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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. Also, the electricity shortages in California have brought a new emphasis to the role that renewable energy may play in electricity supply.

In the 107th Congress, debate over renewable energy programs appears to be taking a focus on tax credits, incentives, and the Bush Administration's National Energy Policy report, *Reliable, Affordable, and Environmentally Sound Energy for America's Future.*

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 remain a factor in debate.

For DOE's FY2003 Renewable Energy Program, the Administration seeks $407.7 million, a $21.3 million (6%) increase relative to the FY2002 appropriation. The main increases are $15.5 million for Superconductivity, $10.7 million for Hydrogen, $7.3 for Solar Buildings, $5.5 million for Renewable American Indian Resources, $5.4 million for Wind, $4.2 million for Biofuels, and $3.7 million for International Renewables. However, there are major cuts in proposed spending, which include decreases of $15.7 million for Distributed Energy, $11.3 million for Concentrated Solar, $6.2 million for Bio-power, and $2.6 million for Program Direction.

An omnibus House energy bill (H.R. 4, Securing America's Future Energy Act), includes many, if not most, of the recommendations from Bush Administration's *National Energy Policy* report. Its renewable energy provisions include R&D funding authorizations, incentives for alternative fuel vehicles, biomass development on federal lands, expedited geothermal leasing, investment and production tax credits, and renewables funding derived from oil development in the Arctic National Wildlife Refuge (ANWR).

In response to H.R. 4, an omnibus Senate energy bill (S.Amdt. 2917 to S. 517, Energy Policy Act) has been introduced. It also has provisions for R&D funding and alternative fuels, but differs by including – for example – a federal purchase requirement, net metering, and a renewable energy portfolio standard (RPS).

The Job Creation and Worker Assistance Act of 2002 (P.L. 107-147, H.R. 3090) was enacted on March 9, 2002. Section 603 extends the renewable energy production tax credit retrospectively, from December 31, 2001 to December 31, 2003. H.R. 4 and S.Amdt. 2917 to S. 517 would extend the credit for an additional 4 years, to January 1, 2006.

MOST RECENT DEVELOPMENTS

On March 14, 2002, separate amendments by Senators Bingaman, Kyl, and Jeffords to the renewable energy portfolio standard (RPS) are scheduled for floor action. (See section below on "Renewables Provisions in Omnibus Energy Bills.") On March 5, 2002, Senator Daschle introduced a Further Modification to S.Amdt. 2917 to S. 517 (which replaces S. 1766), an omnibus Senate energy bill with an RPS, renewable fuel standard, and other renewable energy provisions. The bill responds to the omnibus House energy bill (H.R. 4, Securing America's Future Energy Act of 2001), which passed the House on August 2, 2001. Both bills have provisions for R&D funding and alternative fuels, but have major differences in their coverage of several areas.

On March 9, 2001, 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. The Omnibus Energy bills (H.R. 4 and S.Amdt. 2917 to S. 517) would broaden eligibility for this credit to other renewable energy sources and extend it for an additional three years.

On February 27, the House Appropriations Committee's Subcommittee on Energy and Water Appropriations held a hearing on the FY2003 budget request for the DOE Renewable Energy Program. On February 4, the Administration issued its budget request for FY2003, which seeks $407.7 million, a $21.3 million (6%) increase relative to the FY2002 appropriation. The primary increases are $15.5 million for Superconductivity, $10.7 million for Hydrogen, $7.3 for Solar Buildings, $5.5 million for Renewable American Indian Resources, $5.4 million for Wind, $4.2 million for Biofuels, and $3.7 million for International Renewables. However, the major cuts in proposed spending include decreases of $15.7 million for Distributed Energy, $11.3 million for Concentrated Solar, $6.2 million for Biopower, and $2.6 million for Program Direction.

(The DOE FY2003 Budget Request is on the DOE web site at [http://www.mbe.doe.gov/budget/03budget/content/es/renewabl.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 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 2001*, renewable energy resources supplied about 6.6 Q (quadrillion Btu's or quads) of the 96.1 Q the nation used in 1999, or about 6.9% 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, in 1998 and 1999, declining hydroelectric availability led to a slight drop in national renewable energy use. Industrial use of renewables, supplied primarily by biofuels, accounts for most of the remaining contribution.

