14. ENERGY

Table 14–1. Federal Resources in Support of Energy
(In millions of dollars)

Function 270	1999 Actual	Estimate					
		2000	2001	2002	2003	2004	2005
Spending:							
Discretionary Budget Authority ...	2,863	2,569	2,943	3,342	3,142	3,219	3,311
Mandatory Outlays:							
Existing law	–2,217	–4,473	–3,759	–3,924	–3,699	–4,012	–3,971
Credit Activity:							
Direct loan disbursements	1,128	1,719	1,623	N/A	N/A	N/A	N/A
Guaranteed loans	16	133	176	N/A	N/A	N/A	N/A
Tax Expenditures:							
Existing law	1,880	1,930	1,940	1,955	1,305	1,350	1,380
Proposed legislation	.....	.....	198	371	652	1,143	1,561

N/A = Not available.

Federal energy programs contribute to energy security, economic prosperity and environmental protection. Funded mainly through the Energy Department (DOE), they range from protecting against disruptions in petroleum supplies, to conducting research on renewable energy sources, to cleaning up DOE facilities contaminated by years of nuclear-related research activities. The Administration proposes to spend $2.9 billion for these programs. In addition, the Federal Government allocates about $1.9 billion a year in tax benefits, mainly to encourage development of traditional and alternative energy sources.

The Federal Government has a longstanding and evolving role in energy. Most Federal energy programs and agencies have no State or private counterparts and clearly involve the national interest. The federally-owned Strategic Petroleum Reserve, for instance, protects against supply disruptions and the resulting consumer price shocks, while Federal regulators protect public health and the environment and ensure fair, efficient energy rates. DOE's applied research and development (R&D) programs in fossil, nuclear, solar/renewable energy and energy conservation speed the development of technologies, frequently through cost-shared partnerships with industry. The programs not only open new opportunities for American industry, but reach beyond what the marketplace demands today, putting the Nation in a better position to meet the demands of tomorrow.

Energy Resources and R&D

Strategic Petroleum Reserve (SPR): DOE maintains SPR and invests in R&D to protect against petroleum supply disruptions and reduce the environmental impacts of energy production and use.

SPR was authorized in 1975, in response to the oil embargoes of the early 1970s. The Reserve now holds 567 million barrels of crude oil in underground salt caverns at four Gulf Coast sites. SPR helps protect the economy and provide flexibility for the Nation's foreign policy in case of a severe energy supply disruption.

- In 2001, DOE will maintain its capability to reach a SPR drawdown rate of about four million barrels a day within 15 days and to maintain that rate for at least 90 days.

Applied R&D: DOE's energy R&D investments cover a broad array of resources and technologies to make the production and use of all forms of energy—including solar and renewables, fossil, and nuclear—more efficient and less environmentally damaging. These investments not only lay the foundation for a more sustainable energy future but also open major international markets for manufacturers of advanced U.S. technology and enhance our nation's energy security.

DOE's energy efficiency, renewable energy, and electric energy systems programs form a major part of the Administration's Climate Change Technology Initiative, which is intended to find ways to reduce emissions of carbon dioxide and other greenhouse gases in ways that benefit our economy rather than constrain it. (For more details, see Chapter 5, "Promoting Research.")

Energy Conservation

Energy conservation programs, for which the budget proposes $851 million, are designed to improve the fuel economy of various transportation modes, increase the productivity of our most energy-intensive industries, and improve the energy efficiency of buildings and appliances. They also include grants to States to fund energy-efficiency programs and low-income home weatherization. Each of these activities benefits our economy and reduces emissions of carbon dioxide and other greenhouse gases, and many rely on partnerships with the private sector for cost-sharing and commercialization.

Past Results: Energy-efficiency technologies that have already come to market include heat-reflecting windows, high-efficiency lights, geothermal heat pumps, high-efficiency electric motors and compressors, and software for designing energy-efficient buildings. These five technologies alone have saved consumers and industry over $33 billion in energy costs. In 1999, commercialization efforts were completed for geothermal heat pumps, and full-size electrochromic windows (which darken electrically) and spectrally-selective windows (which block ultraviolet and infrared light) were demonstrated.

