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DEPARTMENT OF ENERGY: PROGRAMS AND REORGANIZATION PROPOSALS

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Updated October 28, 1999

Abstract. The Department of Energy (DOE) is currently the subject of reorganization legislation, because of concern about the security of its nuclear weapons program. This report consists of an introductory discussion of the agency and its mission as a whole, and a description of its major programs as independent entities. The report analyzes the effect of proposed legislation on the nuclear weapons program; on the original mission of the department-enhancing energy security, and on DOE's energy R&D, basic research, and environmental restoration programs.

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CRS Report for Congress

Department of Energy: Programs and Reorganization Proposals

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ABSTRACT

The Department of Energy (DOE) is currently the subject of reorganization legislation, because of concern about the security of its nuclear weapons program. This report, a revision of an earlier CRS review of DOE programs, consists of an introductory discussion of the agency and its mission as a whole, and a description of its major programs as independent entities. The report analyzes the effect of proposed legislation on the nuclear weapons program; on the original mission of the department — enhancing energy security; and on DOE's energy R&D, basic research and environmental restoration programs. The report will be updated as events warrant.

Department of Energy:
Programs and Reorganization Proposals

Summary

Created in response to the energy crisis of the 1970s, the Department of Energy (DOE) survived an attempt to dismantle it early in the Reagan Administration, and another in the 104th Congress. Now the agency is again the subject of reorganization legislation, this time because of concern about the security of its nuclear weapons program. An amendment to the Intelligence Authorization Act for FY2000 (H.R. 1555) was adopted by the Senate to create the Agency for Nuclear Stewardship within DOE. The head of that agency would report directly and only to the Secretary of Energy. The agency would have responsibility for all defense related activities within DOE and be responsible for all DOE facilities in which defense related programs are the sole or primary activity. A similar initiative, creating a National Nuclear Security Administration (NNSA) within DOE, was included by a House-Senate Conference Committee on the FY2000 Department of Defense Authorization bill (S. 1059), reported August 5, 1999. That bill, including the provision creating NNSA, was signed into law October 5 (P.L. 106-65), but the Administration indicated dissatisfaction with some of its provisions and asked the Congress to modify them.

This report, a revision of an earlier CRS review of DOE programs, consists of an introductory discussion of the agency and its mission as a whole, and a description of its major programs as independent entities. Many of DOE's original energy-related missions have disappeared or changed radically. In addition, with the end of the Cold War, DOE's nuclear weapons-related programs, almost two-thirds of the total budget, are undergoing modification. However, regardless of the outcome of the debate on DOE's future, many of its present functions will continue in one location or another.

In presenting DOE's present structure and a detailed description of its individual programs, the report analyzes the effect of the proposed legislation on the nuclear weapons program. In addition, it addresses two primary issues: the effect of restructuring on the original mission of the department — enhancing national energy security in the face of dangerous interruptions in oil imports in the 1970s — and its effect on DOE's energy R&D, basic research and environmental restoration programs.

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Introduction[1]

Created in response to the energy crisis of the 1970s, the Department of Energy (DOE) survived an attempt to dismantle it early in the Reagan Administration, and another in the 104th Congress. Now the agency is again the subject of reorganization legislation, this time because of concern about the security of its nuclear weapons program.

This report, a revision of an earlier CRS review of DOE programs, consists of an introductory discussion of the agency and its mission as a whole, and a description of its major programs as independent entities. Many of DOE's original energy-related missions have disappeared or changed radically. In addition, with the end of the Cold War, DOE's nuclear weapons-related programs, almost two-thirds of the total budget, are undergoing modification. However, regardless of the outcome of the debate on DOE's future, many of its present functions will continue in one location or another.

DOE's FY1999 appropriation was $16.6 billion, of which $11.6 billion was related to the nuclear weapons program (including clean-up and closure of defense facilities). The DOE budget is considered by Congress in two separate appropriations bills: Energy and Water Development, and Interior and Related Agencies. Table 1 shows recent and current DOE budget figures, divided according to the accounts within each subcommittee's jurisdiction.[2]

History

DOE was the structural component of the Carter Administration's response to the 1973 energy crisis. Its 1977 organization act (P.L. 95-31) pulled together the policy and regulatory functions of the Federal Energy Administration (FEA), the energy supply and demand technology functions of the Energy Research and Development Administration (ERDA), and numerous energy activities from other parts of the government. Also added from ERDA, which was formed in 1974 out of the Atomic Energy Commission (AEC) under P.L. 93-438, were its nuclear weapons programs, along with a range of basic research activities focusing on nuclear energy. A major

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[1]Prepared by Carl E. Behrens, Richard E. Rowberg, and Fred Sissine.

[2]For details on FY2000 budget actions and issues, see CRS Report RL30207, *Appropriations for FY2000: Energy and Water Development* and RL30206, *Appropriations for FY2000: Interior and Related Agencies.* Updated regularly.

component of the AEC legacy was an infrastructure of large, multi-purpose research laboratories, called National Laboratories, some of which dated back to World War II.

Energy Policy. The new department's primary civilian mission was defined by the prevailing view that oil was essential in the short term, but that its supply was declining, and would soon become too scarce and expensive to remain the nation's most important fuel. The supply of oil was controlled by the OPEC cartel, which had taken advantage of the 1973 Arab oil embargo to quadruple prices. Taken together, this view held that the world's oil supply was diminishing and that OPEC controlled prices could only portend a succession of price run-ups.

Since the early 1980s, however, earlier predictions of increasing prices and short supply of oil have not developed. Proved world oil reserves increased by about 50% from 1973 to 1990. Prices, while occasionally volatile, have declined in constant dollars to about what they were before the 1973 embargo, and have several times dropped considerably below that level. Regulation of oil prices and distribution, an early mission of DOE, has been abandoned, and development of alternative energy sources, while continuing, has been handicapped by the low price of the oil which the new energy sources were intended to replace. At the same time, the issue of the effect of fossil fuel burning on climate change has injected a new dimension into energy policy and planning.

Research and Development. Since the creation of the department, as energy programs have declined in importance, there has been increased emphasis on basic research and on development of new technologies and processes to aid the nation's economic growth. The result of this shift has been a steady growth in DOE's basic research programs since the early 1980s. This growth has also resulted in a broadening of the scope of the R&D supported by DOE, particularly at the DOE National Laboratories.

Nuclear Weapons Programs. In addition to changes in energy missions and programs, DOE's defense mission has changed. The end of the Cold War accelerated efforts to reduce or halt testing of nuclear weapons. At the same time, nuclear wastes associated with the weapons production programs, some of them dating back to World War II, were recognized as a severe environmental problem. These developments changed the emphasis of the defense programs from creation of new weapons and expansion of the weapons stockpile to maintenance of the existing stockpile, cleanup of the waste, and maintaining weapons-production capability by a "stewardship" program.

Table 1. Energy and Water Development Appropriations
Title III: Department of Energy
(in millions of dollars)

Program	FY1998	FY1999	FY2000 Request
National Security (Weapons)	4,146.7	4,400.0	4,531.0
Other National Security	1,638.8	1,696.7	1,792.0
Defense Environmental Restoration and Waste Management	4,379.5	4,310.3	4,505.7
Defense Facilities Closure Projects	890.8	1,038.2	1,054.5
Environmental Restoration Privatization	200.0	228.4	228.0
Energy Supply R&D			
Solar and Renewable	346.3	365.9	446.0
Nuclear Energy	243.0	284.0	269.3
Fusion Energy (see General Sci. below)	232.0	--	—
Other	171.2	175.1	173.6
Subtotal	992.5	825.0	889.0
Adjustments	(85.7)	(98)	(52.9)
Subtotal	906.8	727.0	836.1
Uranium Enrichment			
Uranium Enrichment D&D	220.2	220.2	240.2
General Science			
High Energy Physics	680.0	696.5	697.0
Nuclear Physics	320.9	335.1	342.9
Basic Energy Sciences	668.2	809.1	888.1
Bio. & Env. R&D	406.7	443.6	411.2
Fusion (see energy supply R&D)	—	223.3	222.6
Other	255.0	175.3	74.7
Subtotal	2,235.7	2,682.9	2,835.4
Environ. Res. & Waste Mgmt., non-defense	497.0	431.2	330.9
Departmental Admin. (net)	87.4	63.9	123.5
Office of Inspector General	27.5	29.0	30.0
Power Marketing Admin.			
Alaska	13.5	0	0

Program	FY1998	FY1999	FY2000 Request
Bonneville (non-add, capital obligations)	(253.0)	--	(352.0)
Southeastern (prior year balance for FY2000)	12.2	7.5	4.7
Southwestern	25.2	26.0	27.9
Western	189.0	203.0	171.5
Colorado River Basin (net)	-16.1	--	-21.0
Falcon & Armistad O&M	1.0	1.0	1.3
FERC (revenues)	165.6 (165.6)	167.5 (167.5)	179.0 (179.9)
Nuclear Waste	350.0	358.0	370.0
Adjustments	1.6	--	-5.5
Total, Title III	**15,943.1**	**16,423.3**	**17,062.0**

Table 2. Interior and Related Agencies Appropriations Department of Energy Programs

Interior and Related Agencies Appropriations	FY1998 Approp.	FY1999 Approp.	FY2000 Request
Clean Coal Technology	-101.0	-40.0	-256.0
Fossil Energy R&D	362.4	384.1	364.0
Alternative Fuels Production	-1.5	-1.3	-1.0
Naval Petrol. & Oil Shale Reserves	107.0	14.0	--
Energy Conservation	611.7	691.7	837.5
Economic Regulation	2.7	1.8	2.0
Strategic Petroleum Reserve	207.5	160.1	159.0
Energy Information Administration	66.8	70.5	72.6
Other	--	36	41
Subtotal	1,256	1,317	1,170
TOTAL DOE	17,512.0	16,569.1	16,779.8

DOE Organization and Management

DOE Management Structure. DOE's top management team includes the secretary, deputy secretary, and under secretary. Some organizational offices report directly to the secretary's office, including the largely independent Federal Energy Regulatory Commission (FERC).[3] External events and federal policy changes have triggered a number of changes to the DOE organizational structure. Virtually every secretary has initiated management reforms and reorganizations to respond to these changing circumstances and to suit his or her preferred management style. In particular, current Secretary Bill Richardson has instituted several reforms, including one focused on the management of DOE's sprawling array of operations offices, field offices, and national laboratories.[4]

The deputy secretary serves as the chief operations officer (COO), with responsibility for environmental management programs, certain energy programs,[5] and a variety of staff and support programs that include contract reform and the Office of Field Integration.[6] Four assistant secretaries report to the deputy secretary.[7] The under secretary has responsibility for the science and technology programs and two energy programs — nuclear energy, and energy efficiency and renewable energy (EERE).[8] The deputy secretary and under secretary share responsibility for the national security programs, including programs under the assistant secretary for defense programs and the assistant secretary for nonproliferation and national security.

Secretary Richardson's Management Reforms. In early 1999, Secretary Richardson instituted a management study on which he based several reforms to the DOE management structure that links headquarters to field operations.[9] A key reform requires each of the 11 field offices to report directly to one of three lead program

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[3] FERC was set up as an independent agency within DOE. The five-member Commission is responsible for the licensing and regulation of hydroelectric power projects, regulation of electric utilities, transmission and sale of electric power, transportation and sale of natural gas, and the operation of natural gas and oil pipelines. Commissioners can be removed by the President only for cause.

[4] When it was established in 1977, DOE inherited about 40 regional and field offices, research centers, university programs, and laboratories from various predecessor agencies. The bulk came from the Atomic Energy Commission, including eight operations offices and various production and weapons facilities.

[5] Energy Information Administration (EIA), Fossil Energy, and the Power Marketing Administrations.

[6] The Office of Field Integration was previously named the Office of Field Management.

[7] Policy and International Affairs; Environmental Management; Environment, Safety, and Health; and Fossil Energy.

[8] This includes one assistant secretary, for EERE.

[9] U.S. DOE. Office of the Secretary. Changes to the Departmental Management Structure. [Memorandum] April 21, 1999. 2 p; and U.S. DOE. Office of the Secretary. Department of Energy Management Review. April 1999. 25 p.

secretarial offices (LPSOs). Thus, the office of the assistant secretary for defense programs serves as LPSO for the Albuquerque and Nevada operations offices; the office of science serves as LPSO for Chicago, Oakland and Oak Ridge operations offices; and the office of the assistant secretary for environmental management serves as LPSO for the Richland, Savannah River, Idaho, Rocky Flats, and Ohio offices and the Office of River Protection.

Under this reform, each LPSO is charged with overseeing performance-based management, reviewing contract decisions, resolving disputes, and appraising field office managers. Also, each LPSO is responsible for long-term planning, landlord activities, and site integration and operations. To fulfill these responsibilities, each LPSO is required to establish a principal deputy for operations. Other program secretarial offices (PSOs) with programs in the field offices, such as fissile materials disposition and nuclear energy, are to serve as "customers" of the field offices where their work is performed. Non-program staff and support offices, such as the office of the chief financial officer and the office of human resources management, still set policy, but now must go through LPSOs to issue decisions, directives, and orders to the field.

