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

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Fred Sissine
Resources, Science, and Industry Division

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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, and the Iraq war of 2003 heightened concern for energy security and raised further concerns about the vulnerability of energy infrastructure and the need for alternative fuels. Further, the 2003 northeast-midwest power blackout, the 2001 power shortages in California and the high natural gas prices in 2003 brought a renewed emphasis on energy efficiency and energy conservation to dampen electricity (and natural gas) 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 108th Congress, debate over energy efficiency programs is focusing on the budget, oil, natural gas, and electricity issues, and provisions in the omnibus energy policy bill, S. 2095, H.R. 6, and S. 14/S. 1149.

The Bush Administration's FY2005 budget request for the Department of Energy's (DOE's) Energy Efficiency Program seeks $875.9 million. This is $2.1 million, or 0.2%, less than the FY2004 appropriation, excluding inflation and including $291.2 million (a $64.0 million increase) for Weatherization.

The House has approved the FY2005 Interior appropriations bill, H.R. 4568. It has $656.1 million for DOE's Energy Efficiency program, including $611.0 million for R&D and $45.1 million for grants. For the Weatherization grant program, the House approved moving the account to the Labor, Heath and Human Services, and Education bill with a recommendation for $227.3 million.

In the first session, the H.R. 6 conference bill had several significant tax and regulatory measures for energy efficiency. It failed to pass the Senate due to concerns about cost and the MTBE "safe harbor" provision.

In the second session, S. 2095 was introduced without the controversial MTBE provision and with a cost estimated at about half that of H.R. 6. S. 2095 has key provisions from H.R. 6: it would set an efficiency standard for "standby mode" energy use in battery chargers and external power supplies; legislate efficiency standards for certain equipment and direct DOE to set a standard by rule for other types of equipment; and set higher goals for efficiency in federal buildings.

Also, S. 2095 would create several tax incentives for energy efficiency measures in home construction, home renovation, appliances, residential equipment, commercial buildings, fuel cells, and combined heat and power equipment. Tax incentives for electric vehicles and alternative fuels are also included.

S. 1637 ("JOBS" bill) passed the Senate with the energy tax provisions from S. 2095. However, H.R. 4520 (American Jobs Creation Act) passed the House with no tax provisions for energy efficiency and two measures (§422) for alternative fuels.

MOST RECENT DEVELOPMENTS

On July 8, 2004, the House Appropriations Subcommittee on Labor, Health and Human Services, and Education approved $227.0 million for DOE's Weatherization grant program. On June 17, the House approved the FY2005 Interior appropriations bill, H.R. 4568. It has $656.1 million for DOE's Energy Efficiency program, including $611.0 million for R&D and $45.1 million for grants. The R&D figure is $4.1 million more than the FY2004 level, excluding inflation. For the Weatherization grant program, the House approved moving the account to the Labor, Heath and Human Services, and Education bill with a recommendation for $227.3 million (H.Rept. 108-542, p. 124). Compared to FY2004, R&D program decreases include $6.9 million less for Advanced Combustion, $3.2 million less for Fuels Technology, $5.0 million less for Fuel Processor R&D (Fuel Cells), $6.0 million less for Industries of the Future (Crosscutting), and $3.5 million less for Congressionally Directed Activities (earmarks). Specific program increases include $3.4 million more for Commercial Buildings, $5.0 million more for Industrial Gasification, and $5.0 million more for Program Direction. (For more on this topic, see "DOE Budget, FY2005," and **Table 3**.)

On June 17, the House passed H.R. 4520 (American Jobs Creation Act) with no tax provisions for energy efficiency and two measures (§422) for alternative fuels. The Senate-passed S. 1637 ("JOBS" bill) has several energy efficiency tax credits (§821 to §829) from S. 2095 and some tax incentives for alternative fuels and electric vehicles (§720 to §721, §811 to §815, and §860 to §862). (For a comparison of S. 2095 and the conference version of H.R. 6, see "Energy Efficiency in Omnibus Energy Bill.")

