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ELECTRIC UTILITY RESTRUCTURING

Implications for Electricity R&D

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Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to appear before you today to discuss funding for electricity research and development (R&D) and the implications for electricity R&D resulting from electric utility restructuring initiatives. Our testimony is based on our 1996 report[1] and updated analysis of changes in the Department of Energy's (DOE) electricity R&D appropriations using more recent data, including DOE's 1999 budget request.

As the electric power industry moves toward less regulation and increased competition, utilities face significant changes. Historically, electric utilities have operated as monopolies in protected geographic areas regulated by state public utility commissions (PUC). These commissions have allowed utilities to recoup their expenditures on electricity R&D from their customers. Today, the electric utility industry is undergoing large-scale restructuring to promote competition among electricity providers. Because electricity prices will no longer be set by regulation but rather by competitive forces in the marketplace, funding for electricity R&D will likely be affected.

In summary, our work has shown the following:

- The Congress provided DOE over $6.7 billion for electricity R&D in fiscal years 1993 through 1998;[2] however, except for fiscal years 1994 and 1995, funding levels have declined. Specifically, funding increased by about 15 percent from 1993 to 1995, then it decreased by about 30 percent. Key budget categories comprising electricity R&D also show wide variation. As stated in our 1996 report, the primary reason for DOE's reduction since fiscal year 1995 has been the Congress's overall effort to reduce the federal budget.
- During calendar years 1993 through 1996, funding for electricity R&D by electric utilities decreased about 33 percent to $476 million[3] ($506 million in 1998 constant dollars), and further reductions were expected. Utilities, in an effort to cut costs in anticipation of a shift from a regulated to a deregulated environment, were reducing their R&D budgets because of the expected increase in competition in the electricity market. State-sponsored electricity R&D programs that we reviewed had also

[1]Federal Research: Changes in Electricity-Related R&D Funding (GAO/RCED-96-203, Aug. 16, 1996).

[2]Dollar amounts are in fiscal year 1998 constant dollars unless otherwise noted.

[3]Dollar amounts are in calendar year 1995 constant dollars.

reduced their spending. The declines in state programs were attributable to reductions in major funding sources, including utilities' contributions.

- Concurrent with the reduction in R&D funding, a shift in the types of R&D funded by electric utilities had occurred, primarily resulting in a decrease in collaborative and longer-term projects. Many utilities were shifting away from these projects, which may benefit all electric utilities, to those they believed would help their own competitiveness in the near term, that is, proprietary R&D projects with a short-term payback.
- Electricity R&D funding by the federal government, the electric utility industry, and most states is declining because of budget reductions and restructuring prospects. At the same time, as the electric utility industry undergoes rapid changes in an era of emerging competition, pressure exists for all federal agencies to demonstrate that they are making effective use of the taxpayers' dollars. Given the inherent difficulties in measuring the benefits of R&D, the economic consequences of these funding declines are unclear.

Background

Electricity R&D encompasses both basic and applied research and includes all aspects of electricity generation, including nuclear, fossil, and renewable energy technologies; transmission and distribution technologies; energy storage technologies; and environmental studies of electricity-related issues, according to the Executive Director of DOE's Energy Resources Board.[4] Funding for electricity R&D comes from several sources, including DOE, electric utilities, and states. However, as the electric power industry moves toward less regulation and increased competition, electricity R&D funding will likely be affected.

Driven by a combination of factors, the movement toward less regulation gained impetus with the enactment of the Energy Policy Act of 1992, which promotes increased competition in the wholesale power market. Other factors spurring the move toward competition include large differences in electricity rates among utilities; new low-cost electricity generation technologies; and recent experiences in reduced regulation in other industries, such as telecommunications and the natural gas industry.

In April 1996, pursuant to its authorities under the Federal Power Act, the Federal Energy Regulatory Commission (FERC) issued a final rule that requires electric utilities to make their transmission lines accessible to other utilities or power producers for the transmission of wholesale

[4]Because DOE does not define electricity R&D but includes it within energy R&D, we used this definition as the basis for the information we present.

power. FERC Order 888 requires that this open access be made available at the same cost that these public utilities incur to transmit their own power. As of February 1998, all 50 states and the District of Columbia had considered reforming their respective retail electricity markets, according to the National Regulatory Research Institute and records obtained from state regulatory agencies. As of last month, at least 17 states had implemented plans to restructure the industry by enacting legislation or adopting final orders.[5] These states represent over 50 percent of the nation's retail electricity customers, according to DOE's Pacific Northwest National Laboratory. Under these plans, activities at the retail level to choose electricity suppliers are only now beginning.

