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Renewable Energy: Tax Credit, Budget, and Electricity Production Issues

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Renewable Energy: Tax Credit, Budget, and Electricity Restructuring Issues

SUMMARY

Energy security, a major driver of federal renewable energy programs in the past, came back into play as oil and gas prices rose late in the year 2000. The Iraq war of 2003 and the terrorist attack of September 11, 2001 have led to heightened concern about energy security, the vulnerability of energy infrastructure, and the need for alternative fuels. Further, the 2001 electricity shortages in California brought a new emphasis to the role that renewable energy may play in electricity supply.

In the 108th Congress, debate over renewable energy programs is focusing on tax credits, incentives, budget, and provisions of the omnibus energy policy bill, H.R. 6.

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 renewable energy policymaking. Concern about technology competitiveness may also be a factor in debate.

For DOE's FY2003 Renewable Energy Program, the Bush Administration sought $407.0 million.

The Consolidated Appropriations Resolution (H.J.Res. 2) was signed into law as P.L. 108-7. For DOE's Renewable Energy Program, it appropriates $422.3 million (excluding $10.0 million in prior year balances), which is $39.6 million more than the FY2002 appropriation. The conference report (H.Rept. 108-10) notes that Biomass/Biofuels subprograms have been combined into a single program and the Solar Energy subprograms have been combined into a single program.

The FY2004 budget request for DOE's Renewable Energy Program seeks $444.2 million (excluding a general reduction), which is $21.9 million more than the FY2003 appropriation, not including inflation. It includes $48.1 million more for Hydrogen (as part of the President's Hydrogen Fuel Initiative) and $15.0 million more for a National Climate Change Technology Initiative. It would also terminate the Concentrating Solar Power Program and cut Biomass/Biofuels by $20.3 million. The request presents a new budget structure.

The House-passed omnibus energy bill (H.R. 6) has a renewable energy production tax credit (PTC), renewable energy fuel standard (RFS), and several other renewables provisions. Also, an adopted floor amendment (H.Amdt. 72), authorizes funds for the General Services Administration (GSA) to install solar electric equipment in public buildings. The Senate held a markup hearing on renewable energy provisions of its draft omnibus energy bill. It also has a PTC, RFS, and other renewables provisions, but with some differences from the House bill.

MOST RECENT DEVELOPMENTS

On April 10, 2003, the House passed the omnibus energy bill (H.R. 6) with a renewable energy production tax credit (PTC), renewable energy fuel standard (RFS), and several other renewables provisions. Also, one renewable energy floor amendment (H.Amdt. 72) was adopted, which would authorize funds for the General Services Administration (GSA) to install solar electric equipment in public buildings. On April 8, the Senate held a markup hearing on renewable energy provisions of the draft Senate omnibus energy bill. It also has a PTC, RFS, and other renewables provisions, but with some differences from the House bill. (For a comparison of the House and Senate provisions, see "Renewables in Omnibus Energy Bills, 108th Congress" hereafter.)

On February 3, 2003, the Bush Administration issued its FY2004 budget request. For DOE's Renewable Energy Program, it seeks $444.2 million (excluding a general reduction), which is $21.9 million more than the FY2003 appropriation, not including inflation. It includes $48.1 million more for Hydrogen (as part of the President's Hydrogen Fuel Initiative) and $15.0 million more for a National Climate Change Technology Initiative. It would also would terminate the Concentrating Solar Power Program and cut Biomass/Biofuels by $20.3 million. The request presents a new budget structure.

(The DOE FY2004 Budget Request is on the DOE web site at [http://www.mbe.doe.gov/budget/04budget/content/es/solar.pdf].)

BACKGROUND AND ANALYSIS

Renewable Energy Concept

Renewable energy is derived from resources that are generally not depleted by human use, such as the sun, wind, and water movement. These primary sources of energy can be converted into heat, electricity and mechanical energy in several ways. There are some mature technologies for conversion of renewable energy such as hydropower, biomass, and waste combustion. Other conversion technologies, such as wind turbines and photovoltaics, are already well-developed, but have not achieved the technological efficiency and market penetration which many expect they will ultimately reach. Although geothermal energy is produced from geological rather than solar sources, it is often included as a renewable energy resource and this brief treats it as one. Commercial nuclear power is not generally considered to be a renewable energy resource. (For further definitions of renewable energy, see the National Renewable Energy Laboratory's web site information on "Clean Energy 101" [http://www.nrel.gov/clean_energy/].)