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 environmental impacts. (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 *FY2005 Congressional Budget Request*, DOE/ME-0022, v. 7, February 2004; it appears at [http://www.cfo.doe.gov/budget/05budget/content/volumes/Volume_7.pdf].)

From FY1973 through FY2002, DOE spent about $11.7 billion in 2003 constant dollars for energy efficiency R&D, which amounts to about 9% of the total federal spending for energy supply R&D during that period. In 2003 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 FY2003, $612 million was appropriated, which is $56 million, or 9%, above the FY1994 mark in 2003 constant dollars. Also, in 2003 constant dollars, since FY1973, DOE has spent about $7.7 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 2003 constant dollars, the federal government spent about $24.3 billion for nuclear (fission and fusion) energy R&D and about $5.5 billion for fossil energy R&D. From FY1973 through FY2003, the federal government spent $49.1 billion for nuclear (fission and fusion), $24.8 billion for fossil, $14.6 billion for renewables, and $11.7 billion for energy efficiency. Total energy R&D spending from FY1948-FY1998, in 2003 constant dollars, reached $131.2 billion, including $74.0 billion, or 56%, for nuclear, $30.9

billion, or 24%, for fossil, $14.6 billion, or 11%, for renewables, and $11.7 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 reorganization that included new offices for FreedomCAR & Vehicle Technologies and for Hydrogen, Fuel Cells and Infrastructure. Information about the new management structure and other aspects of EERE are available on the DOE website at [http://www.eere.energy.gov/office_eere/].

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 (APP) for FY2004*, energy efficiency is addressed under the revised strategic goal #2, "Energy Conservation and the Environment," which states "Energy use and greenhouse gas emissions versus the gross domestic product (GDP) are reduced by 40% by 2025 compared to 2000 and the growth versus the U.S. population stops by 2025." In support of Goal 2, the APP lists five strategic performance goals. ER1-1 says that relative to the 1985 baseline, FEMP will support federal agency efforts to reduce energy intensity by 30% in 2005 and 35% by 2010. ER 1-2 says that from 1991 to 2010, the Industries Program will reduce energy intensity by 20-25%. ER 1-3 says the FreedomCAR and Vehicle Technologies Program will achieve several specific vehicle technical and cost goals through 2010. ER 1-4 says that the Buildings Program will achieve several specific goals to improve building efficiency through 2009. ER 3-1 puts forth specific output goals through 2010 for weatherization grants, state grants, Rebuild America, Energy Star, Clean Cities, and for other programs.

Energy Efficiency in Omnibus Energy Bill (S. 2095)

In the 108th Congress, most legislative action on energy efficiency has focused on the omnibus energy policy bills, S. 1637, S. 2095, H.R. 6, and S. 14/S. 1149. Late in 2003, a cloture motion to stop a Senate filibuster on the conference report (H.Rept. 108-375) for H.R. 6 failed (57-40). Key objections cited in Senate debate include budget concerns and the Title XV "safe harbor" from product liability lawsuits for producers of MTBE (methyl tertiary-butyl ether), ethanol, and other renewable fuels. This section summarizes key energy efficiency provisions in S. 1637, S. 2095, and the conference version of H.R. 6. Among the key provisions for energy efficiency are proposals that would require a DOE rulemaking to set an efficiency standard for "standby mode" energy use in battery chargers and external power supplies; legislate standards for certain equipment and direct DOE to set a standard by rule for other types of equipment; and set goals for efficiency in federal buildings. Other provisions would create incentives for energy efficiency measures in home construction, home renovation, appliances, residential equipment, commercial buildings, fuel cells, and combined heat and power equipment, and for alternative fuels. (For a detailed summary of provisions in the conference version of H.R. 6, see CRS Report RL32204. For more information on CAFE, see CRS Report RL32078, which compares House and Senate versions of H.R. 6 with S. 14. For side-by-side comparisons of provisions in H.R. 6, see CRS Report RL32033 (non-tax provisions), CRS Report RL32042 (tax provisions), and CRS Report RL32041 (electricity provisions).)

