

DEPARTMENT OF ENERGY

The President's Proposal:

- Fulfills the President's commitments to increase conservation and clean power through the Weatherization Assistance Program and the Coal Research Initiative;
- Invests in a new, fuel-efficient automotive technology venture—Freedom CAR—to develop technologies, such as hydrogen-based fuel cells that will reduce reliance on imported oil;
- Strengthens the security of the United States through the military application of nuclear energy and reduces the global threat from terrorism and weapons of mass destruction;
- Accelerates the cleanup of nuclear waste and advances reforms that will result in more cleanup at less cost while protecting workers, the public, and the environment; and
- Provides a new tax credit for the purchase of hybrid and fuel cell vehicles.

Department of Energy

Spencer Abraham, Secretary

www.energy.gov 202-586-8100

Number of Employees: 15,000 Federal and 100,000 Contractor

2002 Spending: \$19.1 billion

Facilities: Twelve operations and field offices oversee four Power Marketing Administrations, 26 laboratories, and 24 other facilities.

The Department of Energy (DOE) has four major functions. These are: 1) national security; 2) environmental quality; 3) science and technology; and 4) energy resources. In the area of national security, the National Nuclear Security Administration maintains the nation's nuclear weapons stockpile and manages non-proliferation efforts to reduce threats from weapons of mass destruction. The environmental quality function is largely conducted by the Office of Environmental Management, which cleans up the environmental contamination resulting from over 50 years of nuclear material production. The Office of Science sponsors a

broad range of basic research that supports other DOE programs and operates a suite of scientific facilities for the benefit of the entire U.S. research community. Finally, the Offices of Fossil Energy, Nuclear Energy, and Energy Efficiency and Renewable Energy conduct applied research aimed at improving energy conservation and supply. Recently, Secretary Abraham declared that the

Department's single overarching mission is supporting national security, which includes energy and economic security. This mission provides direction to all four functions as described below.

Overview

The Department faces some of the most daunting technical challenges of any federal agency. For instance, DOE must certify the safety and reliability of the nation's nuclear stockpile—and do so without nuclear testing. It must clean up sites contaminated by over 50 years of weapons testing and production—an area equal in size to Rhode Island and Delaware combined. The Department must design, site, build, and operate a 10,000-year repository to safely store the nation's nuclear waste. DOE also sponsors an extensive research portfolio encompassing issues ranging from the universe's earliest matter to how to make homes more energy efficient. It carries out most of these tasks using a contractor workforce operating both an aging infrastructure and many large, expensive, one-of-a-kind research facilities. In all these areas, careful planning, rigorous prioritization, and management reforms are particularly important for improving DOE's performance.

Secretary Abraham announced national security as DOE's primary mission in October 2001. He established the following priorities:

- Supporting homeland defense with a focus on the threat of weapons of mass destruction and emphasis on nonproliferation efforts abroad; guaranteeing the safety and reliability of the nuclear stockpile, and ensuring that research and development (R&D) and production plans support the Administration's nuclear strategy; and providing safe, efficient, and effective nuclear power for Navy ships;
- Assuring energy security through infrastructure protection; implementing the President's National Energy Policy; exploring new energy sources and technologies with dramatic environmental benefits; and directing R&D budgets to innovative new ideas while ensuring application of mature technologies; and
- Accelerating the cleanup and closure of sites where there is no longer a national security mission.

Improving management and performance is the unifying theme of the 2003 President's Budget. The Administration's proposals to return value to the taxpayer and address performance issues are organized along the four main "functional areas": National Security; Environmental Management; Science and Technology; and Energy Resources. Nonetheless, safeguarding national security remains the paramount objective.

National Security

Created by Congress in 1999, the DOE's National Nuclear Security Administration's (NNSA) mission is to strengthen the security of the United States by: 1) applying nuclear science and technology to military purposes; and 2) reducing the global threat from weapons of mass destruction. To accomplish this mission, NNSA manages defense-related programs to:

- maintain and enhance the safety, security and reliability of the nation's nuclear weapons stockpile;
- provide the Navy with safe and effective nuclear propulsion plants for ships; and
- prevent the spread of weapons of mass destruction and their components.



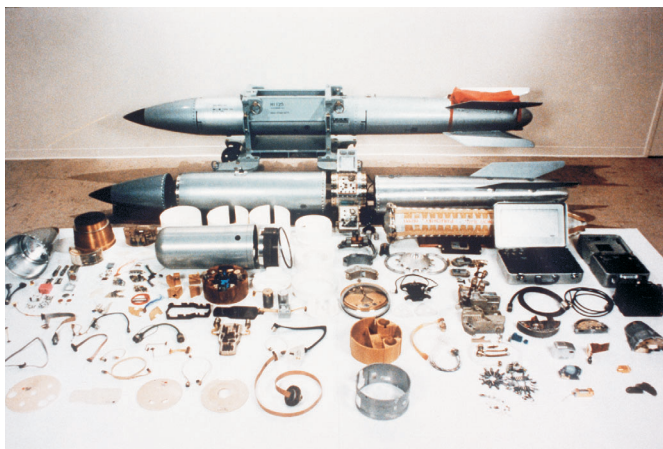
Stockpile Stewardship

Since 1993, DOE has developed and is operating the Stockpile Stewardship program to certify the safety and reliability of the U.S. nuclear stockpile in the absence of underground testing. NNSA achieves this goal by relying on improved science, technology, and computational techniques to detect and predict problems in the aging nuclear stockpile. NNSA is also charged with effectively maintaining and refurbishing existing nuclear warheads, as well as sustaining the design and manufacturing base to produce a new weapon if required.

