

Growing Renewable Energy Recommendations From New England

Report of the New England Roundtable on Federal Renewable Energy Policy



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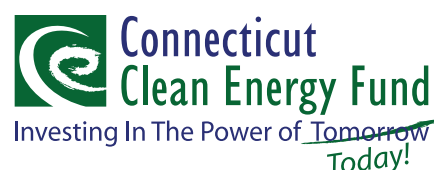
Growing Renewable Energy: Recommendations from New England

Report of the New England Roundtable on Federal Renewable Energy Policy

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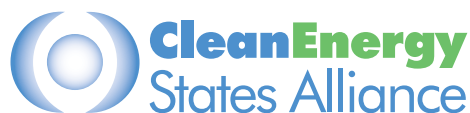
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October 2005.

Foreword

The New England Roundtable on Federal Renewable Energy Policy, held on July 19, 2005 at Worcester Polytechnic Institute in Worcester, MA, was organized to develop specific recommendations to help the nation implement clean energy solutions. This report summarizes those recommendations, which draw on several decades of experience with renewable energy technologies and policies in the Northeast.

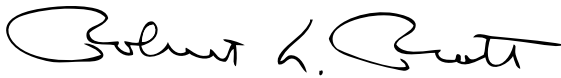
Shortly after the Roundtable took place, Congress completed and President Bush signed the Energy Policy Act of 2005. While the bill includes a number of initiatives to support renewable energy development, it leaves considerable room for further action to promote widespread adoption of renewable energy across the United States. More recently, Hurricane Katrina's impact on the Gulf States graphically demonstrated the need to expand America's renewable energy resources.

The New England states are working individually and regionally to develop a full portfolio of clean and renewable energy technologies, including onshore and offshore wind, biomass, solar, hydropower, landfill gas, and fuel cells. This report summarizes proposals from New England renewable energy practitioners in the following areas:

- Broad Federal Policy Issues
- Federal Incentives for Successful Renewable Energy Project Financing
- Bringing New Renewable Energy Technologies to Market
- Linking Federal and State Research, Development, and Demonstration of Renewable Energy Technologies

The recommendations detailed in the following chapters represent the collective views of the many experienced professionals who participated in the Roundtable, but should not be interpreted as official positions of the sponsoring organizations.

These policies, which draw on practical experience at the state level, are intended to help federal policymakers develop a road map for advancing renewable energy. The benefits offered by renewable fuels—including reduced greenhouse gas and criteria emissions, fuel diversity, and price stability—have never been more relevant.



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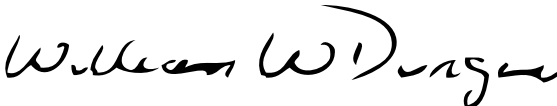
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Executive Summary

Since the early 1970s, the United States has invested more than \$14 billion on research, development, and demonstration (RD&D) of renewable energy technologies in order to broaden our national energy options beyond traditional sources such as fossil fuels and nuclear power. During that time, increasing concern about the environmental impacts of fossil fuels and about our nation's growing dependence on imported oil have reinforced the urgency of developing a broad menu of technologies and fuels to meet America's energy needs.

Today, several renewable energy technologies are mature and ready for large-scale deployment. Some renewable energy sources, such as wind and hydropower, are cost-competitive with traditional fuels in areas with good renewable resources. Others, such as solar photovoltaics, require continued development to bring costs down, but large corporations are actively involved in RD&D and the major technical challenges are well understood.

To fully realize the potential benefits from renewable energy, Federal policy must shift from an approach centered on RD&D activities to one that promotes broad deployment of renewable energy technologies. This report presents recommendations from policymakers, business leaders, academic researchers, public-interest advocates, and state government officials across New England aimed at intensifying the market focus of Federal renewable energy policy. The New England states have taken many steps to foster renewable energy, such as adopting renewable portfolio standards, creating state funds to support clean energy development, and amending regulations to reduce regulatory barriers. However, a stronger commitment at the Federal level is needed to maximize the potential for renewable energy in our region and nationwide.



Executive Summary

The major areas for Federal action addressed in this report are:

- **Top-Level Federal Policy.** Federal policymakers should set goals for renewable energy development; put mechanisms in place for meeting those goals, such as a national renewable portfolio standard; and identify resource categories such as ocean energy where a regulatory structure is needed to stimulate and coordinate renewable energy development.
- **Structuring Federal Incentives for Renewable Energy Project Financing.** Incentive programs should leverage and optimize public funds. Opportunities exist to modify Federal incentive and tax programs in order to harmonize these mechanisms with state policies and maximize renewable energy development by the private sector.
- **Bringing New Renewable Energy Technologies to Market.** The Federal government has many resources, including its status as the nation's largest energy user and its power to highlight and reward state-level innovations, which can be leveraged to help facilitate the commercialization of new renewable energy technologies and applications.
- **Linking Federal and State RD&D on Renewable Energy Technologies.** Today, both Federal and state programs are successful incubators of renewable energy technologies, but their efforts often are not coordinated. Better links between state and Federal RD&D activities will multiply their impact.



