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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, 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, H.R. 6 and S. 14.

The Bush Administration's FY2004 budget request for the Department of Energy's (DOE's) Energy Efficiency Program seeks $875.8 million. The House-passed Interior appropriations bill recommends $879.5 million for DOE energy conservation funding in FY2004. A floor amendment (H.Amdt. 255) added $15.0 million for Weatherization grants with an offsetting, but unspecified, $15.0 million cut for energy conservation. The $879.5 million is $3.7 million, or 0.4%, higher than the Administration's request. Compared to the FY2003 appropriation, this is a decrease of $12.3 million, or 1%, not accounting for inflation. The House-passed amount would eliminate Biorefinery R&D, Industrial Competitiveness (NICE-3), Technology Validation, and International Market Development.

The Senate approved $861.6 million, which is $17.8 million, or 2%, less than the House approved and $30.1 million, or 3%, less than the FY2003 appropriation, not accounting for inflation.

The conference committee on the omnibus energy bill (H.R. 6) has issued a discussion draft of the "tier 2" energy efficiency provisions. Both House and Senate versions of H.R. 6 have provisions that call for a DOE rule 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. Also expected to come up in conference are provisions of the energy tax bill (S. 1149) that would create tax incentives for energy efficiency measures in home construction, home renovation, appliances, residential equipment, commercial buildings, and combined heat and power equipment, and for alternative fuels.

A DOE-initiated report prepared by the National Petroleum Council examines the problem of high natural gas prices and concludes that energy conservation and greater energy efficiency have a key role to play in holding down prices.

MOST RECENT DEVELOPMENTS

On September 25, 2003, the National Petroleum Council issued a draft report, *Balancing Natural Gas Policy*, on the problem of high natural gas prices. It concludes that energy conservation and greater energy efficiency have the most immediate potential to hold down gas prices. (For more on this topic, see "Energy Conservation to Curb Natural Gas Demand," below.)

On September 23, 2003, the Senate passed the Interior Appropriations bill (H.R. 2691, S.Rept. 108-89), which includes $861.6 million for DOE energy conservation funding in FY2004. Compared to the Administration's request, this is a decrease of $14.2 million, or 1.6%, excluding inflation. However, compared to the FY2003 appropriation, this is a decrease of $30.2 million, or 3.3%, excluding inflation. This difference includes a cut of $35.9 million for R&D and an increase of $5.8 million for grants. (For more on this topic, see "DOE Budget, FY2004," below.)

On September 15, the conference committee on the omnibus energy bill (H.R. 6) released a discussion draft of the less controversial "tier 2" energy efficiency provisions. (The only energy efficiency topic treated as a more controversial "tier 1" issue is corporate average fuel economy (CAFE); see "Vehicle Fuel Efficiency and Oil Conservation.") (For a comparison of the House and Senate versions of H.R. 6, see "Energy Efficiency in Omnibus Energy Bills, 108th Congress," below; and see CRS Report RL32033, *Omnibus Energy Legislation (H.R. 6): Side-by-Side Comparison of Non-tax Provisions.*)

(The DOE FY2004 Budget Request is available on the DOE web site at [http://www.cfo.doe.gov/budget/04budget/]; and the EPA FY2004 Annual Performance Plan and Congressional Justification is available on the EPA web site at [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 *FY2004 Congressional Budget Request*, DOE/ME-0022, v. 7, February 2003; it appears at [http://www.cfo.doe.gov/budget/04budget/].)

From FY1973 through FY2002, DOE spent about $11.1 billion in 2002 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 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 FY2002, $638 million was appropriated, which is $82 million, or 15%, 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 $24.3

billion for nuclear (fission and fusion) energy R&D and about $5.5 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 2002 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 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 web site 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 Bills, 108th Congress

In the 108th Congress, most legislative action on energy efficiency has focused on the omnibus energy policy bills, H.R. 6, S. 14, and the Senate energy tax bill (S. 1149), which expected to be considered in conference committee action. Both the House and Senate versions of H.R. 6 have provisions that call for 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. Also, energy tax bill (S. 1149) provisions would create incentives for energy efficiency measures in home construction, home renovation, appliances, residential equipment, commercial buildings, and combined heat and power equipment, and for alternative fuels. Further, the House adopted three energy efficiency-related floor amendments. One (H.Amdt. 70) expresses a "sense of the Congress" to reduce oil imports from 58% to 45%. The second (H.Amdt. 71) requires a study of the energy conservation benefits of telecommuting by federal employees. The third (H.Amdt. 78) establishes a "Conserve by Bicycling" pilot program at the Department of Transportation. (For tier 1 issues (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. Both the House- and Senate-passed versions of H.R. 6 would expand standards to other equipment. The House version (§11045) and the Senate version (§928) have nearly identical provisions that direct DOE to set efficiency standards within three years for "standby mode" energy use by battery chargers and external power supplies. Further, these provisions 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. S. 14 (§621) includes all of these provisions but also would legislate a standard for medium base compact flourescent lamps (CFLs). 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. Most of the other provisions in the House and Senate titles on consumer product efficiency programs are similar. The table below indicates which standards would be set by law and which would be set by DOE rulemaking.