Contribution to National Energy Supply

According to the Energy Information Administration's (EIA's) *Annual Energy Outlook 2003,* renewable energy resources (excluding wood use for home heating) supplied about 5.3

Q (quadrillion Btu's or quads) of the 97.3 Q the nation used in 2001, or about 5.4% of national energy demand. More than half of renewable energy production takes the form of electricity supply. Of this, most is provided by large hydropower. However, from 1998 through 2001, a drought-driven decline in hydroelectric availability led to a major drop in national renewable energy use. Industrial use of renewables, supplied primarily by biofuels, accounts for most of the remaining contribution.

After more than 25 years of federal support, some note that renewable energy has achieved neither a high level of market penetration nor a growing market share among other energy sources. A recent review of renewable energy studies by Resources for the Future, *Renewable Energy: Winner, Loser, or Innocent Victim?*, concludes that the lower-than-projected market penetration and flat market share are due primarily to declining fossil fuel and electricity prices during this period. In contrast, however, it notes that the costs for renewable energy technologies have declined by amounts equal to or exceeding those of earlier projections.

EIA's *Annual Energy Outlook 2003* projects that current policies would yield a 2.1% average annual increase in renewable energy production to 8.8 Q through 2025, resulting in a 65% total increase. This would amount to about 6.3% of the projected 139 Q total demand in 2025. (Detailed breakdowns of renewable energy use appear in EIA's *Renewable Energy Annual 2001* and *Renewable Energy 2000: Issues and Trends*.)

Role in Long-Term Energy Supply

Our Common Future, the 1987 report of the United Nations' World Commission on Environment and Development, found that "energy efficiency can only buy time for the world to develop 'low-energy paths' based on renewable sources." Although many renewable energy systems are in a relatively early stage of development, they offer the world "a potentially huge primary energy source, sustainable in perpetuity and available in various forms to every nation on Earth." It suggested that a Research, Development, and Demonstration (R,D&D) program of renewable energy projects is required to attain the same level of primary energy that is now obtained from a mix of fossil, nuclear, and renewable energy resources.

The *Agenda 21* adopted at the 1992 United Nations Conference on Environment and Development (UNCED) concluded that mitigating urban air pollution and the adverse impact of energy use on the atmosphere — such as acid rain and climate change — requires an emphasis on "clean and renewable energy sources." The U.N. Commission on Sustainable Development oversees implementation of *Agenda 21*. The 2002 U.N. World Summit on Sustainable Development (Johannesburg Summit) adopted a *Political Declaration* and a *Plan of Implementation* ([http://www.johannesburgsummit.org/]), which includes "Clean Energy" as one of five key policy actions. The U.S. Department of State plans to implement a $43 million Clean Energy Initiative in 2003 ([http://www.state.gov/g/oes/sus/wssd/]), and the European Union committed to a $700 million energy partnership.

History

The oil embargo of 1973 sparked a quadrupling of energy prices, major economic shock, and the establishment of a comprehensive federal energy program to help with the nation's immediate and long-term energy needs. During the 1970s, the federal renewable energy program grew rapidly to include basic and applied R&D, and joint federal participation with the private sector in demonstration projects, commercialization, and information dissemination. In addition, the federal government instituted market incentives, such as business and residential tax credits, and created a utility market for non-utility produced electric power through the Public Utility Regulatory Policies Act (P.L. 95-617).

The subsequent failure of the oil cartel and the return of low oil and gas prices in the early 1980s slowed the federal program. Despite Congress's consistent support for a broader, more aggressive renewable energy program than any Administration, federal spending for these programs fell steadily through 1990. Until 1994, Congress led policy development and funding through legislative initiatives and close reviews of annual budget submissions. FY1995 marked a noteworthy shift, with the 103rd Congress for the first time approving less funding than the Administration had requested. The 104th Congress approved 23% less than the Clinton Administration request for FY1996 and 8% less for FY1997. However, funding turned upward again during the 105th Congress and in the 106th Congress. (A detailed description of DOE programs appears in DOE's *FY2003 Congressional Budget Request*, DOE/ME-0003, v. 3, February 2002.)