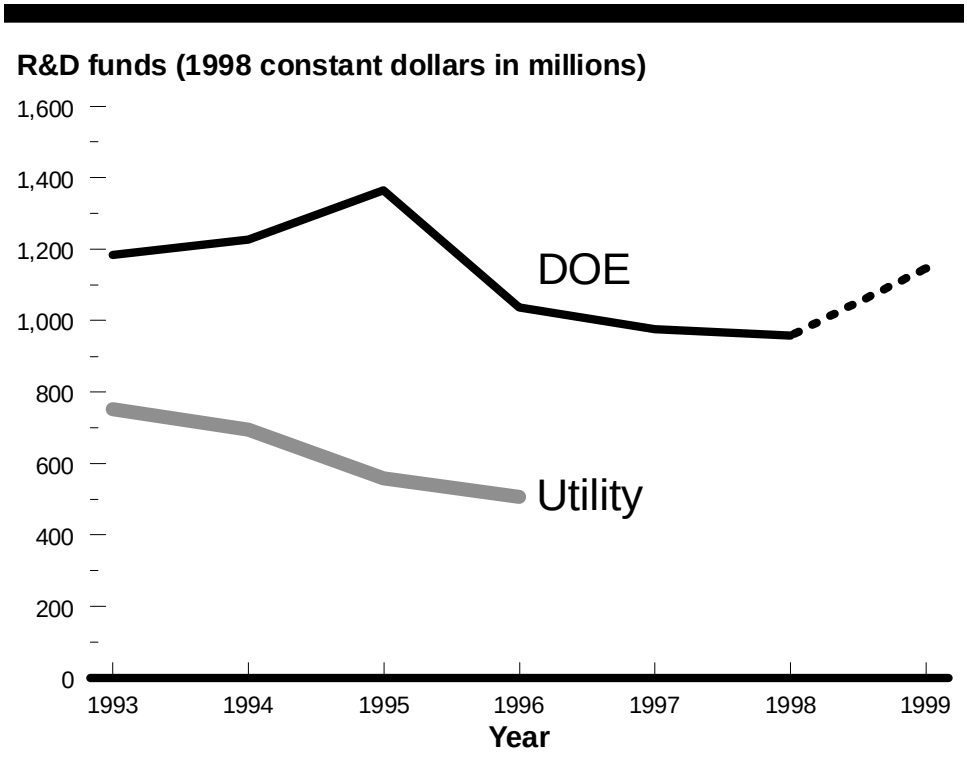
Changes in Electricity R&D Funding

As we reported in 1996, electricity R&D funding was reduced in 1996 from 1993 levels by the federal government, the electric utility industry, and most of the states that we reviewed. Mr. Chairman, I now refer to figure 1, which shows DOE's and investor-owned utilities' funding for electricity R&D. In fiscal years 1993 through 1999, DOE's electricity R&D budget in real terms—that is, correcting for the effects of inflation—has declined slightly (by about 3 percent), assuming the Congress approves the funding levels in DOE's 1999 budget request. However, year to year funding has been uneven. Funding levels increased by about 15 percent in fiscal years 1993 through 1995; decreased by about 30 percent in fiscal years 1995 through 1998; and, for fiscal year 1999, DOE has requested an increase of about 20 percent from the 1998 level. Figure 1 also shows that in 1993 through 1996, utilities' investments have decreased each year.[6] In 1996, utility R&D managers told us that this funding would most likely continue to decline. Among the 80 companies we contacted at that time, the R&D managers of 38 companies predicted decreases in R&D spending, while the managers of only 2 companies predicted increases. The managers from the remaining 40 companies were either unsure, believed their expenditures would remain about the same, or did not provide the information.

[5]The 10 states that had enacted legislation to restructure their retail markets were California, Illinois, Maine, Massachusetts, Montana, Nevada, New Hampshire, Oklahoma, Pennsylvania, and Rhode Island. The seven states that had adopted final orders without enacting legislation were Arizona, Maryland, Michigan, New Jersey, New York, Texas, and Vermont.

