

AD-A106 888

GENERAL ACCOUNTING OFFICE WASHINGTON DC ENERGY AND M--ETC F/6 5/3
ANALYSIS OF FEDERAL FUNDING FOR ELECTRIC UTILITY R&D PROJECTS.(U)
SEP 81

UNCLASSIFIED

GAO/EMD-81-145

NL

1-1
100-111



END
DATE
FILMED
12-81
DTIC



UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

1

LEVEL II

ENERGY AND MINERALS
DIVISION

B-204668

| | |
|---------------|-------------------------------------|
| Accession For | |
| DTIC TAB | <input checked="" type="checkbox"/> |
| Unannounced | <input type="checkbox"/> |
| Justification | |
| BY _____ | |
| DATE _____ | |
| Dist _____ | |
| H | |

25 SEPTEMBER 20 1981

DTIC
ELECTE
NOV 9 1981

AD A I 60 288

71 GA/EMD-11-14

Chairman and Ranking Minority Members,
Selected Committee and Subcommittees

Subject: Analysis of Federal Funding for Electric Utility
R&D Projects. (EMD-81-145)

Your May 12, 1981, letter requested that we examine (1) exist-
ing Federal tax incentives for all types of energy production and
conservation and their effectiveness in achieving their respec-
tive goals and (2) the ability of U.S. electric utilities to
undertake future energy research, development, and demonstra-
tion (R&D) activity in light of the current constrained Federal
budget policy. In discussing the request with your office,
it was agreed we would review Federal research and development
efforts in six areas--atmospheric fluidized-bed combustion,
pressurized fluidized-bed combustion, solar thermal energy
conversion, large-scale wind machines, fuel cells, and municipi-
pal solid waste--and provide a briefing on whether the utility
industry would be able to pick up the proposed Federal research
and development cutbacks.

On July 29, 1981, we briefed the committee staff on the
results of our work. As agreed with your staff this report
addresses the R&D portion of your request. Our work showed
the electric utility industry does R&D, but will not undertake
demonstrations on its own in several of the technologies because
of financial problems, risks associated with demonstrations,
and the large investments required. Consequently, it is likely
commercialization will be delayed or perhaps not occur. A
second report will respond to the Federal tax incentive portion
of the request.

To analyze the Federal funding for electric utility research
and development in selected areas, we directed our work to answer-
ing the following key questions.

- What is the Federal Government's policy towards utility
related research and development?
- What Federal research and development efforts in the
selected areas are proposed to be cut?

DTIC FILE COPY

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

81 11 06 122

(005246)

11172

--What are the prospects for continued research and development by the utility industry given the proposed Federal funding reductions?

To answer these questions, we obtained and reviewed the Department of Energy's (DOE's) past and current budgets as well as its program plans. We interviewed DOE program officials and discussed past and present research and development policy and plans. We also contacted representatives of the Electric Power Research Institute (EPRI), the utility industry, the Tennessee Valley Authority (TVA), the Bonneville Power Administration (BPA), and manufacturing companies which do R&D in the electric area. We discussed both Government and private research and development efforts and obtained utility industry views on Federal reductions in R&D efforts. We reviewed industry research and development program plans, strategies, and studies as well as current industry trade publications, and relied on our prior work in both the R&D and electric utility areas. Details associated with the six areas are discussed in enclosure I to this letter.

FEDERAL RESEARCH AND DEVELOPMENT POLICY

Federal policy toward research and development, prior to the recent change in administrations, was to support a variety of energy alternatives in their early stages and to continue support through the demonstration stage. The proposed redirection of this philosophy is to restructure the technology programs of DOE to emphasize long-term, high risk, but potentially high-payoff research and development while terminating larger technical demonstrations. While the administration recognizes that Federal support for energy research is appropriate, it believes that large demonstrations and the development of commercial applications should be left to the private sector. The basis for this position is that rising energy prices, tax incentives for investment, regulatory relief, and economic recovery make many of these programs attractive and competitive for the marketplace to pursue.