From FY1973 through FY2002, the federal government spent about $14.2 billion (in 2003 constant dollars) for renewable energy R&D. Renewable energy R&D funding grew from less than $1 million per year in the early 1970s to over $1.4 billion in FY1979 and FY1980, then declined steadily to $148 million in FY1990. By FY2002, it reached $403 million in 2003 constant dollars.

This spending history can be viewed within the context of DOE spending for the three major energy supply R&D programs: nuclear, fossil, and energy efficiency 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 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-FY2002, in 2003 constant dollars, reached $128.9 billion, including $73.4 billion, or 57%, for nuclear, $30.2 billion, or 23%, for fossil, $14.2 billion, or 11%, for renewables, and $11.1 billion, or 9%, for energy efficiency.

Tax Credits. The Energy Tax Act of 1978 (P.L. 95-618) created residential solar credits and the residential and business credits for wind energy installations; it expired on December 31, 1985. However, business investment credits were extended repeatedly through the 1980s. Section 1916 of the Energy Policy Act of 1992 (EPACT, P.L. 102-486) extended the 10% business tax credits for solar and geothermal equipment indefinitely. Also, EPACT Section 1914 created an income tax "production" credit of 1.5 cents/kwh for electricity produced by wind and closed-loop biomass (energy crops or trees grown only for use as a fuel) systems. P.L. 106-170 expanded this credit to include poultry waste. On March 9, 2002, the Job Creation and Worker Assistance Act of 2002 (P.L. 107-147, H.R.

3090) was signed into law. Section 603 extends the production tax credit for wind, closed-loop biomass, and poultry waste, retrospectively, from December 31, 2001 to December 31, 2003.

Public Utility Regulatory Policies Act. The Public Utilities Regulatory Policies Act (PURPA, P.L. 96-917) required electric utilities to purchase power produced by qualified renewable power facilities. Under PURPA, the Federal Energy Regulatory Commission (FERC) established rules requiring that electric utilities purchase power from windfarms and other small power producers at an "avoided cost" price based on energy and capacity costs that the utility would otherwise incur by generating the power itself or purchasing it elsewhere. However, to receive avoided cost payments, each renewables facility must file for, and obtain, qualifying facility (QF) status from FERC. EIA's *Renewable Energy 2000: Issues* reports that, in 1998, QF renewable power capacity reached 12,700 megawatts (MW) and generation reached 64 billion kilowatt-hours (kwh). Thus, QFs provided about 1.6% of national electric capacity and about 1.7% of national electricity generation. In comparison, the capacity of all renewables reached 94,800 MW, or about 12% of national capacity; and generation for all renewables stood at 418,000, which is about 11.5% of national generation.

State and Local Government Roles. State and local governments have played a key role in renewable energy development. For example, in the early 1980s, a generous state investment tax for wind energy in California combined with PURPA and the federal tax credit to stimulate industry development of the first windfarms. California and New York have invested some state funds in renewable energy R&D. Recently, Texas and several other states have used a regulatory tool, the renewable energy portfolio standard (RPS), to encourage renewable energy. Also, in 2001, the City of San Francisco enacted a $100 million revenue bond (Proposition B, "Vote Solar") to support solar and wind energy implementation.

(For more on federal, state, and local policies (incentives, grants, standards) for renewable energy, see Database of Incentives for Renewable Energy [http://www.dsireusa.org/].)

DOE's Office of Energy Efficiency and Renewable Energy (EERE). This office is led by the Assistant Secretary for Energy Efficiency and Renewable Energy. In 2002, Assistant Secretary David Garman completed a major reorganization of EERE. The new management strategy is described in *Focused on Results: A New Government Business Model*, available at [http://www.eren.doe.gov/eere/pdfs/eere_reorg.pdf]. More information about EERE is available on the DOE web site [http://www.eren.doe.gov/eere/organization.html].

Renewables in Omnibus Energy Bills, 108th Congress

In the 108th Congress, most legislative action on renewables has focused on the omnibus energy policy bills, H.R. 6, the as yet unnumbered draft Senate energy policy bill, and the Senate energy tax bill, S. 597, which is expected to be added to the draft omnibus Senate energy bill. Key renewables provisions include the renewable energy production tax credit, renewable energy production incentive, renewable fuel standard (RFS), the residential tax credit, and certain alternative fuels incentives. Other renewables provisions cover

hydroelectric relicensing, geothermal leasing, biomass grants, and authorizations for renewable energy R&D programs.

