WRI POLICY BRIEF

WORLD RESOURCES INSTITUTE

National Renewable Electricity Standard Design Features

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To date, a patchwork of 25 states and the District of Columbia have implemented renewable electricity standards (RES).[1] A RES, also called a renewable portfolio standard (RPS), requires electricity suppliers to obtain a minimum percentage of their power from eligible renewable energy sources by a certain date. Although the Federal government has not yet passed a national RES, the 110th Congress is carefully considering establishing such a standard, going so far as to include it in the energy bill passed by the House of Representatives. The Senate has previously passed versions of a RES but this is the first time such a bill has passed the House. A national RES can bring renewable electricity to scale, resulting in important economic, national security and environmental benefits.

Informed by its research and analysis, the World Resources Institute (WRI) supports a national RES. In particular, WRI's Green Power Market Development Group (GPMDG) (*Box 1*) has been actively engaged in building market demand for renewable electricity. Based on WRI's experience in the renewable electricity market, we believe a RES can offer significant economic and environmental benefits. This policy brief evaluates these benefits, discusses important RES design features and addresses frequently asked questions concerning a national RES.

Box 1 — The World Resources Institute and the Green Power Market Development Group

WRI is a global environmental think tank that goes beyond research to find practical ways to protect the Earth and improve people's lives. The Green Power Market Development Group (GPMDG), convened by WRI in 2000, is a unique commercial and industrial partnership dedicated to building corporate markets for green power. The Group seeks to develop 1,000 MW of new, cost-competitive green power by 2010 – enough energy to power 750,000 homes. Group partners are Alcoa Inc., The Dow Chemical Company, DuPont, FedEx Kinko's, General Motors, Georgia-Pacific LLC, Google Inc., IBM, Interface, Johnson & Johnson, Michelin North America, Inc., NatureWorks LLC, Pitney Bowes, Staples, and Starbucks.

WRI works closely with these companies to analyze renewable technologies, market opportunities, new financing techniques, and public policy. Our work together has resulted in over 700 megawatts of new renewable power capacity, including some of the largest renewable energy purchases in the United States. More information about the Green Power Market Development Group and its activities can be found at www.thegreenpowergroup.org.

BENEFITS OF A NATIONAL RENEWABLE ELECTRICITY STANDARD

WRI's experience with green power markets and our review of several analyses by the Energy Information Administration (EIA) and other organizations suggest that a federal RES of at least 15% by 2020 would provide benefits to:

- *The Environment*: A 15 percent by 2020 national RES could help reduce both greenhouse gas (GHG) and criteria pollutant emissions, improving both local health and our ability to mitigate global warming.
  - The EIA projects that, with a 15 percent RES, electricity sector CO_2 emissions in 2030 would be 6 percent below a "business as usual" reference case, netting annual greenhouse gas emissions savings in 2030 of 222 million metric tons.[2]
  - Burning coal, oil, and natural gas accounts for 26% of smog producing NOx emissions (contributing to asthma and public health problems), 64% of acid rain causing SO_2 emissions, and a third of mercury emissions. Increased use of renewables could help reduce these emissions or reduce the cost of complying with pollutant reduction requirements.[3]
- *The Economy*: A federal RES would strengthen the U.S. economically by providing new opportunities for businesses and a diversification of our energy supply. In particular, the RES would:
  - *Stimulate domestic job growth and investment in rural communities*. Increased demand for wind turbines,

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solar power system components, and other advanced technologies that are developed and manufactured by U.S. companies would provide growth opportunities for many industries. A 15 percent national RES could generate 185,000 new and high-paying U.S. jobs in equipment manufacturing, installation, and maintenance—120,000 more than would be created by fossil fuel projects as renewable energy projects are typically more labor intensive.[4] In particular, rural America could benefit from this economic growth since many renewable resources would be located in remote locations.