“Although the United States enacted laws similar to successful legislation in other countries, Denmark and Germany have both increased the market penetration of non-hydro renewables to an extent not yet seen in the United States ... At a general level, Denmark and Germany both displayed an extraordinary level of political commitment to renewable energy that was both consistent and well funded.”

—U.S. Energy Information Administration
Policies to Promote Non-hydro Renewable Energy in the United States and Selected Countries
February 2005

Renewable energy is positioned to meet a growing share of U.S. energy demand over the next several decades. The U.S. Energy Information Administration (EIA) forecasts that renewable energy will account for nearly 10 percent of U.S. energy production by 2025, but this figure includes large-scale hydropower, and according to EIA, renewable energy sources already provide 8.3 percent of U.S. energy output. Many industry experts believe that the potential for renewable energy growth over the next several decades is substantially higher. Maximizing renewable energy output will serve multiple Federal policy goals, from reducing air pollution to moderating energy prices and increasing the domestic component of U.S. energy supply.

To achieve these goals, Federal policymakers should undertake a number of broad initiatives at the national level that will help to define ambitious renewable energy output targets and accelerate the development and deployment of new renewable technologies. Such an approach should treat renewable energy development as strategically important and demonstrate high levels of political commitment, in the manner in which countries such as Germany and Denmark have worked to achieve increasing market penetration levels for renewable energy.

I. Adopt a Goal for Renewable Energy Production

The EIA currently projects that renewable energy will account for 9.7 percent of U.S. energy output by 2025 under its “reference case” scenario (which, as noted above, many industry experts believe significantly underestimates the potential for renewable energy development). An aggressive Federal commitment to renewable energy deployment should set several goals for the coming decades that move the bar higher based on a broad commitment to steps that will accelerate renewable energy deployment. This political signal will help to attract investment and reinforce existing state commitments to renewable energy development.

Recommendations:

- Adopt specific goals for renewable energy generation as a percentage of U.S. primary energy consumption, based on current Federal assessments of what can be achieved through

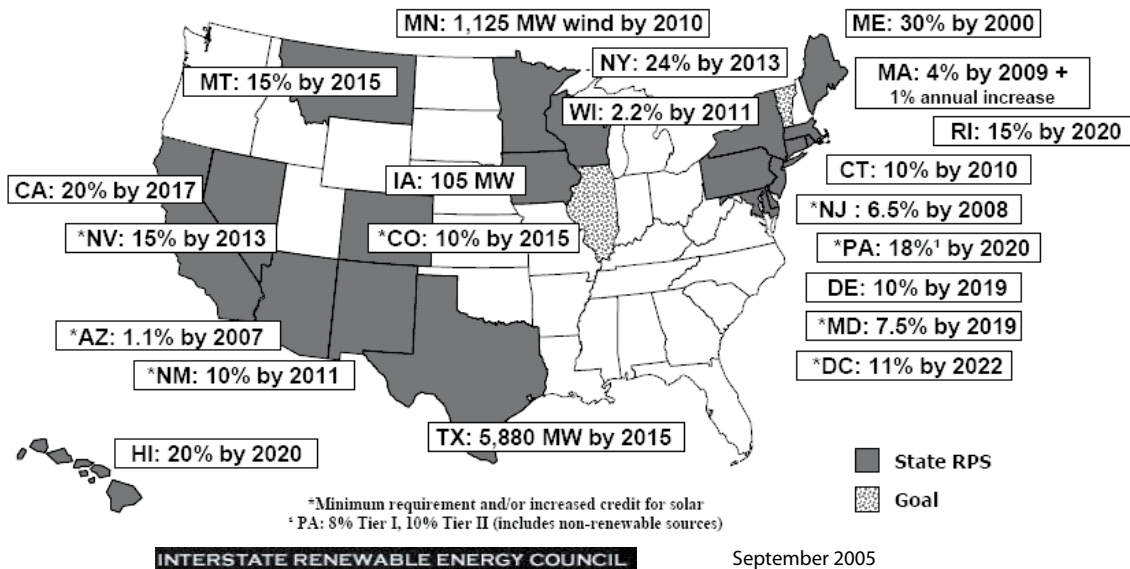
integrated policies to accelerate renewable energy use—for example, 20 percent by 2020 and 50 percent by 2050. The goals should be ambitious, but also realistic and practical, and should not supersede more aggressive state standards.