UTILITY RESEARCH AND DEVELOPMENT

Although some individual electric utilities and manufacturers participate in utility R&D, EPRI serves as the major focal point for conducting electric utility related R&D. EPRI's efforts focus on developing technologies that can be readily applied and improving current technologies. Major emphasis is directed to development techniques or equipment that can be commercially available within 5 to 10 years. EPRI strives to avoid duplicating the efforts supported by other organizations, coordinates its activities on a continuing basis, and participates with others in pilot or demonstration projects that require a large pool of funds. Altogether, EPRI is providing about \$500 million in joint demonstrations valued

at about \$1.6 billion for construction and early operation. The Federal Government, utilities, manufacturers, and other countries make up the balance in either money, facilities, or services.

LACK OF DEMONSTRATION

In reviewing the six areas, our work showed that, if the proposed budget cuts were implemented, demonstration would be missing for several of the technologies. These technologies include atmospheric and pressurized fluidized-bed combustion, solar thermal energy conversion, and fuel cells. The electric utility industry has R&D efforts in these areas, but because of financial problems, risks associated with demonstrations, and the large investments required, it will not carry out demonstrations on its own. Without such demonstrations, it is likely commercialization will be delayed or perhaps not occur.

As noted in enclosure I, atmospheric fluidized-bed combustion (AFBC) is a case in point. The Federal Government supports R&D in this technology under TVA's National Energy Demonstrations Program. TVA and EPRI, investing \$65 million and \$22 million respectively, have a 20-megawatt (MW) AFBC pilot plant ready for operation and testing and also had planned to develop a 200-MW demonstration AFBC plant. The demonstration plant, which will cost about \$200 million and was to be funded half by the Federal Government and half by TVA and EPRI, will not be funded under the proposed Federal budget cuts. TVA and utility industry representatives stated that without Federal support, this project would not be undertaken and commercialization would be delayed.

Fuel cells--a technology which could find significant use in electric utility applications if demonstrated to be economical and reliable--serves as another example. DOE, which initiated and supported a 4.8-MW project on the New York Consolidated Edison Co.'s system, proposed that Federal funding of the project be discontinued even though the facility is ready for operation and testing. DOE rationalized that industry could provide the \$12 million to complete the project. Industry representatives stated that the private sector was committed to providing about \$6 million to operate and test the facility. They indicated to us that, because of tight financial conditions in the industry, the project would probably be terminated unless Federal funding is provided. These same officials stated that, fortunately, several congressional committees were taking action to restore funding.

NEED FOR A MORE DEFINED POLICY

In looking at the rationale for cutting back on R&D in these technologies, our work indicates that a definitive policy towards utility industry R&D is needed. More specifically, the Federal policy to fund long-term, high-profit research does not appear to be compatible with the unique characteristics and needs of the utility industry. In our discussions with DOE officials, we were told that funding for the technologies was being cut because of the overall policy not to support demonstrations or commercialization efforts. Proposed reductions were not justified because the specific technology was not promising or was failing to work. The basic assumption was that private industry would continue this research.

This position does not consider the uniqueness of the electric utility industry. Factors unique to the industry are

- rates-of-return are governed by public utility commissions, and therefore, profits do not necessarily reflect risks as in the case of non-regulated industries,
- many State utility commissions do not permit R&D in the utility rate base,
- energy tax credits for new technologies permitted other industries are not available to electric utilities, and
- financial problems facing the industry and its inability to generate capital funds for expansion makes additional R&D funding even more difficult.

Another unique characteristic of the utility industry is that risk is not just limited to development of new technology. Huge financial risk is associated with incorporating a newly developed and working technology into an established and complex electric power system so that it is both economical and reliable.

CONCLUSIONS

While it is preferable to have the private sector carry out demonstrations, our work indicates that, because of the uniqueness of the electric utility industry, this may not occur. Because of the large costs of demonstrating new technologies, the unique factors affecting the industry such as rate regulation, and its present financial burdens, the Federal policy toward electric utility R&D may have to be viewed in a different context.