Production Tax Credit (PTC) and Production Incentive. The existing renewable energy production tax credit provides a 1.8 cents/kwh credit for businesses that generate power from wind, closed-loop biomass (energy crops), and poultry waste for sale to the grid. P.L. 107-147 extended this credit through Dec. 31, 2003. Both H.R. 6 (Section 41002) and S. 597 would extend the credit for three years, through Dec. 31, 2006. They would also expand the eligible sources to include open-loop biomass (forest, agricultural, and construction wastes). H.R. 6 would further extend the credit to landfill gas and trash combustion facilities. S. 597 does not include landfill gas and trash facilities, but would expand credit eligibility to swine and bovine waste, geothermal energy, solar energy, small irrigation power facilities, municipal biosolids, and recycled sludge. Further, S. 597 (Section 104) sets conditions under which the credit could be transferable.

Parallel to the PTC, there is a renewable energy production "incentive" (REPI) for state and local governments. This 1.5 cent/kwh incentive was created by EPACT Section 1212 and it is funded through appropriations to DOE. H.R. 6 (Section 16072) and the draft Senate bill (Section 502) have identical provisions that would extend this incentive through 2023 and add landfill gas to the list of eligible resources.

Renewable Energy Fuel Standard (RFS). According to the Renewable Fuels Association, the ethanol industry produced 2.2 billion gallons in 2002. H.R. 6 (Section 17101) would require that a minimum volume of gasoline be derived from renewable energy sources, including various forms of ethanol and biodiesel. The RFS would start in 2005 at 2.7 billion gallons per year and grow to 5.0 billion gallons per year in 2015. S. 791 (Section 101) would set an RFS, and it is expected to be added to the draft Senate omnibus energy bill. The RFS would be set at 2.6 billion gallons in 2005, rising to 5.0 billion gallons in 2012. Further, Section 203 would restrict the use of methyl tertiary-butyl ether (MTBE).

Renewable Hydrogen. H.R. 6 (Section 60003) would create a program to produce hydrogen from a variety of sources, including renewable energy and renewable fuels, as part of a broader effort to development hydrogen fuels, vehicles, and infrastructure. According to *The Energy Daily* (March 27, 2003, p. 4), the draft Senate omnibus energy bill will also include energy sources for producing hydrogen.

Residential Tax Credit. H.R. 6 (Section 41001) of S. 597 (Section 303) would create a 15% residential tax credit worth up to $2,000 for homeowners who purchase photovoltaics and solar water heating equipment. The Senate version also provides a 30% credit worth up to $1,000 for wind energy equipment.

Alternative Fuels Incentives. In H.R. 6, Sections 15011-15024, 15046, 17102-17108, and 21703 have measures related to alternative fuels and vehicles. In S. 597, Sections 201-209 contain incentives for ethanol, biodiesel, and other alternative fuels.

Other renewable energy provisions are identified in Table 1 below.

Table 1: Omnibus Energy Bills: Other Provisions

Provision	H.R. 6	Draft Senate Bill
Hydropower	13001-13204	511
Federal Lands	16073, 30501-30503	503
Net Metering	16071	-----
Resource Assessment	16074	501
Funding Authorization	21301-21322	-----
Biomass / Biopower	21706, 30301	531-533
Indian Energy	30301	-----
Geothermal Energy	30601-30614	37876
Insular Areas	30801	505
Federal Purchases	H. Amdt. 72	504

Renewables in Omnibus Energy Bills, 107th Congress

In the 107th Congress, conference committee negotiations over the omnibus energy bill, H.R. 4, were not completed. Key renewables provisions that reportedly (Inside Energy, October 21, p. 1-5) were not agreed to included the renewable energy portfolio standard (RPS), renewable energy fuel standard, the renewable energy production tax credit, a residential tax credit, and several incentives for alternative fuels and vehicles. The conference committee reportedly had reached agreement on three renewables provisions: an annual DOE assessment of renewable energy potential (H601/S262, House recedes), a DOE report on renewable energy potential for American Indian lands (S406, House recedes with amendment), and a wind/hydro study (S408, House recedes with amendment). The renewables provisions in the House version were taken directly from H.R. 2436, H.R. 2460, H.R. 2511, and H.R. 2587 and contained many, if not most, of the renewable energy recommendations in the Bush Administration's *National Energy Policy* report. The Senate version of H.R. 4 incorporated S.Amdt. 2917 to S. 517, which, in turn, replaced S. 1766. Many renewables provisions of the Senate version were taken directly from S. 388, S. 389, S. 596, and S. 597. (For more on H.R. 4, see CRS Report RL31427.)

