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Report to the Chairman, Subcommittee on Energy and Power, Committee on Energy and Commerce, House of Representatives

April 1989

ENERGY INFORMATION

Status, Cost, and Need for Energy Consumption and Fuel Switching Data

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GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-234824

April 19, 1989

The Honorable Philip R. Sharp
Chairman, Subcommittee on Energy
and Power
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

As you requested, we have reviewed the adequacy of the nation's energy information program data on industrial fuel switching. You specifically requested that we address the (1) status of information collected and published on industrial fuel use and fuel switching, (2) costs to government and industry of collecting such information, and (3) need for such information.

Under its basic legislative authority contained in the Federal Energy Administration Act of 1974, as amended, the Department of Energy's Energy Information Administration (EIA) is responsible for collecting energy information and providing it to the federal government, state governments, and the public. EIA manages 70 energy data-gathering surveys, one of which covers fuel switching capability and energy consumption in the manufacturing segment of the industrial sector of the U.S. economy.[1]

Results in Brief

In 1986, EIA's Manufacturing Energy Consumption Survey collected calendar year 1985 fuel switching and energy consumption information from a sample of manufacturers. Although the construction, agriculture, mining, fishing, and forestry segments of the industrial sector were not surveyed, in 1985 the manufacturing segment accounted for about 75 to 80 percent of the total energy consumed in the industrial sector. The results of the energy consumption segment of the survey were published in November 1988, and the results of the fuel switching segment were published in December 1988. In 1989, EIA will conduct the second triennial survey, collecting energy consumption and fuel switching data for 1988.

[1]Fuel switching capability is the capability of an establishment to have used substitute fuels in place of those actually consumed.

Table 1: Estimated Costs to U.S. Government of 1986 Survey

Cost category	Estimated cost
Pilot study	$65,520
EIA staff time	712,521
Travel	16,730
Contract with Census Bureau[a]	819,000
Second contract with Census Bureau	211,355
Engineering and publications support	30,930
Total	**$1,856,056**

[a]To guarantee the confidentiality of data provided by survey respondents, EIA contracted with the Census Bureau to design and select the sample and collect and process the data. Section 9 of Title 13, U.S. Code, provides legal guarantees of confidentiality for data provided to the Bureau by respondents. All survey data are retained at the Bureau, and EIA receives only aggregate statistics.

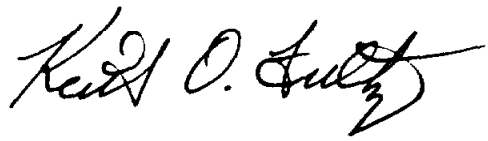
The estimated costs to industry of completing the 1986 survey totaled $4,066,122 (expressed in terms of 1988 dollars). The industry costs were based on EIA's estimate that it would take each respondent an average of 9 hours to complete the survey questionnaire, at a cost of $45 per hour. The total also includes $29,792 (in 1988 dollars) for the estimated costs incurred by 100 manufacturers who participated in a pilot study that preceded the mailing of the questionnaires.

Need for the Information

In total, we interviewed officials of eight federal offices. Seven of the offices had been identified by EIA, in its justification of the 1986 survey to OMB, as potential users of the survey data. The eighth office was identified during our meetings with the other potential users. According to officials of seven of the eight federal offices, the energy consumption data are needed, while officials of five of the offices expressed a need for the fuel switching capability data. The greatest need for the fuel switching data appears to be for planning for and responding to energy emergencies. According to a Department of Energy Office of Energy Emergency Plans official, for example, this information could be used to estimate whether the switching capacity available might offset an anticipated oil shortage or whether other actions such as a drawdown of the Strategic Petroleum Reserve should be considered. He stated that this information would not be the only information considered in the decision process but would provide a higher degree of confidence in the analyses than in the past when they were based on less comprehensive information. Appendixes II and III, respectively, contain more details on the uses of the energy consumption and fuel switching data cited by the offices that we contacted.

its publication date. At that time we will provide copies to the Secretaries of Energy, Commerce, and Defense and the Director of the Federal Emergency Management Agency and make copies available to others upon request. Major contributors to this report are listed in appendix VI.