In 2000:

- Daimler-Chrysler, Ford, and General Motors have recently shown the concept cars that represent the first major results of the Partnership for a New Generation of Vehicles.

In 2001:

- The Federal Energy Management Program (FEMP) will exceed the original Energy Policy Act of 1992 goal of a 20-percent reduction in the Government's energy use per square foot of office space (relative to 1985) by reaching a 22-percent reduction. (In 1999 FEMP nearly reached that goal a year ahead of schedule, achieving a 19.6 percent reduction.)
- Industry will produce 45,000 vehicles that incorporate light-weight materials whose development was supported by DOE's Office of Transportation Technologies.
- Alcohol-fuel companies will produce six million gallons of cellulose-derived ethanol, based on DOE technologies.
- The Office of Industrial Technologies will see 10 of their technologies commercialized, bringing the total to 144. Annual energy savings to the U.S. economy from technologies they have supported will reach 170 trillion Btu, with another 90 trillion Btu saved annually from their industry assessment and technology-transfer programs.
- Local recipients of DOE grant funds will weatherize 76,000 low-income homes.

Solar and Renewable Resources: Solar and renewable resources programs, for which the budget proposes $334 million, focus on technologies that will help the Nation use its abundant renewable resources such as wind, solar, and biomass to produce low-cost, clean energy that contributes no net carbon dioxide to the atmosphere. The United States is the world's technology leader in wind energy, with a growing export market and production costs that have fallen dramatically. In addition, photovoltaics are becoming more useful in remote power applications, and new biofuels plants are being constructed. DOE also is coordinating the President's Million Solar Roofs initiative, whose goal is to facilitate the installation of one million solar roof installations

(a mixture of solar heat/hot water and photovoltaics) by 2010. Two programs that were formerly presented as part of Solar and Renewable Energy are now presented separately: electric energy systems ($48 million) and hydrogen R&D ($23 million). Departmental energy management is a new line-item ($5 million).

Past Results: The DOE wind energy program developed a new generation of airfoil designs for wind turbine blades, which have been incorporated into U.S.-made wind turbines in the 1990s, resulting in up to 30 percent better efficiency. The cost of wind-generated electricity has dropped from 35 cents per kilowatt-hour (kWh) in 1980 to less than five cents per kWh in 1999. (The program has set a very ambitious goal of reducing those costs to 2.5 cents by 2002.) From 1990 to 1999, the production cost per watt of photovoltaic (PV) panels has dropped by a factor of six, and shipments of PV panels have roughly tripled. The cost of geothermal electricity dropped by half from 1980 to 1990 (from 12 to six cents per kWh), and has dropped another one-third between 1990 and 1999, to less than four cents per kWh. States, cities, and Federal agencies to date have pledged 912,000 "solar roofs" over the next eight years, including 200,000 new pledges in 1999.

In 2001, DOE's Solar and Renewable Resources program will:

- support the President's Million Solar Roofs initiative through partnerships and technical assistance so that at least 40,000 solar roofs will be installed in 2001 (51,000 installations have been completed, an increase of 26,400 in 1999).
- aid in the expansion of non-hydropower renewable energy capacity in the U.S. to 10.9 gigawatts.
- continue pushing the technological state-of-the-art:

  — achieve 14 percent stable efficiency in a thin-film photovoltaic module;

  — complete a second commercial-scale test of co-firing switchgrass with coal; and,

  — reduce the cost of geothermal power from "binary" plants to 3.5 cents/kWh.

Electric Energy Systems: The budget proposes $48 million for these activities, which in previous years have been described as part of the solar and renewable energy budget. These programs focus on technical advances in electricity transmission and storage and on the efficiency and reliability of the nation's electrical grid. The largest activity is in high-temperature superconductivity R&D, which can greatly increase the efficiency of generators and heavy electrical machinery, and which can dramatically increase the carrying capacity of high-voltage transmission lines.

