

Issue Brief for Congress

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Energy Efficiency: Budget, Oil Conservation, and Electricity Conservation Issues

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SUMMARY

Energy security, a major driver of federal energy efficiency programs in the past, came back into play as oil and gas prices rose late in the year 2000. The terrorist attack of September 11, 2001, heightened concern for energy security and raised further concerns about the vulnerability of energy infrastructure. Further, the 2001 electricity shortages in California brought a renewed emphasis on energy efficiency and energy conservation to dampen electricity demand.

Also, worldwide emphasis on environmental problems of air and water pollution and global climate change, and the related development of clean energy technologies in western Europe and Japan, may remain important influences on energy efficiency policymaking. Concern about technology competitiveness may also remain a factor in the debate.

In the 107th Congress, debate over energy efficiency programs focused on the budget, oil and electricity issues, and provisions in the omnibus energy policy bill, H.R. 4.

The Bush Administration's FY2003 budget request for the Department of Energy's (DOE's) Energy Efficiency Program sought \$901.6 million. The Consolidated Appropria-

tions Resolution for FY2003 (P.L. 108-7, H.J.Res. 2) contains \$897.6 million for the DOE Energy Efficiency Program, which is \$4.0 million less than the request. Compared to FY2002, the FY2003 level cuts \$15.2 million, or 2%, excluding inflation.

The Bush Administration's FY2004 budget request for the Department of Energy's (DOE's) Energy Efficiency Program seeks \$875.8 million, an \$21.8 million (2%) overall decrease relative to the FY2003 appropriation. The main proposed increases are \$63.2 million for Weatherization grants and \$29.5 million for Fuel Cell Vehicles. The request reduces R&D by \$79.7 million, with proposed cuts that include \$62.7 million for Industry programs, \$18.9 million for Power Technologies, and \$9.6 million for Buildings Equipment.

In the 107th Congress, both the House and Senate versions of Omnibus Energy Bill (H.R. 4) had provisions to authorize funding for R&D and grants. The bills differed over provisions for an efficiency standard for central air conditioners, energy efficiency in housing, and programs for exports and international technology deployment.



MOST RECENT DEVELOPMENTS

On February 20, 2003, the Consolidated Appropriations Resolution (H.J.Res. 2) was signed into law as P.L. 108-7 (H.Rept. 108-10). For DOE's Energy Efficiency Program, it appropriates \$897.6 million (excluding the possible application of a 0.65% across-the-board reduction), which is \$15.2 million less than the FY2002 appropriation. This includes \$5.0 million less for Grants and \$18.2 million less for R&D.

Under the Foreign Operation, Export Financing, and Related Programs Appropriations Bill (H.Rept. 108-10, Sec. 555, p. 192), P.L. 108-7 also contains \$175 million for new "Energy Conservation, Energy Efficiency, and Clean Energy Programs" to reduce greenhouse gas emissions and other environmental problems in developing countries.

On February 3, 2003, the Bush Administration issued its FY2004 budget request. For DOE's Energy Efficiency Program, it seeks \$875.8 million, which is \$21.8 million, or 2%, less than the FY2003 appropriation, not including inflation. It contains \$57.0 million more for Grants and \$79.7 million less for R&D. It also includes \$29.5 million more for Fuel Cell Vehicles for the first year of the President's five-year Hydrogen Initiative and \$9.5 million for a new National Climate Change Technology Initiative. The request presents a new budget structure.

(The DOE FY2004 Budget Request is available on the DOE web site [<http://www.cfo.doe.gov/budget/04budget/index.htm/>]; and the EPA FY2004 Annual Performance Plan and Congressional Justification is available on the EPA web site [<http://www.epa.gov/ocfo/budget/2004/2004cj.htm>] .)

BACKGROUND AND ANALYSIS

Energy Efficiency Concept

Energy efficiency is increased when an energy conversion device, such as a household appliance, automobile engine, or steam turbine, undergoes a technical change that enables it to provide the same service (lighting, heating, motor drive) while using less energy. The energy-saving result of the efficiency improvement is often called "energy conservation." The energy efficiency of buildings can be improved through the use of certain materials such as attic insulation, components such as insulated windows, and design aspects such as solar orientation and shade tree landscaping. Further, the energy efficiency of communities and cities can be improved through architectural design, transportation system design, and land use planning. Thus, energy efficiency involves all aspects of energy production, distribution, and end-use.

These ideas of "efficiency" and "conservation" contrast with energy curtailment, which involves a decrease in output (e.g., turning down the thermostat) or services (e.g., driving less) to curb energy use. That is, energy curtailment occurs when saving energy causes a

reduction in services or sacrifice of comfort. Curtailment is often employed as an emergency measure.

Energy efficiency is often viewed as a resource option like coal, oil or natural gas. In contrast to supply options, however, energy efficiency puts downward pressure on energy prices by curbing demand instead of by increasing supply. As a result, energy efficiency can reduce resource use and effects on the environment. (See CRS Report RL31188, *Energy Efficiency and the Rebound Effect*.)

History

From 1974 through 1992, Congress established several complementary programs, primarily at the Department of Energy (DOE), to implement energy saving measures in virtually every sector of societal activity. These energy efficiency and energy conservation programs were created originally in response to national oil import security and economic stability concerns. In the early 1980s, states and utilities took an active role in promoting energy efficiency as a cost-saving “demand-side management” tool for avoiding expensive powerplant construction. Since 1988, national interest in energy efficiency has focused increasingly on energy efficiency as a tool for mitigating environmental problems such as air pollution and global climate change. This aspect spawned new programs at DOE and at several other agencies including the Environmental Protection Agency (EPA), the Agency for International Development (AID), and the World Bank’s Global Environment Facility (GEF). Energy efficiency is increasingly viewed as a critical element of sustainable development and economic growth.