- In adopting renewable energy goals for the country, the Federal government should take into account the recent dramatic increases in fossil fuel prices. While it is hard to predict long-run energy prices, the addition of new renewable energy sources in response to a national policy would reduce the country’s exposure to fossil fuel price movements.
- In view of recent price increases, analyses of the effects of adding more renewables should include plausible scenarios using high fossil fuel price forecasts, and should recognize that the cost of energy varies by season and time of day.

II. Implement a National Renewable Portfolio Standard for Electricity Generation

One major element of the strategy to reach a national renewable energy production goal should be the adoption of a significant renewable portfolio standard (RPS) for electricity generation. An RPS requirement of 10 percent by 2020 (not including large-scale hydropower) was included in the Senate version of the Energy Policy Act of 2005 but dropped during conference on the bill, in part due to concerns about impacts on the price of electricity and on states with relatively fewer renewable energy resources—despite EIA’s own analysis showing that the RPS would actually lower natural gas and electricity bills for all consumers. However, many New England renewable energy advocates believe that an RPS of 20 percent by 2020 not only is achievable but would provide significant national economic co-benefits. EIA currently projects that electricity prices for the 2005-06 winter heating season will increase by 11 percent nationwide over the previous year due to factors including weather, tight world energy markets, and hurricane damage

Renewables Portfolio Standards



in the Gulf States.¹ This scenario argues for revisiting the projected impact of a nationwide RPS that would increase fuel diversity and hedge against future energy price spikes. Robust systems for crediting and trading renewable energy production will assist in encouraging the most efficient resources to be developed across the country.

Recommendations:

- Require all retail load suppliers to gradually increase their use of wind, solar, and other renewable energy sources to 10 percent or higher by 2020.
- Support the development of national registry systems for registering and trading renewable energy credits, as discussed in the second section of this report, **Federal Incentives for Successful Renewable Energy Project Financing**.

III. Move Federal Renewable Energy Funding Toward Parity with Conventional Fuels

From 1973 through 2002, the United States invested \$99.2 billion in energy research, development, and demonstration, allocated as follows: \$49.1 billion for nuclear power (49%),

\$24.8 billion for fossil fuels (25%), \$14.2 billion for renewable energy (14%), and \$11.1 billion for energy efficiency (11%). Federal policy should aim to reduce the discrepancy between renewable energy technologies and more mature energy sources.

Recommendation:

- Provide support for renewable energy that reflects its multiple social benefits through mechanisms such as RD&D funding, tax credits, and favorable depreciation rates. Increase support for energy efficiency measures to reduce the rate of growth of overall U.S. energy consumption.

IV. Streamlining Siting and Permitting of Renewable Energy Facilities

Similarly to other energy sources, extended siting and permitting processes drive up the cost of renewable energy projects and reduce investor confidence. Federal agencies can reduce these barriers by conducting programmatic and systematic Environmental Impact Statements (EISs) to address issues that apply generally to renewable energy development, patterned after the programmatic EIS recently issued by the Bureau of Land Management for wind energy development on federal lands. Programmatic EISs on technologies such as offshore wind, wave

¹ EIA, *Short-Term Energy Outlook*, September 2005, p. 7.



Hydro technology has long been one of the world's primary renewable electricity sources. Its cost-competitiveness is evidenced by its current role in the U.S. supply portfolio: in 2002, hydro facilities generated 260 billion kilowatt-hours, almost 7% of the nation's total generation.

Capital costs are high for conventional installations, but these facilities have very long life cycles. In addition, fuel costs are nonexistent, and operations and maintenance costs are generally very low. Cost-performance characteristics are uncertain for emerging free-flow technologies.

Ocean energy covers a series of emerging technologies that use the power of ocean currents, waves, and tides to create energy. While very few of these technologies have been implemented on a commercial scale, they show much promise for future development.

Photo credit: Warren Gretz

Photo courtesy of the National Renewable Energy Laboratory

and tidal energy, and biomass projects on Forest Service lands would reduce the need to conduct exhaustive project-specific analyses for individual renewable energy projects by addressing many common concerns in advance.