After more than 20 years of federal support, some note that renewable energy has neither achieved 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 2001* projects that current policies would yield an 1.1% average annual increase in renewable energy production through 2020, resulting in a 26% total increase. This would amount to about 6.5% of the projected 127 Q total demand in 2020. (Detailed breakdowns of renewable energy use appear in EIA's *Renewable Energy Annual 2000* and *Renewable Energy 2000: Issues and Trends*.)

Role in Long-Term Energy Supply

Our Common Future, the 1987 report of the 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, global warming, and climate change — requires an emphasis on "clean and renewable energy sources."

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 *FY2001 Congressional Budget Request*, DOE/CR-0068, v. 3, February 2000.)

From FY1973 through FY1998, the federal government spent about $11.7 billion (in 1999 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 $1.3 billion in FY1979 and FY1980, then declined steadily to $136 million in FY1990. Spending rose from FY1991 to FY1995, declined in FY1996 and FY1997, then rose again in FY1998, reaching $275 million in 1999 constant dollars.

This spending history can be viewed within the context of DOE spending for the three other major energy R&D programs: nuclear, fossil, and energy efficiency R&D. From FY1948 through FY1972, in 1999 constant dollars, the federal government spent about $22.4 billion for nuclear (fission and fusion) energy R&D and about $5.1 billion for fossil energy R&D. From FY1973 through FY1998, in 1999 constant dollars, the federal government spent $43.2 billion for nuclear, $21.1 billion for fossil, $11.7 billion for renewables, and $8 billion for energy efficiency. Total energy R&D spending from FY1948-FY1998 reached $111.5 billion, including $66 billion, or 59% for nuclear, $26 billion, or 23%, for fossil, $12 billion, or 11%, for renewables, and $8 billion, or 7%, 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 systems. P.L. 106-170 expanded this credit to include poultry waste and extended it through December 31, 2001.

Public Utility Regulatory Policies Act. The Public Utilities Regulatory Policies Act (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 1998: Issues and Trends* (p. 4-5) reports that, by the end of 1996, nonutility renewable power capacity reached 17,200 MW, of which 12,600 MW came from QFs, including 3,420 MW of small hydropower facilities. These renewable power facilities generated nearly 90 billion kwh, of which 69 billion kwh was produced by QFs, including about 12 billion kwh of small hydropower. Thus, in 1996, QFs accounted for about 73% of nonutility renewable power capacity and about 76% of nonutility renewable power generation. QFs provided about 1.8% of national electric capacity and about 2.2% of national electricity generation.

DOE's Strategic and Performance Goals

In August 2001, *The President's Management Agenda* was released, setting 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*, renewable energy objectives and strategies appear under general goal #1 "Energy Resources." In its *FY2000 Annual Performance and Accountability Report*, DOE assesses the results of its performance goals for FY2000. In the *DOE Annual Performance Plan for FY2002*, strategic objective ER2 aims to "Ensure a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact." Goals for 2010 include: triple non-hydro renewable generating capacity and complete one million solar roofs. Also, in 2000, the Office of Energy Efficiency and Renewable Energy (EERE) released a strategic plan, Clean Energy for the 21st Century; the National Academy of Public Administration issued *A Review of Management in the Office of Energy Efficiency and Renewable Energy;* and the National Research Council issued *Renewable Power Pathways: A Review of the U.S. Department of Energy's Renewable Energy Programs*.

Renewables Provisions in Omnibus Energy Bills

Much of the legislative action on renewables has focused on two omnibus energy policy bills, H.R. 4 and S.Amdt. 2917 to S. 517 (which replaces S. 1766). H.R. 4 includes renewables provisions that are derived primarily from H.R. 2436, H.R. 2460, H.R. 2511, and H.R. 2587 and contain many, if not most, of the renewable energy recommendations in the Administration's *National Energy Policy* report. Similarly, the renewables provisions of S. 1766 are derived primarily from S. 388, S. 389, S. 596, and S. 597. Both omnibus bills have provisions for R&D funding, distributed power generation, and alternative fuels. However, there are major differences; for example, H.R. 4 would fund renewables with income from oil

development in the Arctic National Wildlife Refuge (ANWR) and establishes an "Energy Sun" label, while S. 1766 would establish federal agency power purchases, net metering, and a renewable energy portfolio standard (RPS).