In 1999, for the first time in the world, a high-temperature superconducting cable provided commercial grid electricity to a manufacturing plant—enough electricity to power a small town.

- In 2001, DOE will make available "second generation" high-temperature superconducting wires in continuous lengths.

Fossil Energy R&D: Fossil fuel energy R&D programs, for which the budget proposes $376 million, help industry develop advanced technologies to produce and use coal, oil, and gas resources more efficiently and cleanly. Federally-funded development of clean, highly-efficient gas-fired and coal-fired generating systems aim to reduce greenhouse gas emission rates, while reducing electricity costs compared to currently available technologies. These programs also include efforts to discover effective, efficient, and economical means of sequestering carbon dioxide. The programs also help boost the domestic production of oil and natural gas by funding R&D projects with industry to cut exploration, development, and production costs.

Past Results: In 1999, DOE demonstrated a more efficient and less costly drilling and completion technology that could ultimately add six trillion cubic feet (TCF) of domestic gas reserves; demonstrated four advanced oil production enhancement technologies that contributed to adding 46 million barrels of incremental domestic oil reserves; and began full-scale component testing of two advanced, utility-scale turbines that are more efficient and less polluting than current technologies.

In 2001, DOE will:

- Demonstrate the feasibility of effectively separating hydrogen and CO2 from synthetic gas using both high-temperature hydrogen separation membranes, and low-temperature CO2 hydrate technology to meet the long-term goals of providing low-cost hydrogen for high-efficiency fuel cells and for concentrating CO2 into forms that can be "sequestered," e.g., buried or otherwise kept out of the atmosphere;
- Complete evaluation of the results of an international collaborative research project on CO2 injection into deep, unmineable coal seams for sequestration; and
- The advanced research materials program will test a high gas flux oxygen separation device that promises more efficient, less expensive gas separation techniques that can improve powerplant efficiency, and can aid carbon sequestration efforts.

Nuclear Energy R&D: Nuclear fission power is a widely used technology, providing about 19 percent of the electric power consumed in the United States and about 17 percent worldwide without generating greenhouse gases. If fossil plants were used to produce the amount of electricity generated by these nuclear plants, more than 300 million additional metric tons of carbon would be emitted each year. Continued R&D addressing the issues that threaten the acceptance and viability of nuclear fission in the United States will help determine whether nuclear fission can continue to supply increasing amounts of economically-price energy while reducing greenhouse emissions.

In 2001, DOE will:

- complete identification of feasible and important new reactor and fuel cycle concepts to help improve the cost, performance, safety, or proliferation-resistence of civilian nuclear power for continued development;
- maintain the advanced radioisotope power system program and facility operations and capabilities for current and future space and national security missions;
- complete the National Environmental Policy Act review of the environmental impacts of returning the Fast Flux Test Facility (FFTF) at Hanford to operation and issue a record of decision; and,
- initiate design of two facilities for processing depleted uranium hexafluoride (DUF6) at Paducah, Kentucky and Portsmouth, Ohio.

Environmental Quality

Environmental Management: In the Non-Defense Environmental Management and Uranium Enrichment Decontamination and Decommissioning Fund, the budget proposes $589 million to manage the Nation's most complex environmental cleanup program, the result of more than five decades of research and production of nuclear energy technology and materials. (For information on DOE's Defense Environmental Management program, see Chapter 11, "National Defense.") This will reduce environmental risk and manage the waste at: (1) sites run by DOE's predecessor agencies; (2) sites contaminated by uranium and thorium production from the 1950s to the 1970s; (3) DOE's inactive uranium processing plant; and, (4) the gaseous diffusion plants operated by the now-private United States Enrichment Corporation.

Past Results: In 1999, DOE completed remediation of three sites: Ames Laboratory in Iowa, Sandia National Laboratory in California, and Princeton Plasma Physics Laboratory in New Jersey. Through 1999, a total of 69 sites have completed remediation.

In 2000:

- DOE plans to complete remediation of two geographic sites.