  - *Reduce upward pressure on the price of natural gas,* an important commodity for commercial and residential consumers and a vital raw material for U.S. chemical manufacturing and other industries. A 2005 review of Federal and state RES proposals by Lawrence Berkeley National Laboratory consistently found that increased deployment of renewables and energy efficiency resulted in lower natural gas prices.[5] EIA forecasts that a national RES would lower electric utility demand for natural gas over the next 15 to 20 years relative to "business as usual," thereby alleviating price pressure on this resource. The analysis shows that, under a 15 percent RES, cumulative end-use expenditures on natural gas through 2030 could be reduced by $3.3 billion as compared to business as usual.[6]
  - *Help stabilize electricity rates.* Renewable electricity is not subject to the volatile price fluctuations that impact other electricity-generating fuels such as coal and natural gas. As a result, corporate and residential electricity rates could benefit from increased stability.

- *Energy security*: A national RES would make the United States more energy independent and secure.
  - Since renewable resources are widely available throughout the United States, the RES would alleviate reliance on imported sources of energy such as liquefied natural gas (LNG). Currently, 19.5 percent of natural gas consumed in the U.S. is imported.[7] EIA estimates that, as a result of a federal 15 percent RES, electricity generation from natural gas will be 2 percent less in 2030 compared to business as usual.[8]
  - The security threat of large-scale disruption of power supplies, and transmission infrastructure could be reduced as renewable energy technologies are less centralized than traditional electric generating facilities.

KEY RENEWABLE ELECTRICITY STANDARD DESIGN FEATURES

WRI's analysis of state RES policy design and the market experiences of WRI's Green Power Market Development Group indicate that several RES design features could help the country capture the economic, security, and environmental benefits of a national RES in an effective and efficient manner:

- *Eligible resources*. In order to capture all of the benefits offered by a national RES, particular attention must be paid to specifying what fuels a power producer can use for RES compliance. State RES policies typically seek to diversify the fuel mix through the support of emerging technologies while switching to clean, low-carbon alternatives. Since generation from coal, natural gas, and nuclear technologies account for approximately 90% of U.S. electric generation, limiting the RES to technologies that are still at low levels of penetration such as wind, geothermal, solar electric, solar thermal, landfill gas, and biomass fuels, would help to further diversify the generation mix.[9] The RES could be designed to ensure that diversification results in technologies that both reduce GHG emissions and lead to local environmental improvements.

  Limiting eligibility of biomass fuels to the following types could minimize negative environmental impacts:

  - Forest-related resources (such as mill residues, pre-commercial thinning, slash, and brush) except those from high conservation value areas, such as old-growth forest, public lands, and important wildlife habitat,
  - Agricultural wastes,
  - Plants grown on already converted land,
  - Plants grown exclusively as fuel for electricity production such as switchgrass and miscanthus,
  - Solid wood waste that does not contain chemically treated or painted wood products (which would release halogenated organic compounds and other chemicals hazardous to human health if burned or combusted),
  - Biomass portions of co-fired power generation units.[10]

  Municipal solid waste (MSW) is not usually eligible for the RES since 30 to 40 percent of combustible MSW consists of non-renewable materials including plastics and, as a result, MSW combustion is not a carbon-neutral source of electricity.[11] Furthermore, burning MSW can release chemicals hazardous to human health including heavy metals, hydrochloric acid, and dioxins.[12]

Because of negative environmental impacts and the maturity of the technology, power from large hydroelectric facilities is usually not eligible for RES requirements.[13] However, some hydropower technologies may have fewer adverse environmental effects:

- Advanced hydropower: Electricity generated by the ocean, waves, currents or tides;
- Low impact hydropower: Electricity generated by a facility certified by the Low Impact Hydropower Institute;
- Incremental hydropower: The additional electricity generated by efficiency improvements or capacity additions at an existing hydropower facility, or new hydropower capacity added to an existing impoundment not otherwise viewed as a good candidate for removal.[14]