Renewable Energy Portfolio Standard (RPS). Section 265 of S.Amdt. 2917 to S. 517 proposes that retail electricity suppliers (utilities) be required to obtain a minimum percentage of their power production from renewable energy.

The RPS is a market-based policy to encourage new power generation from renewables in a setting where renewables cost more than conventional power. Ten states have created an RPS; several with – and a few without – restructuring in place. Among the state RPS policies, the standard in Texas is considered one of the most successful. In general, state experience indicates an effective RPS requires attention to key design elements that include policy goals, an energy target and ramp-up, eligible resources, a focus on retail suppliers (utilities), tradable credits, a credit price cap, an enforcement mechanism, and coordination with other policies.

Some see a federal RPS as a way to replace the PURPA's administrative price determination for power from renewables with a more market-oriented mechanism. The 106th Congress considered a federal RPS proposal for a 7.5% renewable energy target. In the 107th Congress, S. 1333 and H.R. 3037 propose a 20% RPS, and S.Amdt. 2917 to S. 517 proposes a 10% RPS.

However, three different amendments to the RPS are expected in Senate floor action. The Jeffords amendment is expected to follow the RPS in S. 1333 and H.R. 3037, which propose a 3% startup energy target in 2003 and a 1% annual ramp-up to a peak energy target of 20% in 2020. The Kyl amendment is expected to propose a role for "green power" purchases to satisfy an RPS requirement. A March 13 draft of the Bingaman amendment proposes to align the RPS more closely with the Texas framework, by including a 1% startup in 2005 and a 0.5% annual ramp-up to 3% in 2009 and a peak at 9% in 2021.

In the debate over an RPS, one issue is setting an energy target and ramp-up rate that would stimulate new renewables generation without creating hardship for generators and suppliers. Environmental groups contend that a peak as high as 20% is needed to stimulate industry development at a pace that helps curb air pollution and climate change. In contrast, utilities and some others argue that the time required to scale-up and deploy equipment requires a slower ramp-up and a lower peak, closer to that for Texas, which stands at about 2% or 3%.

A second issue is the price cap for tradable renewable energy credits. State experience shows that a price cap is important to control compliance cost, and it may also be important to allowing the compliance cost to be flowed through as a business cost. Utilities have argued for a lower price cap, near 1 cent/kwh, while environmental groups have supported a higher cap of about 4 to 5 cents/kwh.

A third issue is resource eligibility for tradable credits. Some states attempt to give greater encouragement to newer, more costly, and less established forms of renewable energy, such as solar photovoltaics, by assigning them a higher level of tradable credits. Further, some RPS proposals assign tradable credits to existing renewable energy facilities. However,

where credits are allowed for a large amount of existing renewables, for example in states with a large amount of existing biomass or hydro facilities, allowing credits for existing power generation can weaken the RPS incentive for new generation. Also, in a federal policy context, this could create large differences in the impact of an RPS across the states.

(For more on RPS, see CRS Memorandum on *Renewable Energy Portfolio Standard.*)

Renewable Energy Fuel Standard. Section 818 of S. 517 proposes to increase the renewable energy content of motor fuel. Starting in 2003, it would require that motor gasoline contain a certain amount of renewable fuel. There is no comparable provision in H.R. 4. (For more on the Renewable Energy Fuel Standard, see CRS Report RL31276.)

Other Renewables Provisions. Both H.R. 4 (Section 3102) and the forthcoming tax title of S. 517 (Energy Tax Incentives Act of 2002, S.Rept. 107-140) would expand and further extend the renewable energy production tax credit that was recently extended by P.L. 107-147 (H.R. 3090). Also, both bills (H.R. 4, Section 602; S. 517, Section 261) would expand and extend a parallel renewable energy production "incentive" for state and local governments. Further, H.R. 4 proposes the creation of an "Energy Sun" label for renewable energy equipment that could serve in a role parallel to that for the "Energy Star" label for energy-efficient equipment. (The renewables provisions in H.R. 4 are summarized in CRS Report RL31153 and the provisions in S. 517 are summarized in CRS Report RL31276.)