[6]Utility R&D managers told us that on average they devoted about 0.3 percent of their 1994 revenues to R&D.

Figure 1: DOE's and Investor-Owned Utilities' Funding for Electricity R&D, 1993-99



Notes: The decline in utilities' funding is expected to continue.

DOE's time periods are fiscal years; utilities' time periods are calendar years.

DOE's 1993-97 funds are actual; 1998, appropriated; and 1999, requested.

Source: GAO's presentation of data from DOE's budgets, FERC, and selected electric utility companies.

For this testimony, we updated our 1996 analysis of changes in DOE's electricity R&D funding to add more recent data, including the Department's 1999 budget request.[7] While the overall percentage change from fiscal year 1993 is small, key budget categories comprising electricity

[7]To update DOE's electricity R&D funding, we reviewed DOE's budget justifications for fiscal years 1998 and 1999. As appropriate, for existing budget categories, we updated appropriation totals that had been estimated in earlier budget justifications with actual amounts provided in more recent ones. We also included appropriation totals for new electricity-related budget categories that DOE had created. We discussed our methodology and calculations with the Executive Director of DOE's Energy Resources Board, who agreed with the funding levels contained in appendix I. We included adjustments and clarifications he suggested as appropriate. We conducted this update of our analysis in March 1998 in accordance with generally accepted government auditing standards.

R&D show much greater variation. For example, as shown in appendix I, "DOE's Appropriations for Major Electricity R&D Programs, Fiscal Years 1993-99," while funding for renewable energy and energy efficiency R&D would increase by nearly 40 percent, funding for fossil energy and nuclear energy R&D would decrease by about 24 and 51 percent, respectively. We stated in our 1996 report that the primary reason for DOE's reduction in R&D spending in fiscal year 1996 was the Congress's overall effort to reduce the federal spending. According to a senior-level DOE official, current funding levels are driven by recent program goals and budget agreements that were implemented to reduce the overall federal budget.

As stated in our 1996 report, utility R&D managers told us their budgets were reduced primarily because their companies were preparing for deregulation and competition by cutting costs wherever they could. In the past, utilities were allowed to earn a fixed rate of return on all R&D projects that the PUCs allowed in the rate base. In a more competitive marketplace, utilities will be forced to price electricity to compete with other utilities and other power producers. As a result, these R&D managers said that they evaluate potential R&D projects on the basis of their likelihood of providing a near-term return to the utility in terms of allowing it to reduce electricity rates.

The state electricity R&D programs that we reviewed for our 1996 report were also experiencing reductions. Of the 11 large programs in the nine states that we reviewed,[8] 7 had been reduced from 1993 to 1996. Overall, the programs had seen a 30-percent reduction in funding, from $83 million to $58 million,[9] since 1993. Most of these programs involved energy efficiency R&D, and some involved generation technologies of particular interest to that state, such as ones for coal power and renewable energy.

We also reported in 1996 that concurrent with the decline in funding, a shift in the type of R&D being funded had also occurred, primarily resulting in a decrease in collaborative and longer-term projects. Many utilities were shifting their R&D to proprietary R&D and to projects with a short-term payback. Utility R&D managers viewed this shift as part of the effort to recast the utility companies as competitive businesses rather than regulated providers of public services. In addition, as a result of these changes and the reduction in DOE's funding in fiscal year 1996, advanced technology projects in the six technology areas we reviewed were often

[8]The 11 programs represented the major state programs involved in electricity R&D, according to the available data and discussions with key state program officials.

[9]Amounts in 1995 constant dollars.

delayed, scaled back, or canceled. This shift was reflected in the declining support for the Electric Power Research Institute (EPRI),[10] which is the utilities' main vehicle for collaborative R&D. Between 1994 and 1996, membership contributions to EPRI declined by nearly 30 percent, from $424 million to $300 million,[11] and EPRI officials expected a further decline in 1997. Of the 80 companies we contacted, 12 dropped out of EPRI between 1994 and 1996, but most remained members and simply decreased their contributions.