FY2004 DOE Budget

The FY2004 request for DOE finds that hydrogen energy is the "most promising long-term revolution in energy use that can help the nation "liberate itself from dependence on imported oil," according to the Budget of the U.S. Government FY2004 (p 105). The FY2004 request for DOE's Renewable Energy Program elaborates that its aim is to

"accelerate progress" and make hydrogen technologies "cleaner, safer, and lower in cost." Further, it stresses that the new National Climate Change Technology Initiative will create "competitive solicitations" in applied research that aims to reduce greenhouse gas emission and will "complement" existing R&D programs.

FY2003 DOE Budget

On February 20, 2003, the Consolidated Appropriations Resolution (H.J.Res. 2) was signed into law as P.L. 108-7. For DOE's Renewable Energy Program, it appropriates $422.3 million (excluding $10.0 million in prior year balances), which is $39.6 million more than the FY2002 appropriation. The conference report (H.Rept. 108-10) notes that Biomass/Biofuels subprograms have been combined into a single program and the Solar Energy subprograms have been combined into a single program.

On January 29, 2003, the House disagreed to the Senate amendment for H.J.Res 2 and appointed conferees. On January 23, 2003, the Senate passed the Consolidated Appropriations Resolution for FY2003 (H.J.Res. 2), which includes the Energy and Water Appropriations bill (Congressional Record of January 15, 2003, p. S492). For the DOE Renewable Energy Program, it contains $448.1 million (excluding $15.0 million in prior year balances). This is identical to the amount that the Senate Appropriations Committee had recommended in the 107th Congress. The House Appropriations Committee recommendation in the 107th Congress was the same as the FY2002 level.

On September 5, 2002, the House Appropriations Committee recommended (H.R. 5431, H.Rept. 107-681) $396.0 million for the DOE Renewable Energy Program. This is the same amount, not accounting for inflation, as the FY2002 appropriation. The Senate Appropriations Committee recommended (S. 2784, S.Rept. 107-220) $448.0 million (excluding $15.0 million in prior year balances), which was $52.0 million, or 13%, more than the House Appropriations Committee's recommendation.

The Senate report on FY2003 Energy and Water Appropriations found that DOE had not adequately implemented "congressionally-directed activities" set out in the FY2002 conference report and called for a DOE response "before the Conference Committee completes action on the final [FY2003] bill." The House report (H.Rept. 107-681) echoed this concern and it "renewed" an FY2002 directive that DOE provide Congress with "quantitative measures that can be used to evaluate the potential costs and benefits of various renewable energy technologies," to show a basis for its FY2003 budget proposal.

The FY2003 request (as revised by the House Appropriations Committee on March 18, 2002) for DOE's Renewable Energy Program sought "to meet the growing need for clean and affordable energy," according to the Appendix to the U.S. Government's FY2003 Budget (p. 397). To fulfill this policy, DOE proposed to lift funding from $396.0 million in FY2002 to $407.0 million in FY2003, an increase of $11.0 million (3%) above the FY2002 level.

FY2003 USDA Budget

The Department of Agriculture's (USDA) renewable energy programs have recently grown, spurred by federal bioenergy initiatives (P.L. 106-224, Executive Order 13134), the President's National Energy Policy, and the Farm Security Act (P.L. 107-171). According to USDA, renewable energy program funding reached $247.6 million in FY2002. Table 2 shows some funding details. Also, for FY2003, Section 6013 of the Farm Security Act of 2002 provides loan guarantees for renewable energy equipment and broadens the range of

Table 2. USDA Funding for Renewable Energy Programs
($ millions)

	FY2001	FY2002	FY2003*
Biobased Products and Bioenergy Programs			
Agricultural Research Service	48.9	64.2	67.4
Commodity Credit Corporation (CCC)*	40.7	150	-----
Cooperative State Research, Education, Extension	23	12.3	14.2
Forest Service	12.5	12.5	17.5
Other	8	8.2	3.4
Subtotal, Biobased Products and Bioenergy Programs*	133	247.2	102.5
Substitution: Solar and Wind Energy Programs	0.4	0.4	0.4
Farm Security Act, Title IX (mandatory appropriations)	-----	-----	39
Total*	133.4	247.6	141.9
*The appropriations for the FY2003 CCC Bioenergy Incentives Program have not yet been set. The Senate has recommended $50 million and the House has recommended $150 million.			