Tax Credits and Incentives

Several renewable energy tax credit bills have been introduced in the 107th Congress. The sections below illustrate the types of credits that have been proposed. A comprehensive list of tax credit, incentives, and other renewable energy bills appears in CRS Report RL31044.

Production Tax Credit. This 1.5 cent/kwh production tax credit (PTC) was created by Section 1914 of the Energy Policy Act of 1992 (EPAct). It is currently available for wind, closed-loop biomass, and poultry waste. The 106th Congress extended the credit through December 31, 2001. Some bills in the 107th Congress would enhance this credit. some bills (S. 94/H.R. 876, S. 530) would extend the credit for five years, another bill (H.R. 269) calls for a permanent extension of the credit, and still others (H.R. 983, H.R. 1657, S. 188, S. 756, S. 845) would broaden it to include a more extensive variety of biomass sources.

Residential Tax Credit. Two bills (S. 207, S. 293/H.R. 778) amend the Internal Revenue Code of 1986 to create a refundable tax credit for up to 50% of increased residential energy costs, applicable to a variety of residential equipment, including solar water heaters and photovoltaics. Another bill (S. 465) establishes a 15% residential tax credit for homeowners who purchase photovoltaics and solar thermal equipment. S. 596 creates a credit for equipment and building design features in residential and commercial buildings. Also, in *A Blueprint for New Beginnings*, the Bush Administration calls for tax credits for rooftop solar equipment.

Other Incentives and Credits. A 1.5 cent/kwh renewable energy production incentive (REPI) was created by EPAct Section 1212. It is available to state and local government agencies and non-profit electrical cooperatives. One bill (S. 249) would expand the range of eligible renewable energy resources. It would add "incremental" hydropower from new capacity or improved efficiency, and it would broaden biomass resources to include forest wastes, agricultural sources, and certain forms of wood waste. Further, it would add 0.25 cent/kwh, or 17%, to the credit for a qualified facility located on Native American land and for a "co-production" facility that also produces useful heat, mechanical power, or minerals. Also, the National Energy Security Act of 2001 (S. 388/S. 389) proposes an infrastructure credit for alternatively-fueled vehicles operated by state and other fleets covered by EPAct. Credits for fuels are also set out in H.R. 377 and S. 760. H.R. 760 contains a credit for hydropower facilities. Further, in *A Blueprint for New Beginnings*, the Bush Administration calls for tax credits for renewable fuels to help open markets.

FY2003 DOE Budget

The FY2003 request for DOE's Renewable Energy Program seeks "to meet the growing need for clean and affordable energy," according to the Appendix to the U.S. Government's FY2003 Budget (p. 397). In accordance with this policy, DOE proposes to increase solar and renewables funding under DOE's Office of Energy Efficiency and Renewable Energy (EERE) from $386.4 million in FY2002 to $407.7 million in FY2003 (excluding funding for programs under the Office of Science) — an increase of $21.3 million (6%) above the FY2002 level. Overall, this is a relatively flat budget request. However, some programs would get either a significant increase or decrease. The major cuts in proposed spending include decreases of $15.7 million for Distributed Energy, $11.3 million for Concentrated Solar, $6.2 million for Biopower, and $2.6 million for Program Direction.

According to DOE, the cut for Distributed Energy has several parts, including two big parts. First, two one-time Transmission Reliability projects funded in FY2002 for a total of $14.0 million did not need further funding in FY2003. However, the cut would be partially offset by a $3.4 million in increase for reliability compliance, real time monitoring, and load research. Second, $6.3 million in FY2002 funding for DER Systems Integration was not carried into FY2003. However, this cut would be partially offset by a $2.7 million increase to develop a national standard for DER grid interconnection.