Standard set:	H.R. 6 (House & Senate versions)	S. 14
By law	exit signs, traffic signals, torchieres, distribution transformers	all items in H.R. 6 plus unit heaters and compact flourescent light bulbs
By rule	ceiling fans, vending machines, commercial refrigerators and freezers, unit heaters	all items in H.R. 6 except unit heaters

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. The House (§11002) and Senate (§911) versions of H.R. 6 would set goals for further energy efficiency in federal buildings. Although the baseline years and associated coverage periods have different dates, the provisions are nearly identical, setting progressive annual 2% reductions over a 10-year period that end with a 20% reduction from baseline. Also, both bills would also call for DOE to review results by the end of the 10-year period and recommend further goals for building energy savings for an additional decade. S. 14 (§601) had closely similar provisions. Most of the other provisions in the House and Senate titles on 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, the House version of H.R. 6 (§11001) and the Senate version (§919) have similar provisions that call for the implementation of a plan for congressional buildings to meet the energy efficiency goals for federal agencies noted above. The House version 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. In contrast, the Senate version calls for state-of-the-art energy efficiency and renewable energy technologies to be used in the Capitol Visitor Center. S. 14 (§606) had provisions identical to those in the House version.

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 bills propose some modest new tax incentives for energy efficiency.

The Senate energy tax bill (S. 1149) had four energy efficiency tax provisions that are not in the House version of H.R. 6. These provisions may come up in conference. One (§302) creates a tax credit for manufacturers of certain appliances (clothes washers and refrigerators) with energy efficiencies that exceed federal standards. The credit per appliance ranges from $50 to $150, with a $60 million maximum for the total program through 2006. A second provision (§305) creates a tax deduction for efficient commercial buildings. A

maximum of $2.25 per square foot (sf) is allowed through 2009 for new construction or reconstruction where the total energy use is at least 50% below Standard 90.1-1999 of the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). Two other provisions create a $30/unit tax deduction (§306) to utilities for investment in energy management devices installed in residences or businesses and set a 3-year recovery period (§307) for depreciation purposes. The table below shows the differences between the House and Senate maximum tax incentives for efficiency in new and existing homes. S. 14 had provisions identical to those shown below for the Senate version of H.R. 6.

	New Homes		Existing Homes	
	House (§41005)	Senate (§2101)	House (§41004)	Senate (§2109)
Energy Reduction	30%	50%	IECC*	30%
Credit Cap	$2,000	$2,000	$2,000	$300
Period (years)	5	5	3	4

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

Similar tax provisions for fuel cell power plants and combined heat and power (CHP) appear in both bills. Also, both bills have tax incentives for alternative fuel vehicles and equipment.

Energy Efficiency Tax Revenue Effect. **Table 1**, below compares the estimated 10-year revenue effect of energy efficiency and conservation tax provisions in the House and Senate versions of H.R. 6. It also shows the share of the total in each bill.

Table 1. H.R. 6, Tax Revenue Effect
($ billions)

	House	Senate
Energy Efficiency and Conservation Measures (Excludes diesel fuels, alternative fuels, and solar credit)	$ 1.35	$ 2.16
Total, All Tax Provisions	$18.62	$20.63
Energy Efficiency and Conservation Share of Total	7.3%	10.4%

Source: Joint Tax Committee. Estimated Revenue Effects of H.R. 1531, April 3, 2003, and Estimated Revenue Effects of Senate amendment to H.R. 4, May 23, 2002.

Housing, Funding Authorizations, and Other Provisions

The House version (Division G, §70001-§70009) and Senate version (§931-§940)) have identical provisions for energy efficiency in public housing, except that the Senate version adds a provision for a capital fund (§937). They also have nearly identical provisions that

authorize funding for energy assistance (e.g., Low-Income Home Energy Assistance Program, LIHEAP) and grant programs (e.g., DOE Weatherization Program).

DOE Budget, FY2004

Senate floor action (S.Amdt. 1764) added a provision (§336) that would define electric thermal storage technology as a weatherization measure. Also, floor action (S.Amdt. 1777) added a provision (§340) that would incorporate "neighborhood electric vehicle" (one that is both low-speed and has zero emissions) into the definition of alternative-fueled vehicles, making it eligible for certain incentives.