Sincerely yours,



Keith O. Fultz
Director, Energy Issues

Abbreviations

EIA	Energy Information Administration
GAO	General Accounting Office
OMB	Office of Management and Budget

In October 1986, the Congress passed Public Law 99-509 (Omnibus Budget Reconciliation Act of 1986), which required EIA to conduct and publish the results of a survey of energy consumption in the manufacturing industries in the United States on at least a triennial basis and in a manner designed to protect the confidentiality of individual responses. The survey was to include information on the quantity of fuels consumed, energy expenditures, fuel switching capabilities, and the use of nonpurchased sources of energy, such as energy produced by using waste by-products.

EIA revised the fuel switching questions and, after the passage of Public Law 99-509, received approval from OMB to collect the fuel switching data. EIA then directed the Census Bureau to request fuel switching data from 8,750 manufacturers that had responded, by November 7, 1986, to the energy consumption segment of the survey. The fuels for which switching data were requested were purchased electricity, natural gas, distillate fuel oil, residual fuel oil, and coal and coke.

The information from the energy consumption segment and the fuel switching segment of the survey were published in November 1988 and December 1988, respectively.

Potential Uses of Fuel Switching Data

Agency	Use of the data
Department of Commerce	
Bureau of Economic Analysis	None.
International Trade Administration	Analyze the competitiveness of U.S. industries.
Office of Business Analysis	None.
Department of Defense	Prepare contingency plans related to the impact of energy supply disruptions on Defense-related industrial production.
Department of Energy	
Office of Energy Emergency Plans	Prepare contingency plans to determine whether the impact of anticipated fuel shortages can be absorbed or mitigated by switching.
Fossil Energy, Office of Planning and Environment	Assist in analyzing proposed environmental regulations and legislation.
Fossil Energy, Office of Petroleum Reserves	None.
Federal Emergency Management Agency	Prepare contingency plans to assure that defense and essential civilian needs will be met during emergencies.
New York State Energy Office	None.
Pennsylvania Public Utility Commission	None.
Illinois Department of Energy and Natural Resources	None.

Data Limited to Practical Capability to Switch Fuels

Three of the eight federal offices we contacted indicated that the fuel switching data would be of additional usefulness if it had not been limited to the practical capability to switch to other fuels, that is, the capability to switch reduced by such things as binding supply contracts and environmental regulations. According to officials of the Department of Energy's Office of Energy Emergency Plans, Department of Defense's Energy Policy Directorate, and the Federal Emergency Management Agency, EIA's survey information is needed and will be useful, but they would have also preferred to receive data on the total physical capacity to switch fuels. They believe that practical constraints could possibly be set aside during a severe emergency and that, therefore, it would be useful to know the total physical fuel switching capability in contingency planning for such situations, in addition to the practical capability in planning for less severe emergencies.

EIA originally planned to request data on both the total physical capability and the practical capability to switch fuels. However, OMB objected to the burden that would be placed on industry and questioned the need for the data. EIA decided to limit the data collection to the practical capability to switch fuels to reduce the burden and avoid confusion between the two different concepts of fuel switching capability. An EIA official told us that he estimates the burden reduction to have been about an hour per responding manufacturer. Using EIA's estimate of the average hourly cost to industry, we estimate that the additional cost to industry of providing data on the total physical capability to switch fuels would have been about $381,000 (in 1988 dollars). Practical switching capability was selected because EIA considers it to represent actual capability, whereas total physical capability is theoretical unless all constraints to fuel switching are eliminated.

Data Only Collected Triennially

Three of the eight federal offices we contacted would have preferred annual data, rather than triennial data. Officials in the Department of Commerce's Office of Business Analysis, the Department of Energy's Office of Energy Emergency Plans and the Federal Emergency Management Agency believed that this would provide more current data and thus be more useful. EIA officials told us that collection of the data annually would have significantly increased the costs to industry and government. However, they said that EIA had made no estimate of the increased costs. In addition, EIA's energy consumption surveys in the residential and other sectors provide triennial data, which EIA believes has been satisfactory. The manufacturing, residential, and other surveys are

about $4.1 million to about $19 million (in terms of 1988 dollars). The cost to the U.S. government would have increased from about $1.9 million to at least $3.0 million (in terms of 1988 dollars).