Our 1996 report stated that utility R&D managers and DOE and state government officials had expressed concerns about the funding levels of electricity R&D and suggested alternative funding sources. These sources include (1) a state-administered surcharge on all in-state retail sales of electricity and (2) a nationwide charge on all electricity entering a transmission system—a "nonbypassable wires charge."[12]

Several states that are considering deregulating their utilities have proposed surcharges to fund public-benefit R&D; the states include California, Massachusetts, New York, and Rhode Island. For example, one proposal would fund R&D that served a broad public interest that might otherwise be lost in the transition to a more competitive marketplace. The proposal calls for establishing a consortium or public authority to administer the funds but does not specify a funding level.

Some utility R&D managers and state and EPRI officials suggested that a national nonbypassable wires charge could provide an alternative funding mechanism for EPRI and longer-term collaborative R&D. It would ensure that those who do not fund R&D do not achieve a competitive advantage over those who do. Under this proposal, a small charge would be assessed on all electricity entering a transmission grid, whether it be interstate or intrastate. The Gas Research Institute—the R&D counterpart to EPRI for the natural gas industry—is funded by a somewhat similar charge on gas flowing through interstate pipelines. In the past, the Institute has encountered problems with this funding mechanism because individual pipeline companies are allowed to reduce their payments to the Institute if their rates are discounted as a result of competition from other pipeline companies. Many utility R&D managers, although generally reluctant to support any additional charges for electricity, said that a nonbypassable

[10]Founded by the utility industry in 1972 to do R&D, EPRI is funded by the utilities' contributions.

[11]Amounts in 1995 constant dollars.

[12]A nonbypassable wires charge is one that would be assessed on all electricity entering a transmission grid, whether it be interstate or intrastate.

wires charge would be a more equitable way to provide funding than the current system, to which some utilities and independent power producers were not contributing.

Implications for Electricity R&D Funding

Given the inherent difficulties in measuring the benefits of R&D, the economic consequences of these funding changes are unclear. Our past work has demonstrated the difficulty in measuring the impact of technology programs.[13] For example, a wide range of factors determines if and when a particular R&D project will result in commercial or other benefits; it can also take many years for a research project to achieve results. We have found that no single indicator or evaluation method adequately captures the results of R&D. We also have found that it is difficult to establish a causal link between a successful project and government funding early in the project. The commitment to reduce the federal deficit is causing the Congress to reexamine the value of programs across the federal government, exerting pressure on all federal agencies to demonstrate that they are making effective use of the taxpayers' dollars. This greater emphasis on results is evident in the passage of the Government Performance and Results Act of 1993 (Results Act). The Results Act provides a legislative vehicle for agencies to use as they seek to demonstrate and improve their effectiveness. Experiences from the act's pilot efforts reinforce the fact that output measures are highly specific to the management and mission of each federal agency and that no single indicator exists to measure the results of research. If successfully implemented, the Results Act should help the Congress make the difficult funding, policy, and program decisions that the current budget environment demands.

Mr. Chairman, this concludes my prepared statement. I would be glad to answer any questions that you or other Members of the Subcommittee may have.

[13]See Federal Research: Challenges to Implementing the Advanced Technology Program (GAO/RCED/OCE-98-83R, Mar. 2, 1998); Measuring Performance: Challenges in Evaluating Research and Development (GAO/T-RCED-97-130, Apr. 10, 1997); Measuring Performance: Strengths and Limitations of Research Indicators (GAO/RCED-97-91, Mar. 21, 1997); and Measuring Performance: The Advanced Technology Program and Private-Sector Funding (GAO/RCED-96-47, Jan. 11, 1996).

The Department of Energy's Appropriations for Major Electricity R&D Programs

Table I.1: The Department of Energy's Appropriations for Major Electricity R&D Programs, Fiscal Years 1993-99

1998 constant dollars in thousands

Budget item	1993	1994	1995	1996	1997	1998	1999 request
Renewable & energy efficiency	$404,055	$491,909	$566,943	$436,840	$422,232	$451,481	$563,224
Nuclear energy[a]	137,679	104,515	113,697	70,238	61,496	19,000	67,317
Fossil energy	395,104	389,723	375,489	316,909	286,665	285,967	299,126
Energy research, including fusion	106,149	102,476	193,385	91,754	92,514	91,042	97,939
Biological & environmental[b]	137,510	137,336	109,312	117,133	110,909	108,400	116,329
Policy Office[c]	3,775	0	6,451	4,155	2,543	1,936	2,439
Total	**$1,184,272**	**$1,225,960**	**$1,365,276**	**$1,037,028**	**$976,359**	**$957,826**	**$1,146,374**

Notes: The Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy developed an estimate of DOE's budget for utility-related activities for fiscal year 1993, which we used together with other budget data to estimate DOE's budget for electricity R&D activities.