DOE says the 85% cut for Concentrating Solar includes a $3.3 million cut for Distributed Power System Development. Also, it would terminate four subprograms, including cuts of $3.7 million for Dispatchable Systems, $3.4 million for Advanced Components, $0.5 million for the Southwest Resource Opportunity (technical study and assistance), and $0.4 million for the Navajo Electrification Project.

Under Biomass Systems Development, DOE proposes to cut Biopower for Rural Development by $8.4 million, primarily by not extending a variety of earmark projects funded in FY2002. This would be partially offset by a $1 million increase for Small Modular Biopower and a $2 million increase for Gasification R&D. Also, the Regional Biomass Energy Program would be terminated by cutting $0.8 million.

Offsetting the above net reductions, the primary increases are $15.5 million for Superconductivity, $10.7 million for Hydrogen, $7.3 for Solar Buildings, $5.5 million for Renewable American Indian Resources, $5.4 million for Wind, $4.2 million for Biofuels, and $3.7 million for International Renewables.

P.L. 107-66 (Energy and Water Appropriations Bill) appropriated $386.4 million in FY2002 for DOE's Renewable Energy Program.

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 have included a repeal of the mandatory renewables purchase requirement in Section 210 of PURPA. In the 107th Congress, H.R. 381/S. 552 would repeal this section of PURPA.

Renewables Under Electric Industry Restructuring. To encourage a continued role for renewable energy under restructuring, some states and utilities have enacted measures such as a renewable energy portfolio standard (RPS), public benefits fund (PBF), and/or "green" pricing and marketing of renewable power. Also, some restructuring legislation in the 106th Congress included such provisions for renewables. (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].)

Renewable Energy Portfolio Standard (RPS). The RPS is a market-based policy to encourage new power generation from renewables in a setting where renewables cost more than conventional power. (For more on RPS, see CRS Memorandum on *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 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 on-site energy 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/]).

In March, to help increase electricity supplies in the Western states, 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. This action tends to encourage more generation from distributed renewable energy power sources. Also, H.R. 4 (Sections 2121-2128), S.Amdt. 2917 to S. 517 (Sections 102, 242, 1211), H.R. 1045, and H.R. 2496 have 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 April 2001, California enacted a law (ABX129) that raised the size limit for net-metered systems from 10 kw to 1 Mw. Further, the California Public Utility 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, S.Amdt. 2917 to S. 517 (Section 245), H.R. 954, H.R. 3037, H.R. 3089, H.R. 3406, S. 597, and S. 1333 would provide for net metering.

Climate Change

Since 1988, the federal government has accelerated programs that study the science of global climate change and created programs aimed at mitigating fossil fuel-generated carbon dioxide (CO_2) and other human-generated emissions. (For more details, see the CRS electronic briefing book on Global Climate Change at [http://www.congress.gov/brbk/html/ebgcc1.html].)

The federal government funds programs for renewable energy as a mitigation measure at DOE, 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 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.

Legislative Activity in the 107th Congress

Much of the action on renewables has focused on two omnibus energy policy bills, H.R. 4 and S.Amdt. 2917 to S. 517 (which replaces S. 1766). More than 100 renewable energy bills have been introduced during the 107th Congress. These bills cover policy issue areas that include tax credits, regulation, funding, goals, education, farms, and environment; and a range of resources and technologies that include alcohol fuels and biofuels, biopower, geothermal, hydrogen, hydropower, solar, and wind. Some key renewable energy bills are listed in the Legislation section below. A detailed, comprehensive list of bills appears in CRS Report RL31044, *Renewable Energy Legislation in the 107th Congress.*

LEGISLATION

P.L. 107-66, H.R. 2311)

Energy and Water Appropriations Bill, FY20002. Makes appropriations for DOE's Renewable Energy Program. Reported (H.Rept. 107-112) June 26, 2001. Passed House without amendments for renewable energy on June 28. Senate Appropriations Committee reported a Senate bill (S. 1171, S.Rept. 107-39) July 13, 2001. Passed Senate without amendments to renewables, July 19. Conference Committee reported (H. Rept. 107-258) October 30. Signed into law November 12, 2001.