Federal policymakers should also participate in the development of technology-specific environmental impact analysis guidelines for renewable energy aimed at reducing artificial barriers to renewable energy projects. For example, under U.S. Fish and Wildlife Service policies and the Migratory Bird Treaty, wind energy developers are not allowed to consider the relative avian impacts of wind vs. alternative sources of energy (i.e., to consider that wind might actually reduce net bird mortality), and cannot obtain permits for "takings" of low numbers of protected species (with the result that a hunter can get a license to kill a specified number of birds with a gun, but not with a wind turbine). Similarly, current hydropower licensing procedures assess all applications using the most complex policy framework rather than



setting more modest environmental impact hurdles for low-impact projects.

Recommendations:

- Conduct additional programmatic EIS analyses for utility-scale renewable energy technologies.
- Modify existing Federal siting and permitting requirements to reflect the environmental co-benefits and relatively low environmental impacts of renewable energy facilities.

V. Promote Development of Renewable Offshore Energy Resources

Offshore energy is one of the largest renewable resources in New England, so Federal policy can do much to promote renewable energy deployment in the region by removing barriers to the development of wind and tidal power in Federal waters. For example, the permitting and leasing process for off-shore projects should be clarified, with lease revenues dedicated to supporting renewable energy. Other analysts such as the U.S. Commission on Ocean Policy have similarly called for the creation of a framework for developing and managing non-conventional offshore energy resources. Fortunately, the recently enacted Energy Policy Act of 2005 authorizes the U.S. Department of the Interior's Minerals Management Service to create such a framework for siting and leasing of offshore renewable energy projects.

Federal agencies can also promote offshore energy development by building and paying for an off-shore transmission backbone and interconnections to population centers in the northeast to which future (deep-water) offshore wind, wave, and tidal current projects could interconnect. This would represent an infrastructure investment analogous to the interstate highway system: a necessary interconnection that would be uneconomic for individual developers to support, and that can be less costly than individual radial lines and interconnections.

Recommendations:

- Develop a Federal policy framework for siting, permitting, and managing renewable offshore energy resources with lease revenues

channeled back into renewable energy development.

- Identify opportunities for Federal investments to stimulate development of an offshore energy transmission system that would improve the economics of offshore energy generation.

VI. Support Widespread Deployment of Solar Photovoltaic Technology Through Guaranteed Purchasing and National Electric Code Amendments

Solar photovoltaic (PV) technology is advancing. The Federal government can support the development of PV manufacturing through time-limited purchase price floor guarantees that would provide guaranteed minimum returns for a limited time to manufacturers who invest in PV manufacturing plants. By putting out requests for proposals (RFPs) for a quantity of PV modules and offering a guarantee to purchase the units at a specified floor price if the manufacturer could not sell them through other channels at a higher price, Federal agencies would enable manufacturers to build plants with confidence that a market will exist despite technology risks.

Another key policy step to promote PV is to make the National Electrical Code PV-friendly. The National Electric Code, which governs on-grid PV installations in most areas, is neither uniform (different jurisdictions have different editions of the code in effect) nor quick to react. The code cycle is every three years. The draft of the 2008 code is already in, and is being reviewed through



two or three levels prior to adoption. This is not as fast changing as it needs to be to address this industry. Creating a national code standard may be a way to speed up the code cycle, and create a code more friendly to PV. Allowing German or Japanese installation practices as a temporary measure (e.g., until 2010) while the U.S. creates new codes could save \$1 per watt in system costs.

Recommendations:

- Provide Federal price floor guarantees for solar PV and solar thermal technologies, with a sunset provision, to stimulate the construction of new manufacturing facilities.
- Amend the National Electric Code to reduce barriers to use of PV technology by changing the code to allow the following:
 - Allow use of DC quick connect fittings (plugs and receptacles) in lieu of DC disconnect switches now required.
 - Eliminate any requirement for an exterior mounted accessible AC disconnect switch for residential systems.

Photovoltaics are one of the easiest clean energy technologies to install and maintain, making them a viable clean energy option for individual consumers. At the same time, the approval process for photovoltaic installations is unfamiliar to many customers, and requires both building inspector and utility reviews of new systems.

To promote steady, long-term growth of U.S. renewable energy resources, federal policymakers must set long-term targets and create durable incentives that are available over at least a five- to ten-year period. These measures will support domestic renewable energy production in the same way that deep-well incentives have been used to spur development of higher cost, marginal oil and gas properties.

The recently enacted Energy Policy Act of 2005 includes a number of provisions that will help capital-intensive renewable energy projects obtain financing. While important, these policies add up to a relatively weak and short-term federal commitment. For example, the critical extension of the Production Tax Credit (PTC) only applies to projects that are on-line by December 31, 2007. More broadly, the Act does not include a Renewable Portfolio Standard (RPS) or other specific target that would set a goal and timetable for increasing U.S. renewable energy capacity.