To maintain a safe and reliable nuclear deterrent, NNSA's federal workforce of about 1,700 oversees a vast complex that includes Los Alamos, Sandia, and Lawrence Livermore national laboratories; the Nevada Test Site; and extensive production facilities in Amarillo, Texas, Kansas City, Missouri, Aiken, South Carolina, and Oak Ridge, Tennessee. These facilities have a combined contractor workforce of approximately 25,000. This complex carries out four kinds of activities:

- Directed Stockpile Work programs support DOD's nuclear weapons requirements by maintaining and refurbishing warheads to ensure their safety, reliability, and performance. Programs include research, development, and production associated with weapons maintenance, life extensions, and certification of continued reliability. For example, NNSA is in the process of refurbishing an aircraft-delivered weapon, the B-61 bomb, which first entered the stockpile in 1979.
- Science Programs develop and maintain capabilities needed to certify the reliability of the nuclear stockpile into the future. One example is the Inertial Confinement Fusion Ignition Campaign that includes construction and operation of the National Ignition Facility at Lawrence Livermore Laboratory in California. This is a technically challenging effort that has led to significant cost growth and delays. However, because this facility is important to understanding the physics of nuclear explosions, DOE continues to place a high priority on allocating a significant amount of resources to it. DOE laboratories also operate some of the world's largest and fastest computers to perform advanced simulations of nuclear weapons explosions. The size and speed of these computers enable DOE to perform calculations and simulations that, previously, were impossible to perform because of their complexity.
- Infrastructure Programs operate and maintain existing facilities and construct new facilities that underpin the stockpile work. Since the end of the Cold War, some of these facilities have decayed, and NNSA is beginning to improve conditions.
- Security Programs protect the nuclear warheads and their supporting facilities, whether mobile or stationary.

Managing the Stockpile Stewardship program without nuclear testing has proven to be challenging, because much of the work requires DOE to use new and untested techniques. Throughout the Cold War, DOE maintained a viable nuclear stockpile by designing and producing

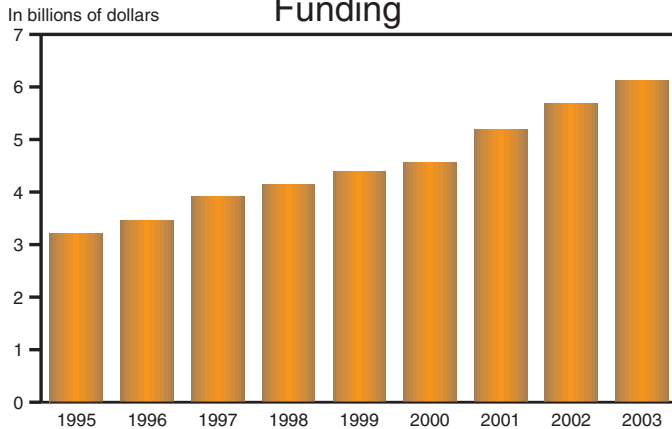


The B-61 bomb, undergoing refurbishment, has approximately 6,000 component parts.

new weapons every 15 to 20 years. New production and underground testing ensured the effectiveness of the weapons.

However, the United States last produced a new weapon in 1991, and last conducted a nuclear test in 1992. Now, DOE must develop new tools to manage the stockpile without the type of design and testing that has supported the stockpile since 1945. This work will remain critical even as DOD draws down the number of operationally deployed warheads to between 1,700 and 2,200 over the next 10 years.

Stockpile Stewardship and Related Funding



For those reasons, NNSA's stockpile stewardship program is a fast-growing effort. Funding has grown by 88 percent since 1995. The accompanying graph shows the growth in funding since 1995 for stockpile stewardship work, the infrastructure that underpins that work, and the associated security requirements. The 2003 Budget requests \$6.1 billion for Stockpile Stewardship and associated administrative activities, \$455 million above the 2002 level. Beyond 2003, the Administration will work with DoD to provide resources to meet DOE's requirements outlined in the Nuclear Posture Review.

Naval Reactors

One true success story of the nuclear age is the development and operation of safe and reliable nuclear-powered warships. DOE's Naval Reactors Program is responsible for all naval nuclear propulsion work, beginning with technology development, continuing through reactor operation and, ultimately, to reactor plant disposal. The program ensures the safe operation of the reactor plants in operating nuclear-powered submarines and aircraft carriers (comprising about 40 percent of the Navy's major warships), and develops new nuclear propulsion plants to meet evolving national defense requirements. By the end of 2003, the goal is to complete 99 percent of the design of the next generation of submarine reactors and to continue work on the design of the next generation of aircraft carrier.

In 2003, the Naval Reactors program will add to its record of 124 million miles steamed without a reactor accident or a significant release of radioactivity into the environment.

Preventing the Spread of Weapons of Mass Destruction

Preventing the spread of weapons of mass destruction around the world is vital to the nation's security. The importance of this was made clearer after the September 11th terrorist attacks. This Administration is fully committed to a comprehensive nonproliferation effort that will reduce the threat of weapons of mass destruction and stop the flow of the materials and expertise required to

build such weapons. The President's Budget includes a significant funding increase to step up efforts in these programs.