Source: USDA. Office of Energy Policy and New Uses. Selected tables from Roger Conway, October 29, 2002.

renewable energy equipment available for loans. Sections 2101 and 6401 of the Act provide other programs and incentives for renewable energy (For more information about USDA Bioenergy Programs, go to the website at [http://www.ars.usda.gov/bbcc/index.htm]).

Electricity from Renewable Energy

The Public Utility Regulatory Policies Act (PURPA) has been key to the growth of electric power production from renewable energy facilities. Since 1994, state actions to restructure the electric utility industry have dampened PURPA's effect. As part of federal restructuring proposals, some bills have included a repeal of the mandatory renewables purchase requirement in Section 210 of PURPA. (For a discussion of broader electricity

restructuring issues, see the CRS Electronic Briefing Book on *Electricity Restructuring* at [http://www.congress.gov/brbk/html/ebele1.shtml].)

Renewables Under Electric Industry Restructuring. To encourage a continued role for renewable energy under restructuring, some states and utilities have enacted such measures as a renewable energy portfolio standard (RPS), public benefits fund (PBF), and/or "green" pricing and marketing of renewable power. The Senate version of H.R. 4 had an RPS (see above under "Renewable Energy Portfolio Standard").

Green Power. The spread of competition in the electric industry has been accompanied by growth in the market for green power services. The term "green power" generally refers to electricity supplied in whole or in part from renewable energy sources. Green pricing is an optional utility service that allows electricity customers who are willing to pay a premium for the environmental benefits of renewable energy to purchase green power instead of conventional power. More than 80 utilities have implemented green pricing programs that can reach more than one-third of the nation's consumers. Green power marketing, the selling of green power programs in either the retail or wholesale competitive marketplace, is underway in the newly competitive electricity markets of California, Connecticut, Illinois, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Texas. The growth of green power has led to market information needs for disclosure and certification, which are discussed in CRS Report RS20270 on *Renewable Energy and Electricity Restructuring*. (For more on green power see the web site [http://www.eren.doe.gov/greenpower/home.shtml].)

Distributed Generation. Distributed generation involves the use of small, modular electricity generators sited close to the customer load that can enable utilities to defer or eliminate costly investments in transmission and distribution (T&D) system upgrades, and provide customers with quality, reliable energy supplies that may have less environmental impact than traditional fossil fuel generators. Technologies for distributed electricity generation use wind, solar, bioenergy, fuel cells, gas microturbines, hydrogen, combined heat and power, and hybrid power systems. For example, DOE's R&D program is developing systems under five megawatts in size that would primarily use agricultural or industrial biomass wastes to supply energy to use on-site or to sell to the grid. As another example, photovoltaic (PV) systems ranging from one kilowatt to one megawatt are commercially available. PV has the advantages of being modular and easy to site near the use, it has low operating and maintenance costs, and its power output curve follows the peak electrical demand. Its main disadvantage is its initial capital cost. (More information about DOE's Distributed Power Program is available at [http://www.eren.doe.gov/distributedpower/]).

During the 2001 electricity crisis in California, FERC waived (EL01-47/000, [http://www.ferc.fed.us/electric/bulkpower/el01-47-000.pdf]) its prior notice requirements for businesses with on-site power generators that sell wholesale power to the grid, to help increase electricity supplies in the Western states. This action tends to encourage more generation from distributed renewable energy power sources. Also, the House version of H.R. 4 (Sections 2121-2128) and Senate version of H.R. 4 (Sections 102, 242, 1211) had provisions for distributed generation.