A related reform created a field management council to be a forum for departmental program integration, policy review, coordination, decision-making, and issue resolution. The seven-member council is chaired by the deputy secretary serving as chief operating officer (COO), and it includes the under secretary and the heads of the three LPSOs — the assistant secretaries for defense programs and environmental management, and the director of the office of science. One field manager and one representative from the other PSOs serve in rotational positions on the Council. All policy guidance from staff and support offices must be reviewed by the Council before it is issued.[10] After the Council reviews a policy, the LPSOs are responsible and accountable for its proper implementation at their sites. The Office of Field Integration, formerly the Office of Field Management, now serves as the secretariat to the Council and reports directly to the COO.

Operations and field office managers remain responsible for all site program and project execution, contract management, and facility operations oversight. Each one reports directly to the respective LPSO. Operations offices will perform field level program integration functions and other tasks delegated by the LPSO and PSOs. They provide a single voice to state and local governments, regulators, media, and the public. Each area office serves as a staff office to its respective operations office.

Thus, the new structure has four key points. One is the Office of the Secretary and the Deputy Secretary (COO). Second, the PSOs are responsible for broad program strategy, policy definition, evaluation, and oversight. Third, the Operations Offices are responsible for program implementation, site-wide integration, and contract management. Fourth, contractors are responsible for day-to-day execution, management and operation of assigned activities. More than 80% of the DOE work force are contractor employees.

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[10] Council members are responsible for ensuring consistency of policy and priorities while contributing field operational considerations to policy and program development.

Project Management Reforms. Dozens of external and internal reviews showed that DOE had systemic problems with project management, including inadequacies in technical scope, schedule planning and control, and cost estimating. The reviews also showed that DOE had unclear roles and responsibilities. Based on these findings, DOE announced major project management reforms focused on installing new oversight and support capabilities in the Office of the Chief Financial Officer (CFO).[11] Projects will be evaluated prior to key decisions, such as baseline approval and construction initiation. Special tracking and control mechanisms are being designed to follow all projects valued at $20 million or more. Further, a COO "watch list" has been set up to identify problem projects that require more stringent financial controls and reporting requirements. Projects on this list include the Savannah River In-Tank Precipitation and Hanford K Basins Spent Nuclear Fuels.

Further, a reform directs the CFO to work with OMB and congressional committees to require higher standards of project management in order for projects to be funded. Also, the policy directs the CFO to work with other offices to devise a plan to assess capabilities, define qualifications, create a training program, and build institutional capability for project planning, control, and reporting.

Another reform directs each LPSO to create an in-house project management capability. To improve accountability, each LPSO must assess its own project management system and prepare a plan for correcting deficiencies and managing improvements. Further, the LPSO must coordinate with the CFO and submit this plan for review.

In addition, one reform aims to improve contractor accountability for project management. It directs the offices of contract reform and privatization, procurement, and the CFO to assess contractor project management issues. Further, it requires a plan to establish priorities and steps to strengthen contract reform.

DOE Security Management Reform. Investigations by DOE and the Federal Bureau of Investigation (FBI) led to Presidential Decision Directive (PDD) 61 that called for new counterintelligence measures. Secretary Richardson incorporated this directive into a broad reform of DOE's security programs that set out several new counter-intelligence measures.[12] One is a goal of ending the backlog of background investigations by the end of 1999. Another is to create a vulnerability assessment group, the "red team," to evaluate espionage threat and vulnerability and to test security and counter-intelligence measures. Also, DOE has signed a memorandum of understanding with the FBI to improve coordination.

However, the primary organizational action under this security reform was the creation of a new office of security and emergency operations, which reports directly to the secretary. It is responsible for all safeguards and security policy, computer security, and emergency operations functions. This new office consolidates functions and budgets from the office of security affairs and the office of the chief information

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[11] U.S. DOE. Office of the Deputy Secretary. Project Management Reform Initiative. [Memorandum] June 25, 1999.

[12] U.S. DOE. Richardson Unveils Security Reform Package. [Press Release] May 11, 1999.

officer (CIO), and it embraces the new office of foreign visits and assignments policy (FVAP) and the new office of plutonium, uranium and special material inventory (PUSMI). All classified and unclassified computer security functions are now centralized under the revamped office of the CIO. Additional funding is being sought for hardware to ensure continual monitoring of computer systems, random audits of users, and more stringent controls over storage media. FVAP ensures that all visitors have appropriate checks and approvals, as mandated by PDD 61. PUSMI enhances the accounting process for the most sensitive nuclear material.

A new office of independent oversight and performance assurance consolidates, expands, and elevates the oversight functions for safeguards and security as well as for special nuclear materials accountability. It also reports directly to the secretary.

GAO Critique. The General Accounting Office (GAO) has also made suggestions for reforming DOE's management.[13] GAO raises concerns about nuclear weapons information security and general management problems involving unclear lines of authority and contractor oversight weaknesses. It observes that DOE's reforms aiming for more direct field reporting to PSOs parallel those attempted under Secretary Watkins during the Bush Administration. GAO contends that the previous reform was abandoned when field and laboratory staff became frustrated by having to report to both program and staff offices. For this and other reasons, it concludes DOE's recent "piecemeal" reforms will fail.

GAO finds that DOE's approach to contract management oversight does not meet modern standards and that its "complex and ever-changing organizational structure" impairs improvements in accountability. Further, it asserts that DOE's record with big projects from 1980 to 1996 involved billions of dollars wasted in cost overruns and other inefficiencies. Based on a survey of former Administration and DOE officials and on other observations, GAO concludes that the DOE reforms are insufficient to overcome fundamental departmental problems. Instead, it recommends that DOE attempt a "more fundamental rethinking" of departmental missions and restructuring of contract policy. It offers a framework of questions to help do this. More specifically, GAO says DOE should reexamine its missions to identify those that can be eliminated because they are no longer valid government functions. For missions that are properly governmental, GAO stresses the need for DOE to reassess the best organizational placement for them.[14] An effective re-organization, it says, "demands a coordinated approach, within and across agency lines, supported by a solid consensus [of the Congress and Administration] for change."

Congressional Actions

Legislation to reorganize the Department of Energy is being considered in both the Senate and House. In the Senate, an amendment to the Intelligence Authorization Act for FY2000 (H.R. 1555) was adopted that would create the Agency for Nuclear

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[13]U.S. GAO. Department of Energy Need to Address Longstanding Management Weaknesses. July 13, 1999. [Printed Testimony] (GAO/T-RCED-99-255)

[14] Further, GAO suggests that DOE's strategic plan may embody weaknesses since it assumes that its existing missions and their organizational placements are valid.

Stewardship within DOE. The head of that agency would report directly and only to the Secretary of Energy. The agency would have responsibility for all defense related activities within DOE and be responsible for all DOE facilities in which defense related programs are the sole or primary activity. There was no companion bill in the House.

A similar initiative, creating a National Nuclear Security Administration within DOE, was included by a House-Senate Conference Committee on the FY2000 Department of Defense Authorization bill (S. 1059), reported August 5, 1999. The House agreed to the conference report on September 15, after rejecting, by a 139-281 vote, a motion by Representative Dingell to recommit. The President signed S. 1059 on October 5, 1999 (P.L. 106-65) but said the provisions setting up NNSA were flawed, and announced that, until further notice, the Secretary of Energy would perform all duties and functions of the Under Secretary for Nuclear Security (who is also the Administrator of Nuclear Security of NNSA), and guide and direct all personnel of NNSA by using his authority to assign any DOE officer or employee to a concurrent office within NNSA. This action drew criticism from some members, and the House Committee on Armed Services established a special oversight panel to "work with the Administration on the timely and effective implementation of the DOE reorganization proposals mandated in" Title XXXII. In a joint hearing of the Senate Energy and Governmental Affairs Committees October 19, Secretary Richardson called the reorganization plan as passed “unworkable” and said he would submit proposals for legislative modifications that would remedy the bill’s “deficiencies.” (For details on reorganization legislation, see CRS Issue Brief IB10036, *Restructuring DOE and Its Laboratories: Issues in the 106th Congress*.)

Issues and Options

There are two primary issues to be considered when reviewing legislative proposals to reorganize or restructure the Department of Energy.

First, what effect would restructuring have on the original motive for the Department — enhancing energy security? Energy remains an important national concern for environmental reasons and because declining domestic oil production seems certain to increase dependence on oil imports, especially from the Middle East. The last 15 years have demonstrated clearly the effectiveness of the market in accommodating large energy price shocks, without federal intervention (except for a modest sale of SPR oil at the beginning of combat in the Persian Gulf war in 1991). While a wide array of promising energy supply and demand technologies has emerged from the DOE energy technology R&D programs, low energy prices have put commercial adoption of most of these technologies well into the future. Furthermore, the apparent success of market-driven energy efficiency gains has raised questions about the need for federal support of new technologies in this area.

Nevertheless, oil imports have steadily risen to constitute more than 50% of the nation's oil supply. And despite attempts to diversify sources of oil imports, Middle East dependence is growing. If these supplies are threatened in the future, it is very likely that federal actions will be taken. The current focus of congressional restructuring proposals is the national security side of DOE. Therefore, DOE’s ability to take actions in the event of an energy emergency should not be adversely affected.

Indeed, if the restructuring brings about management improvements throughout DOE, it is possible that the agency could be more effective in responding to supply disruptions and developing new energy technologies. If the restructuring were to result in a shift of DOE's resources from civilian to national security functions, however, its effectiveness in dealing with any significant energy concerns might be compromised.

The second issue concerns how restructuring would affect DOE's energy R&D, basic research and environmental restoration programs. Those activities constitute about 57% of the DOE budget for FY1999. The proposed restructuring concentrates on the national security programs, which do not energy R&D and basic research. The primary reason for the restructuring proposals, however, is concern over security of nuclear weapons data and information. In addition, some of the facilities included in the proposed restructuring, notably the three weapons labs, are also the home of some of the DOE energy R&D and basic research activities. Therefore, concerns have been raised that the restructuring may have negative consequences for activities not directly involving nuclear weapons (the stockpile stewardship and maintenance programs). For non-weapons programs within the new organization, questions about relative emphasis and allocation of resources arise. Questions about how the management of any new organization will interact with management of DOE's civilian R&D programs also appear important.

Report Organization

The remainder of this report examines the major DOE programs, describing their purpose when begun and their history since then. The program sections are arranged in the order they appear in Table 1 above. Because the weapons programs are the primary subject of the current reorganization initiatives, we have rearranged the order of the programs in the table, and the rest of the report, to put those programs first. (Environmental Restoration and Waste Management, which has separate budget listings for defense and non-defense activities because of split jurisdiction by authorizing committees, is discussed as a single item in this report. This activity is not included in the reorganization legislation.)

Similarly, because DOE's National Laboratories, which are owned and funded by the federal government but staffed by non-federal employees under contract with DOE, would be greatly affected by the reorganization legislation, a separate section discusses the issues surrounding them.

The remaining programs would not be directly changed by the reorganization legislation in P.L. 106-65. However, some of them, especially some of the non-weapons research programs, could be indirectly affected. The sections on those programs include a discussion of possible issues raised by the reorganization.

Weapons Stockpile Stewardship and Management [15]

Description

DOE reorganized its stockpile stewardship (SS) program and its budget reporting for FY1996 in response to presidential and congressional direction of 1993. Under its former name of Weapons Research, Development, and Testing (WRDT), this activity developed new nuclear weapons and held weapons tests. However, in 1992 the United States began a moratorium on its nuclear tests, and in September 1996 President Clinton signed the Comprehensive Test Ban Treaty (CTBT), which bans all nuclear tests. The Defense Department has no current requirement for new-design warheads. In this environment, SS seeks to provide the scientific basis for maintaining nuclear weapons for decades without testing.

SS complements Stockpile Management (SM).[16] In essence, SM monitors, maintains, and dismantles nuclear weapons on a day-to-day basis; SS provides the scientific resources to address problems SM cannot handle. SS is working to increase understanding of nuclear weapons science through a program of computation, archived data from past tests, and experiments using new or existing scientific facilities, and then to apply this understanding to weapons maintenance problems and prediction of such problems. For example, warheads deteriorate with age. Formerly, replacement of old warheads with new ones minimized this effect, and tests could resolve aging problems and provide confidence in their solution. Now, if SM finds that a warhead component has deteriorated, SS might determine whether that affects safety, reliability, or performance. If it does not, SS might try to determine how to retard further deterioration. If it does, SS might decide how to solve the problem. Alternatively, SS might anticipate that a problem will emerge, and will seek solutions in advance.[17] A key element of SS is its use in certifying the U.S. nuclear stockpile each year; that is, confirming that the warhead types meet their required characteristics for safety, yield, etc.