The NNSA will manage over \$1 billion in nonproliferation programs in 2003 aimed largely at securing or eliminating materials in states of the former Soviet Union. NNSA focuses its efforts on those activities that do the most to minimize the potentially catastrophic results of these weapons or materials falling into the wrong hands. For example,

- NNSA operates a program, known as International Nuclear Materials Protection and Cooperation, to secure nuclear materials in the former Soviet Union. These programs include upgrading security at Russian nuclear sites, securing fissile materials that could be used to build weapons, and improving security at Russian borders. By the end of 2003, NNSA will have supported completion of comprehensive security upgrades to 54 of 95 identified former Soviet nuclear sites and will have begun work to secure roughly 80 percent of the weapons-grade nuclear material at these sites.

...And almost every state that actively sponsors terror is known to be seeking weapons of mass destruction and the missiles to deliver them at longer and longer ranges... Working with other countries, we will strengthen nonproliferation treaties and toughen export controls. Together, we must keep the world's most dangerous technologies out of the hands of the world's most dangerous people.

Remarks at the Citadel
President George W. Bush
December 11, 2001

- NNSA manages international security programs aimed at limiting the production of weapons-usable fissile material, facilitates retrieving and securing radioactive spent nuclear fuel, helps engage Russian scientists in non-weapon-related projects, and assists Russia in downsizing its nuclear weapons complex.
- NNSA's Nonproliferation Research and Development program develops technologies needed to detect and deter nuclear proliferation abroad, and to detect and respond to chemical and biological attacks in the United States.
- NNSA's Fissile Material Disposition Program covers activities in both the U.S. and Russia to dispose of weapons-usable fissile materials such as enriched uranium and plutonium. The 2003 Budget supports the first year of a newly-revised program for plutonium disposition. Beyond 2003, the Administration is committed to providing the resources necessary to fully support this new plan.

While the nonproliferation programs are critical to national security, DOE in previous years has been slow to spend the funds the Congress provided. A key impediment has been timely access to Russian sites, which sometimes requires lengthy negotiations. The Administration is committed to resolving problems and accelerating its nonproliferation effort.

Status Report on Select Programs

The Administration is reviewing programs throughout the federal government to identify strong and weak performers. The budget seeks to redirect funds from lesser performing programs to

more effective or higher priority programs. The following ratings of selected DOE programs are illustrative. Some programs are discussed in more detail in this chapter.

Program	Assessment	Explanation
National Nuclear Security Administration—Naval Reactors	Effective	Outputs are identifiable and make key contributions to national security. Delivery schedules are consistently met. Contracts have positive and negative incentives, and include performance requirements.
National Nuclear Security Administration—Weapons Activities	Moderately effective	Certifies safety and reliability of nuclear weapons stockpile and maintains a high-quality scientific capability. However, it needs to improve its long-range planning and resource allocation process and better link stockpile requirements to available resources.
Defense Environmental Restoration and Environmental Management	Ineffective	Many sites are behind schedule for cleanup. Completion costs are escalating. “Compliance agreements,” signed before the breadth of problems was known, make it difficult to effectively manage the program.
Office of Science	Effective	Supports world-class basic research. Effectively operates a large suite of scientific user facilities.
Fossil Energy R&D	Ineffective	Broad mission, lack of investment criteria and unmeasurable performance goals allow for funding of virtually any project. This leads to corporate subsidies. Program has contributed little to improving the prospects for new energy technology.
Nuclear Energy, Science and Technology	Ineffective	Resists competitive, peer-reviewed research awards. Resource allocation does not support priorities identified by external experts.

Environmental Quality

Environmental Management

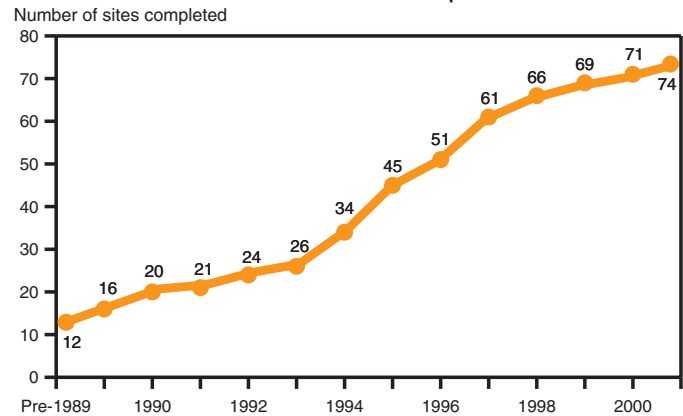
Decades of nuclear weapons production and energy research have generated vast amounts of hazardous waste and radioactive contamination. The Environmental Management (EM) program is responsible for cleaning up 114 sites where the Energy Department and earlier government agencies tested and produced nuclear weapons or conducted nuclear energy research. In 1998, the EM program published *Accelerating Cleanup: Paths to Closure*, which outlined a plan to complete the 53 sites remaining (one site was added to the list after *Accelerating Cleanup* was published), at an estimated cost of \$147 billion during the period 1997 to 2070.

The current cost estimate for cleaning up this set of 53 sites is \$220 billion, an increase of 50 percent in just three years. As of 2001, DOE has completed 14 of those 53 sites.