The DOE energy efficiency program includes R&D funding, grants to state and local governments, and a regulatory framework of appliance efficiency standards and voluntary guidelines for energy-efficient design in buildings. In addition, its budget supports regulatory programs for energy efficiency goals in federal agencies and standards for consumer products. (Detailed descriptions of DOE programs appear in DOE’s *FY2003 Congressional Budget Request*, DOE/ME-0007, v. 5, February 2002; which appears at [<http://www.cfo.doe.gov/budget/03budget/index.htm>]

From FY1973 through FY1998, DOE spent about \$8.5 billion in 2002 constant dollars for energy efficiency R&D, which amounts to about 10% of the total federal spending for energy supply R&D during that period. In 2002 constant (real) dollars, energy efficiency R&D funding declined from \$795 million in FY1979 to \$227 million in FY1988 and then climbed to \$556 million in FY1994. For FY2001, \$633 million was appropriated, which is \$77 million, or 14%, above the FY1994 mark in 2002 constant dollars. Also, in 2002 constant dollars, since FY1973, DOE has spent about \$7.4 billion on grants for state and local conservation programs.

This spending history can be viewed within the context of DOE spending for the three major energy supply R&D programs: nuclear, fossil, and renewable energy R&D. From FY1948 through FY1972, in 2002 constant dollars, the federal government spent about \$23.9 billion for nuclear (fission and fusion) energy R&D and about \$5.4 billion for fossil energy R&D. From FY1973 through FY2002, the federal government spent \$49.1 billion for nuclear (fission and fusion), \$24.8 billion for fossil, \$14.2 billion for renewables, and \$11.1

billion for energy efficiency. Total energy R&D spending from FY1948-FY1998, in 2003 constant dollars, reached \$128.9 billion, including \$73.4 billion, or 57%, for nuclear, \$30.2 billion, or 23%, for fossil, \$14.2 billion, or 11%, for renewables, and \$11.1 billion, or 9%, for energy efficiency.

Since 1985, national energy use has climbed about 20 Q (quads — quadrillion Btus, British thermal units), reaching a record high of 99 Q in 2000. DOE's 1995 report *Energy Conservation Trends* finds that energy efficiency and conservation activities from 1973 through 1991 curbed the pre-1973 growth trend in annual primary energy use by about 18 Q, an 18% reduction. In 1992, this was saving the economy about \$150 billion annually in total U.S. energy expenditures, a one-fourth reduction from the previous trend. Further, assuming fossil and other fuels were displaced in proportion to their actual use in 1992, then energy efficiency and conservation were providing about 300 million metric tons of carbon (MMTC) emission reductions that year.

DOE's Strategic and Performance Goals

In 2002, the Office of Energy Efficiency and Renewable Energy (EERE) completed a major re-organization. The number of deputy assistant secretaries is reduced from five to two, the number of offices shrinks from 19 to 14 (11 program and 3 business) and includes new offices for FreedomCAR & Vehicle Technologies and for Hydrogen, Fuel Cells and Infrastructure, and the number of programs is reduced from 31 to 11. The new management strategy is put forth by Assistant Secretary David Garman in *Focused on Results: A New Government Business Model*, available at [http://www.eren.doe.gov/eere/pdfs/eere_reorg.pdf]. More information about EERE is available on the DOE web site [<http://www.eren.doe.gov/eere/organization.html>].

A National Research Council report, *Energy Research at DOE: Was it Worth It?*, found that from 1978 to 2000 an investment of about \$8 billion in DOE's Energy Efficiency Programs produced an economic return of at least \$30 billion. Areas found short of expected benefits lacked incentives needed for private sector adoption.

The President's Management Agenda set out the Bush Administration's framework for performance management based on human capital, competitive sourcing, financial performance, electronic government, and integration of budget with performance. The Government Performance and Results Act (GPRA, P.L. 103-62) requires each federal agency to produce and update a strategic plan linked to annual performance plans.

In DOE's *Strategic Plan of September 2000*, energy efficiency objectives and strategies appear under strategic goal #1, "Energy Resources." In the *DOE Annual Performance Plan for FY2003*, energy efficiency is addressed under the Energy Resources goal by two strategic objectives: ER1, Management of Energy Intensity, and ER3, Weatherization of Low Income Homes. From 2000 to 2020, ER1 seeks to reduce the oil intensity of energy use in the U.S. economy by 2% over a baseline of 23%, reduce energy intensity per unit of Gross Domestic Product (GDP) by 4% over a baseline of 28%; and reduce the need for new electricity generating capacity by 10% from the baseline projection. From 2003 through 2005, ER3 seeks to weatherize at least 123,000 households per year.

Energy Efficiency in Omnibus Energy Bills, 107th Congress

On June 27, 2002, the conference committee for the omnibus energy bill, H.R. 4, began work. Both bills have provisions for R&D funding and grant programs, but have major differences in their coverage of these and some other energy efficiency policy areas. (A side-by-side comparison of the two versions of H.R. 4 appears in CRS Report RL31427, *Omnibus Energy Legislation*.)

Much of the legislative action on energy efficiency is focused on the House and Senate versions of the omnibus energy policy bill, H.R. 4. The House version (Securing America's Future Energy Act) includes energy efficiency provisions that are taken directly from H.R. 2436, H.R. 2460, H.R. 2511, and H.R. 2587 and contain many recommendations from the Bush Administration's *National Energy Policy* report. The Senate version of H.R. 4 (Energy Policy Act) incorporates S.Amdt. 2917 to S. 517 which, in turn, replaces S. 1766. Many energy efficiency provisions of the Senate version are derived from S. 388, S. 389, S. 596, and S. 597.