Efficiency Standards for Consumer and Commercial Products

DOE currently sets minimum energy efficiency standards for several consumer and commercial products, including household appliances such as clothes washers and refrigerators. S. 2095 (§133) and H.R. 6 (§133) would expand efficiency standards within three years to cover "standby mode" energy use by battery chargers and external power supplies. It would also legislate efficiency standards for exit signs, torchieres, traffic signals, and distribution transformers and call for DOE to set standards by rule for suspended ceiling fans, vending machines, unit heaters, and commercial refrigerators and freezers. In March 2003 testimony on a draft version of H.R. 6, the American Council for an Energy-Efficient Economy estimated that these new standards would save more energy than any other efficiency provisions in H.R. 6. The table below indicates which standards would be set by law and which would be set by DOE rulemaking.

Standard set:	S. 2095 / H.R. 6 Conference
By law	exit signs, traffic signals, torchieres, distribution transformers, unit heaters, medium base compact fluorescent lamps
By rule	ceiling fans, vending machines, commercial refrigerators and freezers, residential furnace fans

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 past goal had called for a 20%

reduction in federal buildings' energy use, measured in energy use per square foot (sf), over the period from 1985 to 2000. This goal was exceeded, slightly. S. 2095 (§102) and H.R. 6 (§102) would set goals for further energy efficiency in federal buildings. Compared to the baseline year energy use in 2001, the provision sets progressive annual 2% reductions over a 10-year period from 2004 to 2013, ending with a 20% reduction from baseline. Also, DOE would be required to review results by the end of the 10-year period and recommend further goals for an additional decade. Most of the other provisions for federal programs are administrative measures that would help agencies achieve the above-described goals.

The historical record shows that congressional buildings have had less focus on energy efficiency goals than those in the executive branch. To address this, S. 2095 (§101) and H.R. 6 (§101) call for the implementation of a plan for congressional buildings to meet the energy efficiency goals for federal agencies noted above. The bill also calls for a study of the potential for energy efficiency and renewables to increase reliability during a power outage and authorizes up to $2 million.

Tax Incentives for Efficiency and Conservation

Since the late 1970s, there have been some tax incentives to promote fuel switching and alternative fuels as a way to conserve gasoline and reduce oil import dependence. In contrast, tax incentives for energy efficiency and for electricity conservation have been rare, and generally short-lived. The omnibus energy bill proposes some modest new tax incentives for energy efficiency. This section lists the tax measures with the 10-year scoring for the conference version of H.R. 6 and, because S. 2095 has not been scored, estimates for its provisions are taken from the scoring for S. 1149 as reported by committee. The energy efficiency provisions in S. 1637 are very similar to those in S. 2095.

The bill proposes tax credits to improve efficiency in new and existing homes. The table below shows the eligibility requirement, dollar cap, period, and estimated tax revenue drain (using figures for S. 1149 to estimate those for S. 2095).

	New Homes		**Existing Homes**	
	H.R. 6 (§ 1305)	S. 2095 (§1321)	H.R. 6 (§ 1304)	S. 2095 (§1329)
Energy Reduction Requirement			IECC*	30% IECC
Minimum	30%	30%		
Maximum	50%	50%		
Maximum Value of Credit (Cap)			$2,000	$300
30% reduction	$1,000	$1,000		
50% reduction	$2,000	$2,000		
Period (years)			less than 3	less than 3
30% reduction	less than 3	less than 2		
50% reduction	less than 3	less than 4		
Revenue Drain ($ millions)	$409	$492	$352	$223

Note: IECC represents year 2000 standards in the International Energy Conservation Code.

The 10-year revenue impacts for other energy efficiency tax incentives in S. 2095 (S. 1149) and H.R. 6 are shown in the table below.

	Revenue Drain ($ millions)		Bill Section	
	H.R. 6	S. 2095	H.R. 6	S. 2095
Manufacturers of Appliances Credit	$255	$282	§1307	§1322
Commercial Buildings Deduction	$230	$532	§1308	§1325
Utilities Deduction - Energy Management Devices	$130	$192	§1309	§1326 & §1327
Fuel Cells Credit	$ 29	$46	§1303	§1324
Combined Heat & Power (CHP) Credit	$ 46	$111	§1306	§1328

Note: IECC represents year 2000 standards in the International Energy Conservation Code.