The House approved $879.5 million for DOE energy conservation funding in FY2004. Compared to the Administration's request, this is an increase of $3.7 million, or 0.4%. However, compared to the FY2003 appropriation, this is a decrease of $12.3 million, or 1%, excluding inflation. In House floor action, H.Amdt. 255 (Sanders-Kind) added $15.0 million for Weatherization grants with an unspecified $15.0 million offsetting cut in energy conservation.

The Senate Appropriations Committee recommends (S. 1391, S.Rept. 108-89) $861.6 million, which is $17.8 million, or 2%, less than the House approved and $14.1 million less than the request. Compared to the FY2003 appropriation, the Committee recommendation would cut overall funding by $30.1 million, or 3%, not accounting for inflation. Grants would increase by $5.8 million, but R&D would decline from $623.5 million to $587.6 million, a drop of $35.9 million, or 6%.

The FY2004 budget request stresses that the Administration's energy efficiency programs can improve economic growth, energy security, and the environment. The request presents (and **Table 3** shows) a new budget structure that reflects the recent reorganization of DOE's Office of Energy Efficiency and Renewable Energy (EERE). The Administration proposes to decrease conservation funding under EERE from $891.8 million in FY2003 to $875.8 million in FY2004. The main Administration initiatives are: (1) FreedomCAR and Hydrogen Fuels, reflected in a $22.4 million, or 41%, increase for Fuel Cell Technologies to help reduce foreign oil dependence, improve electric power infrastructure security and reliability, and curb greenhouse gas emissions; (2) the National Climate Change Technology Initiative (NCCTI), which would receive $9.5 million to promote competitive project solicitations to reduce greenhouse gas emissions; and (3) the Weatherization grants program, which would increase by $64.7 million, or 29%, to reduce energy bills and improve energy affordability for low-income families. To offset these increases, the FY2004 request also proposes several decreases. Compared to the FY2003 appropriation, the FY2004 request would cut overall funding by $16.0 million, or 2%, not accounting for inflation. R&D funding would decline from $623.5 million to $548.8 million, a drop of $74.7 million, or 12%.

For further information on the *Energy Conservation Budget*, see the web site at [http://www.cfo.doe.gov/budget/04budget/]. For further information on *Energy Conservation Programs*, see the Web site at [http://www.eere.energy.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 2. EPA Funding for Climate Protection Energy Efficiency Programs (CPP)

($ millions current)

	FY2001 Enacted	FY2002 Enacted	FY2003 Conf.	FY2004 Request	FY2004 House	FY2004 Senate	Senate -FY2003
CPP Buildings	52.5	48.6	49.8	48.3	50.3	50.3	0.5
CPP Transport.	29.4	30.8	21.6	22.9	22.9	22.9	1.4
CPP Industry	31.9	25.4	25.7	26.4	26.4	26.4	0.8
CPP Carbon Rem.	1.0	1.5	1.6	1.7	1.7	1.7	0.2
CPP State / Local	2.5	2.2	2.3	2.6	2.6	2.6	0.3
CPP Int'l Cap.	5.5	7.0	7.1	6.6	6.6	6.6	-0.5
CPP Int'l Partner.	——	——	——	——	——	——	——
CPP Int'l Coop'n	0.8	——	——	——	——	——	——
CPP Other	——	8.4	7.2	8.0	8.0	8.0	0.7
CPP, SUBTOTAL	123.6	123.9	115.2	116.6	118.6	118.6	3.3
Climate Chg Rsch	22.6	21.4	21.7	21.5	21.5	21.5	-0.2
TOTAL	146.2	145.3	137.0	138.1	140.1	140.1	3.1

Source: S.Rept. 108-143; H.Rept. 108-235; EPA FY2004 Congressional Justification, p. VI-28; H.Rept. 108-10 (Cong. Rec. Feb. 12, 2003, p. H1087.

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.

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 web site at [http://www.eren.doe.gov/EE/power_distributed_generation.html] and at [http://www.eren.doe.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), *Impacts of Energy Efficiency and Renewable Energy on Natural Gas Markets*, says the above-noted measures could be expanded to include increased R&D funding and stronger provisions for gas- and electricty-savings in H.R. 6. (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?*)

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 24% (2001) of the world's oil consumption and about 40% (2002) of total U.S. energy use. The nation uses (2000) about 19.7 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

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 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 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

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. The bill incorporates provisions of H.R. 39, H.R. 238, and H.R. 1531. 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.

H.R. 2691 (Taylor) / S. 1391 (Burns)

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, 2004. Passed House, amended, July 17. Senate bill reported (S.Rept. 108-89) July 10. Senate inserted text of S.Amdt. 1724 (S. 1391) into H.R. 2691, and passed it, amended on September 23.

H.R. 2800 (Kolbe) / S. 1426 (McConnell)

Foreign Operations, Export Financing, and Related Programs Appropriations bill, 2004. House bill reported (H.Rept. 108-222) July 21, 2004. Senate bill reported (S.Rept. 108-106) July 17. Under Environment Programs, Senate bill (§654) appropriates $185 million for "energy conservation, energy efficiency, and clean energy" in developing countries to reduce greenhouse gases.