Both versions of H.R. 4 have provisions that authorize funding for energy efficiency R&D and grant programs, create a lighting technology initiative, propose efficiency measures for standby power in appliances, and set goals for efficiency in federal buildings. However, there are major differences. For example, the House version would allow federal agencies to form energy saving performance contracts with utilities and provide statutory authority for a DOE distributed power hybrid systems program; the Senate version would set a higher standard for efficiency in central air conditioners, propose greater incentives for housing programs, and authorize new export and international deployment programs. (A side-by-side comparison of provisions in the two versions of H.R. 4 appears in CRS Report RL31427, *Omnibus Energy Legislation*. Provisions of the House version of H.R. 4 are described in CRS Report RL31153. Provisions of S. 1766 are described in CRS Report RL31276. A comprehensive list of bills appears in CRS Report RL31127, *Energy Efficiency and Energy Conservation Legislation in the 107th Congress*.)

Efficiency Goals for Federal Buildings

The purpose of federal efficiency goals is to lead by example in saving energy, reducing costs, and helping transform markets for new equipment. The House version (§121) and Senate version (§911) differ over federal building goals, measured in energy use per square foot (sf). The past goal called for a 20% reduction from 1985 to 2000. Relative to 1985, Executive Order 13123 directs agencies to achieve another 15% reduction (to 35%) by 2010. Relative to 2000, EO13123's 35% reduction goal equates to a reduction of 18.8% by 2010. The House version adopts this goal for 2010 and directs a further 10% drop (from 35% to 45%) relative to the 1985 baseline for 2020. The Senate version would make 2000 the new baseline year, and calls for an 18% reduction by 2010 (equivalent to 33.6% relative to 1985) and a 20% reduction by 2011 (or 37.3% relative to 1985). DOE says that moving the baseline year from 1985 to 2000 offers analytical and administrative advantages, because agencies are more electricity intensive and the composition of buildings has changed due to certain agency and military base closings. P.L. 100-615 had updated the baseline year from

1975 to 1985. The Conference Committee on H.R. 4 has not reached an agreement on efficiency goals for federal buildings.

Also, the House version (§128) and Senate version (§919) have provisions for congressional buildings, which the record shows have had less focus on energy goals than those in the executive branch. The House version calls for a study of the potential for energy efficiency and renewables to increase reliability during a power outage. The Senate version calls for implementation of a plan for congressional buildings to meet the goals for federal agencies noted above. It also calls for use of efficiency and renewables in the new Capitol Visitor Center. In Conference Committee action on H.R. 4, the House receded and accepted the Senate provision with an amendment adding the House provision and deleting the Senate mandate involving the Capitol Visitor Center.

Tax Incentives

The Senate version, which incorporated S. 1979 (Energy Tax Incentives Act, Title III; S.Rept. 107-140), has nearly \$2 billion in energy efficiency and conservation tax incentives, out of a \$15 billion total for energy tax incentives. The House version (Division C, Title I) has about \$5 billion in efficiency tax measures out of a \$36 billion total for energy tax incentives. The bills have somewhat different provisions for new homes, existing homes, appliances, and energy management devices; but nearly identical provisions for residential solar equipment, business fuel cells, and combined heat and power (CHP). Also, both bills have tax incentives for alternative fuel vehicles and equipment. The Conference Committee on H.R. 4 has not reached an agreement on tax provisions.

On March 9, 2002, the Job Creation and Worker Assistance Act of 2002 (P.L. 107-147, H.R. 3090) was enacted. Section 602 extends a tax credit for electric vehicles and Section 606 extends a tax deduction for clean fuel vehicle property.

Air Conditioner Efficiency Standard

The efficiency of this equipment is measured in terms of the Seasonal Energy Efficiency Ratio or "SEER." A higher SEER value indicates higher efficiency. A SEER value of 10 took effect in 1992.

The Bush Administration stopped a DOE rule by the Clinton Administration that would have raised the SEER from 10 to 13 by the year 2005. In July 2001, the Bush Administration proposed a new rule with a SEER of 12. On May 23, 2002, DOE published a final rule for the SEER of 12 that would take effect in January 2006. A group of five states (California, Connecticut, Maine, New York, and Vermont), two manufacturers (Goodman Manufacturing and Goettl Air Conditioning), and several environmental and low-income advocacy groups have challenged DOE's proposed SEER 12 in the U.S. Court of Appeals for the Second Circuit. The case is cited as: *Natural Resources Defense Council v. Abraham*, No. 10-4102 (2d Cir. filed June 19, 2001). Oral arguments are scheduled for January 2003.

The House version of H.R. 4 (§124) and the Senate version (§927) had markedly different provisions for a new efficiency standard for central air conditioners and heat pumps. The Senate version (§927) directed DOE to amend the national energy efficiency standard for central air conditioners and heat pumps within 60 days after enactment. In sharp contrast,

the House provision (§124) was restricted to requiring only that federal agencies acquire central air conditioners and heat pumps with a SEER 12, where they are cost-effective. The Conference Committee on H.R. 4 decided to let the federal circuit court decide whether a SEER of 12 or 13 should be in place.

DOE Budget, FY2004

The Budget Appendix to the U.S. Government's FY2004 Budget (p. 378) notes that "[t]he Administration's energy efficiency programs have the potential to produce substantial benefits for the Nation ... in terms of economic growth, increased energy security and a cleaner environment." Specifically, it says that "[t]he 2004 budget proposes a major new initiative to accelerate the worldwide availability and affordability of hydrogen-powered fuel cell vehicles." Also, it says the proposed National Climate Change Technology Initiative "... has as its primary goal the reduction of greenhouse gas emissions ... " According to the Budget Highlights of the DOE request (p. 100), the "request presents a new budget structure that mirrors the new organizational structure. In addition, the budget shifts reflect application of the R&D Investment Criteria and the Program Assessment Rating Tool developed as part of the *President's Management Agenda*."