Also, Sections 1311 to 1317 of S. 2095 (S. 1149) provide $2.28 billion in incentives for alternative fuels, vehicles, and equipment. Comparable provisions in H.R. 6 (§1313, 1314, 1315, and 1318) provide $2.42 billion.

Energy Efficiency Tax Revenue Effect. **Table 1**, below compares the estimated 10-year revenue effect of energy efficiency and conservation tax provisions in the conference version of H.R. 6 and S. 2095. The amounts for S. 2095 are estimated from the scoring for S. 1149, as reported by committee. Based on industry assessments, the figures for efficiency exclude the solar/fuel cell credit, which was scored at $448 million.

Table 1. S. 2095 and H.R. 6, Tax Revenue Effect

($ billions)

	H.R. 6	S. 2095
Energy Efficiency and Conservation Measures (Excludes diesel fuels, alternative fuels, and solar credit)	$ 1.45	$ 1.73
Net Total, All Tax Provisions	$23.51	$14.80
Energy Efficiency and Conservation Share of Total	6.2%	11.7%

Source: Joint Tax Committee (JTC), Estimated Revenue Effects of the Conference Agreement for the "Energy Tax Policy Act of 2003," November 18, 2003; and JTC, Estimated Revenue Effects of S. 1149 as Reported by the Committee on Finance, May 30, 2003.

Housing, Funding Authorizations, and Other Provisions

S. 2095 (and H.R. 6 conference) has provisions (Sections 141-149) for energy efficiency in public housing. Also, Section 121 authorizes funding for energy assistance (e.g., Low-Income Home Energy Assistance Program, LIHEAP) and Sections 122 and 123 authorize grant programs (e.g., DOE Weatherization Program and State Energy Program). Several other energy efficiency programs are authorized in Title I and Title IX.

DOE Budget, FY2005

The FY2005 budget request (Appendix, p. 397) notes that the "Administration's energy efficiency programs have the potential to produce substantial benefits for the nation — both now and in the future — in terms of economic growth, increased energy security and a cleaner environment." In particular, the request says it "continues the Hydrogen Fuel Initiative to accelerate the worldwide availability and affordability of hydrogen-powered fuel cell vehicles."

As Table 3 shows, the request seeks $875.9 million for energy efficiency, which is $2.1 million, or 0.2%, less (excluding inflation) than the FY2004 appropriation. The funding request includes $64.0 million more for Weatherization grants, $12.3 million more for Hydrogen (for validation and stack components), and $5.0 million more for Program Direction. However, it would cut Industrial Technologies by $35.0 million (mainly specific industries), Vehicle Technologies by $21.3 million (mainly Advanced Combustion and Fuels Technology), and Distributed Energy Resources by $7.9 million. Terminations and zero appropriations include FreedomCAR Peer Review, Oil Heat Research, FEMP Management Support, Cooperative Programs, and congressional earmarks.

For further information on the *Energy Conservation Budget*, see the website at [http://www.cfo.doe.gov/budget/04budget/]. For further information on *Energy Conservation Programs,* see the website at [http://www.eere.energy.gov/].

EPA Budget, FY2005

The FY2005 request for EPA's CPP Programs is $125.7 million, which would be a $9.1 million increase over the FY2004 appropriation. For specific programs, the request includes $1.1 million less for Buildings and $0.5 million less for Transportation. It also includes $1.6 million more for Industry and $0.8 million more for International Capacity Building.

Late in FY2003, after concerns were raised that the Energy Star Buildings program's spend out had been cut $12.5 million, or 25%, the Administration directed that $7.0 million be put back. 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.