P.L. 107-115 (H.R. 2506)

Foreign Operations, Export Financing, and Related Programs Appropriations Bill, FY2002. 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 Council (OPIC), and other bilateral and multilateral programs. House Appropriations Committee reported (H.Rept. 107-142) July 17, 2001. Passed House July 24. Senate Appropriations Committee reported (S.Rept. 107-58) September 4, 2001. Conference held November 14. Conference reported (H.Rept. 107-345) December 19, 2001. Signed into law January 10, 2002.

P.L. 107-147 (H.R. 3090)

Job Creation and Worker Assistance Act of 2002. Section 603 extends the renewable energy production tax credit for 2 years, retrospectively from December 31, 2001 to December 31, 2003. Also, Section 602 extends a credit for electric vehicles and Section 606 extends a deduction for clean fuel vehicle property. House Committee on Ways and Means reported (H.Rept. 107-251) bill on October 17, 2001, with two-year extension of renewables production tax credit. Passed House October 24. Senate Finance Committee reported

(Committee Print 107-49) an amendment in the nature of a substitute with an amendment to the title on November 9. Section 404 of the Senate version proposed one-year extension of renewables production tax credit. Brought to the floor November 13. Amended in Senate (S.Amdt. 2896) and passed Senate February 14, 2002. House approved agreement with Senate Amendment March 7, 2002. Signed into law March 9, 2002.

H.R. 4 (Tauzin)

Securing America's Future Energy (SAFE) Act of 2001. Incorporates certain renewable energy provisions from H.R. 2436, H.R. 2460, H.R. 2511, and H.R. 2587. It provides for biomass on federal lands and geothermal leasing; authorizes R&D funding; creates tax credits for residential solar and alternative fuel vehicles, and renewable power production; and for hydropower development and licensing. Introduced July 27, 2001; referred to Committee on Energy and Commerce, and to the Committees on Science, Ways and Means, Resources, Education and the Workforce, Transportation and Infrastructure, the Budget, and Financial Services. Passed House, amended, August 2.

H.R. 2646 (Combest)

Farm Security Act of 2001. Section 605 provides loan guarantees for renewable energy equipment and Section 606 broadens the range of renewable energy equipment available for loans. Introduced July 26; referred to Committee on Agriculture. Reported (H.Rept. 107-191, Parts I, II, and III) August 2. Passed House October 5. [See S. 1731]

S. 1731 (Harkin)

Farm Aid Bill (Agriculture, Conservation, and Rural Enhancement Act). Title IX (p. 816-875) has several renewable energy provisions. Section 902 requires federal purchases of biobased products, biofuels development, and biodiesel education. It also provides renewable energy loans (up to $10 million) and grants (up to $200,000). Section 903 extends the Biomass R&D Act of 2000 (P.L. 106-224) through FY2006 and mandates a $15 million per year appropriation for each year from FY2002 through FY2006. Section 904 provides technical and financial assistance, loans, and loan guarantees for renewable energy development by rural electric cooperatives. Section 905 addresses measures to sequester carbon and reduce greenhouse gas emissions. Section 906 directs the Department of Agriculture to promote renewable fuels production. Section 907 continues and expands the bioenergy program at the Dept. of Agriculture. Reported in lieu of S. 1628 on November 27, 2001. Committee on Agriculture, Nutrition, and Forestry filed written report (S. Rept. 107-117) on December 7. Amended, incorporated into H.R. 2646 as an amendment in the nature of a substitute, and passed Senate, February 13, 2002. [See H.R. 2646]

S. 1766 (Daschle-Bingaman)

Energy Policy Act of 2002. There are many provisions for renewables throughout the bill. Under Title II on Electricity, Subtitle C, Section 244 would repeal PURPA power purchase requirements for renewable energy facilities and Section 245 would allow net metering at residences (up to 10 kw) and at businesses (up to 500 kw). Under Subtitle E on renewable energy, Section 261 extends the production incentive for state and local governments, Section 262 calls for an national assessment of resources to be conducted annually, Section 263 requires federal purchases of power from renewables to grow from 3% in 2003 to 7.5% in 2010, Section 264 authorizes $20 million for rural construction grants, Section 265 creates a 10% renewables portfolio standard, and Section 266 calls for a wind/solar pilot project on federal land. Title III establishes hydroelectric relicensing