Furthermore, according to EIA, the state data that would have been reported would probably have been statistically reliable only for the 10 largest manufacturing, energy-consuming states and an unknown number of other states because the Census Bureau's Annual Survey of Manufactures sample, from which the energy consumption survey sample was drawn, is not stratified by state. EIA also pointed out that, even with statistically reliable data, the data for some states might still have not been disclosable due to the small number of manufacturers in some types of industries in those states.

Major Contributors to This Report

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Scope and Methodology

To gather information on the three specific questions raised in the request, we (1) interviewed EIA officials about the development and design of the survey; (2) examined EIA's files showing the justification to OMB for the survey; (3) reviewed the OMB file on its analysis of EIA's justification for the survey; (4) reviewed EIA's statistical sampling methodological report; and (5) reviewed EIA's files showing the comments of industry, state offices, and others as to the need for the survey.

We interviewed officials of the Department of Defense, the Federal Emergency Management Agency, three bureaus of the Department of Commerce, three offices of the Department of Energy, and three state offices to gather information on these officials' potential uses of the data being collected because actual data from EIA's survey were not available until November 1988 and December 1988. We also obtained these officials' opinions on the impact of various design limitations on the usefulness of the data for their specific purposes and reviewed reports and other documentation supporting their need for the survey data. These federal offices included all of the federal agencies identified by EIA as potential users of the survey data. The 3 states (Illinois, Pennsylvania, and New York) were judgmentally selected from the 17 identified by EIA as potential users of the data. Each of the states selected was in the top 10 manufacturing, energy-consuming states. Because our interviews with the officials of the three states showed that the survey results would not be useful to them because they were not reported for their individual states, we decided that it would not be necessary to contact additional states.

It was not possible to contact manufacturers who responded to the survey because their identities and the data they provided have the confidentiality protection conferred on surveys conducted by the Census Bureau. However, we did review comments submitted by trade associations and manufacturers to EIA and OMB in response to the Federal Register notices on the survey and comments they made at a public hearing conducted by EIA. To obtain data on the costs incurred by manufacturers in responding to the survey, we used estimates that had been developed by EIA and submitted to OMB.

planned so that not all of them will be done in the same year, to provide the most effective use of EIA's staffing and funding.

Data Restricted to Manufacturing

Officials in the same three federal offices would have preferred data for all components of the industrial sector, including construction, agriculture, mining, fishing, and forestry. The officials recognized that the EIA data on manufacturing would cover most of that sector but regarded total sector data as being even more useful in planning for energy emergencies.[1] According to an EIA official, collecting the data for all components of the industrial sector would have significantly increased the costs to industry and government, because individual sampling frames would have been required for each of the components. However, he said that EIA made no estimate of the increased costs.

Lack of State-Level Data

The EIA survey collected data from individual manufacturers, but because of confidentiality requirements and the fact that the sample was not structured to gather representative data from each classification of manufacturing within each state, the lowest geographic breakdown of the survey data available is at the Census Bureau region level. Officials of the three state offices we contacted were disappointed to find out that state-level data would not be available and cited various needs that would have been met by that type of information. They would have used the data for purposes such as doing energy demand forecasts, measuring the effectiveness of fuel switching programs during emergencies, and evaluating utilities' requests to offer special discounted rates to industrial customers who might otherwise switch to alternative fuels offered by competitors. According to the state officials, they currently use information from various sources to carry out these functions but would have preferred the EIA data because of its greater statistical validity.