B-204668

Federal R&D policy with respect to the utility industry needs to consider the underlying circumstances surrounding the industry and the importance of electric energy to the Nation's energy, security, and economic needs. R&D priorities must be established to assure the most effective use of limited funds. Individual projects need to be carefully evaluated before they are discontinued. Cancellation of such R&D efforts on any other basis can result in commercialization of promising technology being delayed or lost.

As requested by your offices, we did not obtain agency comments on this report. This report is being sent today to the Chairman and Ranking Minority Members of selected committee and subcommittees. Copies of this report are also being sent to the Director, Office of Management and Budget and the Secretary of Energy. We will also make copies available to others upon request.



J. Dexter Peach
Director

Enclosure

FEDERAL RESEARCH
AND DEVELOPMENT EFFORTS IN SIX AREAS

In responding to the Committee on Science and Technology request, we looked at Federal research and development efforts in the six areas they identified--atmospheric fluidized-bed combustion, pressurized fluidized-bed combustion, solar thermal energy conversion, large-scale wind machines, fuel cells, and municipal solid waste. Our work indicates that the proposed Federal budget cuts in these areas could limit the demonstration of atmospheric fluidized-bed combustion, pressurized fluidized-bed combustion, solar thermal energy conversion, and fuel cell technology to the utility industry. Consequently, development of these technologies could be delayed or not finished. With respect to wind machines, views are mixed on whether the proposed cuts would adversely impact on the development and commercial application of the technology in the utility sector. The technology associated with using municipal solid waste appears to be at the commercialization stage and the proposed Federal R&D cutbacks would not have a material adverse affect.

In the following sections, for each of the six areas, we

- describe the technology and its application to the electric utility industry,
- discuss Federal R&D funding levels and proposed budget reductions, and
- present views on whether proposed Federal R&D budget reductions would affect the development of the technology.

ATMOSPHERIC FLUIDIZED-BED COMBUSTION

Atmospheric fluidized-bed combustion (AFBC) is an encouraging new technology for electric power production. The technology is an alternative to the conventional methods of burning coal for electric power generation and promises to be a more economically efficient, and environmentally acceptable process. In an atmospheric fluidized-bed combustion system, coal and limestone are mixed in a heated chamber. Air is forced into the boiler to mix the coal and limestone. The sulfur dioxide that is released when the coal is heated is absorbed by the limestone. The steam that is produced drives a conventional steam turbine.

AFBC has several advantages over a conventional system. The capture of sulfur dioxide reduces capital costs; efficiency

is improved; a dry waste product is produced which could be useful; and many types of coal can be burned in the system. Several problem areas of technical uncertainties exist with AFBC. Some of the principal concerns are the selection of boiler materials to withstand corrosion; the feeding of coal and limestone in the boiler; the operation of the dust collectors; and the control of the plant during start-up, shutdown, and fuel insertion.

DOE has stated that the technology for AFBC has reached the threshold of commercial acceptance. At present, the only ongoing Federal effort in AFBC for utility application is under TVA's National Energy Demonstrations Program. In September 1979, TVA approved the construction and operation of a 20-MW pilot plant. Construction is scheduled for completion in March 1982, at which time a 5-year test program will begin. The 20-MW pilot plant will be used to test and evaluate operating control modes, procedures, and equipment; to investigate key systems for performance and reliability; to demonstrate adequate emission controls, combustion efficiency, and limestone utilization; and to train operating personnel. Pilot plant testing will be a cooperative effort between TVA and EPRI.

TVA and EPRI are also planning a 200-MW demonstration plant. TVA began design activities for the demonstration plant in 1976. Completion of the project was projected by early 1988. Commercialization of AFBC for utility applications is possible within 10 years after the demonstration project comes on line. Units of 600 to 800 MW are the target size.