SS is centered at the three DOE nuclear weapons laboratories -- Sandia National Laboratories (headquartered in NM), Los Alamos National Laboratory (NM), and Lawrence Livermore National Laboratory (CA). As part of the effort to generate new data and to attract and train young scientists, SS is building new scientific facilities, mainly at these laboratories, to enable experiments simulating aspects of nuclear weapon performance. Also relevant to SS is the Nevada Test Site (NTS). The first nuclear test at NTS was conducted in 1951; all U.S. nuclear explosions since 1973 have been conducted there. U.S. policy requires the ability to resume nuclear testing if another nation tests or if supreme U.S. interests require, e.g., a major weapon

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[15]Prepared by Jonathan E. Medalia, Specialist in National Defense, Foreign Affairs, Defense, and Trade Division.

[16] DOE uses "stockpile stewardship" inconsistently, sometimes to refer only to the science component, and at other times to refer to both science and production.

[17] For a detailed description, see U.S. Department of Energy. Office of Defense Programs. *Stockpile Stewardship Plan: Second Annual Update (FY1999), Executive Overview,* April 1998, 40 p.

problem that cannot be resolved without testing. DOE is reducing activities at NTS to a level where it would take two or three years to conduct a test after a decision to resume. DOE is also using an underground chamber at NTS to conduct "subcritical experiments," in which high explosives are used to examine the behavior of aged plutonium without causing a nuclear chain reaction that would violate the CTBT.

History of Stockpile Stewardship

Nuclear weapons work began with the Manhattan Project in 1942; the first nuclear weapons test was held July 16, 1945. Work continued at a low level for a few years; five tests were conducted in 1946-1950. Since then, the program has mirrored the tides of the Cold War. The 1950s saw the development of thermonuclear weapons and the deployment of many new types of weapons, with 188 U.S. nuclear tests between 1951 and 1958. The United States, United Kingdom, and Soviet Union held a testing moratorium from 1958 to 1961; in 1963, they agreed to the Limited Test Ban Treaty, which bars atmospheric, space, and underwater (but not underground) nuclear tests. In the 1960s, the United States conducted its highest level of testing, with 433 tests. The pace of U.S. testing gradually slowed over the course of the 1970s and 1980s, though many warhead types were developed in the late 1970s and early 1980s. With the end of the Cold War and with nuclear testing halted, the weapons program has shifted from developing new weapons with testing to maintaining existing ones without testing.

Nuclear weapons work has been housed in several agencies over the last half-century. The Manhattan Project was under the jurisdiction of the Army. In 1946 the Atomic Energy Commission (AEC) was established, providing civilian control of all nuclear weapon activities except military use. In 1974, in response to the energy crisis, the Energy Research and Development Administration (ERDA) was established to centralize national energy efforts. ERDA incorporated the weapons functions of the AEC, which was abolished, and several other energy-related agencies. In 1977, ERDA was combined with other agencies into the Department of Energy to give cabinet-level attention to energy.

History of Stockpile Management

Through the 1980s, the key mission of Stockpile Support, the predecessor of SM, was production of nuclear warheads. Several large facilities were built for the Manhattan Project, including those at Hanford, WA, for producing plutonium, and at Oak Ridge, TN, for enriching uranium. The 1950s saw more facilities built, including Savannah River Site (SC) for producing plutonium and tritium, Rocky Flats Plant (CO) for fabricating plutonium components, and Pantex Plant (TX) for assembling nuclear weapons. They were sized for a high rate of warhead production. Other concerns were subordinated to production because of the urgency of the Cold War and because, in the early years, the environmental, safety, and health risks posed by weapons production were much less fully understood than is the case now. In addition to production, Stockpile Support tasks included:

- Monitoring the condition of stockpiled warheads, called "surveillance": Nuclear warheads deteriorate over time. High explosives degrade, metals

corrode, components may crack, and impurities build up in plutonium. These changes may affect safety, reliability, and performance. The surveillance program tries to detect these changes.

- Maintaining warheads: This includes changing tritium reservoirs on warheads (see below) and replacing or repairing deteriorated components.

- Dismantlement of retired warheads: Throughout the Cold War, new warheads would replace older ones, often before the latter deteriorated with age. Retired warheads would be disassembled at Pantex and their high explosive burned. Uranium and plutonium components were shipped back to Oak Ridge and Rocky Flats, respectively, where they had been manufactured. They would be reduced to metal and reused in new weapons.

In 1989, following an FBI raid, Rocky Flats was closed because of environmental and health violations. As it was the only facility that made plutonium components on a large scale, weapons production ceased after components it had already made were used up. The end of the Cold War and the breakup of the Soviet Union in 1991 ended the requirement to produce new warheads. Many other production facilities have closed.

Status of Stockpile Stewardship

SS, SM, and a third element, Program Direction, are grouped under the category of Weapons Activities. (Program Direction funds federal personnel for DOE's Office of Defense Programs, which is in charge of the weapons program, and funds some related activities that fall outside SS and SM, such as environment and security.) For FY1999, the adjusted funding is $2,115.9 million for SS, $2,052.6 million for SM, $250.0 million for Program Direction, less $18.4 million for use of prior year balances, for a total of $4,400.0 million for Weapons Activities. The request for FY2000 is $2,286.2 million for SS, $1,998.3 million for SM, $246.5 million for Program Direction, and none for prior year balances, for a total of $4,531.0 million for Weapons Activities. Along with funds for continuing programs, DOE proposed FY2000 funding for the following.

- The National Ignition Facility (NIF) at Lawrence Livermore National Laboratory, designed to use large lasers to initiate fusion in a small target, approaching conditions of fusion in a warhead ($248.1 million of a total estimated cost of $1,198.9 million);

- The Accelerated Strategic Computing Initiative, intended to accelerate industry progress in supercomputers well beyond what is currently anticipated in order to support development and use of computer codes for weapons ($341.0 million in an ongoing project);

- Testing Capabilities and Readiness, funds to maintain the ability to resume testing, to conduct subcritical experiments, some maintenance of Nevada Test Site, and related efforts ($177.1 million in an ongoing program);

- The Processing and Environmental Technology Laboratory at Sandia National Laboratories (Albuquerque), a laboratory to study weapon materials that replaces several old buildings ($10.9 million, completing funding for a total estimated cost of $45.9 million); and

- Dual-Axis Radiographic Hydrotest Facility, Los Alamos National Laboratory, to take x-ray pictures of the implosion of a nuclear weapon's primary stage (using surrogate material instead of fissile material) to gain data on weapon condition, behavior, and aging ($61.0 million of a total estimated cost of $259.7 million).

Related Programs. Programs related to SS, along with their original FY2000 requests, include Nonproliferation and National Security ($705.4 million), Intelligence ($36.1 million), Counterintelligence ($31.2 million), and Worker and Community Transition ($30.0 million).

Status of Stockpile Management

The historical missions noted above continue. New missions include enhanced surveillance, bringing new techniques to bear to monitor the stockpile; stockpile life extension programs, or rebuilds of warheads to correct for actual or potential problems and to replace aging components and materials in an effort to make warheads safe and reliable beyond their original design lives; providing a new source for tritium; and ability to respond to nuclear incidents worldwide. Reflecting these changes, DOE changed the name of the Stockpile Support program to Stockpile Management. The FY1999 SM adjusted budget was $2,052.6 million; the FY2000 request is $1,998.3 million.

Related Program. A related program is Fissile Materials Disposition, for which the FY2000 request is $200.0 million.

Issues and Implications of Reorganization Proposals

This section analyzes several potential impacts on the nuclear weapons complex of the main reorganization proposal currently before the 106th Congress. This proposal, contained in Title XXXII of the FY2000 Defense Authorization bill (S. 1059, P.L. 106-65), signed into law October 5, would create a National Nuclear Security Administration (NNSA) within DOE. Also in the conference bill, Title XXXI contains Subtitle D, Matters Relating to Safeguards, Security, and Counterintelligence, and Subtitle E, Matters Relating to Personnel; aspects of these subtitles are discussed here as well. The present analysis applies with special force to the three nuclear weapons laboratories, as they have been at the center of concern over espionage, but applies as well to the four plants and the Nevada Test Site. The House agreed to the conference report September 15, after rejecting, by a vote of 139-281, a motion by Representative Dingell to recommit to the conference committee, with instructions to insist on striking all provisions that limit any existing authority of the Secretary of Energy to direct the NNSA.

Regarding organization, the legislation provides that NNSA shall have an Administrator for Nuclear Security who is also Under Secretary for Nuclear Security. This individual "shall be subject to the authority, direction, and control of the Secretary [of Energy]" (sec. 3202). Within NNSA there shall be an Office of Counterintelligence and an Office of Intelligence (sec. 3204). There shall also be a Deputy Administrator for Defense Programs, responsible for nuclear weapons work (sec. 3214), a Deputy Administrator for Defense Nuclear Nonproliferation (sec. 3215), and a Deputy Administrator for Naval Reactors (sec. 3216).

Security. The legislation takes a number of steps in an effort to improve security. By creating a semiautonomous agency that is, among other things, responsible for setting its own security policies, the legislation seeks to make it quicker and easier to implement security-related directives within the nuclear weapons complex than would be the case if other organizations within DOE had to sign off on such measures. The legislation raises the profile of security and counterintelligence by having these functions headed by a Chief of Defense Nuclear Counterintelligence and a Chief of Defense Nuclear Security, both within NNSA, who shall report to the Administrator for Nuclear Security and who have direct access to the Secretary of Energy. Because these two chiefs are within NNSA, the legislation intends that they should be more attuned to security issues within the nuclear weapons complex than would be the case if they were outside it, and weapons complex personnel should be more responsive to them. In this context, Victor Reis, the outgoing Assistant Secretary of Energy for Defense Programs, testified before the House Armed Services Committee on July 14, 1999, that appreciation of the importance of security can be attained only by

> imbedding the security apparatus within the organization that has the responsibility for getting the job done. Security, like safety, then becomes part of the team that is focused on the mission, not entrusted to an external group that is looking to play "gotcha."[18]

The Defense Authorization Act takes other steps to raise the profile of security. Among other things, it requires annual reports to Congress on counterintelligence (sec. 2304); establishes a Commission on Safeguards, Security, and Counterintelligence at Department of Energy Facilities (sec. 3142); requires DOE and contractor employees to be "fully trained in matters relating to the protection of classified information and to potential espionage and counterintelligence threats" (sec. 3145); requires other reports to Congress on security (sec. 3150-3153); and mandates a counterintelligence polygraph program (sec. 3154). More generally, the legislation's stress on security and the storm over security beginning in March 1999 have made an indelible impression on nuclear weapons complex management and staff alike about the importance of taking security with the utmost seriousness.[19] Such actions seem sure to make security a more integral part of the culture and modus operandi of the

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[18]Testimony as reported in "Richardson Avoids Showdown with Retiring Defense Chief Reis," *Nuclear Weapons & Materials Monitor*, July 19, 1999: 4.

[19] CRS Issue Brief IB10036, *Restructuring DOE and its Laboratories: Issues for the 106th Congress.* Updated regularly.

weapons complex, which is arguably more effective and less intrusive than if security is imposed by other parts of DOE or external auditors.

Science. There is some question on whether the legislation, by building a wall around a semiautonomous agency, will impair the new agency's ability to do outstanding science. The excellence of the nuclear weapons laboratories stems in part from their scientists' ability to contact and work with outside scientists. As the American Physical Society stated, "national security will ultimately be damaged if the underlying science suffers as a result of government practices that indiscriminately discourage or limit the open exchange of ideas."[20] Making the weapons program more self-contained might impede contact with scientists in other parts of DOE. Moreover, the conference bill requires the Secretary of Energy to complete a background review for each citizen from a sensitive country before that person can visit a nuclear weapons laboratory, and imposes a moratorium on most visitors from sensitive countries until key officials can certify that the foreign visitor program meets various counterintelligence and security standards (sec. 3146). The review requirement, along with greatly increased concern about foreign nationals posing a security risk, might discourage weapons complex staff from inviting some foreign visitors; on the other hand, it might be argued that raising the threshold of effort needed to bring in such visitors would reduce the number of such visitors for whom there is the least justification and urgency. A higher threshold, though, does not necessarily reduce the number of would-be spies.

A related science issue is whether measures to increase security will lead current staff to leave weapons work in midcareer or to retire earlier than they otherwise would, and lead prospective applicants to reject job offers at the labs in weapons work, to decide not to work at the labs, or to decide not to apply. Such measures include the polygraphing of some 5,000 employees, the prospect of not continuing the University of California as the contractor operating Livermore and Los Alamos National Laboratories, and the institution of classification-like controls on release or discussion of broad categories of unclassified information by lab staff. Discussions in July 1999 between CRS and nuclear weapons complex staff reveal that these may be serious problems; others outside the labs hold that the scientists should "get with the program," that they should be more accepting of security as part of the job, and that after some initial grumbling they will get back to work. Moreover, the legislation includes several provisions aimed at recruitment, retention, and skill development (sec. 3162, 3163).