Table 2. EPA Funding for Climate Protection Energy Efficiency Programs (CPP)

($ millions current)

	FY2001 Enacted	FY2002 Enacted	FY2003 Enacted	FY2004 Appn.	FY2005 Request	FY2005 -FY2004	Percent Diff.
CPP Buildings	52.5	48.6	49.8	48.3	47.2	-1.12	-2.3%
CPP Transport.	29.4	30.8	21.6	22.9	22.4	-0.53	-2.3%
CPP Industry	31.9	25.4	25.7	26.4	28.0	1.56	5.9%
CPP Carbon Rem.	1.0	1.5	1.6	1.7	1.7	-0.03	-2.0%
CPP State / Local	2.5	2.2	2.3	2.6	2.6	0.03	1.2%
CPP Int'l Cap.	5.5	7.0	7.1	6.6	7.4	0.79	12.0%
CPP Int'l Partner.	——	——	——	——	——	——	——
CPP Int'l Coop'n	0.8	——	——	——	——	——	——
CPP Other	——	8.4	7.2	8.0	16.4	8.43	105.8%
CPP, SUBTOTAL	123.6	123.9	115.2	116.6	125.7	9.12	7.8%
Climate Chg Rsch	22.6	21.4	21.7	21.5	20.6	-0.93	-4.3%
TOTAL	146.2	145.3	137.0	138.1	146.3	8.19	5.9%

Source: Personal communication with Ed Callahan, EPA, Feb. 4, 2004; EPA FY2005 Congressional Justification; and previous EPA budget justifications.

Energy Security

Since September 11, 2001, terrorist attacks have focused national attention on developing a strategy to address the vulnerabilities of energy systems and other essential services. The Department of Homeland Security (DHS, P.L. 107-296) includes offices and programs (Infrastructure Protection, Energy Security and Assurance) responsible 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. It can also reduce the risk of oil shortages, energy price shocks, and attendant impacts on the national economy. Some of the possible ways that energy efficiency can improve energy security are described in *U.S. Energy Security Facts* (available at [http://www.rmi.org/images/other/S-USEnergySecurityFacts.pdf].)

Electricity Demand-Side Management (DSM) and Distributed Power

The August 2003 electric power blackout that affected several states and Canadian provinces rekindled interest in energy efficiency, energy conservation / demand response measures, and distributed power generation. The use of energy-efficient appliances and other end-use equipment can reduce electricity demand, which drives the need for new power plants. 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 in the President's DHS proposal calls

for it 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. H.R. 6 and S. 14 have provisions for distributed energy. (For more on distributed energy see the DOE website at [http://www.eere.energy.gov/EE/power_distributed_generation.html] and at [http://www.eere.energy.gov/distributedpower/].)

Energy Conservation to Curb Natural Gas Demand

The Secretary of Energy requested that the National Petroleum Council (NPC) report on policy options to address the problem of high natural gas prices. The draft report, *Balancing Natural Gas Policy*, says gas prices could average from $5 to $7 per 1,000 cubic feet for years to come, and it concludes, among other options, that energy conservation and greater energy efficiency have the biggest immediate potential to hold down prices. The report recommends updating building codes and equipment standards, promoting Energy Star equipment, using the most efficient power plants, deploying distributed energy, installing smart controls, and employing best practices for low-income weatherization. The Alliance to Save Energy applauds these policy suggestions, but raises a concern that other policy measures it had recommended — including tax incentives, utility performance standards, federal buildings improvements, and regulations to make energy conservation profitable for utilities — were not included among the report's suggestions. Also, a report by the American Council for an Energy-Efficient Economy (ACEEE), *Natural Gas Price Effects of Energy Efficiency and Renewable Energy Practices and Policies*, says that in one year, a massive energy efficiency effort could be put in place that would reduce gas use by 1.9% and cut prices by 20%. (The NPC report is at [http://www.npc.org/] and the ACEEE report is at [http://www.aceee.org/energy/efnatgas-study.htm].)

Vehicle Fuel Efficiency and Oil Conservation

Energy efficiency measures to curb oil demand, and other oil conservation measures, may help address energy security, 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*).