This section offers strategies to foster long-term federal commitments and incentives commensurate with the time required to develop renewable energy resources and realize the long-term value they represent. It recommends four actions:

- Adopt a national RPS and encourage the states to work together effectively on renewable energy development and Renewable Energy Certificate (REC) markets.
- Use loan guarantees and long-term power purchase agreements to attract lower cost financing for renewable energy development.
- Extend the time frames for existing renewable energy provisions in the tax code, and adopt new rules that broaden the ability of smaller private developers and communities to share in these benefits.
- Aggressively implement the new federal purchase requirements for renewable energy adopted in the Energy Policy Act of 2005.

I. Renewable Energy Targets and REC Markets

A. Federal Renewable Portfolio Standard

Over the past decade, state-level RPS requirements and tradable renewable energy credits have spurred the development of renewable energy in many regions. The Senate version of the Energy Policy Act of 2005 included a national RPS requiring 10 percent of U.S. electricity to be generated by renewable resources before 2020. A national RPS will make renewable energy markets more certain and more stable, thus improving developers' ability to obtain long-term contracts and financing—which will reduce the cost of renewable power.

Recommendations:

- Set national renewable energy targets (in megawatts) for 2025 and 2050.
- Focus on new electricity capacity (i.e., facilities built after implementation of the standard).
- Set the national RPS target as a minimum requirement that allows states to set higher goals, and leave implementation of existing RPS policies to the states.

B. REC Markets

A number of states, as well as private organizations, have established standards for conferring tradable RECs that represent the attributes of electricity produced from renewable fuels. Clearly articulated federal mandates for a national REC market will assure lenders and equity providers that RECs are a secure stream of future revenues, thus reducing renewable energy financing costs without any federal expenditure. Broadening the REC market can attract additional sources of capital and make investors more willing to commit funds to renewable energy projects. National REC trading will support the construction of new renewable generation in regions with the best resources and appetite for them, and enable these facilities to “ship” and sell RECs into regions where the greatest demand exists.

Federal REC policy should embrace the inherent portability of RECs, endorse REC trading between regions and foster a national

REC market, similar to the cap-and-trade systems established for SO₂ and NO_x emissions allowances under the Clean Air Act.

Recommendations:

- Establish a national REC registry, similar to existing state and regional systems such as the New England Independent System Operator's Generation Information System, to track the environmental attributes of each unit of electricity generated. This system could be mandatory for states that do not yet belong to a regional registry, while mirroring the system in place for states that already belong to a registry. Ensure that the national REC registry is coordinated with existing state REC trading markets to avoid duplication of efforts and double-crediting. Require state and federal regulators to reduce seams between regional REC-trading markets.

II. Guarantees to Enhance Project Financing

A. Loan Guarantees

By reducing the cost of financing renewable energy projects, loan guarantees enable new technologies to be more rapidly deployed. A federal loan guarantee program for renewable energy would help the United States recapture technological leadership in the field of clean energy technology innovation.

The Energy Policy Act of 2005 authorizes loan guarantees for a variety of energy projects, including clean coal-generating equipment and construction of facilities to process and convert municipal solid waste and cellulosic biomass into fuel ethanol. Title XVII of the Act authorizes the U.S. Department of Energy (U.S. DOE) to guarantee loans to developers of generation projects that employ "innovative technology," but it is not clear how much renewable generation will be developed as a result of the legislation.²

² The legislation authorizes loan guarantees only for projects that "avoid, reduce or sequester air pollutants or anthropogenic emissions of greenhouse gases" and [emphasis added] "employ new or significantly improved technologies as compared to commercial technologies in service..."

Recommendations:

- Broadly define eligible technologies and projects.
- Appropriate funds sufficient to stimulate significant levels of renewable energy production.

B. Long-term Contract Guarantees

In some states, due to market structure and financial risk issues, renewable energy projects have difficulty attracting financing because no counterparties are willing (or have adequate credit support) to enter into long-term contracts for renewable power. Federal guarantees that address long-term power purchase agreement (PPA) risks associated with price and off-taker credit would enhance the marketplace for renewable generation.

III. Extending and Broadening Tax Incentives

A. Tax Credits

The Energy Policy Act of 2005 extended the federal Production Tax Credit (PTC) to projects placed in service by the end of 2007, and broadened the program to include some additional renewable energy resources. However, many renewable energy projects require months or years of lead time for siting and permitting. Consequently, a two-year extension is of limited value in stimulating new renewable energy development. Many experts have pointed out that repeated short-term extensions create a stop-and-start pattern that reduces certainty for investors.