Accountability. An enduring complaint over the years about DOE is that the organizational structure is hopelessly confusing, that it is incapable of reform, and that it diffuses accountability so much that no one is responsible for anything. The President's Foreign Intelligence Advisory Board called DOE "[a] dysfunctional bureaucracy that has proven it is incapable of reforming itself."[21] This problem, it is

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[20] American Physical Society, "APS Statement on National Security and Open Conduct of Science," May 21, 1999, at [http://www.aps.org/exec/sec-open.html].

[21] U.S. President's Foreign Intelligence Advisory Board. Special Investigative Panel. *Science at Its Best, Security at Its Worst: A Report on Security Problems at the U.S.* (continued...)

argued, makes it all but impossible for DOE to implement security measures effectively. According to a 1994 DOE report,

> These multiple safeguards and security offices [at DOE] have resulted in duplication of guidance, unnecessary requests for information and clarification, and inefficient program execution. Unchecked, this counter-productive tendency threatens the success of the overall safeguards and security effort.[22]

In the case of the recent alleged Chinese espionage at Los Alamos, for example, elements of DOE did not communicate effectively with one another, and critical information was lost.

As provided in the Defense Authorization Act, NNSA would try to change that situation by clarifying lines of authority. With the Administrator for Nuclear Security given direct responsibility and authority for the nuclear weapons complex and all other DOE national security functions, with all NNSA personnel responsible to the Administrator or the Secretary and not to people in any other part of DOE, and with the legislation making security more salient, the new organization should be better able to coordinate security efforts and they should be subject to fewer cross-pressures undermining them. On the other hand, some express concern that a separate NNSA within DOE would weaken accountability. At a July 13, 1999, joint hearing by the House Commerce Committee and the House Science Committee, Representative Dingell said, "Proposals to set up a fully or semi-autonomous agency would only ... insulat[e] these programs from outside scrutiny and accountability," and Maureen Eldredge, Program Director for the Alliance for Nuclear Accountability, a private anti-nuclear group, expressed concern that similar proposals are "a chilling return to the darker days of the past, when weapons work was done unchecked by environmental consequences, regulation or public scrutiny."[23]

Congressional Oversight. The Defense Authorization Act includes multiple requirements for reporting to Congress, as noted under "Security," above. In particular, there is to be a detailed annual report on security and counterintelligence programs at each DOE facility, including the status and effectiveness of such programs, the adequacy of procedures and policies for protecting classified information, a determination of whether each weapons laboratory is in full compliance with security measures, significant violations of security and counterintelligence requirements, and certain information on foreign visitors (sec. 2304).

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[21](...continued)
Department of Energy. June 1999, p. 4.

[22] U.S. Department of Energy. Office of Safeguards and Security. *Status of Safeguards and Security, Fiscal Year 1993,* January 1994. Cited in U.S. President's Foreign Intelligence Advisory Board. Special Investigative Panel. *Science at Its Best, Security at Its Worst: A Report on Security Problems at the U.S. Department of Energy,* June 1999, p. 18.

[23] Cited in "DOE Weapons Reorg Plan Stirs Broader House Action," *Nuclear Weapons and Materials Monitor,* July 19, 1999: 6.

The legislation intends to convey to DOE and the nuclear weapons complex how seriously the Congress takes security matters. Requirements for reporting make clear that the security and counterintelligence are of critical importance, and imply that noncompliance will be noticed and is not acceptable. Combined with the clearer lines of authority and responsibility in NNSA, the reporting requirements aim to serve as an incentive to full compliance. In addition, aside from the legislative provisions, the legislation expresses the congressional perspective on security. A 1999 report on maintaining nuclear weapons expertise recommended reinvigorating congressional oversight of the nuclear weapons program. It also noted,

> The Administration and the Congress, through actions and words, should make a concerted and continuing effort to convey to the nuclear weapons community that their mission is vital to the security of the nation ... This message should be unequivocal, clear, and periodically reinforced.[24]

The legislation arguably does this, conveying to the nuclear weapons community the importance of its mission.

On the other hand, the legislation does not address suggestions for a parallel reorganization of Congress to oversee the nuclear weapons program. Congress mirrors the multiple and conflicting jurisdictions and lines of authority within DOE for this program, with many committees involved. Observers have noted a need to facilitate oversight, streamline reporting by NNSA to Congress, and reduce the burden of testifying before and answering to multiple committees. While it could be argued that having multiple committees involved in the nuclear weapons program ensures that contending interests and priorities are represented, the same argument could be made on behalf of keeping the structure of the nuclear weapons program unchanged. If the present structure of that program is deficient on the executive branch side, Congress may wish to consider if a similar structure for congressional oversight may also warrant attention.

Whither NNSA? The fate of the proposed NNSA is unclear as of mid-September. NNSA is contentious on grounds of secretarial responsibility and authority, and compliance with environment, safety, and health legislation. Secretary Richardson said in August, "I would most likely recommend to the President that he veto the bill" on grounds that the Secretary of Energy, under the bill, "undermines the secretary's authority" over NNSA and "blurs the lines of responsibility" in various areas.[25] Senator Carl Levin said, "I remain concerned that the proposed reorganization so significantly reduces the authority of the Secretary of Energy over the nuclear weapons programs of the Department that it makes him less accountable

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[24] U.S. Commission on Maintaining United States Nuclear Weapons Expertise. *Report to Congress and the Secretary of Energy Pursuant to the National Defense Authorization Acts of 1997 and 1998.* March 1, 1999, p. iii, vi.

[25] H. Josef Hebert, "Energy Secretary Dislikes Provision of Defense Bill," Associated Press newswire, August 11, 1999.

for the management of these critical programs."[26] On the other hand, it is argued, the changes introduced by the legislation "would eliminate tangles in the lines of authority, House Republicans said, and replace what Representative Mac Thornberry of Texas called 'a dysfunctional bureaucracy' with a military-style chain of command from the Secretary through the new agency's director to field directors of weapons laboratories ..."[27]

The states have a different concern. Said one report, "Last week, 46 state attorneys general said in a letter to congressional leaders that the reorganization would undercut a 1992 law that explicitly gave the states regulatory control over the DOE's hazardous waste management and cleanup activities."[28] Kenneth Salazar, the Colorado Attorney General, wrote to the chairs of the conference on the bill, "the reorganization should not subordinate environment, safety and health concerns to weapons production and development. I am concerned that this will be the unintended consequence of the proposed amendment."[29] In contrast, Representative Thornberry indicated the legislation would leave existing state controls on environmental matters in place.[30] Similarly, Senator Domenici said, "what this legislation changes is not statutory requirements, just the management structure responsible for complying with these requirements."[31]

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[26] "Levin Releases CRS Memorandum Questioning DOE Reorganization Proposal," news release, September 8, 1999. [http://www.senate.gov/~levin/releases/090899.htm].

[27] Eric Schmitt, "Congressional Pact Alters Energy Dept. to Protect Nuclear Secrets," *New York Times*, August 6, 1999: 9.

[28] Walter Pincus and Vernon Loeb, "Veto Urged for Energy Revamp," *Washington Post*, September 9, 1999: 19.

[29] Barbara Ferry, "Madrid Mobilized Against Plan for DOE," *Santa Fe New Mexican*, August 6, 1999: A-2.

[30] Pincus and Loeb, "Veto Urged for Energy Revamp."

[31] Ferry, "Madrid Mobilized Against Plan for DOE."

DOE Laboratories[32]

Description

The Department of Energy has the government's largest laboratory system. This includes nine major DOE multiprogram laboratories: Argonne National Laboratory (IL), Brookhaven National Laboratory (NY), Idaho National Engineering and Environmental Laboratory (ID), Lawrence Berkeley National Laboratory (CA), Lawrence Livermore National Laboratory (CA), Los Alamos National Laboratory (NM), Oak Ridge National Laboratory (TN), Pacific Northwest National Laboratory (WA), and Sandia National Laboratories (NM). These multiprogram laboratories and the National Renewable Energy Laboratory (CO), a "program-dedicated laboratory," generally are referred to as DOE's National Laboratories.

In addition to these 10 National Laboratories, DOE has 13 smaller laboratories (including, for example, Fermilab, Thomas Jefferson National Accelerator Facility, and SLAC (Stanford Linear Accelerator Center)) and provides significant funding for former DOE laboratories (for example, Bates Linear Accelerator Laboratory). Most of DOE's laboratories, and all of its National Laboratories, are Federally Funded Research and Development Centers (FFRDCs). FFRDCs are owned and funded by the government but staffed and operated by nonfederal employees of universities or private corporations under contract with DOE.

The DOE laboratories support DOE's four major mission areas: national security, especially nuclear weapons programs; nuclear and other energy resources; science and technology, including fundamental scientific research in, for example, high energy and nuclear physics and basic energy sciences; and environmental quality, especially environmental restoration and waste management. Technology transfer and scientific education are secondary and cross-cutting missions of the laboratories.

DOE's estimated FY2000 funding of its nine multiprogram laboratories is $5,912.1 million. This represents about 77% of total DOE laboratory funding. It also represents about 7.7% of the total FY2000 U.S. government budget request for federal research and development.

[32]Prepared by William C. Boesman, Specialist in Science and Technology, Resources, Science, and Industry Division.

Table 3. DOE Multiprogram Laboratory Funding

Laboratory	FY1999 Adjusted	FY2000 Request
Argonne (IL)	368.5	343.6
Brookhaven (NY)	341.6	336.7
Idaho National Eng'r'g and Env'l (ID)	648.6	639.6
Lawrence Berkeley (CA)	277.2	274.8
Lawrence Livermore (CA)	1,090.3	1,1113.6
Los Alamos (NM)	1,252.5	1,315.9
Oak Ridge (TN)	526.3	612.9
Pacific Northwest (WA)	239.5	226.4
Sandia (NM)	1,036.0	1,048.6
Total	5,780.5	5,912.1

History

The DOE laboratories trace their beginnings to the Manhattan Project, the nation's atomic weapons development program during World War II. The government funded construction of facilities but used universities and companies with existing expertise to carry out the work. This arrangement avoided the need for the government to develop its own expertise and allowed paying higher rates than generally available in federal service. Three of DOE's national laboratories are still primarily nuclear weapons laboratories: Los Alamos, Livermore, and Sandia. Following the war, the Atomic Energy Act established the Atomic Energy Commission (AEC) to manage and regulate nuclear R&D, and to take over the weapons program and extend it to civilian atomic energy and related fields, including the use of nuclear materials for medical and biological purposes. Nuclear R&D, including nuclear weapons R&D, has been under civilian control since then.

In 1974, the Energy Reorganization Act transferred the R&D functions, including the laboratories, of the AEC to the newly created Energy Research and Development Administration (ERDA). Also transferred to ERDA were energy-related functions and some small single-program laboratories of the Department of the Interior, National Science Foundation, and Environmental Protection Agency. The Federal Nonnuclear Energy Research and Development Act of 1974 gave ERDA a broad mandate to conduct energy R&D and demonstration projects and to promote the commercialization of energy technologies. DOE was established in 1977 with ERDA and its laboratories as its core and with a broad responsibility for national energy policy. Congress subsequently mandated a number of specific new

responsibilities for DOE in the general areas of energy development and conservation, technology transfer, and environmental restoration and waste management. Since the 1980s, however, as concerns about the "energy crisis" of the 1970s lessened, some of the department's energy-related R&D programs have been canceled or have received less support than previously.

Current Status

The DOE National Laboratories are world-class laboratories that contribute significantly to DOE's major mission areas. There has been concern in the last several years, however, as evidenced in the 1995 "Galvin" Task Force report,[33] that the DOE laboratories have lost their R&D focus as DOE's mission areas have become more diverse. In the 106th Congress, following the release of the Cox committee report[34] and the Rudman report,[35] legislation has been developed to deal with security problems by establishing an semi-autonomous agency within DOE to administer DOE's national security functions and its three nuclear weapons laboratories (Los Alamos, Livermore, and Sandia) and the related nuclear weapons plants and testing area. The issues raised by these legislative initiatives are discussed in the previous section.

[33]U.S. Department of Energy. Secretary of Energy Advisory Board. *Alternative Futures for the Department of Energy National Laboratories*. February 1995. 2 volumes.

[34]U.S. Congress. House. Select Committee on U.S. National Security and Military/Commercial Concerns With the People's Republic of China. *U.S. National Security and Military/Commercial Concerns* . . . . H. Rept. 105-851, 105th Congress, 2nd session, Report 105-851. Washington, GPO, 1999.

[35]Executive Office of the President. President's Foreign Intelligence Advisory Board. *Science at Its Best — Security at Its Worst*. Washington, June 1999. 58 p., Appendix, 35 p.