DOE Budget, FY2003

The House-passed FY2003 Interior and Related Agencies Appropriations Bill (H.R. 5093) recommends \$984.6 million for DOE's Energy Efficiency Program. Floor amendment No. 8 (Sanders) added \$3.0 million to the Energy Star Program, offset by a general reduction for DOE. The House-passed total is \$71.8 million more than the FY2002 appropriation and \$83.0 million more than the request. The Senate Appropriations Committee bill (S. 2708) recommends \$921.7 million. This is \$8.9 million more than the FY2002 appropriation and \$20.1 million more than the request. H.R. 5093 recommends \$62.9 million more than S. 2708, including \$51.7 million more for R&D and \$14.2 million more for grants. (See Table 2 for details.)

On February 28, 2002, the House Appropriations Committee's Subcommittee on Interior Appropriations held a hearing on the FY2003 request for the DOE Energy Efficiency Program. Most questions focused on funding for transportation programs and the need to reduce national oil dependence. For example, DOE explained that the new FreedomCAR Program builds on results from the Partnership for a New Generation of Vehicles (PNGV) and has a goal to accelerate the development of fuel cell technology, expecting that it would lead to commercial vehicles during the period from 2010 to 2020. A concern was raised that this time frame would not help reduce oil use in the shorter term. Also, a concern was expressed about the Administration's proposed spending cuts for the Hybrid Vehicle and Electric Vehicle programs. DOE said it expects that hybrid cars will enter the commercial market in 2003 and, thus, the need for support is shifting away from research and development and toward tax credits and market incentives.

The Budget Appendix to the U.S. Government's FY2003 Budget (p. 403) notes that DOE's "energy efficiency programs produce substantial benefits for the Nation." However,

the Administration stresses that the FY2003 budget proposes shifts that reflect findings of the *National Energy Policy Report* and the *President's Management Agenda*. According to the Budget Highlights of the DOE request (p. 103), the "Energy Efficiency [Office] will terminate projects that provide insufficient public benefit, redirect activities to better provide public benefits, place certain activities on a watch list to ensure they advance effectively, and expand several programs that could achieve significantly increased benefits with additional funding."

The Administration's FY2003 budget request for DOE's Energy Efficiency Program proposes to decrease funding from \$912.8 million in FY2002 to \$901.6 million in FY2003, a reduction of \$11.2 million (1%) below the FY2002 level. This nearly flat total budget request includes some significant program funding changes. While grants would increase by \$40.9 million, R&D would fall by \$52.1 million.

For further information on the *Energy Conservation Budget*, see the web site at [<http://www.mbe.doe.gov/budget/03budget/>]. For further information on *Energy Conservation Programs*, see the Web site at [<http://www.eren.doe.gov/>].

EPA Budget, FY2004

The FY2004 request for EPA's CPP Programs is \$116.6 million, which would be a \$1.4 million increase over the FY2003 appropriation. For specific programs, the request includes \$1.5 million less for Buildings and \$0.5 million less for International Capacity Building. It also includes \$1.4 million more for Transportation and \$0.8 million more for Industry.

Table 1. EPA Funding for Climate Protection Energy Efficiency Programs (CPP)
(\$ millions current)

	FY2001 Enacted	FY2002 Enacted	FY2003 Request	FY2003 Conf.	FY2004 Request	FY2004 -FY2003
CPP Buildings	52.5	48.6	49.8	49.8	48.3	-1.5
CPP Transportation	29.4	30.8	21.6	21.6	22.9	1.4
CPP Industry	31.9	25.4	25.7	25.7	26.4	0.8
CPP Carbon Removal	1.0	1.5	1.6	1.6	1.7	0.2
CPP State & Local	2.5	2.2	2.3	2.3	2.6	0.3
CPP Int'l Capacity	5.5	7.0	7.1	7.1	6.6	-0.5
CPP Int'l Partnerships	----	----	----	----	----	----
CPP Int'l Tech. Coop'n	0.8	----	----	----	----	----
CPP Other	-----	8.4	7.2	7.2	8.0	0.7
CPP, SUBTOTAL	123.6	123.9	108.1	115.2	116.6	1.4
Climate Change Rsch	22.6	21.4	21.7	21.7	21.5	-0.2
TOTAL	146.2	145.3	129.8	137.0	138.1	1.2

Source: EPA FY2004 Congressional Justification, p. VI-28; H.Rept. 108-10 (Cong. Rec. Feb. 12, 2003, p. H1087).

EPA conducts its CPP programs under the Office of Environmental Programs and Management (EPM) and the Office of Science and Technology (S&T). EPA's CPP programs are focused primarily on deploying energy-efficient technologies. These programs include Green Lights, Energy Star Buildings, Energy Star Products, Climate Wise, and Transportation Partners. They involve public-private partnerships that promote energy-efficient lighting, buildings, and office equipment. Efforts also include information dissemination and other activities to overcome market barriers.

Energy Security

The terrorist attacks of September 11, 2001, have focused national attention on developing a strategy to address the vulnerabilities of energy systems and other essential services. The President's proposal for a Department of Homeland Security (as well as a previous Executive Order on *The Office of Homeland Security (OHS) and the Homeland Security Council*) calls for measures to protect energy infrastructure, including power plants, transmission lines, oil refineries, oil storage tanks, oil and natural gas pipelines, and other energy infrastructure. By reducing the demand for fuels and electricity, energy efficiency measures may contribute to energy security by slowing growth in the number of energy facilities and amount of other energy infrastructure.