Currently, DOE is not supporting utility related R&D in this area and did not request any funds for fiscal year 1982. Both TVA and EPRI are jointly funding the 20-MW, AFBC pilot facility. TVA is spending \$65 million and EPRI \$22 million on the project. With respect to the 200-MW demonstration project, TVA and EPRI are able to fund 50 percent of the \$200 million project but must find funding for the other half. DOE was expected to fund the other portion of the project, but because of the administration's policy of not funding demonstration projects it seems unlikely that this money will be available. TVA and EPRI officials told us that if the 200-MW demonstration project is not funded it will delay or eliminate the commercialization of AFBC.

PRESSURIZED FLUIDIZED-BED COMBUSTION

Another alternative to conventional methods of burning coal for electric power production is pressurized fluidized-bed combustion (PFBC). The PFBC system differs from AFBC in that it operates at 7 to 16 times normal pressure to produce hot

pressurized combustion gases necessary for gas turbines and is potentially more efficient because it is adaptable to combined cycle (steam & gas) systems. The major advantages of PFBC over the conventional system are the removal of sulfur dioxide and nitrogen oxide emissions, the use of many types and grades of coal, a dry waste product which is potentially useful, and reduced plant size and cost. Along with these advantages, there are some disadvantages with the PFBC system. These disadvantages include: the development of a compatible dust removal/gas turbine that will operate reliably, problems with the feeding system, and the cleaning of hot gases before they go into the gas turbine.

There are three significant PFBC efforts in electric utility related R&D. DOE is constructing a 13-MW pilot plant at Wood-Ridge, New Jersey. Detailed design of the pilot plant took place in 1978 with construction scheduled for completion in fiscal year 1983. Another effort involves a testing facility located in England. DOE, along with the Governments of the United Kingdom and Germany under a 1975 agreement, is to share the costs of building and operating this facility. Construction was completed in 1980. The project's objectives are to carry out tests over a wide range of operating conditions and provide data for a commercial plant. The last major effort is in the planning phase. American Electric Power (AEP), an investor-owned electric company, has plans to design and build a 170-MW PFBC combined-cycle demonstration plant with DOE support. A feasibility study for the plant has been completed, and plans are to initiate construction in late 1982.

DOE requested \$17 million in fiscal 1982 for R&D in this area. The major portion of the request would be used to continue construction of the 13-MW combined cycle pilot plant. Funds for the international energy test facility were not requested, even though England and Germany could refuse to allow U.S. participation in scheduled tests and data collection if the United States refused to continue in the program. The basis for this decision was that sufficient data would be available from the pilot plant to support technological development in the United States. Further, DOE did not request funds for AEP's proposed project and given the current Federal R&D policy it does not appear likely that the agency will. The House Appropriations Committee has recommended that \$26 million be provided for PFBC and that DOE continue to fund the cooperative effort with England and Germany, to avoid jeopardizing DOE's \$28 million investment.

EPRI officials stated that the proposed Federal cuts in R&D would severely delay or even eliminate the strong and growing commercial interest in PFBC. An AEP official stated that they hoped DOE would fund half of its proposed \$250 million demonstration plant because of the large financial burden it

would place on the company. Further, we were told that if DOE money is not available, the AEP project may have to be postponed because of lack of funds.

SOLAR THERMAL ENERGY CONVERSION--CENTRAL RECEIVERS

Solar thermal energy conversion has the potential to provide up to 500-MW per facility using a no-cost energy source. Depending upon when a utility-integrated demonstration of R&D is accomplished, the technology could be used by utilities in about 10 to 20 years. Solar thermal energy systems come in two types--dispersed systems which use individual solar collectors and centralized systems which collect energy by focusing mirrors, called heliostats, upon a central receiver set upon a tower. Although both systems provide thermal energy which can power a generator, centralized systems produce electricity more efficiently than dispersed or decentralized systems. Other advantages of central receiver systems are their usefulness in many geographic areas and their suitability for replacing or being used with other fuels in energy-producing plants (called repowering).