Renewable Energy[36]

Description and Budget

DOE's renewable energy R&D programs encompass eight distinct lines of technology development, R&D partnerships with industry, and long-term research. The major thrusts are in photovoltaics, biofuels, wind, geothermal, and solar thermal, with modest programs in hydrogen, solar buildings, and small hydro.

After peaking in FY1979, spending on renewable energy R&D sharply declined in the early 1980s, and continued to fall during the balance of the decade. In the 1990s, funding has increased somewhat. In constant 1995 dollars, funding grew from $13 million in FY1973 until it peaked in FY1979 at $1.4 billion. Spending plunged to $430 million by FY1982, and continued a steady decline to $129 million in FY1990. Since then, it has increased steadily. In current dollars, funding was $346 million in FY1998 and $366 million in FY1999. The FY2000 request was $446 million.

History

Federal programs for solar heating and cooling research as well as geothermal research originated in the National Science Foundation (NSF) in the early 1970s. In FY1973, NSF spent about $4 million for solar research and a smaller, unspecified amount for geothermal research. Both programs were transferred to the Energy Research and Development Administration (ERDA) when it was established in 1974. The wind energy program inherited by ERDA was originally part of the Federal Energy Administration (FEA) Project Independence Solar Energy Plan and involved a number of federal agencies including the National Aeronautics and Space Administration (NASA) and the Department of Agriculture. At ERDA, the renewable energy program was given equal status with other supply options through designation of its own assistant administrator.

In 1974, the Congress enacted three laws (P.L. 93-409, P.L. 93-473, P.L. 93-577) that, together with the Energy Reorganization Act, expanded the range of renewable energy R&D lines and authorized the creation of the Solar Energy Research Institute (SERI, later renamed as the National Renewable Energy Laboratory). ERDA's 1975 National Energy Plan emphasized the importance of renewables as a long-term (post-2000) technology development option. ERDA's second plan in 1976 recognized prior commercial uses in the early 1950s and created an additional focus on short-term applications and demonstrations of solar technologies. ERDA's renewable energy functions were transferred along with others when DOE was established in 1977.

From the early, long-term focus on solar heating and cooling and geothermal research, the program has broadened to include a wide range of technology

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[36]Prepared by Fred J. Sissine, Specialist in Energy Science Technology and Policy, Resources, Science and Industry Division.

development and industry partnerships in areas such as high-efficiency photovoltaics, biomass gasification powerplants and export partnerships that support global market share development. A number of environmental laws, such as the Clean Air Act, and international treaties, such as the Framework Convention on Climate Change, incorporate renewable energy measures as a key part of their pollution prevention strategies.

Current Status

The largest R&D efforts are focused on "clean" solar, wind and biomass power sources, to combat air pollution, climate change and other environmental problems, and on biofuels as a clean vehicle fuel to reduce oil import vulnerability and air pollution problems. Wind energy is expanding in global markets and recent progress in fuel cells for vehicles has rekindled interest in hydrogen as a fuel. There is also expectation that hydrogen can serve as an energy carrier and storage medium that allows renewable energy power production to support vehicle fuel needs.

Nuclear Energy R&D[37]

Description and Budget

The Office of Nuclear Energy, Science, and Technology (NE) manages DOE programs for the development of improved nuclear power plants, nuclear power systems for spacecraft, and naval reactors. The office also manages DOE research reactors and surplus nuclear facilities, produces radioactive isotopes for medical and other applications, and manages the conversion of depleted uranium from enrichment operations into stable forms.

Funding for civilian nuclear energy activities totaled $243 million in FY1998 and $284 million in FY1999. The Administration's FY2000 request was $269 million.

History

Efforts to harness nuclear energy began in the late 1940s with a joint program by the Navy and the Atomic Energy Commission (AEC), one of DOE's predecessor agencies, to develop a submarine nuclear propulsion system. The program quickly achieved success with the light water reactor (LWR), which used ordinary water for cooling and to help sustain a nuclear chain reaction to produce energy. The design became the basis for the first commercial-scale nuclear power plant, Shippingport, which began operating near Pittsburgh in 1957.

During the 1960s, the LWR was adopted as the standard commercial nuclear power technology in the United States and throughout most of the world. The U.S. nuclear R&D program then turned most of its attention to what was expected to be the next generation of nuclear plants — breeder reactors, which could produce more fissile nuclear fuel than they consumed. Several prototype reactors were built, and DOE made plans to build the first commercial-scale breeder reactor at Clinch River, TN. But the program grew increasingly controversial because of the breeder reactor's principal fuel — plutonium, a nuclear weapons material — and the deteriorating economic outlook for the technology. Congress canceled the Clinch River project in 1983.

During the late 1980s and early 1990s, the nuclear R&D program focused primarily on improved versions of today's commercial LWRs, space power systems, and advanced reactor technologies. One advanced technology, liquid metal reactors, grew out of the breeder program and generated much of the same controversy, which resulted in its termination by Congress in 1994. The other major advanced reactor technology under development by DOE, the high-temperature gas-cooled reactor, was ended in 1995.

DOE shared the nuclear industry's costs for completing detailed engineering for improved LWR nuclear power plants, a program whose funding ended in FY1997.

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[37]Prepared by Mark Holt, Specialist in Energy Policy, Resources, Science and Industry Division.

The new designs are intended to be safer and more economical to build and operate than existing reactors, but the commercial outlook remains uncertain.

Natural uranium must be "enriched" in the fissile isotope U-235 to become useable fuel for light water reactors. The operation of three huge uranium enrichment plants, originally built to provide enriched uranium for nuclear weapons and naval power reactors, was previously a major activity of the DOE nuclear energy office. The oldest of those facilities, at Oak Ridge, TN, was closed in 1985, and the operation of the remaining two, at Paducah, KY, and Portsmouth, OH, was transferred to the government-owned U.S. Enrichment Corporation (USEC) by the Energy Policy Act of 1992. USEC, which was sold to the private sector in 1998, leases the two remaining enrichment plants from DOE.

Status

Two DOE nuclear power research programs are now proposed or underway. The "nuclear energy research initiative" (NERI), designed to support innovative nuclear energy research projects, received an initial appropriation of $19 million in FY1999. The "nuclear energy plant optimization" (NEPO) program, which has yet to be funded, is intended to improve the economic competitiveness of existing nuclear power plants. DOE requested $25 million for NERI and $5 million for NEPO in FY2000.

Much of the nuclear R&D program's current budget is devoted to shutting down facilities involved in the liquid metal reactor program, a process that is expected to take several years. Some of the technology developed for the liquid metal reactor program is being modified for treatment of various DOE spent fuel and other radioactive waste. Breeder reactor opponents are fighting the waste treatment technology program on the grounds that it could form the basis for future revival of the liquid metal reactor program.

The Naval Reactors Program, a joint activity with the Defense Department, would be transferred to the new National Nuclear Security Administration under the provisions in Title XXXII of the FY2000 Defense Authorization Act, S. 1059.

Development of nuclear reactors for space missions ended in FY1995, primarily because of a lack of commitment by other agencies or industries that might deploy such a system. Substantial work is continuing, however, on non-reactor nuclear power systems for space applications. Such systems, which have been used on a number of missions, generate power from the heat produced by radioactive decay.

Although uranium enrichment operations have been privatized, DOE's nuclear energy office remains responsible for management of thousands of containers of depleted uranium hexafluoride, the material left over from the enrichment process. Under current plans, special facilities are to be constructed at each site to convert the uranium hexafluoride to a form that is safer to handle and store.

Basic Energy Sciences (BES)[38]

Description and Budget

The Basic Energy Sciences (BES) program, which is funded at $799.5 million for FY1999, is the most diverse research program within DOE. Its stated goals are to carry out scientific research related to energy technology development, and to maintain and develop major research facilities for national use. The research in BES consists of a wide range of basic research activities in materials, chemistry, engineering, earth sciences, and energy biosciences. In addition to energy technologies, BES research has potential applications in a wide variety of industrial areas. The major user facilities — synchrotron radiation and neutron sources — operated by BES at the DOE labs are used extensively by industry, universities, and government on a cost-shared basis. Support of these user facilities constitutes nearly half of the DOE BES budget. DOE is currently constructing a new user facility, the Spallation Neutron Source (SNS). This facility is designed to produce a large flux of neutrons for use as a tool to study genetic structure, chemical reactions, and structure of materials, among other areas.

History

The BES program finds its roots in research funded by the Atomic Energy Commission (AEC) from 1946 to its demise in 1974. When the Energy Research and Development Administration was established that year (P.L.93-438), it absorbed all the AEC R&D programs. At the time, the AEC sponsored a broad-based research program in many of the same general areas as the current BES program. The AEC program, called physical research, was almost entirely aimed at civilian nuclear science and technology befitting the Agency's mission. When the program was transferred to the Energy Research and Development Administration (ERDA) in 1974, its coverage broadened to include all the energy technologies under ERDA's jurisdiction. The BES label first appeared in the ERDA's FY1976 energy R&D plan. When ERDA was absorbed by DOE in 1977, the BES research program moved as well.

In addition to the original research programs inherited from AEC which have expanded significantly, DOE has added research in earth sciences, energy biosciences (biomass based fuels) and advanced energy projects.

Current Status

DOE requested $888.1 million for Basic Energy Sciences for FY2000, 11.1% above FY1999. Nearly all of the increase was for continued construction of the SNS for which DOE requested $214 million in FY2000 compared to $130 million in FY1999. In addition, DOE asked for an additional $8 million for Climate Change Technology Initiative research, which would be spread among all of the BES subprograms. DOE requested $7 million in new funds for a portion of the Scientific

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[38]Prepared by Richard E. Rowberg, Senior Specialist in Science and Technology Policy, Resources, Science, and Industry Division.

Simulation Initiative, which would be used for studying combustion processes. Offsetting reductions were requested in the Engineering and Geosciences, Materials, Chemical Sciences, and Biosciences subprograms, and by completion of the Combustion Research Facility-II.

Issues

The future of the BES program is closely tied to that of the National Laboratories. At the nine multi-purpose laboratories, the two programs supply about 34% of the non-defense R&D funding. The diversity of activities conducted by these two programs contributes to the concerns about the lack of clear missions for these laboratories. As the laboratories have expanded their interactions with the private sector, it is many of the BES activities and facilities that are being offered for private participation.

Restructuring DOE to establish a separate entity for defense programs could have some effect on the BES program. About $57.3 million of the FY1999 BES appropriations, 7.2%, is being spent at the three weapons labs, Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories (SNL). Most of the BES research undertaken at those labs is independent of the weapons work and does not use facilities also used by the stockpile stewardship program. Nevertheless, there is likely some interaction between the researchers of the two programs, and any management change instituted at the labs for security purposes is likely to affect the non-defense activities as well. It would be rather difficult for laboratory management to operate under one set of procedures and structure for the weapons program and another for the civilian research activities. Of particular concern would be the possibility that exchange of scientific information between the two groups on related subjects, such as materials science and chemistry, would be hindered by barriers created by restructuring.

Also, if the BES research effort at the three labs is subject to the same management structure as the weapons program while the BES activities at the other labs are subject to a different structure, there could be inefficiencies created in joint lab activities. The Spallation Neutron Source (SNS) project is a potential case-in-point. LANL has an important role in the project, which will require the use of LANL accelerator research capabilities. A part of that capability is also being used by the DOE weapons programs. The SNS project structure has already been criticized for being too complex, and DOE restructuring may add to that complexity.

Computational and Technology Research (CTR)[39]

Description and Budget

The Computational and Technology Research (CTR) program supports basic research in mathematics and computer science, and advanced energy projects. The program funds research on advanced computer applications and provides access to high performance computers for researchers in the DOE laboratories through the National Energy Research Scientific Computing Center (NERSC). This program also is responsible for the DOE portion of the Next Generation Internet (NGI) initiative.[40] Finally, DOE civilian technology transfer activities are contained in this program.

History

Until FY1997, the CTR program was part of the DOE Basic Energy Sciences program dating back to the latter program's origins in the Atomic Energy Commission. For FY1997, DOE removed the advanced energy projects and applied mathematics subprograms from the previous version of the BES program and formed the CTR program.

Current Status

For FY2000, DOE requested $198.9 million for computational and technology research, 26.3% above FY1999. The bulk of the increase was for the Scientific Simulation Initiative to develop and deploy software for the DOE supercomputing systems, begin the development of terascale computing and networking facilities, and start the selection of scientific projects for initial applications of those systems. The FY2000 request for the CTR portion of this initiative was $52 million. DOE also requested a slight increase for NERSC and the Energy Sciences Network to provide support for DOE researchers. Funding for the NGI would remain the same for FY2000 as for FY1999.

Issues

The proposed DOE restructuring could pose significant concerns for this program. While the supercomputer facilities at the NERSC Center are not part of the defense programs and are not located at one of the three weapons labs, some in Congress have expressed concern about the presence of two supercomputer programs within DOE. In particular, the House Appropriations Committee, during consideration of the DOE appropriations for FY2000, questioned the need for the development of an additional supercomputer facility when substantial funding was already being provided for the Accelerated Strategic Computer Initiative (ASCI) within the DOE defense programs. The House Committee noted that DOE had stated

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[39]Prepared by Richard E. Rowberg, Senior Specialist in Science and Technology Policy, Resources, Science, and Industry Division.