What accounts for these delays and cost increases? Some result from technical uncertainties. But another problem is that the program has become less focused on cleaning up sites and has instead turned into a local “jobs” program. The Administration finds 2070, well beyond the life span of most Americans alive today, as an unacceptable deadline to complete the cleanup of existing sites.

For more than a decade, the General Accounting Office has designated DOE’s contract administration and management of its EM projects as a high-risk area, vulnerable to fraud, waste, and abuse. Problems in this area include cost and schedule overruns and DOE’s inability to hold contractors accountable. At the Savannah River site in South Carolina, for example, the EM program selected a process to separate radioactive waste from liquids in storage tanks. In 1985, EM estimated it would take three years and \$32 million to construct the necessary facility. In 1999, after more than a decade of delays and spending about \$500 million, the EM program terminated the project because the facility could not operate within required safety margins. Problems of this type persist. The accompanying figure shows the change since 1989 in estimated costs to clean up the five major sites. Some of the variance is due to more complete information regarding the extent of contamination, but the program has also failed to meet cost, schedule, and performance goals.

Number of Environmental Management Sites Cleaned Up

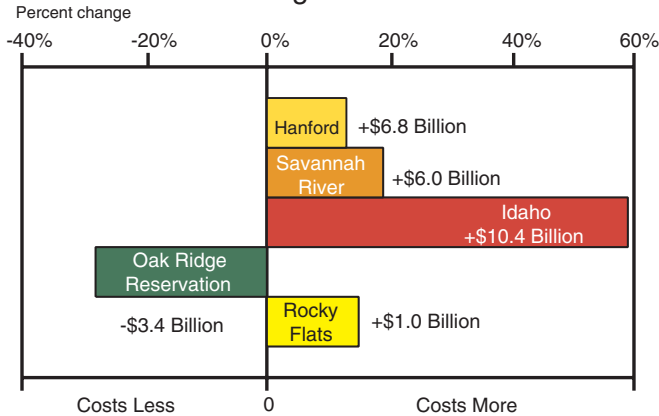


Source: Office of Environmental Management, DOE.

Progress vs. Payroll

In 2000, DOE reallocated \$30 million from priority cleanup projects at Savannah River, S.C., Hanford, Wash., and Idaho National Lab. The Department decided to use these funds instead to revive the EM laboratory-directed research and development program suspended by the Congress and to employ workers displaced when the Congress terminated the DOE Office of Field Integration.

**Change in Cost at Major Sites
Since Original Estimate**



Source: Office of Environmental Management, DOE.

Today, the Department recognizes the significant management challenges facing the EM program and is moving to meet them. In March 2001, Secretary Abraham ordered the Office of Environmental Management to do a top-to-bottom review and identify ways to improve performance. Management improvements instituted by the Department will accelerate cleanup and lower costs. The program is scheduled to complete cleanup of Missouri’s Weldon Spring site in 2002, and Kentucky’s Maxey Flats Disposal site in 2003. The total number of EM sites completed by the end of 2003 will be 76 of 114.

Environmental Management Performance				
Geographic Site	Rating Criteria			Overall
	Mission	Performance	Reform	
Idaho National Lab, ID	●	●	●	●
Savannah River, SC	●	●	●	●
Hanford, WA	●	●	●	●
Rocky Flats, CO	●	●	●	●
Oak Ridge Reservation, TN	●	●	●	●

The EM scorecard above presents the Administration’s baseline assessment of performance at the five largest EM sites as of early 2001. These sites account for roughly 60 percent of EM’s total resources, or about \$3.8 billion a year. This evaluation is based upon the following criteria: “mission” assesses whether plans and resources are adequately focused on completing site cleanup; “performance” evaluates whether cleanup activities are consistent with cost, schedule, and performance baselines; and “reform” indicates whether sites recognize performance problems and are attempting to improve performance.

- Even though the Idaho National Engineering and Environmental Laboratory receives substantial earmarked funding through the EM Office of Science and Technology, it is unable

to complete projects on time and within budget. The Administration proposes accelerating the completion date from the current date of 2050 and closing the lab.

- The Savannah River Site spent \$500 million on a radioactive waste treatment plant that could not operate as required, yet DOE rewarded the contractor with a contract extension in 2000. The site resists project management improvements, and it too should be placed on an accelerated cleanup track.
- Hanford appears to be improving its management, despite a history of significant problems managing large capital projects and a cleanup that is behind schedule and over budget.
- Rocky Flats has generally performed well, but recent schedule slippage for critical-path nuclear material stabilization raises concerns about attaining the primary goal of closure by December 2006.
- Oak Ridge has performed reasonably well. The site has focused on the easy work, not on higher risk reduction activities. This misdirection of effort accounts for the mediocre rating for the site.

The President proposes \$6.7 billion for the Environmental Management program. This amount includes \$800 million in a new “reserve” fund to implement fundamental program changes, with the expectation that the proposed reforms will improve cleanup efficiency by completing construction projects within baselines, reducing the cost of waste treatment and disposal, and integrating cleanup strategies across different sites. The proposed EM budget focuses resources on sites with better performance, while the Department implements reforms identified by the Secretary’s top-to-bottom review at those sites with poor performance. The budget adds funding for higher priority, better managed activities such as waste treatment at Hanford, closure of the Fernald site, and cleanup at the Oak Ridge National Lab, by reducing funding for congressional earmarks, poorly performing projects in the EM Office of Science and Technology, and excess administrative staff.