CAFE is a key federal regulatory policy that had instituted a gradual ramp-up of fuel efficiency for newly manufactured cars and light trucks. The present CAFE standard for new cars is 27.5 mpg. The national fleet fuel economy for cars peaked at 21.1 mpg in 1991,

declined slightly, and then climbed to 22.1 mpg in 2001. Similarly, light trucks peaked at 16.9 mpg in 1991, declined slightly, and then reached 17.6 in 2001. A floor amendment to S. 14 on fuel economy failed to pass. (For more on CAFE standards, see CRS Issue Brief IB90122, *Automobile and Light Truck Fuel Economy: Is CAFE up to Standards?*)

A December 2003 report by the Congressional Budget Office (CBO), *The Economic Costs of Fuel Economy Standards Versus a Gasoline Tax*, found that a 46-cent-per-gallon gasoline tax increase would achieve a 10% reduction in fuel use at a cost that is 3% less than the cost of creating a higher CAFE standard with or without credit trading.

In the January 2003 State of the Union Speech, President Bush announced $720 million in new funding for a hydrogen fuel initiative to accelerate the use of fuel cells for transportation and power generation. Fuel cells can reduce gasoline (hence oil) use due to the ability to employ hydrogen-rich fuels, such as natural gas and alcohol fuels. The initiative 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 Fuel Cell Technologies Program (see **Table 3**) but includes some funding from other agencies. (For more details on FreedomCAR see CRS Report RS21442, *Hydrogen and Fuel Cell Vehicle R&D: FreedomCAR and the President's Hydrogen Fuel Initiative*.)

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 26% (2000) of the world's oil consumption and about 40% (2002) of total U.S. energy use. The nation uses (2002) about 19.6 million barrels of oil per day (mb/d), of which about 13.8 mb/d is used for transportation, including 4.7 mb/d for cars and 3.4 mb/d for light trucks (includes 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

The FY2004 Foreign Operations, Export Financing, and Related Programs Appropriations Bill (P.L. 108-199, Division D, Section 555) provides $180 million for "energy conservation, energy efficiency, and clean energy" to reduce greenhouse gas emissions in developing countries.

DOE's November 2003 report, *U.S. Climate Change Technology Program — Technology Options for the Near and Long Term*, compiles information from multiple federal agencies on more than 80 technologies. For these end-use and supply technologies, the report describes President Bush's initiatives and R&D goals for advancing technology development, but it does not estimate emissions saving potentials, as some previous DOE reports on the topic had presented.

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), 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-9 in 2003, the parties resolved to prepare for the Protocol's enactment, implement measures such as energy efficiency to help decouple economic growth and emissions growth, and the European Union and several nations pledged $410 million annually for two funds focused on mitigation measures for developing nations.

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 January 2003 *Annual Energy Outlook 2003* projects 2010 emissions will be 1,800 MMTC, 32% more 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 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

The debate over the federal role in restructuring includes questions about energy efficiency. The 2001 electricity problems in California 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. *Energy Efficiency Leadership in California*, an April 2003 report by the Natural Resources Defense Council and Silicon Valley Manufacturing Group, uses California Energy Commission data to project that additional efficiency measures could reduce electric demand by 5,900 MW and save $12 billion over the next 10 years.

Many states and electric utilities 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 "public goods" 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.shtml] and CRS Issue Brief IB10006, *Electricity: The Road Toward Restructuring*.)

LEGISLATION

P.L. 108-108 (H.R. 2691)

Department of Interior and Related Agencies Appropriations bill, 2004. Makes appropriations for DOE Energy Efficiency Program. House bill reported (H.Rept. 108-195) July 10, 2003. President signed into law November 10.

P.L. 108-199 (H.R. 2673)

Consolidated Appropriations Bill, 2004. Incorporates Foreign Operations (Division D) and VA-HUD (Division G) appropriations bills for FY2004. House Agriculture appropriations bill (now Division A) reported (H.Rept. 108-193) July 9, 2003. Passed House July 14. Passed Senate November 6, without report. Conference reported Consolidated bill November 25. House approved December 8. Senate approved January 22, 2004. Signed into law January 23, 2004.

P.L. 108-199 (Division D, Foreign Operations Appropriations Bill)

Consolidated Appropriations Bill, FY2004. Division D contains the Foreign Operations, Export Financing, and Related Programs Appropriations Bill, 2004. Section 555 on Environment Programs provides $180 million for "energy conservation, energy efficiency, and clean energy" in developing countries to reduce greenhouse gases.