[40]U.S. Library of Congress, Congressional Research Service, *Next Generation Internet*, by Glenn McLoughlin, CRS Report 97-521 SPR (Washington: updated September 5, 1997).

that ASCI would not be limited to just defense applications, and expressed its view that Congress was unable to support two supercomputer programs within DOE. Nevertheless, the Committee recognized the importance of applying supercomputers to complex problems and directed DOE to work with the Committee to identify a mutually agreeable program.[41]

With restructuring, such a program might be significantly more difficult to accomplish than is currently the case. Because the ASCI activity is the heart of the DOE Stockpile Stewardship program and is likely to be the principal focus of additional security measures under the restructured arrangement, access to ASCI supercomputers for non-weapons work might become very difficult. Furthermore, the existence of separate management procedures and structures for ASCI and for DOE users outside the weapons programs might complicate use of the ASCI facilities even if arrangements could be made that did not compromise security.

[41]U.S. Congress. House. Committee on Appropriations. *Energy and Water Development Appropriations Bill, 2000*. Report to accompany H.R. 2605. H. Rept. 106-253. July 23, 1999, p. 114.

Biological and Environmental Research[42]

Description

The Biological and Environmental Research (BER) program is focused on basic research in the biomedical and environmental sciences for the purposes of understanding potential long-term health and environmental effects of energy production and use. Included within BER are research on global climate change, radionuclide medicine and DOE's portion of the human genome project. This program also helps operate the Environmental Molecular Sciences Laboratory (EMSL) for bioremediation research. For FY1999, the program is being funded at $436.7 million.

History

The roots of the BER program go back to the Manhattan Project. Research into the biological effects of radiation was funded in conjunction with the building of the atomic bomb. After the war, the Atomic Energy Commission (AEC) assumed responsibility for this research and expanded it into nuclear medicine as part of the AEC mandate to explore peaceful uses of the atom. The AEC funding continued until the agency was terminated in 1974. By that time, environmental research had also become part of the program as concern about the environmental effects of nuclear power plants grew. When the Energy Research and Development Administration (ERDA) took over the AEC research activities, the biological, environmental, and health programs expanded to cover all forms of energy production. This emphasis continued when the DOE became responsible for ERDA's programs in 1977. Since then, the BER research program has expanded its mission to become a major source of federal basic research support in the biomedical and environmental sciences.

Status

Currently, the BER program has two major activities along with a broad set of activities in biomedical and environmental science. The first is the human genome project, coordinated by the National Institutes of Health, whose goal is to map the entire human genome. Much of the DOE portion of this project is being carried out at the National Laboratories. The second major activity is the carbon dioxide research project, which is part of the U.S. Global Change Research Program. The carbon dioxide project focuses on the chemistry of carbon emissions from fossil fuel combustion. For FY2000, the BER program requested $411.2 million for biological and environmental research, 5.8% below FY1999 level.

Issues

For FY1999, about 13.7% of the BER funded research is being conducted at the three DOE weapons labs. Most of that funding is for the DOE portion of the Human

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[42]Prepared by Richard E. Rowberg, Senior Specialist in Science and Technology Policy, Resources, Science, and Industry Division.

Genome Project, which is centered at LANL and LLNL. There is little if any overlap between the BER work and the weapons work at the three labs other than sharing a common management structure. Therefore, concerns about restructuring would likely be limited to how a change in management structure and procedures would affect the BER research effort at the three labs, and whether it would affect interaction of those BER activities with those going on at other laboratories under the existing DOE management structure. Another concern, peculiar to the Human Genome Project, is whether heightened security measures brought on by the restructuring, would create any barriers between DOE researchers and those at the National Institutes of Health, which is the lead agency on the project. In particular, there might be consequences for public access to the genome databases being established at LANL and LLNL from the genetic sequencing work.

Fusion Energy Sciences (Magnetic Fusion Energy)[43]

Description

The Fusion Energy Science (FES) program concentrates on basic research in plasma and fusion science and technology to expand the knowledge base needed to develop fusion-based power reactors and to enhance the application of plasma science in industry.[44] The program supports research on two major tokamak facilities and a number of alternative concepts. For the last several years, DOE has participated in the International Thermonuclear Experimental Reactor (ITER) project. That participation ends in FY1999, however, with the end of the engineering design activity phase. The program is now developing a "roadmap" for future fusion research that integrates both magnetic and inertial fusion concepts with the goal of a demonstration power plant by 2035. The budget for the FES program for FY1999 is $222.6 million.

History

Magnetic fusion research began in 1951 when scientists at various Atomic Energy Commission (AEC) National Laboratories and at Princeton University began to explore the possibility of containing the fusion reaction for peaceful purposes. The AEC began funding that research and in 1952 established a fusion research activity within its Research Division. The program, called controlled thermonuclear research (CTR), continued to be funded by the AEC until its research responsibilities were transferred to the Energy Research and Development Administration (ERDA) in 1974. By that time, the program was renamed magnetic fusion research since another line of CTR was being pursued based on the principle of inertial confinement fusion (ICF). The AEC also supported ICF research which, because of its weapons applications, remained in the defense research portion of the AEC and ERDA. When DOE was formed, the MFE program was absorbed by the agency. Over the years, it shifted from being a basic research program to an energy technology development effort. Recently, however, budget cuts and congressional mandates have resulted in the program's being redirected toward basic fusion science and technology and renamed Fusion Energy Sciences (FES). The ICF work remains in the DOE defense programs, although a small activity on inertial fusion energy was started in the FES program a few years ago.

Status

DOE requested $222.6 million for fusion science research in FY2000, the same as FY1999. The request, however, contained $10 million for the first year of a three-year, $48 million effort to decontaminate the Tokamak Fusion Test Reactor, which was shut down in FY1998. DOE requested an increase of $4.7 million for research

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[43]Prepared by Richard E. Rowberg, Senior Specialist in Science and Technology Policy, Resources, Science, and Industry Division.

[44]U.S. Library of Congress, Congressional Research Service, *Magnetic Fusion Energy: The DOE Fusion Energy Sciences Program*, by Richard Rowberg, CRS Issue Brief 91039 (Washington: regularly updated).

on novel magnetic confinement configurations. Funding for the first full year of operation of the National Spherical Torus Experiment was also requested for FY2000. Small increases were requested for the Doublet III-D and Alcator C-Mod experiments. A major reduction was requested for engineering research as a result of the completion of ITER participation and enabling R&D.

Issues

About 8.8% of FES funding goes to the three DOE weapons labs. Most of the research is generally independent of the weapons research going on at the labs, and the immediate effect of restructuring would seem to be relatively small beyond the possible management questions discussed above for the BES and BER programs. The connection between the FES and ICF programs, however, might be significantly complicated by a restructuring. Congress directed DOE to undertake a major study of its entire fusion research effort with the objective of integrating those activities more effectively. While this does not mean putting all fusion research within one program, it is likely to mean greater coordination of research planning and more collaborative research projects. If the ICF program is put in a new agency within DOE under restructuring, such coordination may become more complicated, particularly if the greater security focus of the new agency results in additional barriers between the civilian and defense research activities.

Environmental Management[45]

Description and Budget

DOE's nuclear weapons activities during the past 50 years, as well as its non-defense nuclear programs, have generated large amounts of waste and environmental contamination. Proper management of that waste and the restoration of the environment at DOE sites is the job of the Assistant Energy Secretary for Environmental Management (EM). The Environmental Management Program is DOE's largest activity, with the responsibility for managing several of the Department's largest facilities and an FY1999 appropriation of about $6.23 billion. The Administration's FY2000 request is $6.36 billion.

The Environmental Management Program encompasses four primary activities:

- Waste management, consisting of the storage, treatment, and disposal of a wide variety of radioactive, non-radioactive, and mixed waste;
- Environmental restoration, involving the mitigation and cleanup of contaminated soil and groundwater at DOE sites;
- Safe shutdown and management of surplus DOE facilities and the reduction of hazards posed by associated nuclear materials; and
- The development of new technologies to allow DOE to achieve its environmental and waste management goals more effectively and at lower cost.

Funding for the EM Program comes from three major appropriations categories: defense (DOE cleanup activities authorized by the annual defense authorization bill), non-defense, and the Uranium Enrichment Decontamination and Decommissioning Fund. The Enrichment D&D Fund includes a contribution from commercial nuclear reactor owners. Although DOE's uranium enrichment program was privatized in 1998, the Department still owns the enrichment plants and is responsible for their final cleanup when they are permanently closed.

History

Throughout World War II and most of the Cold War, DOE and its predecessor agencies enforced their own requirements for waste management and environmental protection, with little outside oversight. At least partly because of the urgency of war and the threat posed by the Soviet Union, the environmental effects of the nation's nuclear weapons production program were considered a relatively low priority. Radioactive waste often leaked from inadequate storage containers and was routinely discharged directly into soil and surface water.

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[45]Prepared by Mark Holt, Specialist in Energy Policy, Resources, Science and Industry Division

The enactment of major federal environmental laws gradually changed DOE's self-regulatory status, and by the mid-1980s the Department was required to accept the jurisdiction of the Environmental Protection Agency (EPA) and state environmental agencies over its facilities. DOE began negotiating agreements with environmental regulators that established milestones for bringing DOE facilities into compliance with federal and state environmental laws.

DOE's growing environmental commitments led to the 1989 establishment of the Environmental Management Program, which was formed by consolidating environmental cleanup and waste management activities from the DOE offices of Defense Programs, Nuclear Energy, and Energy Research. The new program grew rapidly, from an annual appropriation of $2.3 billion in FY1990 to $6 billion in FY1994. The explosive funding growth was fueled by environmental pressure and by the end of the Cold War; the halt in nuclear warhead production resulted in transfers of funding, personnel and facilities to the Environmental Management Program.

Congressional concern about DOE's management of the cleanup effort resulted in the transfer of part of the EM Program to the U.S. Army Corps of Engineers. The Formerly Utilized Sites Remedial Action Program (FUSRAP), which cleans up old industrial sites that were involved in the nuclear weapons program, was transferred to the Corps by the FY1998 Energy and Water Development Appropriations Act. Conferees on the bill noted that the Corps conducts similar activities for the Department of Defense, "and the conferees believe there are significant cost and schedule efficiencies to be gained by having the Corps manage FUSRAP as well."[46]

Status

Through 2070, the cost of DOE cleanup, waste management, and related environmental activities could total nearly $150 billion, according to DOE's 1998 report on accelerating the cleanup program.[47] Those costs will depend primarily on the extent to which contamination must be removed from DOE sites and the efficiency of program management. DOE has long urged the establishment of flexible cleanup standards based on expected future land use.

Since FY1994, funding for the Environmental Management Program has flattened out, and DOE has been developing strategies to reduce the total cost of the cleanup effort. One of DOE's primary strategic directions is reflected in the 1998 report on Accelerating Cleanup, which establishes a goal of completing work at as many sites as possible by 2006. Early completion of site cleanups is expected to save billions of dollars in long-term infrastructure and other "landlord" costs. However, some environmental groups have expressed concern that such early cleanups may be less complete than previously planned.

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[46]U.S. Congress. House of Representatives. Conference Report. Making Appropriations for Energy and Water Development for the Fiscal Year Ending September 30, 1998, and for Other Purposes. Report 105-271. p. 36.

[47]U.S. Department of Energy. *Accelerating Cleanup: Paths to Closure*. DOE/EM-0362. June 1998.

Another DOE management strategy is the "privatization" of much of the Department's waste management work. Under the privatization initiative, various waste treatment and processing facilities would be developed by the private sector, and DOE would pay a fee when waste was successfully treated. Privatization and other contracting initiatives are intended to increase incentives for cost reduction and efficiency in the environmental management program, which has been criticized for excessive costs and low productivity.

Issues

Although much of the activity of the EM program is concerned with cleaning up weapons production sites, proposed legislation setting up a semi-autonomous nuclear weapons agency does not include the EM program in the new agency. As discussed above (see p. 20), a number of States' Attorneys General have expressed concern that their authority over environmental activities of the new agency would be weakened, but it is not clear how or to what extent EM programs, which would not be transferred, would be affected in this way.

High Energy and Nuclear Physics[48]

Description

The High Energy Physics (HEP) program supports experimental and theoretical studies of the fundamental structure of matter and energy. It operates several large accelerators, including the Tevatron at Fermilab and the linear accelerator at the Stanford Linear Accelerator Center (SLAC). It also supports theoretical and experimental research at a number of universities in the nation. A major initiative of the HEP program is participation in the Large Hadron Collider (LHC) project at the Center for European Nuclear Research (CERN) in Europe. The LHC is an expansion of the particle accelerator at CERN, which would provide a substantial increase in its capability, making it the largest high-energy accelerator in the world. An agreement between DOE and CERN was reached last year on U.S. participation in the project. The budget for the HEP program for FY1999 is $691.6 million.

