURE V

ENCLOSURE V

UTILITIES IMPRESSIONS OF EASE OR DIFFICULTY
OF COMPLYING WITH THE OFF-GAS PROVISIONS

Utility Rating of Compliance Difficulty

<u>Reliability council area</u>	<u>Very difficult</u>	<u>Somewhat difficult</u>	<u>Uncertain</u>	<u>Somewhat easy</u>	<u>Very easy</u>
ECAR			1	2	2
ERCOT	9	2			
MAAC			2	1	2
MAIN	2	1	1	3	
MARCA			4	3	8
NPCC	1		2	1	3
SERC	4	2	2	3	3
SPP	25	5	1		
WSCC	<u>3</u>	<u>6</u>	<u>6</u>	<u>2</u>	<u>1</u>
	<u>44</u>	<u>16</u>	<u>19</u>	<u>15</u>	<u>19</u>