In 2001, DOE will:

- complete remediation at three geographic sites;
- increase the total number of geographic sites completed to 74 of 113; and,
- fill five canisters with high-level waste at the West Valley Demonstration Project in New York for long-term storage.

Radioactive Waste: DOE's Civilian Radioactive Waste Management Program oversees the management and disposal of spent nuclear fuel from commercial nuclear reactors and

high-level radioactive waste from Federal cleanup sites. In 2001, DOE will:

- conduct public hearings on the Secretary's consideration of the possible recommendation of the Yucca Mountain, Nevada site for development as a repository;
- complete a review of the Site Recommendation Report that will provide the technical bases for a Site Recommendation Statement;
- complete a Site Recommendation Statement for the Secretary to submit to the President and then the Congress, if the Secretary and the President decide to recommend the site; and,
- if the President and Congress approve the Site Recommendation, work on completing a License Application to the Nuclear Regulatory Commission.

Energy Production and Power Marketing

Power Marketing Administrations: The Federal Government is reshaping programs that produce, distribute, and finance electric power. The four Federal Power Marketing Administrations, or PMAs, (Bonneville, Southeastern, Southwestern, and Western) market electricity generated at 127 multi-purpose Federal dams and manage 33,000 miles of federally-owned transmission lines in 34 States. The PMAs sell about five percent of the Nation's electricity, primarily to preferred customers such as counties, cities, and publicly-owned utilities. The PMAs face growing challenges as the electricity industry moves toward open, competitive markets.

- In 2001, each PMA will operate its transmission system to ensure that service is continuous, reliable, and balanced—that is, that the system achieves a "pass" rating each month under the North American Electric Reliability Council performance standards. Each PMA received a "pass" rating every month during 1999. These measures are used industry-wide and indicate the reliability and quality of power provided by utilities.

Tennessee Valley Authority (TVA): TVA is a Federal Government corporation and the Nation's single largest electric power generator. It generates four percent of the electric power in the country and transmits that power over its 17,000 mile transmission network to 159 municipal utilities and rural electric cooperatives that serve some eight million customers in seven States.

TVA is responding to changes that are bringing greater competition to the electric power industry by taking steps to maintain its ability to supply power at competitive prices. The agency is now engaged in a major effort to cut its debt. TVA has cut its debt by $1.3 billion in the past three years.

- In 2001, TVA will reduce its debt by over $750 million.

(For information on TVA's non-power activities, see Chapter 19, "Community and Regional Development.")

Rural Utilities Service: In 2001, the Agriculture Department's Rural Utilities Service (RUS) will make $1.6 billion in direct loans to rural electric cooperatives, public bodies, nonprofit associations, and other utilities in rural areas for generating, transmitting, and distributing electricity. Its main goal is to finance modern, affordable electric service to rural communities. Included within this funding amount is $400 million for private sector guarantees, which will help rural utility borrowers position themselves to be viable in a competitive, deregulated environment. RUS borrowers continue to provide service in the poorest counties in rural America and to the majority of counties suffering the most from population out- migration.

- In 2001, RUS will upgrade 169 rural electric systems, which will benefit over 1.8 million customers and create or preserve approximately 40,250 jobs.

Energy Regulation

The Federal Government's regulation of energy industries is designed to protect public health, achieve environmental and energy goals, and promote fair and efficient interstate energy markets.

Appliance Efficiency Rules: DOE improves the Nation's use of energy resources through its appliance energy efficiency pro-

gram, which specifies minimum levels of energy efficiency for major home appliances, such as water heaters, air conditioners, and refrigerators, and for commercial-scale heating and cooling components. The initial efficiency standards were established in legislation, and DOE periodically issues rules to revise those standards or to create standards for new categories of equipment.

Past Results: In 1999, DOE issued six new proposed rules. In previous years DOE has issued eight final rules. As a result of the appliance efficiency rules that DOE administers, consumers are saving approximately $4.7 billion annually in reduced energy costs. In 2001:

- DOE will issue one final rule and three proposed rules and determinations on different categories of appliances.