The Nuclear Physics program (NP) supports research into the structure of the nucleus of the atom and the forces holding the nucleus together. It supports theoretical and experimental research at universities and the national laboratories. Large research facilities within this program include the Thomas Jefferson National Accelerator Facility (TJNAF) in Newport News, VA, now in operation, and the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Lab, which will be completed this fiscal year. The FY1999 budget for NP is $338.5 million.

History

The general sciences program is the oldest research program funded by DOE. It is a direct descendent of research funded during World War II in conjunction with the Manhattan Project. Since the science underlying the atomic bomb was a result of basic research in nuclear and particle physics up to the early 1940s, federal authorities responsible for nuclear weapons development believed it essential to continue funding such research. In 1946, before the Atomic Energy Commission (AEC) came into being, nuclear physics research was funded by the Office of Naval Research. In 1947, the AEC was established and began to support this research effort. The AEC quickly became the dominant supporter of nuclear physics research and remained so until its demise in 1974. During that period, the research program took on the name high energy physics as a recognition of the growing particle-energies that are characteristic of the research. In 1974, the Energy Research and Development Administration took over funding until 1977 when the Department of Energy was formed. In recent years, the program has split into its current components of high energy and nuclear physics.

Status

For FY2000, DOE requested $697.1 million for high energy physics research, 0.8% above FY1999. The highlight of the FY2000 HEP program is to be completion

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[48]Prepared by Richard E. Rowberg, Senior Specialist in Science and Technology Policy, Resources, Science and Industry Division.

and initial operation of several new facilities. Increases were requested for initial operation of the Fermi main injector and two new detectors at Fermilab. Additional funding was also requested for operation of the new B-Factory and associated detector at SLAC. Funding requested for the DOE contribution to the LHC program would reach $70 million in FY2000, a $5 million increase over FY1999.

The DOE nuclear physics research request for FY2000 was $352.8 million, 1.3% above FY1999. Completion of the RHIC resulted in a decline of $16.6 million from FY1999 in construction funds. DOE requested an increase of $25.8 million in operating funds for RHIC, as it starts operation, and for the Alternating Gradient Synchrotron, which the NP program assumes from the HEP program. DOE also requested an increase of $3.1 million for operation of the TJNAF, which is scheduled to operate for 4,500 hours in FY2000. In the first version of the budget request to Congress, DOE asked that the Bates laboratory at MIT cease operations in FY2000 resulting in an $11.4 million reduction from FY1999. A subsequent amendment to the request, however, restored those funds.

Issues

These two programs are likely to be the least affected of any of the DOE science programs by a restructuring. During FY1999, only about 1.2% of HEP and NP funding goes to the three labs. Nearly all of that is nuclear physics research carried on at LANL by the Los Alamos Neutron Science Center using its 800-Mev proton accelerator. That work could be affected by the restructuring — the accelerator is also used by the defense programs — but it is a small fraction of the total DOE effort. A possible concern may arise in connection with the use of DOE supercomputer facilities by the two programs. Currently, that work is carried out by the supercomputer facility at Lawrence Berkeley Laboratory, the National Energy Research Scientific Computing Center. If that computing activity must be shifted to any extent to the Accelerated Strategic Computer Initiative facilities within the defense programs, however, restructuring could pose problems for the HEP and NP programs to the degree new security procedures raise barriers to the ASCI program.

Nonproliferation and National Security Office[49]

Description and Budget

The Office of Nonproliferation and National Security (NNS) was established in 1991 to consolidate DOE's arms control and nonproliferation programs. The DOE applies expertise derived from developing and managing U.S. nuclear weapons to a wide range of arms control and nonproliferation policies. These include implementation and enforcement of international treaties such as the Nuclear Nonproliferation Treaty (NPT) and legislation such as the Atomic Energy Act of 1954 and the Nuclear Nonproliferation Act of 1978. DOE also implements portions of the Nunn-Lugar Cooperative Threat Reduction programs in the former Soviet Union.

The end of the Cold War and consequent nuclear arms control agreements confront DOE with new challenges such as dismantling and storing retired nuclear warheads and deciding what to do with excess weapons materials, especially plutonium. The Administration's FY2000 budget request for NNS was $843.25 million.

DOE retains its longstanding responsibilities in the field of nuclear nonproliferation. The largest account for DOE's nonproliferation activities is its Nonproliferation and Verification R&D program. This program includes support for treaty verification, nuclear export controls, international safeguards, intelligence, and dismantlement assistance to the former Soviet countries. Much of this work is conducted at the National Laboratories.

History of DOE's National Security Role

The DOE's technical capabilities stem from nearly 50 years of developing and managing the U.S. nuclear weapons program. Soon after World War II, responsibility for the U.S. nuclear stockpile was transferred from the military's Manhattan Project to a new civilian agency, the Atomic Energy Commission (AEC). The AEC built, tested, and maintained nuclear weapons, largely through the National Laboratories. The Department of Defense retained responsibility for nuclear weapons on active duty. Congress exercised strong oversight over the AEC through its Joint Committee on Atomic Energy. When it was created in 1977, DOE acquired these functions and inherited responsibility for managing the nuclear weapons complex. The DOE's expertise in nuclear weapons is not duplicated elsewhere in the government, and is directly relevant to nonproliferation policy.

[49]Prepared by Zachary S. Davis, Specialist in International Nuclear Policy, Resources, Science, and Industry Division.

Issues

In the legislative proposals to create a semi-autonomous agency within DOE that would be responsible for all nuclear weapons-related issues in S. 1059, NNS would become part of the new agency.

As part of the new agency, NNS would be subject to new security measures that could affect its programs, especially cooperative programs with Russia. Key issues that await resolution include: 1) implementation of environment, health, and safety regulations inside the new agency; 2) role of DOE field offices; 3) effect of reorganization and new security measures on NNS programs and lab operations.

Power Marketing Administrations[50]

Description and Budget

DOE's four Power Marketing Administrations (PMAs) developed out of the construction of dams and multi-purpose water projects during the 1930s that are operated by the Bureau of Reclamation and the Army Corps of Engineers. The original intention behind these projects was conservation and management of water resources, including irrigation, flood control, recreation and other objectives. However, many of these facilities generated electricity for project needs. The PMAs were established to market the excess power; they are the Bonneville Power Administration (BPA), Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA).

The power is sold at wholesale to electric utilities and federal agencies "at the lowest possible rates ... consistent with sound business practice," and priority on PMA power is extended to "preference customers," which include municipal utilities, co-ops and other "public" bodies. The PMAs do not own the generating facilities, but they generally do own transmission facilities, except for Southeastern. The PMAs are responsible for covering their expenses and repaying debt and the federal investment in the generating facilities. The 104th Congress debated sale of the PMAs and did, in 1995, authorize divestiture of one PMA, the Alaska Power Administration. Sale of the remaining PMAs has not since been an issue, pending decisions yet to be made about the treatment of public power in the broader context of electric utility restructuring.

BPA receives no annual appropriation. The Administration's request for the other three PMAs for FY2000 was $200 million, a reduction of 15.8% from the FY1999 appropriation. The savings would stem from the Administration's proposal that, beginning in FY2000, customers of SEPA, WAPA, and SWPA would be responsible for making their own power purchases and transmission arrangements from any suppliers other than the PMA to satisfy their needs. Under the Purchase Power and Wheeling Program (PPW), the PMAs have purchased electricity and transmission capability, which is repaid by PMA customers, to supplement federal generation. The premise behind the proposed elimination of the PPW program was that deregulation should make it less expensive and less complicated for PMA customers to make these arrangements. Another possible reason is that the money appropriated to the PMAs under PPW is repaid to the Treasury rather than to DOE. This means that the PPW appropriation is fully scored against the caps on discretionary domestic spending with which DOE must comply. Bipartisan groups in both the House and Senate have found this feature of the budget request to be controversial.

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[50]Prepared by Robert L. Bamberger, Specialist in Energy Policy, Resources, Science and Industry Division.

Federal Energy Regulatory Commission[51]

Description and Budget

The Federal Energy Regulatory Commission, created as an independent agency within DOE, inherited the functions of the former Federal Power Commission — regulation of some parts of the natural gas, hydropower, and electric power industries — and the regulation of oil pipeline rates from the Interstate Commerce Commission. FERC is essentially independent of DOE. Its FY1999 appropriation was $167.5 million, all of it to be paid for by user fees, following authority granted it in the 1986 Omnibus Budget Reconciliation Act. For FY2000, the request was $179 million.

History and Status

FERC's specific activities have evolved since its creation as major changes were legislated, especially in the natural gas market and — since the 1992 Energy Policy Act — in electric power generation. In the current development of legislation restructuring the electric power industry, proposals to increase FERC's role in the partially deregulated market are subject of debate. (For more details on FERC's role in electricity restructuring, see the CRS Electronic Briefing Book on Electric Utility Restructuring at [http://www.congress.gov/brbk/html/ebeletop.html].)

[51]Prepared by Carl E. Behrens, Specialist in Energy Policy, Resources, Science and Industry Division.

Civilian Nuclear Waste Management[52]

Description and Budget

The Office of Civilian Radioactive Waste Management (OCRWM) is responsible for the disposal of highly radioactive waste from commercial nuclear reactors and defense nuclear facilities. Under the Nuclear Waste Policy Act (NWPA) as amended, OCRWM must investigate the suitability of Yucca Mountain in Nevada for a permanent underground nuclear waste repository and is authorized to develop waste transportation systems. If the site is suitable, DOE can build and operate a repository at Yucca Mountain upon receiving a license from the Nuclear Regulatory Commission (NRC).

Funding for the program is provided primarily by a fee of one-tenth of a cent per kilowatt-hour of nuclear electricity generated in the United States; revenues from the fee are held in the Nuclear Waste Fund. DOE cannot spend money from the fund without annual appropriations by Congress. OCRWM also receives appropriations from general revenues to pay for disposal of highly radioactive defense waste. FY1999 funding for the program totaled $357 million, and the Administration is seeking $370 million in FY2000, plus the release of an additional $39 million in previously appropriated funds.

According to DOE, the requested funding level would allow the Department to remain on schedule for studying the proposed national disposal site at Nevada's Yucca Mountain. DOE's schedule calls for an environmental impact statement for the disposal facility to be completed in 2000, and, if the site is found suitable, an application for a construction permit to be submitted to the Nuclear Regulatory Commission by 2002. Waste disposal could begin by 2010, according to the Department.

History

Highly radioactive, long-lived nuclear waste has been accumulating since the beginning of nuclear weapons production in the 1940s. Most of that military "high level" radioactive waste consists of liquids remaining from the chemical extraction of plutonium and uranium from material that had been irradiated in government nuclear reactors. When full-scale commercial nuclear power plants began operating in the 1960s, the developers of the new industry anticipated that commercial spent fuel would be similarly "reprocessed" to extract plutonium and uranium for new reactor fuel.

Because of concerns about the weapons use of plutonium and diminishing economic prospects, however, commercial spent fuel reprocessing never took place on a significant scale in the United States. As a result, spent nuclear fuel is being stored at power plant sites pending disposal. Liquid high-level waste from defense-

[52]Prepared by Mark Holt, Specialist in Energy Policy, Resources, Science, and Industry Division

related reprocessing is stored in tanks and bins at four DOE sites; special treatment plants will have to be constructed at each site to solidify the waste for transportation and disposal.

Methods for disposing of highly radioactive waste have been studied by DOE and its predecessor agencies since the early 1950s, including disposal in abandoned salt mines, subseabed burial, and launching into space. In 1970, the Atomic Energy Commission (AEC) issued a policy calling for the federal government to develop an underground high-level waste repository and charge a fee for disposal. A salt mine near Lyons, Kansas, was selected as the first repository site but the location quickly proved technically unsuitable. Numerous other sites were studied during the 1970s, but little progress was made toward opening a repository. Spent nuclear fuel began filling the storage pools at reactor sites, and nuclear utilities called for federal action to solve the problem.

In response, Congress enacted the Nuclear Waste Policy Act of 1982 (NWPA, P.L. 97-425), which required DOE to intensively investigate three candidate sites for the nation's first high-level nuclear waste repository. One of the sites was to be submitted to NRC for licensing, with disposal operations scheduled to begin by 1998. Utilities were required to sign disposal contracts with DOE and pay a fee into the newly established Nuclear Waste Fund. OCRWM was established to run the program.

After much controversy over DOE's implementation of NWPA, the Act was substantially modified by the Nuclear Waste Policy Amendments Act of 1987 (Title IV, Subtitle A of P.L. 100-203, the Omnibus Budget Reconciliation Act of 1987). Under the amendments, the only candidate site DOE may consider for a permanent high-level waste repository is at Yucca Mountain, Nevada. If that site proves unsuitable, DOE must return to Congress for further instructions.