Federal efforts to develop central receiver systems include three projects: the Albuquerque Central Receiver Test Facility (CRTF), the repowering program, and the Barstow Solar I pilot plant. The CRTF and Barstow Solar I are independent plants used to test subsystems of central receiver systems. The repowering project was planned to show that central receiver systems could replace or be used in addition to other energy sources at existing powerplants.

DOE has proposed eliminating the repowering program and reducing funds for the Barstow Solar I program. Originally, DOE funded four repowering conceptual designs--two for electricity production and two for industrial process heat production. A decision, however, was made not to continue funding the \$152-million program. This decision was based on the belief that rising conventional energy prices and Federal tax credits will stimulate industry to do near-term R&D and commercialization, rather than on a specific evaluation of the program. The House Appropriations Committee, however, has taken action to restore \$6 million for funding this effort.

The Barstow Solar I project is a 10-MW pilot plant costing about \$137 million. DOE contributed \$117 million and Southern California Edison contributed about \$20 million in engineering labor, land, and generators. DOE's request for project operating funds was reduced by about \$1.6 million, from \$5.6 million in fiscal year 1981 to \$4.0 million in fiscal year 1982. The project will be used to gather data for small grid applications, and possibly, for repowering plants.

In discussing Federal R&D efforts, industry representatives said continuity in Federal programs is an important goal. We were told changes in Federal funding sometimes affect not only the program involved but also private programs as well. Government funding cuts are seen as a negative signal. In fact, the manufacturing firms we contacted noted that cutting back on funds will delay, or maybe prevent, commercialization of such systems.

Most utilities, according to EPRI, cannot do much R&D. Some utilities, in States such as California and Arizona, have engaged in projects with the Federal Government. For utilities to gain confidence in central receivers, one more step beyond Barstow is needed to "get a fix" on the economics. Plants in the 30- to 40-MW range are needed before utilities will go to the 300- to 400-MW size. EPRI, which plans to spend about \$11 million in solar R&D over the next 5 years, could not undertake such projects on its own.

A number of manufacturers we contacted indicated they are doubtful that technologies can be commercialized based only on experiences from experiments or prototypes. They emphasize that this transition is even more difficult when the user is the regulated utility. They also noted that utilities are having financial problems.

Further, manufacturers told us that many utilities are enthusiastic about central receiver systems and want to see a working model. The manufacturers, for their part, are studying these systems and subsystems, but they are not ready to "move out." New technologies are too high-risk for individual utilities, they say, and are more likely to be pursued by third-party investor groups, but only while tax credits are available. Tax credits will decrease the technology gap, but utilities are not eligible for these credits by law.

LARGE-SCALE WIND MACHINES

Wind energy has been used for hundreds of years, though only recently have machines capable of producing bulk electric power been designed. Wind can be effectively used to reduce conventional fuel needs when used along with more reliable energy sources. Wind machines operate when wind speed reaches a certain level: if the wind reaches an engineering determined maximum speed, the blades are automatically adjusted to bring the machine to a halt. The largest wind machines tested in the United States to date produce up to 2.5 MW. Wind "farms," consisting of many machines, can be used to produce electric power in quantities suitable for utility purposes.

Federal utility-related R&D in wind energy has focused on large-scale technology. Although other agencies also use wind turbines, DOE directs and the National Aeronautics and Space Administration (NASA) manages the primary wind program. This program, as originally planned, included three generations of kilowatt and megawatt machines. The first generation machines (MOD-OA and MOD-1) are scheduled to be phased out in fiscal year 1982, after testing is completed. A second generation machine (MOD-2) is being used in a three machine cluster as part of a joint project between DOE, NASA, and BPA. This partnership enabled DOE/NASA to hook the cluster into a utility grid in a high-wind area. Although one machine malfunctioned soon after beginning operation, testing will be continued with the \$1.4 million allotted in the DOE budget. The third generation machine (MOD-5) ^{1/} is designed for use in more geographic areas than the MOD-2 and contains some possibly high payoff features.