Net Metering. Net metering allows customers with generating facilities to "turn their electric meters backwards" when they are feeding power into the grid, so that they receive

retail prices for the excess electricity they generate. This encourages customer investment in distributed generation, which includes renewable energy equipment. In 2002, California enacted laws (AB58, Chapter 836; AB2228, Chapter 845) that encourage net metering, including a provision that permanently raises the size limit from 10 kw to 1 Mw. Further, the California Public Utilities Commission approved $138 million annually over four years for programs that reduce peak demand, including a provision for up to 50% of system cost to customers that install PV, wind, or fuel cells that use renewable fuels ranging in size from 30 kw to 1 MW. Also, the Senate version of H.R. 4 (Section 245) provided for net metering.

Climate Change and Renewables

Because most forms of renewable energy generate no carbon dioxide (CO_2), renewables are seen as a key long-term resource that can substitute for fossil energy sources used to produce vehicle fuels and electricity. The percentage of renewable energy substitution depends on technology cost, market penetration, and the use of energy efficiency measures to control energy prices and demand. DOE's 2000 report, *Scenarios for a Clean Energy Future*, estimates that new policies could triple non-hydro renewables electricity production in 2010 from a projected business-as-usual 86 billion kilowatt-hours (Bkwh) to 265 Bkwh. EPA's *Climate Action Report-2002* describes federal renewable energy programs aimed at reducing greenhouse gas emissions. In *Climate Change 2001: Mitigation*, the Intergovernmental Panel on Climate Change looks at the role that renewables can play in curbing global CO_2 emissions.

Since 1988, the federal government has accelerated programs that study the science of global climate change and has initiated programs aimed at mitigating fossil fuel-generated carbon dioxide (CO_2) and other human-generated emissions.

The federal government funds programs for renewable energy as a mitigation measure at DOE, the Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the Agency for International Development (AID), and the World Bank. The latter two agencies have received funding for renewable energy-related climate actions through Foreign Operations appropriations bills.

Because CO_2 contributes the largest share of greenhouse gas emission impact, it has been the focus of studies of the potential for reducing emissions through renewable energy and other means. Except for biofuels and biopower, wherever renewable energy equipment displaces fossil fuel use, it will also reduce carbon dioxide (CO_2) emissions, as well as pollutants that contribute to water pollution, acid rain, and urban smog. In general, the combustion of biomass for fuel and power production releases CO_2 at an intensity that may rival or exceed that for natural gas. However, the growth of biomass material, which absorbs CO_2, offsets this release. Hence, net emissions occur only when combustion is based on deforestation. In a "closed loop" system, biomass combustion is based on rotating energy crops, there is no net release, and its displacement of any fossil fuel, including natural gas, reduces CO_2 emissions.

LEGISLATION

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

Consolidated Appropriations Resolution for FY2003. The Energy and Water Appropriations Bill appears as Division D of the Resolution and makes appropriations for DOE's Renewable Energy program. House passed as a continuing resolution, January 8, 2003. Senate inserted its amendment (S.Amdt 1) and issued an unnumbered committee print (*Congressional Record*, p. S492) January 15, 2003. Passed Senate, amended, January 23, 2003. Conference reported (H.Rept. 108-10) February 13. Passed House and Senate February 13. Signed into law February 20.

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

Consolidated Appropriations Resolution for FY2003. The Foreign Operations, Export Financing, and Related Programs Appropriations Bill appears as Division E of the Resolution. Appropriates funding for renewable energy and energy efficiency under programs of the Global Environment Facility (GEF), U.S. Agency for International Development (AID), Overseas Private Investment Corporation (OPIC), and other bilateral and multilateral programs. Under Development Assistance, Section 555 appropriates $175 million in a new account to create a fund for "energy conservation, energy efficiency, and clean energy" in developing countries. As noted above, signed into law February 20.

H.R. 6 (Tauzin)

Energy Omnibus Bill. Includes provisions for renewable energy production tax credit (PTC), renewable energy production incentive (REPI), renewable energy fuel standard (RFS), renewable hydrogen, residential solar tax credit, alternative fuels, and others. Incorporates renewable energy 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.

Joint Staff Draft of Senate Omnibus Energy Bill

Renewable energy appears as Titles V. S. 597 (energy tax bill) and S. 791 (renewable fuels mandate) expected to be incorporated. Draft introduced April 4, 2003. Renewable energy markup held April 8.