Because of the limited amount of funds available to plan and conduct the survey, EIA did not attempt to collect data that would be reportable at the level of individual states. According to an EIA official, significantly increased costs would have been required to be able to report the data at the state level. He said that it would have been necessary to use a sample of U.S. manufacturers almost five times the size of the sample that was used, and this would have increased the cost to industry from

[1] According to EIA, manufacturing represents about 75 to 80 percent of the industrial sector's total energy consumption.

Design Limitations Affect the Use of Survey Data

All of the potential users we contacted believed that the data from EIA's survey would be much better in terms of comprehensiveness and statistical validity than any previous data used. However, officials of four of the seven federal offices that will use the EIA data told us that the data would be even more useful without certain limitations in the survey design. (See table IV.1.) These potential users indicated that the survey information would have been more useful if it

- included the total physical capability to switch fuels;
- were collected on an annual basis; and
- were collected for each segment of the industrial sector, including agriculture, construction, and mining.

In addition, officials of the three state offices we contacted told us that they will not be able to use the data because the survey was not designed to develop information at the state level.

EIA had considered these alternatives in designing the survey but had decided not to include them because of the additional costs involved and the burden that would have been placed on the respondents to the questionnaire.

Table IV.1: Potential Users That Reported That the Usefulness of the Data Would Be Constrained by Design Limitations

	Design limitations			
Agency	Data reported at Census region level	Practical switching capacity collected	Data collected every 3 years	Only manufacturing sector covered
Department of Commerce				
Office of Business Analysis			X	X
Department of Defense		X		
Department of Energy				
Office of Energy Emergency Plans		X	X	X
Federal Emergency Management Agency		X	X	X
New York State Energy Office	X			
Pennsylvania Public Utility Commission	X			
Illinois Department of Energy and Natural Resources	X			

Potential Uses of Energy Consumption Data

Agency	Use of the data
Department of Commerce	
Bureau of Economic Analysis	Update the national input-output accounts, which trace the flow of goods and services among industries in the production process.
International Trade Administration	Analyze the competitiveness of U.S. industries.
Office of Business Analysis	Update the national energy accounts, which trace the flow of energy products throughout the economy.
Department of Defense	Prepare contingency plans related to the impact of energy supply disruptions on Defense-related industrial production.
Department of Energy	
Office of Energy Emergency Plans	Help identify sectors of the economy that are energy-dependent on one type of fuel.
Fossil Energy, Office of Planning and Environment	Assist in analyzing proposed environmental regulations and legislation.
Fossil Energy, Office of Petroleum Reserves	None.
Federal Emergency Management Agency	Prepare contingency plans to assure that defense and essential civilian needs will be met during emergencies.
New York State Energy Office	None.
Pennsylvania Public Utility Commission	None.
Illinois Department of Energy and Natural Resources	None.

Development of the Survey to Collect Data on Manufacturing Fuel Use and Switching Capability

From 1974 through 1981, the Energy Information Administration (EIA) had funded an energy supplement to the Census Bureau's Annual Survey of Manufactures from which EIA obtained manufacturing energy consumption data. The supplement, entitled "Fuels and Electric Energy Consumed," was discontinued in 1982 due to EIA's budget reductions. According to EIA, the supplement had been the principal source of information on manufacturing energy consumption. The supplement did not provide fuel switching data. Before EIA's 1986 survey, the most recent collection of fuel switching data on a statistically reliable basis was a 1977 survey of manufacturers' alternative energy capabilities by the Census Bureau.

In 1983, EIA began developing an approach to collect comprehensive, statistically reliable energy consumption and fuel switching data from manufacturers to fill what EIA considered to be its largest data gap. EIA was already conducting triennial surveys of the residential, nonresidential (commercial buildings), and residential transportation sectors, but it had not done a comprehensive survey of the industrial sector, which accounted for about 37 percent of total U.S. energy consumption in 1985. Because the manufacturing segment consumed most of the energy in the industrial sector, EIA considered a manufacturing survey to be the most effective way of filling the data gap.

In February 1984, EIA published a notice in the Federal Register soliciting comments on the design and development of the survey. Between June and November 1984, EIA visited 20 manufacturing sites in order to identify the manufacturers' concerns. Another Federal Register notice was published in March 1985 and a public hearing, which was attended by a number of industry representatives, was conducted in May 1985.