P.L. 108-199 (Division G, VA-HUD Appropriations Bill)

Consolidated Appropriations Bill, FY2004. Division D contains the Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations bill, 2004. It makes appropriations for EPA's Climate Protection Energy Efficiency Programs (CPP). House bill reported (H.R. 2681, H.Rept. 108-235) July 21, 2003. Passed House July 25. Senate bill reported (S. 1584, S.Rept. 108-143) September 4. Incorporated into consolidated appropriations bill (H.R. 2673) as Division G, November 25.

H.R. 6, House Version (Tauzin)/H.R. 6, Senate Version (Domenici)

Omnibus Energy Bill. In Division A, Title I has provisions for energy efficiency and energy conservation, Titles V and VII treat alternative fuels, Title VI has a PURPA cogeneration provision, and Title VIII addresses automobile efficiency. In Division B, Title I contains R&D authorizations. In Division D, Title I has tax incentives for efficiency and conservation. Introduced April 7, 2003; referred to Committee on Energy and Commerce and several other committees. Passed House, amended, April 10. Senate version incorporates text of omnibus energy bill (H.R. 4) that the Senate adopted in the 107th Congress. Passed Senate July 31, in lieu of S. 14. Conference reported (H.Rept. 108-375) November 18. House approved November 18. Senate cloture motion failed (57-40) November 21.

H.R. 4503 (Barton)

Energy Policy Act of 2004. Omnibus energy policy bill, nearly identical to conference version of H.R. 6.. Introduced June 3, 2004; referred to Committee on Energy and Commerce. Passed House (244-178) June 15, 2004.

S. 1637 (Grassley)

The energy tax provisions of S. 2095 appear in Titles VII and VIII. Energy efficiency and conservation measures appear in Sections 821-829. Alternative fuel measures are in Sections 720, 721, 811-815, and 860-862. Bill introduced September 18, 2003. S.Amdt. 2687 approved March 22, 2004, adding some one-year energy tax incentive extensions. Recommitted to the Committee on Finance on April 8, 2004, with instructions to incorporate S.Amdt. 3011 as an amendment in the nature of a substitute. S.Amdt. 3011 added many energy tax provisions of S. 2095. Senate passed (92-5) May 11, 2004.

S. 2095 (Domenici)

Omnibus Energy Bill. This bill is a pared-down version of the conference bill, H.R. 6, which failed under a Senate cloture vote (57-40) . Energy efficiency appears as Title I. Also, Title VII A covers alternative fuels, Title VIII covers hydrogen, Title IX covers R&D authorizations, Title XI on Electricity includes a provision on PURPA and cogeneration, and Title XIII has tax incentives. Introduced February 12, 2004.

CONGRESSIONAL HEARINGS, REPORTS, AND DOCUMENTS

U.S. Congress. House. Committee on Appropriations. Subcommittee on Interior and Related Agencies. DOE's FY2005 Budget Request. Hearing held February 26, 2004.

(An extensive list of hearings on energy efficiency in the 108th Congress appears on a DOE website at [http://www.eere.energy.gov/office_eere/congressional_test.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 2004.* 2004. 120 p. [http://www.greenercars.com/indexplus.html]

Cato Institute. *The High Costs of Federal Energy Efficiency Standards for Residential Appliances.* [Policy Analysis No. 504] 2003. 15 p.

General Accounting Office (GAO). *Research and Development: Lessons Learned from Research Could Benefit FreedomCAR Initiative*. (GAO -02-8101) 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/sci/eere/cef/]

——*U.S. Electric Utility Demand-side Management.* In *Electric Power Annual 2000, Volume II.* (DOE/EIA-0348[2000]/2) November 2002. p. 77-84. [http://www.eia.doe.gov/cneaf/electricity/epav2/epav2.pdf]

U.S. Environmental Protection Agency. *U.S. Climate Action Report 2002.* 2002. 260 p. [http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsUSClimateActionReport.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]

Vine, Edward et al. *Public Policy Analysis of Energy Efficiency and Load Management in Changing Electricity Businesses.* Energy Policy, v. 31, 2003. p. 405-430.