Further, the development of small, modular "distributed energy" systems (also referred to as distributed generation and distributed power) under DOE's program may help reduce the security risk by decentralizing energy facilities and establishing some facilities off-grid. Also, the "response and recovery" element calls on OHS to "... ensure rapid restoration of transportation systems, energy production, transmission, and distribution systems. ..." The deployment of smaller, highly mobile distributed energy equipment may help address this aspect of energy security. Several bills, including the House and Senate versions of H.R. 4, have provisions for distributed energy. (For more on distributed energy see the DOE web site at [http://www.eren.doe.gov/EE/power_distributed_generation.html] and at [<http://www.eren.doe.gov/distributedpower/>].)

Oil Conservation

Energy efficiency measures to curb oil demand, and other oil conservation measures, may help address economic issues such as high gasoline prices and oil import dependence and environmental issues such as air pollution, climate change, and the proposal to develop oil in the Arctic National Wildlife Refuge (ANWR).

For the ANWR issue, technology-driven improvements to the fuel economy of cars and light trucks – without any change to the Corporate Average Fuel Economy (CAFE) standard – might save more fuel than would likely be produced by oil drilling in ANWR, although the two options are not mutually exclusive. The Energy Information Administration (EIA) says that a technology-driven projection for cars and light trucks could increase fuel economy by 3.6 mpg by 2020. Through the first 20 years, this increase would generate oil savings equivalent to four times the low case and three-fourths of the high case projected for ANWR oil production. Extended through 50 years, the fuel economy savings would range from 10

times the low case to more than double the high case for ANWR. (For more information on this issue, see CRS Report RL31033, *Energy Efficiency and Renewable Energy Fuel Equivalents to Potential Oil Production from the Arctic National Wildlife Refuge*).

The House debated a provision in H.R. 4 (Division A, Section 201) that proposes to increase CAFE for new light trucks by an amount necessary to save five billion gallons of gasoline by 2010. This fuel-saving goal would likely require fuel economy to rise from the current standard of 20.5 miles per gallon (mpg) to a level that is one to three mpg higher. The Conference Committee on H.R. 4 agreed to the five billion gallon House proposal over a ten-year period through 2012. It also agreed to a flexible fuel vehicle CAFE credit that some say would more than offset the provision for saving five billion gallons of gasoline. CAFE is a key federal regulatory policy aimed at a gradual ramp-up of fuel efficiency for newly manufactured cars and light trucks. The national fleet fuel economy for cars declined from 21.6 mpg in 1998 to 21.4 mpg in 1999 and that for light trucks declined from 17.4 in 1993 to 17.1 in 1999. The present CAFE standard for new cars is 27.5 mpg. (For more on CAFE standards, see CRS Issue Brief IB90122, *Automobile and Light Truck Fuel Economy: Is CAFE up to Standards?*)

In the January 2003 State of the Union Speech, President Bush announced \$720 million in new funding for the “Freedom Fuel Initiative” to accelerate the use of fuel cells for transportation and power generation. It builds on the Freedom Cooperative Automobile Research (FreedomCAR) Program launched in early 2002 by the Bush Administration to replace the Clinton Administration’s Partnership for a New Generation of Vehicles. FreedomCAR creates a partnership with the auto industry to develop a fuel-cell-powered vehicle that would attain commercial use during 2010 to 2020. This program is funded primarily by DOE’s Energy Efficiency Program for Transportation (see Table 2), but includes some funding from several other agencies. (For more details on PNGV see CRS Report RS20852, *The Partnership for a New Generation of Vehicles: Status and Issues.*)

Oil use for gasoline, home heating, and other applications makes it important to the transportation and production sectors of the nation’s economy. Thus, fluctuating oil prices and dependence on imported sources can create economic vulnerabilities. Also, oil use has important environmental impacts. Its extraction and transport can lead to spills that pollute land and water. Further, oil-based fuels, such as gasoline, generate sulphur dioxide and other air pollutants as well as large amounts of carbon dioxide that contribute to climate change.

U.S. oil use accounts for about 23% (1998) of the world’s oil consumption and about 39% (2000) of total U.S. energy use. The nation uses about 17.2 million barrels of oil per day (mb/d), of which about 11.5 mb/d is used for transportation, including 3.8 mb/d for cars and 2.5 mb/d for light trucks (which include pickups, minivans, and sport utility vehicles).

Oil use in transportation can also be reduced through short-term conservation measures such as increased use of public transit, carpooling and ridesharing, and telecommuting; and through curtailment (e.g. driving less) and substitution of alternative fuels. Other measures can help reduce non-transportation oil uses. For example, home improvement measures such as insulation, energy-efficient windows, and weatherization measures can reduce the use of home heating oil.

Climate Change: Energy Efficiency's Role

Under the FY2003 Foreign Operations, Export Financing, and Related Programs Appropriations Bill in the 107th Congress, the Senate Appropriations Committee recommended (S.Rept. 107-219) \$175 million under Development Assistance in a new fund for “energy conservation, energy efficiency, and clean energy” in developing countries. In contrast, the House Appropriations Committee recommended (H.Rept. 107-663) \$3 million for this clean energy fund.

Energy efficiency is seen as a key means to reduce fossil fuel-induced carbon dioxide (CO₂) emissions that may contribute to global climate change. Thus, recent debates over the U.S. role in the Kyoto Protocol and related international negotiations to curb global emissions of greenhouse gases tend to be reflected in deliberations over federal funding and incentives for energy efficiency.