The Congress provided funds to EIA in fiscal year 1985 for the survey. EIA (using the Census Bureau as its data collecting and compiling agent) distributed the questionnaire in July 1986. The questionnaire was designed to gather information on energy consumption from a statistical sample of 11,684 U.S. manufacturers.[1] The questionnaire did not include questions on fuel switching because, in June 1986, the Office of Management and Budget (OMB) denied approval for the fuel switching segment. OMB was concerned that the validity and utility of the data would not justify the heavy burden placed on the survey's respondents.

[1] We reviewed the sampling procedures used in the survey and found them to be acceptable from a statistical viewpoint.

Contents

Officials of four of the seven federal offices that will use the EIA data told us that the data would be even more useful without certain limitations in the survey design. The limitations mentioned by the potential users included

- the lack of information on total physical capability to switch fuels;
- data collection on a triennial rather than an annual basis; and
- the lack of information on other segments of the industrial sector, such as agriculture, construction, and mining.

In addition, officials of the three state offices that we interviewed indicated that the EIA data would not be useful to them because the data cannot be summarized for the individual states.

EIA had considered these alternatives in designing the survey but had decided not to include them because of the additional costs involved and the burden that would have been placed on the respondents to the questionnaire. See appendix IV for more information on how the design limitations affect the usefulness of the data.

Scope and Methodology

To gather information on the three specific questions raised in your letter, we (1) interviewed EIA officials and examined their files concerning the development and design of the survey, (2) obtained data on EIA's costs of designing and conducting the survey and EIA's estimates of the costs incurred by manufacturers in responding to the survey, and (3) interviewed officials of offices identified by EIA as potential users of the data concerning how they planned to use the data and obtained their opinions on the impact of various design limitations on the usefulness of the data for their specific purposes. See appendix V for further details on our methodology.

We have discussed the factual information in this report with officials of EIA, the Departments of Defense and Commerce, and the Federal Emergency Management Agency and have included their comments where appropriate. However, as agreed with your office, we did not request official agency comments on a draft of this report. We performed our review in accordance with generally accepted government auditing standards from April to December 1988.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from

EIA estimated that the cost of the survey to the U.S. government, consisting of EIA and Census Bureau costs to design and conduct the survey, was about $1.8 million (in 1988 dollars) and that the cost to the manufacturers participating in the survey was more than $4 million (in 1988 dollars).

According to EIA's justification to the Office of Management and Budget (OMB) for the survey, most of the potential users of the survey data were federal offices. Officials of seven of the eight federal offices we contacted indicated various uses for the energy consumption data, such as updating the national input-output tables and energy accounts, analyzing the competitiveness of U.S. industries, and doing energy emergency contingency planning. Officials of five of the eight federal offices indicated uses for the fuel switching data and most frequently cited its use for contingency planning for emergencies or supply disruptions. EIA's justification to OMB also identified 17 states as potential users, but officials of the 3 state offices that we contacted told us that the EIA data would not be useful because it cannot be summarized for individual states.

Status of Information on Industrial Fuel Use and Fuel Switching

EIA began development of a survey to collect energy consumption and fuel switching data from manufacturers in 1983. OMB denied approval of the fuel switching questionnaire, but the energy consumption questionnaire was distributed in July 1986. After EIA revised the questionnaire and the Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509 which required EIA to gather both energy consumption and fuel switching data from U.S. manufacturing industries on at least a triennial basis) was passed, EIA received OMB's approval to distribute the fuel switching questionnaire. EIA published the results of the energy consumption segment of the questionnaire in November 1988 and the fuel switching segment in December 1988. See appendix I for more information on the development of the survey.

The next triennial survey will be conducted in 1989 to collect data for 1988. EIA requested OMB's approval in February 1989 and plans to mail out the questionnaires in June 1989.

Cost of 1986 Survey

As shown in table 1, the estimated costs to the U.S. government of the 1986 survey totaled $1,856,056 (in 1988 dollars).