Radioactive Waste Disposal

Growing quantities of spent nuclear fuel and high-level radioactive waste have been accumulating at commercial nuclear reactor sites and storage facilities across the country for half a century. As required by law, DOE has investigated the suitability of a storage site at Yucca Mountain, Nevada, 100 miles northwest of Las Vegas, for over 20 years.

Based on sound science and compelling national interest, the Secretary of Energy has informed the Governor of Nevada of his intent to recommend the Yucca Mountain site to the President for development as a geologic repository for the nation’s nuclear waste. Should the site be formally designated this year, current plans call for the repository to open in 2010.

The Budget provides sufficient funding for DOE to prepare a license application to meet that deadline. If the site is designated, the Administration will seek additional funding to begin construction of essential transportation facilities and infrastructure within Nevada, and provide a long-term management and financing plan for the entire licensing and construction effort. The Administration is committed to ensuring the environmentally sound and safe disposal of the nation’s radioactive waste.

Congressional Earmarks

The President's Budget generally allocates funding for specific programs, such as research and cleanup programs, based on an analysis of objective factors including the results of peer review and engineering capabilities. Congressional earmarks skew these determinations and divert funds from higher priority and more effective programs. For instance, in 2002 the Congress earmarked 134 DOE projects totaling \$300 million. Unfortunately, this trend is getting worse. Earmarks in the Office of Science increased 60 percent over the previous year, to \$72 million, and 400 percent more than 1999. One adverse effect is that during 2002, DOE will only be able to operate its scientific user facilities at approximately 75 percent of the optimally available hours. Had these funds been allocated to facility operations as needed, a broader segment of the research community could have benefited, and the return on the federal investment would have been higher.

In other programs, earmarking is having an even more damaging effect. In 2002, the Congress earmarked almost one-fourth of the funding for applied research in renewable energy technologies. For example, the Congress earmarked \$3 million "for the Winona, Mississippi, biomass project, where the current investment in the plant shall count as the required demonstration project cost share." Although the National Energy Policy promotes applied research in biomass to help the nation utilize its resources, congressional earmarks such as this one bypass the competitive awards process that results in better, more relevant science to advance national goals. This earmark is particularly troubling because the project had previously failed to win a funding award in a DOE competitive solicitation, and the earmark circumvents the cost-sharing requirements prescribed by the Energy Policy Act. The budget supports the President's commitments and tackles the most pressing energy issues by increasing resources for high priority programs by wasting less on ineffective ones or earmarked projects.

Science and Technology

Redirecting earmarked funds to the frontiers of science where DOE is working is one good place to invest. The Department performs a broad array of basic research in fields from applied math to physics to biology. It is the primary federal agency supporting research in particle physics, nuclear physics, fusion energy sciences, and chemistry of the radioactive elements. The Department's basic research programs are generally effective, with Office of Science-supported researchers winning numerous awards and honors. In the past decade, seven Nobel Laureates won Nobel Prizes in Chemistry or Physics for work that DOE sponsored.

The Office of Science also operates a suite of 27 scientific user facilities—such as x-ray light sources, fusion devices, particle accelerators and colliders—used each year by over 18,000 university, industry, and government scientists. Researchers traveling to use these facilities expect that the photon, neutron, proton, electron, or other beams will be provided for their experiments on schedule. DOE facilities delivered 99 percent of scheduled operating hours over the period 1997–2001. More importantly, these facilities deliver scientifically. As just one example, 11 of the 12 irreducible building blocks of all known matter were discovered at particle physics facilities the Department has run over the last 50 years. The only one not discovered at a U.S. high-energy physics facility was the electron, discovered in England in 1897.

Access to DOE facilities is allocated by peer-review to the most scientifically promising of the proposed experiments. Awarding research funds through a peer-reviewed, competitive process is the preferred method to improve chances for higher quality results. Agencies, and programs within

them, vary in the degree to which they award funds competitively. Overall, only 24 percent of DOE research funds are competed, while another 49 percent are subject to limited competition. For the Office of Science, 45 percent of the research funds not spent on facility operations are fully competed; 55 percent are subject to merit review with limited competition.

Agency	Percent of Research Competed in 2001
National Science Foundation	94
Department of Health and Human Services.....	83
National Aeronautics and Space Administration.....	75
Department of Commerce.....	42
Department of Energy.....	24

The Office of Science spends 37 percent of its research funds on facility operations. To maintain operations of its user facilities at the highest level possible, Office of Science advisory committees periodically review both the operational efficiency and scientific productivity of DOE's user facilities. These reviews have teeth. In 1997, the Basic Energy Science Advisory Committee undertook a review of the Advanced Light Source (ALS) at Lawrence Berkeley Laboratory. Finding the facility's performance wanting, DOE cut its budget, the director resigned, and the facility embarked on a path to recovery. Last year, the advisory committee revisited the facility and re-evaluated its scientific output. Noting that none of the criticisms in the earlier report were still valid, the review panel found that the ALS had established areas of excellence in a number of important scientific areas. It singled out for special mention the unique capabilities of the ALS to study ultrafast processes in solids and gases, which have application for chemical reactions, phase transitions, surface dynamics, and a wide variety of critical biological processes.