H.R. 2861 (Walsh)/S. 1584(Bond)

Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations bill, 2004. Makes appropriations for EPA's Climate Protection Energy Efficiency Programs. House bill reported (H.Rept. 108-235) July 21, 2003. Passed House July 25. Senate bill reported (S.Rept. 108-143) September 4.

S. 14 (Domenici)

Omnibus Energy Bill. Energy efficiency appears as Title VI. Also, Title VII A covers alternative fuels, Title VIII covers hydrogen, Title IX covers R&D authorizations, and Title XI on Electricity includes a provisions on PURPA and cogeneration. Energy efficiency markup held April 8. S. 1149 (energy tax bill) is expected to be incorporated into S. 14. Introduced April 30, 2003. Floor action began May 6.

S. 1149 (Grassley)

Energy Tax Incentives Act of 2003. Supersedes S. 597. Contains provisions for energy efficiency tax incentives (Title III, Section 101) and alternative fuels incentives (Title II). Committee on Finance reported (S.Rept. 108-54) May 23, 2003. Expected to be incorporated into S. 14 as a floor amendment.

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.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 2003.* 2003. 120 p.
[http://www.greenercars.com/indexplus.html]

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 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/ORNL/Energy_Eff/CEF.htm]

——*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://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]

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.

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/freedomcar/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/]

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-FY2004

(selected programs, $ millions)

	FY2003 Appn.	FY2004 Request	FY2004 House	FY2004 Senate	Senate-FY2003
VEHICLE TECH.	177.3	157.6	184.4	174.2	-3.1
Hybrid and Electric	42.7	49.6	44.6	44.6	1.9
Advanced Combustion	56.3	37.1	55.6	55.6	-0.7
Materials Technology	36.8	39.6	41.2	40.2	3.5
Fuels Technology	19.6	6.8	20.3	9.3	-10.3
Technology Introduction	4.6	5.9	4.5	5.4	0.8
FUEL CELL TECH.	55.1	77.5	56.5	68.5	13.4
Transportation Systems	6.2	7.6	6.6	7.6	1.4
Distributed Energy Systems	7.5	7.5	7.5	7.5	0.0
INTERGOVERNMENTAL	314.4	357.0	322.5	311.5	-3.0
Weatherization Program	223.5	288.0	240.0	230.0	6.5
State Energy Program	44.7	38.8	45.0	44.0	-0.7
Other State Energy	5.3	2.4	2.4	2.4	-3.0
Gateway Deployment	40.9	27.6	35.1	35.1	-5.8
Rebuild America	11.0	8.6	10.6	8.6	-2.4
Clean Cities	11.0	6.6	10.6	11.6	0.6
Energy Star	4.2	3.7	3.7	3.7	-0.5
Ind. Competitiveness	2.7	0.0	0.0	0.0	-2.7
Inventions	3.8	2.4	3.9	4.9	1.0
International Market Dev.	0.6	0.0	0.0	0.0	-0.6
DISTRIB. ENERGY RES.	61.1	51.8	64.3	57.5	-3.6
BUILDING TECH.	59.4	52.6	59.0	62.1	2.7
Res. & Commercial Bldgs	16.8	20.2	17.7	20.2	3.4
Emerging Technologies	31.3	21.8	29.7	29.8	-1.5
INDUSTRIAL TECH.	98.6	64.4	97.7	76.4	-22.1
Ind. of the Future, Specific	60.4	24.0	47.8	32.0	-28.4
Ind. of the Future, Cross.	34.2	34.4	43.9	38.4	4.2
BIOMASS/ BIOREFINERY	24.6	8.8	0.0	10.8	-13.8
Advanced Biomass Tech.	9.2	8.4	0.0	10.4	1.2
Systems Integ. & Production	14.6	0.0	0.0	0.0	-14.6
FED. ENERGY MGMT	19.3	20.0	20.0	20.0	0.7
PROGRAM MGMT	77.0	76.7	90.2	80.7	3.7
Energy Eff. Science Init.	5.0	0.0	5.0	0.0	-5.0
National Climate Initiative	0.0	9.5	0.0	0.0	0.0
R&D SUBTOTAL	623.5	548.8	594.5	587.6	-35.9
GRANTS SUBTOTAL	268.2	327.0	285.0	274.0	5.8
TOTAL	891.8	875.8	879.5	861.6	-30.1

Sources: S.Rept. 108-89; H.Rept. 108-195; EERE Pocket Card, Apr. 30, 2003: DOE FY2004 Bud. Rst, v. 7, Feb. 2003; H.Rept. 108-10 (Cong. Rec. Feb. 12, 2003, p. H1087-88).