Industry R&D efforts are geared towards near-term use, operating needs, and reliability. EPRI has been increasing its efforts in wind energy through: developing siting methods, evaluating the experiences of utilities involved in wind, analyzing the market penetration potential, determining the effect of wind on utility networks, and assessing large wind turbine performance. Currently, five major turbine manufacturers are developing large-scale wind machines. Several Government funded projects and a couple of privately funded ones have used these machines to date. Industry estimates that 50 to 100 machines need to be produced before they will become cost-effective and are mass produced. One company estimated that if they produce 3 to 4 machines per year, when tax credits expire in 1985, there will be a gap of 90 units. Since utilities are regulated, have financial problems, and will not make risky investments, wind machine manufacturers do not expect many orders until the business risk is reduced.

Federal funding for wind demonstrations is not yet certain. While money is available to finish testing MOD-2, DOE is considering not completing the third generation/MOD-5 turbines. Of the original \$72 million MOD-5 cost estimate, \$16 million was spent through fiscal year 1981. DOE decided to cancel the project in fiscal year 1982, however, the House Appropriations Committee, as part of the Energy and Water Bill, is recommending \$18 million for the project. A final decision on funding for MOD-5 will not be reached until fall of 1981.

^{1/}Wind machines named MOD-3 and MOD-4 were canceled because they were too similar to earlier models.

Industry response to the DOE wind funding cuts vary on some points and are united on others. While MOD-5 is supported by some as a necessary step for increasing experience and confidence, others assert that the technology is more complex than is needed. Industry representatives believe the Government should continue R&D on blade life, operating times, and new technologies as well as doing further research on wind sites. Though some of these representatives did not agree with all aspects of the wind program, they indicated to us that showing Government support through funding and doing R&D has been important in developing the technology.

Overall, the industry is concerned about maintaining incentives for energy producers and users. Energy and investment tax credits and accelerated depreciation are mechanisms that they mentioned, although they noted that most utilities are presently not eligible for such credits. They say that more certain and consistent policies on such incentives are needed for the market to operate effectively.

FUEL CELLS

The fuel cell power generator is a new technology which promises to help meet electric power demands. In generating electric power, fuel cells will use liquid fuels from petroleum or coal. These devices convert the chemical energy of fuels directly into electricity with no intermediate combustion cycle. Invented in 1839 and simple in concept, the device's development has been a long time in coming and only now appears to have reached the stage where it may contribute to utility electric power generation. In contrast to conventional generation, fuel cells offer advantages of almost instant power, high efficiency at both partial and full capacity, fuel flexibility, low pollution, quiet operation, and quick installation. Despite these many advantages, large amounts of money need to be invested in this technology to make it reliable and inexpensive enough to be used on a commercial basis.

Federal support for fuel cell R&D has mostly been under the auspices of DOE. Currently, DOE, along with EPRI and other participants, is supporting a 4.8-MW fuel cell powerplant at a Consolidated Edison site in New York. This \$70 million demonstration project is intended to verify the technology's suitability and reliability for electric utility service. The project is a test and is not intended to operate on a cost-effective basis. In addition to this effort, TVA is also looking at fuel cell R&D. The TVA effort differs from the New York fuel cell project in that it focuses on use of coal derived fuels rather than natural gas or petroleum distillate. The program is intended to be implemented in two phases--a pilot plant project and a demonstration plant project.

In 1982 DOE requested \$28.6 million for fuel cell R&D, a \$3.4 million reduction over 1981. DOE, in justifying its 1982 request to the Congress, stated it would provide \$10.1 million for phosphoric acid systems development, \$14.1 million for molten carbonate systems development, and \$4.4 million for advanced concepts development. DOE, however, did not request funds to operate the 4.8-MW fuel cell powerplant at the Consolidated Edison site in New York. DOE stated that the project, as part of a national plan for fuel cell development, would be borne by private sector participants in the national program. DOE also noted with the experiment underway, it would direct its efforts to higher-risk R&D activities. The Senate and House authorization committees, recognizing the importance of this project in their reconciliation report, directed DOE to continue to support the project. Further, no appropriations were included in the President's 1982 budget for TVA's fuel cell project even though TVA has invested about \$3 million in the effort. As such, continuation of the project is doubtful.