The budget proposes \$3.3 billion for DOE Science programs. Consistent with the Administration's emphasis on shifting funds to higher priority programs, the budget redirects funding for the particle physics fixed target program at Brookhaven to operations at Fermi National Accelerator Laboratory.

Energy Resources

DOE performs research and development on energy production, use, and conservation over a wide spectrum of technologies such as nuclear, solar, wind, fossil, and many others. Other programs in this area include energy security activities of the Strategic Petroleum Reserve and the Northeast Heating Oil Reserve.

Presidential Initiatives

The budget continues to fulfill the President's commitments to increase funding for the Weatherization Assistance Program over the next 10 years to assist 1.2 million low-income families while improving the nation's energy conservation. The program's energy conservation construction

measures for homes help save each low-income family an estimated \$218 annually on utility bills, at an average one-time cost of \$2,000 to \$2,500 each. With an average life span of 20 years, the improvements generate more than \$4,000 in total utility bill savings per home. The budget proposes to weatherize 123,000 homes in 2003, a 17 percent increase over 2002.

The budget also continues to fulfill the President's commitment to search for technology that will allow us to burn coal cleanly and more efficiently. Last year's budget added \$150 million to existing coal research towards the President's commitment to spend \$2 billion over 10 years on clean coal research. In this budget, all coal programs are brought under one umbrella—the President's Coal Research Initiative. This approach, using a more transparent budget structure, will improve the management and oversight of this \$326 million program. Funds from the earlier, much-criticized demonstration program of the 1980s will be redirected to the Coal Research Initiative, freeing up almost \$500 million that has languished unexpended and unproductive for years.

Old Clean Coal

The old Clean Coal program was intended to demonstrate technologies that could reduce acid rain-producing emissions from coal-fired power plants. Projects required a minimum 50 percent cost-share from industry. Commercially successful projects were supposed to reimburse the federal investment. Less than \$2 million of the \$1.6 billion expended—about one tenth of one percent—has been repaid. Of the 50 projects funded, 12 costing \$97 million were terminated or withdrawn prior to completion.

The General Accounting Office examined 13 projects: six were behind schedule by two to seven years, and two were bankrupt.

Getting More for Each Research Dollar

The federal government needs to spend each dollar carefully, recognizing it is the taxpayers' money, not its own. In an effort to better prioritize research and development spending, the Administration, in consultation with the National Academy of Sciences and many others, developed investment criteria for applied R&D programs. The Administration is using the specific R&D criteria to recommend funding levels for the Department's applied R&D programs that support the President's National Energy Policy.

This is the first application of these criteria to specific programs to ensure that programs fulfill an essential federal role, have well-developed plans to achieve objectives, and achieve results that benefit the nation. Next year, the Administration will develop investment criteria for basic research programs and extend the application of applied R&D criteria throughout the government for use in development of the 2004 Budget.

Application of the criteria indicated that data on the expected performance of many R&D projects are not readily available. For instance, some of the 19 fossil energy R&D programs failed to report any performance data at all, and those that did tended to report goals rather than the current cost performance of technologies under development. The Department is addressing this lack of performance data. In addition, the grading method needs to be improved to distinguish between programs more carefully. For instance, about 80 percent of the programs graded by DOE achieved a maximum score.

R&D Investment Criteria at Work

Despite these initial problems, the criteria supplied enough guidance to determine some higher and lower performing programs. For example, ideas about a concept called “whole-house design” show significant promise for reducing the cost of solar water heating and developing a “zero-net energy home.” While the Concentrating Solar Power program succeeded in lowering the cost of power produced by solar collectors, the price tag for this technology still cannot come close to competing with conventional power sources. Therefore, the budget increases funding to the Solar Building Technology Research program by shifting funding from the Concentrating Solar Power program.

The R&D investment criteria also directed funding shifts in the Department’s wind power programs. Due in part to DOE’s historical support for wind R&D, wind energy capacity in the United States increased 50 percent in 2001, to about 4,200 megawatts—enough electricity to meet the needs of one million households each year. Wind technology can compete on cost in some areas of the country with high average wind speeds. Now, the Department will turn its focus toward developing wind power technologies to compete in lower wind-speed areas.

Even high-performing R&D programs may conduct research that could or should be funded by industry. For example, the fossil energy program proposed an expansion of research efforts into offshore drilling techniques. Yet, this area carries a great incentive for industry to invest its own resources, and industry has a long history of doing just that. So there is little reason for taxpayers to help them out. The budget proposes reductions to programs that are poorly performing, misdirected, or are corporate subsidies. Some of this funding is redirected to programs recommended by the National Energy Policy, such as hydrogen and superconductivity research and other programs performing particularly well.

Following the lead of the National Energy Policy, the budget accelerates commercialization of stationary fuel cells in the next three to four years. It adds a \$54 million capstone to the more than \$1.2 billion spent developing this technology over the last two and half decades. Also in keeping with

Improving R&D Investment Criteria

The National Academy of Sciences recently reported that from 1978 to 2000 the Department of Energy’s energy efficiency and fossil energy R&D programs produced a return of \$40 billion off an investment of \$13 billion. Dampening this piece of otherwise good news was the fact that three-quarters of these benefits were attributable to three projects that cost only \$11 million. What happened to the rest of the money? Good question.