In fulfilling requirements under the United Nations Framework Convention on Climate Change (UNFCCC), in June 2002, EPA issued the third U.S. climate report to the United Nations entitled *Climate Action Report 2002*. In it, the Bush Administration commits to reducing greenhouse gas intensity (emissions per unit of GDP) by 18% (4% more than under existing policies) over 10 years through a combination of voluntary, incentive-based, and existing mandatory measures focused on energy efficiency and other measures. This is projected to attain a 4.5% reduction from forecast emissions in 2012. The Administration has proposed this policy in place of the Kyoto Protocol, which it opposes due to concerns that it could raise energy prices and slow economic growth. Further, the Administration has stated its intent to support funding for energy efficiency and renewable energy programs at DOE and at the Global Environment Facility.

The 2001 *White House Initial Review on Climate Change* cites an existing array of energy efficiency and other programs that support goals of the UNFCCC and refers to the National Energy Policy (NEP) report's provisions for CHP, CAFE, Energy Star, and other energy efficiency policies as part of the foundation for its strategy to curb greenhouse gas (GHG) emissions.

The Kyoto Protocol had called for the United States to cut GHG emissions to 7% below the 1990 level during the period from 2008 to 2012. At the Seventh Conference of Parties (COP-7) in 2001, the United States was accused of avoiding real efforts to reduce emissions, through energy efficiency and other means, in order to address the Kyoto Protocol. At COP-8 in 2002, the parties resolved to continue efforts to ratify the Protocol and meet its goals.

DOE's 2000 report *Scenarios for a Clean Energy Future* shows the potential for advanced energy efficiency and other measures to cut two-thirds of the projected U.S. carbon emissions growth by 2010 and to cut emissions to the 1990 level by 2020. Assuming no major future policy actions, the reference case scenario in the EIA's December 2000 *Annual Energy Outlook 2001* projects 2010 emissions will be 34% higher than that for 1990. DOE's 1995 report *Energy Conservation Trends* shows that energy efficiency has reduced long-term rates of fossil energy use and thereby curbed emissions of CO₂ significantly. (For more details about the potential for energy efficiency to reduce CO₂ emissions, see CRS Report RL30414, *Global Climate Change: The Role for Energy Efficiency*.)

Electric Industry Restructuring and Conservation

There is a debate over the federal role in restructuring generally and in creating incentives to ensure a continuing role for energy efficiency specifically. The recent electricity problems in California, combined with the prospect of similar problems in other western states and the Northeast, raised the issue of whether a federal role is needed to encourage demand-side energy efficiency and load management measures. A June 2002 report (#49733) by the Lawrence Berkeley National Laboratory, *California Consumers Kept Lights on During Electricity Crisis by Conserving and Investing in Efficient Equipment*, found that conservation and efficiency measures reduced summer 2001 peak demand by 10%, increased system reliability, avoided some wholesale power purchases, and avoided \$2 billion to \$20 billion in potential losses from rolling blackouts. Some provisions in H.R. 4 would increase the energy efficiency of buildings, appliances, or other equipment that would reduce electric power demand or otherwise conserve electricity.

In the 1980s, many states and electric utility companies created demand-side management (DSM) programs to promote energy efficiency and other activities as a less costly alternative to new supply. DSM became a significant part of the nation's energy efficiency effort. Utility DSM spending peaked in 1994 at \$2.7 billion and DSM energy savings peaked in 1996 at 61 billion kilowatt-hours (which is equivalent to the output from 12 one-gigawatt powerplants).

After California issued its 1994 proposal for electric industry restructuring, many states and utilities reduced DSM efforts. By 1998, utility DSM spending had fallen to about \$1.4 billion. In response, some states, such as California, include provisions for energy efficiency and conservation in their restructuring legislation. For example, California's law (A.B. 1890, Article 7) placed a charge on all electricity bills from 1998 through 2001 that provided \$872 million for "cost effective" energy efficiency and conservation programs. Other states, such as Pennsylvania, have few if any provisions for energy efficiency.

(For a discussion of broader electricity restructuring issues, see CRS Electronic Briefing Book on *Electricity Restructuring* at [<http://www.congress.gov/brbk/html/ebele1.html>] and CRS Issue Brief IB10006, *Electricity: The Road Toward Restructuring*.)

LEGISLATION

P.L. 108-7, Division E (H.J. Res. 2)

Consolidated Appropriations Resolution for FY2003. Foreign Operations, Export Financing, and Related Programs Appropriations, 2003, appears as Division E of the Resolution. Appropriates funding for renewable energy and energy efficiency under programs of the Global Environment Facility (GEF), U.S. Agency for International Development (AID), Overseas Private Investment Corporation (OPIC), and other bilateral and multilateral programs. Under Development Assistance, Section 555 appropriates \$175 million in a new account to create a fund for "energy conservation, energy efficiency, and clean energy" in developing countries. House passed as a continuing resolution, January 8, 2003. Senate inserted its amendment (S.Amdt 1) and issued an unnumbered committee print

(*Congressional Record*, p. S492) January 15, 2003. Passed Senate, amended, January 23, 2003. Conference reported (H.Rept. 108-10) February 13. Passed House and Senate February 13. Signed into law February 20, 2003.

P.L. 108-7, Division F (H.J. Res. 2)

Consolidated Appropriations Resolution for FY2003. Interior and Related Agencies Appropriations, 2003, appears as Division F of the Resolution and makes appropriations for DOE's Energy Efficiency program. Signed into law February 20, 2003.

P.L. 108-7, Division F (H.J. Res. 2)

Consolidated Appropriations Resolution for FY2003. Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations, 2003, appears as Division F of the Resolution. It includes appropriations for EPA's Climate Protection Energy Efficiency Programs. Signed into law February 20, 2003.