In discussing these cutbacks with DOE and industry representatives, we found that everyone agreed that this was a promising technology. There was, however, disagreement on whether the Federal Government should continue supporting the 4.8-MW fuel cell test facility in New York. DOE indicated that EPRI has a healthy fuel cell budget and that DOE's position with respect to funding the project is that it does not participate in commercialization. Further, DOE advised us that advancement of this aspect of the technology is a matter of normal engineering practice.

EPRI advised us that it plans to allocate \$4.5 million to the New York project. Another \$1.5 million would be provided by other participants. However, unless DOE contributes about \$6 million, we were advised the project could be terminated and the development of the technology delayed or stopped. We were also advised that most of EPRI's planned R&D funding in this technology will be directed toward design and commercial configuration of fuel cell plants and that the New York demonstration project will answer key questions about the technology and provide operating experience to do the commercial configuration work.

With respect to the TVA efforts, TVA and industry representatives indicated to us that the projects were important and would not be undertaken without additional support. An EPRI representative advised us that, in his view, funding of the 4.8-MW New York project is more significant and is vital to development of the first generation of fuel cells. Once this is accomplished, other fuel cell generations will follow.

MUNICIPAL SOLID WASTE

Increasing fuel costs and land fill costs have encouraged both municipalities and utilities to generate electric power from municipal solid waste (MSW). There are several processes for converting solid waste to electric energy. Incineration systems generate steam by burning unprocessed solid waste. The steam is piped away and used in electric power generation. This technology is commercially available and used in Europe. The refuse-derived fuel (RDF) systems is another type of process. Municipal solid waste is shredded and the combustible paper, food, and other organic material are separated from non-combustibles such as glass and metals. The organic material is then fired in dedicated boilers or as supplemental fuel to generate electricity. These systems have been applied successfully in the United States.

Federal funding for utility related R&D in the municipal solid waste area has been relatively small. Currently, DOE has nine projects involving electric utilities. DOE, as part of its budget request for fiscal year 1982, planned to participate with EPRI in a \$400,000 project to develop guidelines for preparing supplementary firing refuse-derived fuels in utility boilers. This project, because of budget cuts, has been placed on hold, and we were advised that it would probably be terminated because congressional funding did not appear likely.

EPRI, which hopes to co-fund the project, said it has been delayed because Federal support has not been provided and that without such support the project would have to be scaled down or canceled. An official stated that this project is important because it would provide guidance on where and when this supplementary firing of RDF is feasible or not. However, our past work 1/ has shown that the technology has been demonstrated in a number of cases. Based upon this, we believe that reduced Federal R&D would not cause any significant delays.

1/"Conversion of Urban Waste to Energy: Developing and Introducing Alternate Fuels from Municipal Solid Waste," EMD-79-7, February 28, 1979.

LIST OF ADDRESSES FOR GAO REPORT ENTITLED
"ANALYSIS OF FEDERAL FUNDING FOR ELECTRIC
UTILITY R&D PROJECTS" (EMD-81-145)

The Honorable Don Puqua
Chairman, Committee on Science and
Technology
House of Representatives

The Honorable Larry Winn, Jr.
Ranking Minority Member, Committee
on Science and Technology
House of Representatives

The Honorable Hamilton Fish, Jr.
Ranking Minority Member, Subcommittee
on Energy Development and Applications
Committee on Science and Technology
House of Representatives

The Honorable Manuel Lujan, Jr.
Ranking Minority Member, Subcommittee
on Energy Research and Production
Committee on Science and Technology
House of Representatives