Many projects that set taxpayers back billions of dollars generated little or no economic benefit. Take the Coal Liquefaction program, which has spent more than \$2 billion on improving the conversion of coal to liquid fuels. Despite its technical success, the program has made little progress toward manufacturing economical coal-derived fuels. For the effort to be profitable at the current level of development, oil prices would have to reach a sustained level of \$45 per barrel, more than twice what the commodity currently trades for.

The R&D investment criteria developed in the President’s Management Agenda will help agencies select broadly beneficial projects that individual firms would be unlikely to undertake. Achieving the greatest possible return on each taxpayer dollar is an essential part of the Administration’s performance-based focus.

the National Energy Policy, the budget furnishes \$50 million to research fuel cells for transportation technologies.

Remodeling a Public-Private Partnership

The National Energy Policy also recommends funding R&D programs that are “performance-based and are modeled as public-private partnerships.” The Administration proposes a new venture with the auto industry called Freedom CAR (Cooperative Automotive Research). The partnership aims to develop technologies, such as hydrogen-based fuel cells, that solve many of the problems associated with the nation’s reliance on oil.

Freedom CAR replaces the Partnership for a New Generation of Vehicles (PNGV), which had a misguided focus and insufficient accountability due to its multi-agency structure. The new joint effort will build on some of the PNGV’s technical successes and address the program’s shortfalls, including its poor management structure. Partners will include DOE and the U.S. Council for Automotive Research (USCAR), an umbrella organization of major U.S. automakers. The automakers will provide technical experts to conduct peer-review of project proposals, but direct federal support of automakers will be limited.

This new venture will have clear goals. DOE will develop performance measures and assess research projects annually, and independent technical experts will peer review the program biennially. The venture will be funded solely through DOE, and will be managed by one accountable DOE program manager. The new venture will embrace the President’s Management Agenda’s investment criteria for applied R&D programs, including a strict adherence to the cost-sharing guidelines.

Renewable Tax Incentives

The budget proposes significant tax incentives primarily targeted at encouraging energy efficiency and use of renewable resources. These total \$9.5 billion over 10 years. The budget includes several new energy tax incentives and extensions of existing ones, including incentives recommended by the National Energy Policy. Specific proposals would:

- Extend and modify the tax credit for producing electricity from environmentally friendly sources, such as biomass and wind (\$1.9 billion);
- Provide a tax credit for residential solar energy systems (\$75 million);
- Provide a new tax credit for the purchase of certain hybrid and fuel cell vehicles (\$3.0 billion);
- Provide a tax credit for energy produced from landfill gas (\$1.1 billion);
- Extend the ethanol tax exemption;
- Provide a tax credit for investment in combined heat and power (\$1.2 billion); and
- Modify the tax treatment of costs associated with decommissioning nuclear power plants (\$2.1 billion).

The Administration also proposes \$51 billion to permanently extend the Research and Experimentation tax credit for all sectors of the economy.

Legislative Proposals

The Administration proposes opening a small part of the Arctic National Wildlife Refuge (ANWR) to oil and gas exploration. The Administration would devote \$1.2 billion of the bonus bid receipts, paid for the right to explore in a small part of ANWR, to increasing renewable energy R&D. This research will help the nation reduce its dependence on fossil fuel. Another portion of expected receipts from future royalties will be devoted to increasing land conservation and reducing maintenance backlogs on public lands in the Department of the Interior.

Power Marketing Administrations

The Western, Southwestern, Southeastern, and Bonneville Power Marketing Administrations (PMAs) market electricity generated at 133 multipurpose federal dams and related facilities. Overall, they manage more than 33,000 miles of federally owned transmission lines. The 2003 Budget provides \$183 million in new discretionary budget authority for Western, Southwestern, and Southeastern. The PMAs will continue to meet their performance goal of providing safe and reliable service. To do that, each PMA must achieve a "pass" rating each month under the North American Electricity Reliability Council's industry-wide performance standards.

The National Energy Policy report directs federal agencies to remove constraints on the interstate transmission grid to help ensure that the nation's electricity can flow more freely. The Administration has made considerable progress this past year working with the state of California and private utilities to secure private-sector financing for construction of transmission facilities that will relieve the transmission bottleneck in northern California.

PMAs receive their power from hydroelectric dams operated by the Corps of Engineers and Bureau of Reclamation. In 2003, Southeastern, Southwestern and Western will begin to directly finance the Corps of Engineers' power-related operating and maintenance expenses. In past years, the Corps obtained appropriations to pay these expenses, and the PMAs repaid the costs to the U.S. Treasury.



The Bonneville Power Administration (BPA) finances its \$3 billion annual cost of operations and investments from its annual power revenues and through borrowing from the U.S. Treasury. The budget proposes to increase BPA's current borrowing authority ceiling of \$3.75 billion by \$700 million to enable BPA to finance transmission system, conservation, and hydropower improvements. BPA will encourage non-federal or joint financing of all its future investments in transmission system upgrades and other investments. It will report its evaluation of these financing opportunities to DOE before using its borrowing authority.

Strengthening Management

DOE is making progress in addressing the President's Management Agenda and anticipates much improvement through 2002. For example, DOE is making strides in improving its financial management and has received an unqualified audit opinion on its financial statements in four of the last five years. DOE is working with OMB to integrate budget and performance. However, E-Government, especially management of its Information Technology (IT) investments, is DOE's weakest link. Previously, DOE failed to prioritize and report on its IT investment portfolio or manage IT strategically. The Department is currently consolidating its IT portfolio under the Chief Information Officer (CIO), who reports directly to the Deputy Secretary.