procedures. Under Title IV on Indian Energy, Section 406 calls for a report on renewable energy development potential, and Section 408 creates a feasibility study for a wind/hydropower demonstration project. Under Title VIII on Fuels, Subtitle B, Section 811 requires federal fleets to increase use of alternative fuels, Section 817 creates a biodiesel fuel use credit, and Section 818 prescribes a renewable content for motor vehicle fuel. Under Title XII on R&D, Subtitle B, FY2003-FY2006 funding is authorized in Section 1221 for renewable energy R&D programs, in Section 1222 for biopower and biofuels technology programs, and in Section 1223 for hydrogen R&D programs. Under Title XIII on Climate Change, Subtitle C, Section 1321 authorizes such sums as needed for export programs, and Section 1322 authorizes an international technology deployment program to support cost-shared pilot projects in developing countries. Introduced December 5, 2001; placed on Senate Calendar.

Energy Tax Incentives Act of 2002 (Baucus)

Expands and extends the renewable energy production tax credit. Reported (S.Rept. 107-140) March 1, 2002. Expected to be taken up as an amendment to S. 517.

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CRS Report RS20270 . *Renewable energy and electricity restructuring*, by Fred Sissine.

CRS Electronic Briefing Book. Electric utility restructuring and reliability, by Amy Abel. [http://www.congress.gov/brbk/html/ebele1.shtml]

CRS Issue Brief IB10054. *Energy tax policy*, by Salvatore Lazzari.

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FOR ADDITIONAL READING

Tables showing DOE Renewable Energy R&D Funding (current and constant) trends back to FY1974 are available from the author of this issue brief.

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Table 3. DOE Renewable Energy Budget for FY2001-FY2003

($ millions)

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY	FY2001 Apprn.	FY2002 Apprn.	FY2003 Request	Request-FY2002	Pct. Diff.
Biofuels - Total	85.4	88.1	86.0	-2.0	-2%
Biofuels/Utility Power	39.3	39.2	33.0	-6.2	-16%
Biofuels/Transportation	46.1	48.8	53.0	4.2	9%
Geothermal	26.6	27.3	26.5	-0.8	-3%
Hydrogen	26.6	29.2	39.9	10.7	37%
Small Hydro	4.9	5.0	7.5	2.5	49%
Solar Energy	91.7	89.4	87.6	-1.8	-2%
Concentrating Solar Power	13.6	13.2	1.9	-11.3	-85%
Photovoltaics	74.3	71.6	73.7	2.1	3%
Solar Buildings	3.9	4.7	12.0	7.3	155%
Wind	39.1	38.6	44.0	5.4	14%
TECHNOLOGIES SUBTOTAL	274.4	277.6	291.5	13.9	5%
Electric/Storage	51.2	70.7	70.4	-0.2	0%
Renewable Support & Implementation	21.5	13.7	23.9	10.1	74%
Dept. Energy Management	2.0	1.4	3.0	1.6	111%
International Renewables	4.9	2.8	6.5	3.7	129%
Production Incentive	4.0	3.8	4.0	0.2	6%
Renew. Amer. Indian Res.	6.6	2.8	8.3	5.5	193%
Program Support	4.0	2.8	2.1	-0.8	-27%
NREL (incl. construction)	4.0	4.9	5.0	0.1	3%
Program Direction	19.4	19.5	16.9	-2.6	-13%
RENEWABLES, Subtotal	370.5	386.4	407.7	21.3	6%
OFFICE OF SCIENCE					
OS/Photovoltaics Rsch.	2.8	—	—	—	—
OS/Biomass-Biofuels	26.7	—	—	—	—
OS/Wind	0.3	—	—	—	—
OS/Solar Photoconversion	14.3	—	—	—	—
OS/Hydrogen	3.0	—	—	—	—
OS/Subtotal	47.1	—	—	—	—
RENEWABLES with OS	420.3	—	—	—	—

Source: DOE FY2003 Cong. Budget Request, v. 3; Feb. 2002.