Federal Energy Regulatory Commission (FERC): FERC, an independent agency within DOE, regulates the transmission and wholesale prices of electric power, including non-Federal hydroelectric power, and the transmission of oil and natural gas by pipeline in interstate commerce. FERC promotes competition in the natural gas industry and in wholesale electric power markets. Recent FERC reforms to give consumers competitive choices in services and suppliers will cut consumer energy bills by $3 to $5 billion per year.

In 2001, FERC, in order to promote competitive, well-functioning energy markets, will measure the response of prices to external conditions in natural gas and electricity, the level of price volatility and changes in price volatility in electricity and gas, and the correlation of commodity prices across regions.

DOE Corporate Management

Program and contract management at DOE is a Priority Management Objective of the Administration because more than 90 percent of the Department's budget is spent on contracts to operate its facilities (see Chapter 31, "Improving Government Performance through Better Management.")

All DOE programs may be affected by a proposed consolidation of its security activities within one departmental budget account. The Administration anticipates transmitting a budget amendment to propose this consolidation in early 2000.

Nuclear Regulatory Commission (NRC)

NRC, an independent agency, regulates the Nation's civilian nuclear reactors and the medical and industrial use of nuclear materials and their safeguards, and the disposal of nuclear waste in order to ensure public health and safety and to protect the environment. NRC international activities also promote adequate protection of U.S. interests in nonproliferation and the safe and secure use of nuclear materials in other countries. To meet the challenges of a restructured and deregulated electric utility industry, NRC is committed to adopting a more risk-informed and performance-based approach to regulation. This regulatory framework will focus NRC and licensee resources on the most safety-significant issues, while providing flexibility in how licensees meet NRC requirements.

Past Results: In 1999, NRC and the U.S. nuclear industry achieved the same goals as listed below for 2001: zero radiation-related deaths or illnesses from the operation of civilian reactors or the use and disposal of nuclear materials, and zero significant adverse impacts on public health and safety and the environment from the recovery, clean-up, and disposal of radioactive wastes.

In 2001:

- NRC's nuclear reactor safety goal is for there to be zero radiation-related deaths and illnesses in connection with the operation of civilian reactors.
- NRC's nuclear materials safety goal is for there to be zero radiation-related deaths and illnesses in connection with the use of nuclear materials.
- NRC's nuclear waste safety goal is for there to be zero significant adverse impacts to the current and future public health and safety and the environment from radioactive wastes.

Tax Incentives

Federal tax incentives are mainly designed to encourage the domestic production or use of fossil and other fuels, and to promote the vitality of our energy industries and diversification of our domestic energy supplies. The largest incentive lets certain fuel producers cut their taxable income as their fuel resources are depleted. An income tax credit helps promote the development of certain non-conventional fuels. It applies to oil produced from shale and tar sands, gas produced from a number of unconventional sources (including coal seams), some fuels processed from wood, and steam produced from solid agricultural byproducts. Another tax provision provides a credit to producers who make alcohol fuels—mainly ethanol—from biomass materials. The law also allows a partial exemption from Federal gasoline taxes for gasolines blended with ethanol.

The direct funding in the Climate Change Technology Initiative is complemented by a $4 billion, five-year package of tax incentives that will help reduce greenhouse gas emissions by spurring the purchase of energy-efficient products and the use of renewable energy. For homes and buildings, the incentives provide tax credits for the purchase of new energy-efficient homes; for purchase of highly energy-efficient equipment like heat-pump water heaters, natural-gas heat-pumps, and fuel cells; and, for purchases of rooftop photovoltaic and solar hot-water systems. For vehicles, the incentives extend the current tax credit for electric and fuel-cell vehicles, and create a new system of tax credits for hybrid vehicles. To promote renewable energy, the provisions extend the current tax credits for power produced from wind and "closed loop" biomass, and create new credits for certain "open loop" biomass projects, methane from landfills, and co-firing of biomass with coal in existing powerplants. To encourage more industrial use of distributed power generation, a uniform 15-year cost-recovery period is proposed for distributed-power property.