S. 154 (Dayton)

Biodiesel Renewable Fuels Act, appears as Title III. Provides a business tax credit for biodiesel fuel used in the production of a qualified biodiesel mixture and provides manufacturers a prorated reduction of motor fuel excise taxes. Encourages federal agencies to use ethanol and biodiesel blends. Introduced February 14, 2003; referred to Committee on Finance.

S. 355 (Lincoln)

Biodiesel Promotion Act of 2003. Similar to S. 154. One of seven bills (S. 355 - S. 361) with provisions for renewable energy and energy efficiency.) Introduced February 11, 2003; referred to Committee on Finance.

S. 385 (Daschle)

Fuels Security Act of 2003. Provides for increased production and use of renewable fuels, especially ethanol. Similar to Renewable Fuels Standard set out in Section 820 in the Senate version of H.R. 4 from the 107th Congress. Introduced February 13, 2003; referred to Committee on Environment and Public Works.

S. 461 (Dorgan)

Creates a program to promote hydrogen fuel cells. Introduced February 26, 2003; referred to Committee on Finance.

S. 597 (Grassley)

Energy Tax Incentives Act of 2003. Contains provisions for renewable energy production tax credit, alternative fuels incentives, and residential solar energy property. Introduced March 11, 2003; referred to Committee on Finance. Expected to be incorporated into omnibus energy bill.

S. 791 (Inhofe)

Reliable Fuels Act. Would establish a renewable energy fuel standard (RFS) and restrict use of methyl tertiary-butyl ether (MTBE). Introduced April 9, 2003; referred to Committee on Environment and Public Works. May be incorporated into omnibus energy bill.

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FOR ADDITIONAL READING

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Table 3. DOE Renewable Energy Budget for FY2001-FY2004

($ millions)

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY	FY2002 App.	FY2003 Request	FY2003 H.App.C.	FY2003 Senate	FY2003 Conf.	FY2004 Request	FY2004 - FY2003
Biofuels - Total	87.7	86	86	100	90	69.8	-20.3
Biofuels/Utility Power	-----	-----	33	-----	-----	-----	-----
Biofuels/Transportation	-----	-----	53	-----	-----	-----	-----
Geothermal	27	26.5	26.5	37	30	25.5	-4.5
Hydrogen	28.9	39.9	35.5	45	40	88.0	48.0
Small Hydro	5	7.5	6.5	7.5	5.3	7.5	2.2
Solar Energy	88.5	87.6	87.6	95	95	83.7	-11.3
Concentrating Solar Power	-----	1.9	1.9	6	5.5	0.0	0.0
Photovoltaics	-----	73.7	73.7	77	-----	76.7	-----
Solar Buildings	-----	12	12	12	-----	7.0	-----
Wind	38.2	44	44	50	44	41.6	-2.4
TECHNOLOGIES SUBTOTAL	275.3	291.5	286.1	334.5	304.3	316.0	11.7
Electric/Storage	73	70.4	70.4	75	85	70.8	-14.2
Superconductivity	32	47.8	47.8	50	-----	47.8	-----
Other	41	22.6	22.6	25	-----	23.0	-----
Renewable Support & Implementation	10.9	23.9	19.9	29.9	21.5	20.9	-0.6
Dept. Energy Management	1.4	3	1.5	3	1.5	2.3	0.8
International Renewables	2.8	6.5	4	6.5	4	6.5	2.5
Production Incentive	3.8	4	6	5	5	4.0	-1.0
Renew. Amer. Indian Res.	2.8	8.3	6.3	9.3	6	6.0	0.0
Program Support	0	2.1	2.1	6.1	5	2.1	-2.9
NREL (incl. construction)	4.9	5	5	6.8	5.5	5.0	-0.5
National Climate Change Tech.	-----	-----	-----	-----	0	15.0	15.0
Program Direction	18.7	16.2	14.6	16.9	16	16.6	0.6
RENEWABLES, Subtotal	382.7	407	396	463.1	432.3	444.2	11.9
Prior Year Balances	-----	-----	-----	-15	-10	0.0	10.0
RENEWABLES, Total	382.7	407	396	448.1	422.3	444.2	21.9

Source: DOE FY2004 Cong. Budget Request, v. 3; Feb. 2003 (p. 244-247); H.Rept. 108-10; H. Appropriations Committee Revisions, March 18, 2002; S.Rept. 107-220; H.Rept. 107-681; DOE FY2003 Cong. Budget Request, v. 3; Feb. 2002.