CRS Reports

CRS Report RL32033. *Omnibus Energy Legislation (H.R. 6): Side-by-side Comparison* of Non-tax Provisions, by Mark Holt and Carol Glover.

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

CRS Report RS20298. *Sport Utility Vehicles, Mini-Vans, and Light Trucks: An Overview of Fuel Economy and Emissions Standards*, by Brent Yacobucci.

Websites

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

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

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

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

U.S. Department of Energy. Energy Efficiency and Renewable Energy Network.
[http://www.eere.energy.gov/]

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

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 3. DOE Energy Efficiency Budget for FY2003-FY2005

(selected programs, $ millions)

	FY2003 Appn.	FY2004 Appn.	FY2005 Request	FY2005 House	House-FY2004	Percent Change
VEHICLE TECH.	174.2	178.0	156.7	167.4	-10.6	-6%
Hybrid and Electric	42.0	45.0	51.8	46.8	1.8	4%
Advanced Combustion	55.3	54.4	35.9	47.5	-6.9	-13%
Materials Technology	36.1	39.7	39.8	38.4	-1.3	-3%
Fuels Technology	19.2	16.5	6.8	13.3	-3.2	-19%
Technology Introduction	4.6	4.9	6.0	5.0	0.1	2%
FUEL CELL TECH.	53.9	65.2	77.5	71.0	5.8	9%
Fuel Processor	23.5	14.8	13.9	9.9	-5.0	-33%
Stack Component	14.8	25.2	30.0	27.5	2.3	9%
INTERGOVERNMENTAL	314.2	308.6	72.9	84.7	——	——
Weatherization Program*	223.5	227.2	[291.2]	[227.3]	[0.1]	[0%]
State Energy Program	44.7	44.0	40.8	45.1	1.1	3%
Other State Energy	5.3	2.3	2.4	2.4	0.0	1%
Gateway Deployment	40.6	35.2	29.7	37.2	2.0	6%
Rebuild America	11.0	10.0	8.8	9.8	-0.2	-2%
Clean Cities	10.9	11.0	7.0	11.0	0.0	0%
Energy Star	4.2	3.7	5.0	4.0	0.3	9%
Ind. Competitiveness	2.7	0.0	0.0	——	——	——
Inventions	3.8	4.3	2.5	4.0	-0.3	-7%
International Market Dev.	0.6	0.0	0.0	——	——	——
DISTRIB. ENERGY RES.	60.1	61.0	53.1	62.5	1.5	2%
BUILDING TECH.	58.3	59.9	58.3	64.9	5.0	8%
Res. & Commercial Bldgs	16.5	17.5	23.9	21.9	4.4	25%
Emerging Technologies	30.6	30.0	25.1	31.7	1.7	6%
INDUSTRIAL TECH.	96.8	93.1	58.1	84.9	-8.1	-9%
Ind. of the Future, Specific	59.3	47.2	22.4	47.2	0.0	0%
Ind. of the Future, Cross.	33.5	39.9	31.9	33.9	-6.0	-15%
BIOMASS/ BIOREF'Y	24.1	7.5	8.7	12.7	5.2	69%
Utilization	9.0	7.1	8.3	7.3	0.2	2%
Industrial Gasification	14.3	0.0	0.0	5.0	5.0	——
FED. ENERGY MGMT	19.3	19.7	17.9	17.9	-1.8	-9%
PROGRAM MGMT	77.0	85.0	81.7	90.2	5.2	6%
National Climate Initiative	0.0	0.0	0.0	——	——	——
R&D SUBTOTAL	611.7	606.9	543.9	611.0	4.1	1%
GRANTS SUBTOTAL	268.2	271.1	40.8	45.1	-226.0	-83%
TOTAL	880.2	878.0	584.7	656.1	-221.9	-25%

Sources: DOE FY2005 Budget Request, v. 7, Feb. 2004; H.Rept. 108-542.

*House approved moving the account to the Labor, HHS, and Education. bill and recommends $227.3 million.