Status

Despite the congressional mandate in 1987, progress on the proposed Yucca Mountain repository has fallen behind schedule. DOE delayed the scheduled opening of the repository to 2003 and then to 2010, a date considered optimistic by many.

Nuclear utilities, which have paid more than $9 billion into the Nuclear Waste Fund, have strenuously complained about DOE's failure to begin taking their spent fuel by NWPA's 1998 deadline. Because of the repository delays, many nuclear power plants are expected to require additional on-site storage capacity, typically consisting of metal or concrete casks. Owners of permanently shutdown reactors contend that DOE’s failure to remove spent fuel from the closed plant sites is forcing them to bear indefinite long-term storage costs.

Legislation has been considered in the past three Congresses to establish an interim storage facility at Yucca Mountain that could begin receiving spent fuel more quickly than the planned permanent repository. However, the proposal has been blocked by presidential veto threats. In response to utility lawsuits, DOE has offered to take ownership of waste at reactor sites and pay the costs of on-site storage, but no agreement has been reached.

Fossil Energy Research and Development[53]

Description and Budget

DOE's fossil energy research program is intended to develop new technologies for extracting and using coal, oil, natural gas, and other fossil fuels. The types of technologies under development include ultra-high efficiency coal combustion systems, new methods for producing liquid fuels from coal, and improved oil and gas production techniques. Appropriations for fossil energy programs totaled $384 million in FY1999, and the Administration requested $364 million for FY2000.

History

Research on coal technologies was conducted by the Department of the Interior until Congress transferred those activities to the newly established Energy Research and Development Administration (ERDA) in 1974. At the same time, the scope of fossil energy research was greatly expanded by the Federal Nonnuclear Research and Development Act of 1974 (P.L. 93-577), which also authorized major ERDA research efforts into renewable energy sources and other non-nuclear energy technologies. Those programs were transferred to DOE upon its establishment in 1977.

Because of the disruption of oil supplies during the 1970s, the federal fossil energy research program at that time focused largely on technologies to produce liquid fuels from coal and other solids, such as oil shale. A number of large demonstration projects were planned under the authority of the Nonnuclear Act. A perceived need to speed the commercial availability of alternative liquid fuels led to the establishment of the Synthetic Fuels Corporation (SFC) in 1980 by the Energy Security Act (P.L. 96-294). SFC was authorized to provide loan guarantees, price supports, and other assistance to private synthetic fuels ventures.

Under the Reagan Administration, federal support for fossil fuels technology demonstration and commercialization was greatly reduced, and several large DOE projects were canceled. Falling oil prices reduced the commercial viability of projects supported by SFC, prompting most private firms to abandon the pursuit of synthetic fuels. In late 1985, Congress abolished SFC but transferred $400 million of its authorized funding to the new Clean Coal Technology Reserve, the initial funding source for the Clean Coal Technology Program.

Status

Environmental issues, particularly global climate change concerns, have increasingly driven the budget priorities for DOE's fossil fuels research program in recent years. An emerging research area for the program is carbon sequestration,

[53]Prepared by Mark Holt, Specialist in Energy Policy, Resources, Science, and Industry Division.

including a wide range of technologies for the physical, chemical, and biological removal of carbon from the atmosphere.

The shift in focus to natural gas is based on the current outlook for fossil fuel availability and current prices, as well as environmental advantage versus coal or petroleum. Critics question the extent to which fossil fuel R&D should be based on current trends and natural gas viewed as a "transition fuel" to non-fossil fuels.

The Naval Petroleum Reserves[54]

Description and Budget

The National Defense Authorization Act for FY1996 (P.L. 104-106) authorized sale of the Naval Petroleum Reserve (NPR) oil field at Elk Hills. On February 5, 1998, Occidental Petroleum Corporation took title to Elk Hills and wired $3.65 billion to the U.S. Treasury. In anticipation of operating Elk Hills for only part of 1998, the Administration had requested $117 million for FY1998 and Congress approved $107 million. P.L. 104-106 also transferred most of two Naval Oil Shale Reserves to the Department of the Interior (DOI). DOE expects to spend $21.2 million during FY2000 from prior year funds and sought no new appropriation for the reserves operated by DOI.

History

The Naval Petroleum and Oil Shale Reserves were established in the early 1900s to assure availability of oil fuels for the Navy, which was converting its vessels from coal to oil prior to World War I. There was some production from the NPR during the 1920s, World War II, and the 1950s, but the Reserves had been essentially shut in for more than a decade when the Arab oil embargo was imposed in 1973. The embargo spurred some reassessment of NPR policy, and in 1976, Congress enacted the Naval Petroleum Reserves Production Act (P.L. 94-258). The Act ordered production from the fields at a maximum efficient rate (MER), and provided that NPR oil would be sold into the U.S. market.

The Bush and Reagan Administrations proposed that the U.S. divest itself of the NPR, both for budgetary reasons and on the grounds that it was inappropriate for the federal government to be in the oil business. The Clinton Administration and Congress agreed; legislative authorization for the sale was enacted in February 1996.

[54]Prepared by Robert L. Bamberger, Specialist in Energy Policy, Resources, Science, and Industry Division.

Energy Efficiency[55]

Description

DOE's energy efficiency R&D programs encompass a broad array of technology development activities, R&D partnerships with industry, and long-term research objectives that span all major sectors and end-uses including buildings, industry, transportation and utilities. Program spending has been controversial. The passage of the Energy Policy Act of 1992 (EPACT, P.L. 102-486) and a priority commitment to energy efficiency by the Clinton Administration had raised the spending levels for FY1994 and FY1995, but Congress trimmed the Administration's FY1996 request from $890 million to $537 million. The FY1999 appropriation was $692 million; the FY2000 request was $836 million.

History

In April 1973, President Nixon created an Office of Energy Conservation at the Department of the Interior (DOI) to "coordinate the energy conservation programs" of the federal government. In December 1973, the Federal Power Commission reported that federal research related to energy conservation represented less than 1% of all energy-related federal R&D programs, which stood at $731 million in FY1973. On May 7, 1974, Congress enacted the Federal Energy Administration (FEA) Act (P.L. 93-275), which transferred the functions of DOI's Office of Energy Conservation to the new FEA's Office of Energy Conservation and Environment. This included various regulatory functions as well as "promoting efficiencies in the use of energy resources." In October 1974, President Ford signed the Energy Reorganization Act, which created an Office for Energy Conservation as part of the new Energy Research and Development Administration (ERDA). ERDA included conservation as an "afterthought," but the 1976 National Energy Plan elevated it to the highest national priority, matching that for energy supply options. ERDA conservation functions were transferred along with others when DOE was established in 1977. The mandate for conservation was broadened to include "maximum possible measures" in federal agencies, highest priority for a "comprehensive energy conservation strategy," and "optimal development" of programs.

In 1995 dollars, conservation R&D funding grew steadily from $5 million in FY1974 until spending peaked in FY1979 at $682 million. Funding plunged to $137 million by FY1982, then climbed gradually to $240 million in FY1991. It then increased sharply reaching a recent peak of $441 million for FY1995. From the early, short-term focus on voluntary and regulatory measures, the program has broadened to include a wide range of technology development and industry partnerships such as hydrogen-powered fuel cell vehicles and the Partnership for a New Generation of Vehicles (PNGV). A growing number of environmental laws, such as the Clean Air Act, and international treaties, such as the Framework Convention on Climate

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[55]Prepared by Fred J. Sissine, Specialist in Energy Science Technology and Policy, Resources, Science and Industry Division.

Change, rely on energy efficiency measures as a key part of pollution prevention strategies.

Current Status

By far, the largest conservation R&D effort is focused on transportation, particularly the development of electric and hybrid vehicles and the production of alternative fuels to combat oil import vulnerability and air pollution problems. The bulk of industrial R&D programs are aimed at reusing waste heat and minimizing energy and materials use to support energy productivity, competitiveness and environmental goals. The buildings R&D programs emphasize technology development for building construction and end-use equipment to support energy productivity and environmental goals.

The Strategic Petroleum Reserve[56]

Description and Budget

The Strategic Petroleum Reserve was authorized in late 1975 by the Energy Policy and Conservation Act (P.L. 94-163) to create a stockpile of crude oil that could be sold into U.S. markets in the event of a disruption in imported supply. Oil being such a vital commodity to the U.S. economy, there were parallel hopes that an SPR of ample inventory would discourage the use of oil as a political weapon, and that its sale during an interruption would blunt rises in the price of oil. Purchases of oil for the SPR were suspended beginning in FY1995. Spending priorities shifted to replacing or upgrading equipment and infrastructure that is nearing the end of its useful life.

After funding the Strategic Petroleum Reserve program from sales of SPR oil in FY1997 and FY1998, the 105th Congress approved a conventional appropriation of $160.1 million for the program in FY1999. This followed the cancellation of another authorized sale. In all, roughly 28 million barrels of SPR oil were previously sold to finance maintenance and upgrade of SPR facilities.

The Administration requested $164 million for FY2000, a slight increase over FY1999 to support operations, maintenance and security.

History

Fill of the SPR was initiated in 1978, but acquisition of oil for it has followed a peripatetic course. Oil purchases were suspended to ease buying pressures on oil markets after the Shah of Iran was deposed. Congress insisted that fill be resumed at a minimum of 100,000 b/d in the Energy Security Act (P.L. 96-294). During the earliest years of the Reagan Administration, the fill rate approached 300,000 b/d, but had declined to roughly one-tenth that rate by the early 1990s.

The priority of the SPR declined during the 1990s as a number of developments intersected: (1) a consensus to cut federal spending; (2) declining likelihood of crippling oil supply interruptions; (3) unregulated oil markets which appear to operate efficiently and effectively in allocating and pricing oil; (4) a developing consensus that, at nearly 600 million barrels, the SPR is probably an adequate level of insurance; and (5) that the cost/benefits tradeoff were seen not to justify financing additional fill under present market and world conditions.

There were also plans at one time to expand the SPR beyond its current capacity of 750 million barrels, but there is no interest in doing so at this time.

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[56]Prepared by Robert L. Bamberger, Specialist in Energy Policy, Resources, Science and Industry Division.

Energy Information Administration[57]

Description and Budget

The Energy Information Administration, a semi-independent agency of the Department of Energy, collects and analyzes data on all forms of energy production and consumption in the United States and, to a lesser extent, worldwide. In FY1999, $70.5 million was appropriated for EIA; the FY2000 request was $72.6 million.

History

Although some government energy data collection, especially in electric power and natural gas, has a long history, the 1973 oil crisis stimulated a major effort to extend and consolidate information about energy, and especially about petroleum. The 1974 Federal Energy Administration (FEA) Act gave the Administrator of the new agency authority to gather information from energy producing and consuming firms, and the 1976 Energy Conservation and Production Act created an Office of Energy Information and Analysis (OEIA) within FEA. In 1977 the DOE Organization Act established EIA as the single government authority for energy information, and gave it independence from DOE regarding data collection and from the whole of government respecting the content of its reports. It also transferred all the mandates from OEIA, as well as electric power and natural gas information from the Federal Power Commission.

The consolidation of all these functions, and the high policy profile of energy issues and legislation in the years following DOE's formation, caused a major expansion in EIA's budget, which reached $116 million in FY1981. Also uncovered were some difficulties.

One problem was the contrast between data collected for statistical policy guidance and that collected for regulatory purposes. In regulation, of which there was a major increase following passage of the many energy statutes of the 1970s, the need is for information on individuals and firms; most statistical series, on the other hand, depend on sampling and aggregating data, and often seek to suppress individual data to protect privacy and encourage cooperation.

Another problem lay in guaranteeing the reliability of the data. Statutory insistence on EIA's independence gained support from suspicions that earlier agencies had been influenced by Administration policy makers. However, as long as energy issues remained active and emotional, the agency's products were questioned when they did not support one position or another.

A third difficulty arose from EIA's independence, which tended to isolate its output from that of other agencies, leading to some difficulty in compatibility and comparison.

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[57]Prepared by Carl E. Behrens, Specialist in Energy Policy, Resources, Science and Industry Division.

Current Status

The decline in energy regulatory policies and statutes has reduced EIA's burden significantly, and the lack of an energy crisis after the early 1980s lessened the concern with EIA's impartiality while allowing it to extend the time line of its historical data series, many of which had been started only after the 1973 oil embargo. When the 1990 Gulf War stimulated legislative interest in energy again, the resulting Energy Policy Act of 1992 merely added a number of new data series, such as energy consumption, alternative fuels, and greenhouse gas emissions, to EIA's mandate.

Despite the lessened urgency of demand for energy data, however, EIA continues with a smaller budget to collect and analyze a massive amount of energy-related information. Using 75 different data-collection forms, it produces two weekly, seven monthly, three quarterly and 38 annual data series publications, in addition to many one-time studies and publications. It also maintains and operates 51 computer models to help it project and analyze energy production and use.