H.R. 238 (Boehlert)

Energy Research, Development, Demonstration, and Commercial Application Act of 2003. Authorizes energy R&D appropriations, provides a broad array of energy efficiency goals, sets goals for reducing costs of renewable energy technologies, and launches a number of energy technology initiatives including building performance standards and clean school buses. Introduced January 8, 2003; referred to Committee on Science, Subcommittee on Energy and Materials.

H.R. 586 (Larson)/S. 309 (Allen)

Aeronautics Research and Development Revitalization Act of 2003. An initiative to develop technologies that will enable development of future aircraft with significantly lower noise, emissions, and fuel consumption. Includes R,D&D initiative at the National Aeronautics and Space Administration to improve aviation fuel efficiency 10% over 10 years. House bill introduced February 5, 2003; referred to Committee on Science, Subcommittee on Space and Aeronautics. Senate bill introduced February 5, 2003; referred to Committee on Commerce, Science, and Transportation.

S. 139 (Lieberman)

Climate Stewardship Act of 2003. Accelerates the reduction of greenhouse gas emissions in the United States by establishing a market-driven system of greenhouse gas tradeable allowances that could be used interchangeably with passenger vehicle fuel economy standard credits, to limit greenhouse gas emissions in the United States and reduce dependence upon foreign oil. Introduced January 9, 2003; referred to Committee on Environment and Public Works.

S. 167 (Bingman)

Next Generation Lighting Initiative. Creates R,D&D program to develop by 2012 advanced, energy-efficient, solid state lighting technology base on white light emitting diodes. Introduced January 15, 2003; referred to Committee on Energy and Natural Resources.

S. 189 (Wyden)

21st Century Nanotechnology Research and Development Act. Authorizes FY2004 DOE appropriation of \$160 million for nanotechnology R,D&D that addresses a variety of

goals, including improved energy conservation. Introduced January 15, 2003; referred to Committee on Energy and Natural Resources.

S. 194 (Corzine)

National Greenhouse Gas Emissions Inventory and Registry Act of 2003. Establishes an inventory, registry, and information system of United States greenhouse gas emissions to inform the public and private sector concerning, and encourage voluntary reductions in, greenhouse gas emissions. Includes emissions reductions from energy efficiency activities. Introduced January 15, 2003; referred to Committee on Environment and Public Works

S. 361 (Lincoln)

Resource Efficient Appliance Incentive Act of 2003. Creates a business credit for manufacturers of certain energy-efficient clothes washers and refrigerators ranging from \$50 to \$150, with a maximum expenditure of \$60,000,000. Introduced February 11, 2003; referred to Committee on Finance.

CONGRESSIONAL HEARINGS, REPORTS, AND DOCUMENTS

U.S. Congress. House. Committee on Science. President's Hydrogen Initiative. Hearing held March 5, 2003.

U.S. Congress. House. Committee on Energy and Commerce. Subcommittee on Energy and Air Quality. Comprehensive National Energy Policy: Hearing held March 5, 2003.

(An extensive list of hearings on energy efficiency in the 107th Congress appears on a DOE web site at [<http://www.eren.doe.gov/eere/testimony.html>].)

FOR ADDITIONAL READING

American Council for an Energy-Efficient Economy. *Proceedings from the ACEEE 2002 Summer Study on Energy Efficiency in Buildings*. Washington, 2002. (10 v.)

— *ACEEE's Green Book: The Environmental Guide to Cars and Trucks: Model Year 2003*. 2003. 120 p. [<http://www.greenercars.com/indexplus.html>]

— *Proceedings from the ACEEE 2001 Summer Study on Energy Efficiency in Industry*. 2001. (2 v.) 1127 p.

Electric Power Research Institute (EPRI). *Selling Customers on Energy Efficiency*. EPRI Journal, v. 23, November/December 1998. p. 8-17.

General Accounting Office (GAO). *Research and Development: Lessons Learned from Previous Research Could Benefit FreedomCAR Initiative*. (GAO-02-8101) June 2002. 50 p.

National Research Council. *Energy Research at DOE: Was It Worth It? [Energy Efficiency and Fossil Energy Research 1978 to 2000]*. 2001. 224 p.
[<http://www.nap.edu/books/0309074487/html/>]

— *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards*. 2001. 184 p.

U.S. Department of Energy. Interlaboratory Working Group. *Scenarios for a Clean Energy Future*. (ORNL/CON-476) November 2000. 350 p.
[http://www.ornl.gov/ORNL/Energy_Eff/CEF.htm]

— Energy Information Administration. *Measuring Energy Efficiency in the United States' Economy: A Beginning*. (DOE/EIA-0555[95]/2) October 1995. 91 p.
[<http://www.eia.doe.gov/emeu/efficiency/contents.html>]

— *U.S. Electric Utility Demand-side Management*. In *Electric Power Annual 1999, Volume II*. (DOE/EIA-0348[99]/2) October 2000. p. 73-80. Data for 2000 are available at [http://www.eia.doe.gov/cneaf/electricity/dsm00/dsm_sum.html]

U.S. Environmental Protection Agency. *U.S. Climate Action Report 2002*. May 2002. 260 p. [<http://www.epa.gov/globalwarming/publications/car/index.html>]

— *Partnerships Changing the World: Energy Star and Other Voluntary Programs 2001 Annual Report*. (430-R-02-010) August 2002. 52 p.
[<http://www.epa.gov/appdstar/pdf/cpdann01.pdf>]

U.S. Executive Office of the President. President's Committee of Advisors on Science and Technology. *Powerful Partnerships: The Federal Role in International Cooperation on Energy Innovation*. June 1999.

CRS Reports

CRS Report RL31427. *Omnibus Energy Legislation: H.R. 4 Side-by-side Comparison*, by Mark Holt and Carol Glover.

CRS Report RL31127. *Energy Efficiency and Energy Conservation Legislation of the 107th Congress*, by Fred Sissine.