One additional management area particularly important for DOE is contract reform and project management. DOE spends more than 90 percent of its budget through contracts. It is essential that DOE integrate cost and performance standards down to the project level into the competitions for large contracts. DOE traditionally competes large contracts first and then negotiates performance and cost standards after the award. DOE plans to enhance and improve contract and project management by increasing the technical skills and resources it needs to make its managers accountable for achieving project and contract cost, schedule, and performance goals.

Initiative	2001 Status
<p>Human Capital—DOE has two main problems: an aging workforce and imbalances in core skills needed to carry out its missions. The Department has not effectively used existing statutory and regulatory flexibility as part of an overall strategy to address workforce issues. DOE's Workforce Restructuring Plan lacks a vision of the staffing needed for its scientific and technical missions. It does not include a proposal for streamlining headquarters and field offices to reduce management layers. DOE's 100,000-plus contractors are not included in the scope of its workforce restructuring plans. With one of the highest contractor-to-federal staff ratios (7:1), DOE must have skills necessary to provide substantive oversight and management of its contracts. DOE will revise its workforce-restructuring plan to:</p> <ul style="list-style-type: none"> • Address skill gaps in contract administration and project management; • Develop and maintain science and technical staff; • Eliminate headquarters and field office redundancies; and • Integrate human resources into budget and strategic plans. 	●
<p>Competitive Sourcing—The Department prepared a 2000 inventory of 9,941 commercial positions performing tasks that are commercial in nature, more than a third of which are within the Power Marketing Administrations. The Department's competitive sourcing plan must meet the President's Management Agenda goal to compete 15 percent of the agencies' commercial positions through 2003, in an effort to eventually compete 50 percent of all commercial activities.</p>	●
<p>Financial Management—DOE was one of only six agencies to receive an unqualified audit opinion on its first consolidated financial statement. It has continued to receive unqualified opinions every year, except 1998 because of its environmental liabilities. DOE was also one of four agencies whose financial systems met the Federal Financial Management Improvement Act requirements. Despite these successes, DOE is still reporting material management control weaknesses. DOE will continue to work on resolving these issues and will:</p> <ul style="list-style-type: none"> • Develop a financial management plan that includes a schedule and addresses system integration, especially with its contractor systems; • Integrate financial, budget, and program information in its systems in order to provide cost information related to performance; and, • Ensure implementation of its Business Management Information System (BMIS) is on track and that it will correct managerial accounting issues as planned. 	●

Initiative	2001 Status
<p>E-Government—DOE reports only 10 percent of its IT investments as “major,” which excludes too many relevant projects from oversight and justification of continual investment. DOE has significant weaknesses in its capital planning and investment control process, use of enterprise architecture in decision making, and the effectiveness of its security policies. Because of a lack of information or business case for its IT investments, it is impossible to evaluate DOE’s compliance with e-government standards. Its financial management system does have some enterprise resource planning management capabilities. DOE must make much more progress in this area by providing complete, accurate, and timely submissions that are justified by a good business case for all of its major IT investments. The Department needs to implement the capital planning and investment control process, and should:</p> <ul style="list-style-type: none"> • Redefine its major IT investments to include a majority of the \$1 billion in annual IT investments; • Consolidate the IT portfolio and manage it at a departmental level; and • Provide strong leadership from the CIO. 	
<p>Budget/Performance Integration—Historically, planning and budgeting have been separate activities that were not sufficiently coordinated. Strategic and performance plans tend to be submitted after the budget, rather than informing budgets. There has been little attempt to tie resources to results. Although DOE has been working to correct some of these problems, there is still a long way to go. Use of R&D investment criteria should reduce “justification by anecdote”, helping DOE to focus on outcomes and how programs influence them. The Department needs to capture meaningful data on performance. Each program should develop performance metrics for all priority programs that will inform and justify budget request decisions.</p>	

Department of Energy
(In millions of dollars)

	2001 Actual	Estimate	
		2002	2003
Spending:			
Discretionary Budget Authority:			
National Security			
National Nuclear Security Administration	6,950	7,249	8,039
Other Defense Activities	601	548	472
Energy Resources	2,468	2,704	2,669
Science and Technology	3,227	3,248	3,293
Environmental Quality	6,803	7,137	7,269
Corporate Management and all other programs	138	80	176
Subtotal, Discretionary budget authority adjusted ¹	20,187	20,966	21,918
Remove contingent adjustments.....	-70	-73	-71
Total, Discretionary budget authority	20,117	20,893	21,847
Emergency Response Fund, Budgetary Resources:			
Weapons Activities.....	5	131	—
Defense Nuclear Nonproliferation.....	—	226	—
Defense Environmental Management.....	—	8	—
Other Defense Activities.....	—	4	—
Total, Emergency Response Fund, Budgetary resources	5	369	—
Mandatory Outlays:			
Existing law	-766	-1,326	-1,253
Legislative proposal	—	—	149
Total, Mandatory outlays.....	-766	-1,326	-1,104

¹ Adjusted to include the full share of accruing employee pensions and annuitants health benefits. For more information, see Chapter 14, "Preview Report," in *Analytical Perspectives*.