The existing PTC is also difficult to monetize. Unlike low-income housing tax credits, Section 45 tax credits for renewable energy cannot be easily transferred or used with traditional finance structures, such as leases, nor can such tax credits be sold to third parties. Because many renewable energy developers are small companies that lack the financial structure to utilize tax credits, they are forced to sell their projects to larger companies. The result is over-concentration and a lack of competition. For example, several large utility affiliates own over 75 percent of all U.S. wind generating capacity.

Incentives for renewable energy and renewable fuel users send important signals to consumers as well as producers. Personal and corporate tax credits

Federal Incentives for Successful Renewable Energy Project Financing

and other monetary incentives also represent a way of monetizing the many social benefits of renewable fuels, including low emissions, technology development, and reduced dependence on imported oil.

The Energy Policy Act of 2005 establishes a number of new tax credits for home and business use of renewable energy. However, as with the PTC, these credits are only available for two years.

Recommendations:

- Increase the placed-in-service period for the Production Tax Credit from two years to a time frame consistent with renewable energy project development requirements (at least five to ten years).
- Harmonize the PTC so that tax credits can be easily traded and monetized.
- Increase the eligibility period for personal and corporate tax credits for renewable energy and renewable fuels purchases.

B. *Use of Tax-Exempt Capital for Renewable Energy*

In Germany and Denmark, wind power has become very popular because local communities can invest in small projects. Local ownership builds community support that is critical in the permitting process. U.S. communities in Massachusetts and elsewhere are considering installing small wind projects (up to 5 MW), which generally are too modest to interest developers. Such projects would be more economically attractive with tax-exempt financing.

The Energy Policy Act of 2005 creates Clean Renewable Energy Bonds (“CREBs”) which effectively enable electric cooperatives and municipalities to use interest-free bonds to finance renewable energy projects. This provision has great potential to enable greater municipal involvement, but it is subject to a cap and expires on December 31, 2007. This period may be too short to allow communities to participate given the time required for siting and permitting renewable energy projects.

The benefits of using tax-exempt debt could also be extended to private developers of renewable energy projects. The federal tax code permits tax-exempt financing for many private uses, including

waste recovery power generation and limited construction of private electrical transmission projects.³ However, the code currently does not permit use of tax-exempt bonds for renewable energy projects, even though such projects have positive environmental and rural development benefits. In addition, the use of tax-exempt bonds for private purposes is subject to a cap on the amount of private activity bonds that each state can issue. In practice these caps mean that money would not be available for renewable energy projects.

Recommendations:

- Extend CREBs for a longer period.
- Review other federal restrictions on the use of tax-exempt municipal financing with the goal of enhancing community participation in renewable energy projects.
- Add investments in renewable energy projects to the list of purposes which are exempt from the state tax-exempt financing volume caps.

IV. Aggressively Implement Federal Purchase Requirements

Section 203 of the Energy Policy Act of 2005 sets requirements for federal purchases of renewable energy as follows (by fiscal year):

2007-2009	3.0 percent
2010-2012	5.0 percent
2013 and thereafter	7.5 percent

These goals are established “to the extent economically and technically practical.” Federal government support should greatly enhance renewable energy projects’ ability to obtain attractive financing.

Recommendation:

- Act aggressively and creatively in implementing federal purchase requirements to meet the new targets. Federal actions should include long-term contractual commitments to produce cost-effective financing for projects while obtaining a stable cost of energy to benefit the government.

³ 26 U.S.C. § 142 (2005).

Significant investments in renewable energy research, development, and demonstration (RD&D) since the 1970s have produced a broad set of options for addressing U.S. energy requirements, including solar, wind, hydropower, geothermal, biomass, and waste technologies. While RD&D remain important priorities, federal policy can and should also promote large-scale commercialization of renewable energy. Putting renewable energy technologies to use will provide taxpayers with a tangible return on their investment in the form of lower energy costs, improved environmental quality, and increased national energy security.

This section recommends policies to promote widespread commercialization and use of renewable energy technologies by increasing demand and using Federal programs to supplement relevant state programs:

- Maximize Federal government purchasing power by modifying procurement policies and mandating purchase of technologies that support agency missions.
- Provide Federal funding for state and local efforts to promote deployment of renewable energy technologies.
- Amend or enhance relevant Federal energy programs to increase their focus on markets for renewable energy.
- Increase public awareness of renewable energy as a mature technology that delivers multiple public benefits.