Figures sometimes do not add to totals because of rounding.

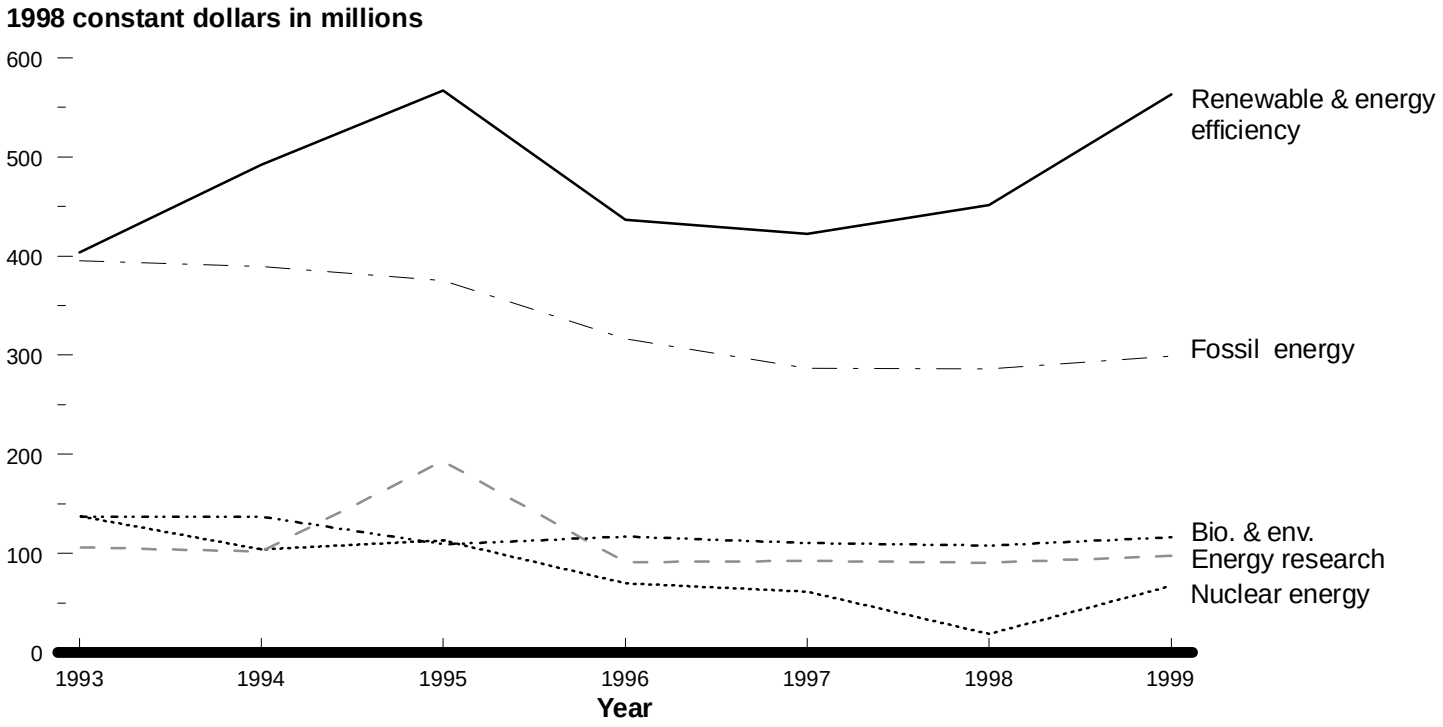
[a]Includes $12 million provided by the Department of Defense in fiscal year 1998.

[b]Includes R&D on the effect of carbon dioxide on the earth's atmosphere and on people.

[c]Includes environmental policy studies, analysis of DOE's R&D activities, and evaluation of proposed regulations' effect on the energy system.

Source: GAO's presentation of data from DOE's budgets.

Figure I.1: DOE's Appropriations for Major Electricity R&D Programs, Fiscal Years 1993-99



Legend

Bio. & env. = Biological and environmental

Note: Figure excludes funding for the Policy Office.

Source: GAO's presentation of data from DOE's budgets.

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