CRS Report RL30452. *Climate Change: Federal Research, Technology, and Related Programs*, by Michael M. Simpson.

CRS Report RL30414. *Global Climate Change: The Role for Energy Efficiency*, by Fred Sissine.

CRS Report RS21442. *Hydrogen and Fuel Cell Vehicle R&D: FreedomCAR and the President's Hydrogen Fuel Initiative*, by Brent Yacobucci.

CRS Report RS20852. *The Partnership for a New Generation of Vehicles (PNGV): Status and Issues*, by Brent Yacobucci.

CRS Report RL31188, *Energy Efficiency and the Rebound Effect*, by Frank Gottron.

Web Sites

American Council for an Energy-Efficient Economy (ACEEE). Extensive listing of web sites on energy efficiency. [<http://www.aceee.org/>]

CRS electronic briefing book on Electricity Restructuring. [<http://www.congress.gov/brbk/html/ebele1.html>]

CRS electronic briefing book on Global Climate Change. [<http://www.congress.gov/brbk/html/ebgcc1.html>]

National Association of State Energy Offices. [<http://www.naseo.org/>]

U.S. Council for Automotive Research (USCAR). FreedomCAR. [<http://www.uscar.org/pngv/index.htm>]

U.S. Department of Energy. Energy Efficiency and Renewable Energy Network. [<http://www.eren.doe.gov/>]

U.S. Department of Energy. FY2004 Congressional Budget Request. [<http://www.cfo.doe.gov/budget/04budget/index.htm/>]

U.S. Lawrence Berkeley Laboratory. Center for Building Science. [<http://eetd.lbl.gov/>]

U.S. Environmental Protection Agency. FY2004 Budget Justification (Goal 6, Climate Change, p. VI-28). [<http://www.epa.gov/ocfo/budget/2004/2004cj.htm>]

U.S. Environmental Protection Agency. Energy Star Programs. [<http://www.energystar.gov/>]

Table 2. DOE Energy Efficiency Budget for FY2001-FY2004
(selected programs, \$ millions)

	FY2001 Apprn.	FY2002 Apprn.	FY2003 Request	FY2003 Conf.	FY2004 Request	FY04 -FY03	Pct. Diff.
BUILDINGS	295.1	380.3	408.8	366.1	400.2	-34.1	-9%
Research & Stnds	64.2	62.4	52.6	59.8	51.1	-8.7	-15%
Equipment	40.7	38.5	31.7	40.4	30.8	-9.6	-24%
Weatherization	152.7	230.0	277.1	225.0	288.2	63.2	28%
State Energy Grant	37.9	45.0	38.8	45.0	38.8	-6.2	-14%
Mgt & Planning	14.1	15.1	14.1	14.1	1.5	-12.6	-89%
FEDERAL MGMT.	25.7	23.3	27.9	23.9	20.0	-3.9	-16%
INDUSTRY	148.6	148.9	138.3	138.3	75.6	-62.7	-45%
Aluminum	-----	8.1	8.1	8.1	3.3	-4.8	-60%
Petroleum	-----	2.8	0.0	0.0	0.0	0.0	-----
Mining	-----	5.1	5.1	6.1	2.4	-3.3	-58%
Agriculture	-----	7.3	8.3	8.3	8.8	0.5	7%
Crosscutting	-----	60.9	57.1	58.6	42.8	-15.8	-27%
Industrial Materials	-----	13.7	12.7	14.7	12.7	-2.0	-14%
Combustion	-----	18.4	15.6	15.6	2.0	-13.6	-87%
Inventions	-----	4.4	2.4	3.9	2.4	-1.5	-39%
Ind. Tech. Assistance	-----	14.9	15.9	14.9	15.9	1.0	7%
POWER TECH.	47.3	63.8	63.9	70.7	51.8	-18.9	-27%
TRANSPORTATION	255.4	252.7	222.7	248.1	242.7	-5.3	-2%
Vehicle Tech.	159.9	155.1	149.3	164.3	180.2	15.9	10%
Hybrid Systems	-----	46.6	42.6	42.6	49.6	7.0	16%
Fuel Cell	-----	41.9	50.0	48.0	77.5	29.5	61%
Adv. Com. Engine	-----	49.1	40.7	57.2	37.1	-20.1	-35%
Electric Vehicle	-----	7.0	3.5	4.5	-----	-4.5	-----
Fuels Utilization	23.5	25.9	18.5	20.2	6.8	-13.4	-66%
Materials Tech.	42.4	40.3	29.8	37.4	39.6	2.2	6%
Tech. Deployment	15.1	15.2	15.0	16.1	12.5	-3.6	-22%
Mgt & Planning	8.5	10.2	10.1	10.1	3.6	-6.5	-64%
POLICY & MGMT.	43.3	43.8	40.1	42.1	76.7	34.6	82%
Program Review	-----	-----	-----	0.5	0.0	-0.5	-----
R&D SUBTOTAL	624.9	637.8	585.7	619.6	539.9	-79.7	-13%
GRANTS SUB.	190.6	275.0	315.9	270.0	327.0	57.0	21%
Nat. Climate Init.	-----	-----	-----	0.0	9.5	9.5	-----
GROSS TOTAL	815.4	912.8	901.6	889.6	876.4	-13.2	-1%
Adjustments	-----	-----	-----	8.0	-0.6	-8.6	-----
ADJUSTED TOTAL	813.4	912.8	901.6	897.6	875.8	-21.8	-2%

Sources: DOE FY2004 Cong. Bud. Request, v. 7, February 2003. H.Rept. 108-10 (Cong. Rec. Feb. 12, 2003, p. H1087-88); H.Rept. 107-564; S.Rept. 107-201;