I. Maximize Federal Government Purchasing Power

Under the Energy Policy Act of 2005, Federal agencies are directed to obtain 3 percent of their electricity from renewable sources in fiscal years 2007 through 2009, rising to 5 percent in fiscal years 2010 through 2012 and 7.5 percent annually thereafter. Eligible technologies include solar, wind, biomass, landfill gas, ocean energy, geothermal, municipal solid waste, and incremental hydropower. According to the Federal Energy Management Program (FEMP), the federal government spent nearly \$4.4 billion for buildings and facilities energy in FY 2003. Federal agencies purchased or produced 877 gigawatt-

hours of new renewable energy in FY 2003, a 32 percent increase from the previous year.

Federal purchases are an important tool for generating large-scale renewable energy demand. Renewable energy installations at Federal facilities—particularly at sites with security missions, such as military bases—testify that the technologies are mature and reliable.

Recommendations:

- Modify the Federal Energy Management Program to expand deployment of renewable energy technologies and purchases of green power at federal sites. Require the Department of Homeland Security to increase purchases of distributed generation systems with storage capabilities for emergency situations.
- Combine Federal government renewable energy purchasing power and states' purchasing power through joint purchase orders to help increase production and reduce costs. Encourage Federal agencies that produce renewable energy to buy down the cost of emerging technologies. Expand participation by Federal agencies in the Environmental Protection Agency's Green Power Partnership Program.

II. Federal Support for State and Private Renewable Energy Investments

Many states and regions have developed major programs to promote the use of renewable energy, from renewable portfolio standards to investment funds that support private research, development, demonstration, and deployment activities. Federal investments channeled through these programs can increase their impact and take advantage of local and regional expertise and industry strengths. Federal policymakers should also identify opportunities to increase the focus of existing programs, such as national laboratory research activities and EPA's Energy Star program, on market issues and initiatives to scale up renewable technology production.

Recommendations:

- Provide Federal block grants to states with specific policies and programs to promote

“As a major consumer that spends \$200 billion annually on products and services, the Federal Government can promote energy efficiency, water conservation, and the use of renewable energy products, and help foster markets for emerging technologies.”
—Executive Order 13123
June 3, 1999

renewable energy, such as RPSs, clean energy funds, and policies to eliminate regulatory barriers to broader deployment of clean distributed generation technologies.

- Provide Federal funds for programs to buy down the costs of renewable energy technologies, with a sunset provision (prescribed or through competitive bidding).
- Provide Federal matching grants for investments in emerging renewable energy technologies.

III. Enhance Federal Renewable Energy Programs' Market Focus

Several Federal agencies, including the Department of Energy and many of its national laboratories, provide critical support for renewable energy research and development. Without diluting these agencies' research functions, policymakers should explore opportunities to increase their contribution to commercialization and large-scale production. Similarly, initiatives such as the Environmental Protection Agency's Energy Star program that promote the deployment of superior conventional energy technologies should be amended to include support for deployment of renewable energy technologies. Geothermal heat pumps are the only renewable technology that currently carries the Energy Star label, but this widely-recognized

standard could be applied to many other renewable energy applications for homes and businesses.

Recommendations:

- Amend the structure of the renewable energy laboratories to increase market-focused activities and support for technology commercialization.
- Enhance the Energy Star program to include renewable energy resources.

IV. Promote Public Awareness of Renewable Energy Benefits

Many renewable energy providers are working with state and local governments to improve consumer perceptions of renewable energy as a robust technological option that works and is widely available today. Recent surveys indicate that the general public is aware of renewable energy and its environmental and public health benefits, but many Americans see it as an unreliable choice compared to conventional fuels.

As the nation's largest energy consumer, the Federal government can amplify messages from renewable advocates at the state and local level that many renewable energy technologies are mature and applicable to diverse public and private uses. Effective public messaging about renewable energy is a relatively low-cost way for the Federal government to promote increased deployment of renewable technologies.

Recommendations:

- Increase Federal support for and involvement in renewable energy outreach activities at the state level.
- Provide block grants and matching funds to state energy offices for activities to increase local awareness of renewable energy.
- Institute a test-bed program to demonstrate new clean energy technologies in real-world applications at Federal facilities nationwide.

The Energy Star program generates powerful savings at home and at work.

Photo courtesy of the National Renewable Energy Laboratory



Linking Federal and State Research, Development, and Demonstration of Renewable Energy Technologies

States and the Federal government (along with the private sector) each have important roles to play in advancing RD&D of renewable energy technologies, through mechanisms including grants, tax credits, production incentives, and other initiatives designed to stimulate business innovation. Increased coordination between Federal and state support should seek to focus renewable energy RD&D on promising technologies with the potential to achieve significant market penetration in the near to medium term.

The Energy Policy Act of 2005 includes some important policies to support renewable energy development and deployment, including an extension of the Production Tax Credit and new tax credits for the installation of alternative fuel vehicles, refueling stations, and solar energy technologies. However, most of these credits expire after two years, and the PTC has repeatedly been allowed to lapse in recent years, creating a start-stop pattern that undermines long-term planning and investment. As recommended elsewhere in this report, Federal policymakers should set long-term national goals for renewable energy market penetration, and tax credits and similar incentives should be put into place for as long as they are expected to be needed to achieve those goals. Sending a clear signal to users and investors that the Federal government is making a long-term commitment to scaling up renewable energy is the most important step that policymakers can take to stimulate increased RD&D of renewable energy technologies.

This section recommends strategies for federal support of renewable energy RD&D that are designed to complement state-level initiatives:

- Provide block grants to state renewable energy programs to fund RD&D activities.
- Amend the Small Business Innovative Research and Small Business Technology Transfer programs to authorize state support for companies seeking grants.
- Identify opportunities to reduce regulatory barriers to the development of innovative renewable energy technologies

I. Block Grants to States for RD&D

Block grants provide relatively unrestricted transfers of funds to states to achieve broad policy aims, such as community development or providing maternal and child health services. They allow state governments to experiment with different ways of spending money to achieve stated goals. Block grants for renewable energy RD&D would allow states to support or attract



Ionic liquids can be used to achieve certain chemical processes that use biomass as a feedstock. Research into these interesting salt-like materials is just a small part of the RD&D activity that needs to be propelled by policies supporting renewable energy.

Photo courtesy of the National Renewable Energy Laboratory

strong clusters of high-priority renewable energy companies, providing added benefits from economic development and job creation in a clean, high-value-added industry. States could also use block grants to promote renewable energy deployment through measures such as offering matching funds for installed systems.

Recommendation:

- Provide block grants to states for activities in support of renewable energy RD&D, allowing states to set eligibility requirements and award levels.

II. SBIR and STTR Grants

Under the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, federal agencies with large-scale research and development programs set aside 2.5 percent and 0.3 percent, respectively, of their extramural R&D budgets for competitions among small businesses. The SBIR program

Linking Federal and State Research, Development, and Demonstration of Renewable Energy Technologies

funds early-stage R&D at small technology companies, while STTR funds cooperative R&D projects involving a small business and a research institution. Grantees retain the rights to technologies that they develop and are encouraged to commercialize them. The programs have existed for many years, but have increased their focus on emphasis on energy technologies with the expansion of portable power needs (U.S. Department of Defense) and renewable/alternative energy (U.S. DOE).

SBIR and STTR have three phases. Phase I explores the feasibility of innovative concepts with awards up to \$100,000 for about 9 months. Only Phase I award winners may compete for Phase II, the principal R&D effort, with awards up to \$750,000 over a two-year period. This phase generally requires matching funds. In Phase III, non-Federal capital is used by the grantee to pursue commercial applications of its R&D. Being able to show matching funds increases the likelihood that companies will win a Phase II award. States are not currently allowed to provide matching funds for companies applying for SBIR or STTR awards.

Recommendation:

- Amend the SBIR and STTR guidelines to allow states to provide debt or loans as matching funding or some kind of success-based return.

III. Reduce Regulatory Barriers to Innovative Renewable Energy Technologies

Renewable energy companies are continuously exploring new technology applications such as micro and small hydropower, wave and tidal energy, and distributed generation. For example, “micro-conduit” hydropower systems can be installed in public water systems, using existing flow as a power source to generate electricity. Streamlining procedures at FERC and other relevant agencies for licensing new renewable energy technologies will help speed deployment and increase investor confidence.

Recommendation:

- Use declaratory rulings and other regulatory streamlining procedures to reduce administrative hurdles and facilitate demonstration and deployment of innovative renewable energy technology applications.

Closing Comments

Renewable energy has made great progress at the state level, stimulated by measures such as portfolio standards, state investment funds, and the development of regional “clusters” of expertise on specific technologies. Many U.S. renewable energy resources are location-specific—for example, wind resources are strongest in the Plains states and along coastlines, while solar resources are concentrated in the Southwest—but every state has some potential for renewable energy development.

Without a strong, long-term Federal commitment to increased renewable energy deployment, however, state-level renewable energy programs will inevitably fail to maximize our national potential to develop and utilize clean renewable fuels. The Federal government can help attract investors into the renewable energy field and increase public awareness of renewable energy as a mature, reliable and valuable option by setting national goals and focusing agency efforts on programs to increase renewable energy market penetration levels. An intensified Federal commitment to promoting renewable energy will pay for itself many times over through the environmental, energy security, and economic development benefits that renewables provide.

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