- *Target level and timing*. Establishing a long-term, legally binding target is important for ensuring renewable energy supply. WRI's GPMDG market experience indicates that financial institutions will often not finance renewable energy projects at competitive rates unless long-term power contracts—at least 10 years—are in place. A target of 15 or 20 percent renewable power by 2020, for example, would provide investors with the predictability and security required for project lending at reasonable rates. Achieving such long-term targets through gradual increases in annual requirements would encourage steadier investment flows into renewable energy technologies and industries. Under the 15 percent RES passed by the House of Representatives in August of 2007, non-hydro renewable power capacity could increase from 20 gigawatts (GW) in 2005 to 91 GW by 2020.[15]
- *National sourcing of renewable energy certificates.* Allowing retail electricity suppliers to purchase renewable energy certificates (RECs) from any renewable power generator or facility in the United States that meets the RES standard would reduce the cost of compliance. A single REC trading system for both federal and state compliance will further reduce the cost of compliance. A REC represents one megawatt-hour (1,000 kilowatt-hours) of electricity generated from eligible renewable resources that was produced and delivered to the power grid. Care must be taken to ensure that RECs are not double counted. Under a national RES, retail electricity suppliers would submit RECs sufficient to meet the RES. The experience of WRI's GPMDG in the voluntary REC market has demonstrated that interstate trading can dramatically lower the cost of RECs. A national REC market would stimulate competition between renewable power generators throughout the country and allow buyers to access RECs from regions where renewable power generation is most available and cost-competitive.[16]
- *Application of target.* Having the national RES apply to all retail electricity suppliers would maximize the policy's ability to meet its economic, security, and environmental objectives and would make the policy more competitively neutral. Exempting suppliers based on size, type of ownership, or other parameters would undermine these goals. For instance, waiving requirements for publicly-owned retail electricity suppliers and for rural electric cooperatives would exempt 26 percent of all U.S. electricity sales.[17] Furthermore, these exemptions are unnecessary since interstate REC trading would provide them with a flexible, cost-effective means of meeting the RES targets.
- *Penalties for non-compliance.* To be effective, a national RES would need credible non-compliance penalties for retail electricity suppliers that fail to meet a given year's target. The penalty embedded in the Texas RES – $50 or two times the average trade value of RECs for the compliance year — has been particularly effective and could serve as a model for a national RES.[18] Such a penalty would likely be sufficient to deter non-compliance while ensuring the cost of satisfying the electricity standard does not become excessive. In addition, revenues from such penalties could be allocated to fund additional renewable energy deployment to ease compliance in future years.[19]
- *Interaction with state RES*. A national RES target would be a minimum requirement for retail electricity suppliers across the country. Individual states, however, would be free to establish or retain state RES targets if they go above and beyond the federal requirements. In such cases, renewable power generated to meet the Federal RES would also count towards the state RES. However, care must be given to ensure that states with more stringent standards than the national standard should not be allowed to sell any excess credits to other states before retiring those excess credits (and the attributes) for state RES compliance. If this is not done, more aggressive state programs will not have a net impact on national renewable energy capacity.

CONCLUSION

A national renewable electricity standard could encourage competition and innovation in the renewable energy field, reduce renewable energy cost, and strategically diversify away from polluting sources of energy. By driving renewables to scale in the United States, a RES also creates an opportunity for American industry to excel in the development and deployment of renewable energy projects — and can position the U.S. as a leading supplier in growing international market place.

The U.S. would benefit in a variety of important ways: reductions in CO_2 emissions and energy bills from low-carbon sources of energy, improved air and water quality, and new jobs and economic opportunity in underserved communities. Businesses will benefit from reduced price volatility, lower energy costs and new investment opportunities. The incentives provided by a national RES, combined with our spirit of innovation and entrepreneurship, could allow America to lead the world in renewable energy technologies while taking a significant step towards tackling the critical threat of global climate change.

NOTES

1. Database of State Incentives for Renewable Energy: www.dsireusa.org, November 2007.
2. Energy Information Administration, "Impacts of a 15-Percent Renewable Portfolio Standard", (Washington DC: Energy Information Administration, 2007).
3. Nogee, Alan; Deyette, Jeff; Clemmer, Steve. "The Projected Impacts of a National Renewable Portfolio Standard", *Electricity Journal*. May 2007, Vol. 20, Issue 4, p 33-47.
4. Union of Concerned Scientists. October 2007. "Cashing in on Clean Energy." Washington, DC: Union of Concerned Scientists.
5. Wiser, R., M. Bolinger, and M. St. Clair. 2005. *Easing the Natural Gas Crisis: Reducing Natural Gas Prices through Increased Deployment of Renewable Energy and Energy Efficiency*. LBNL-56756. Berkeley, Calif: Lawrence Berkeley National Laboratory.
6. Energy Information Administration, "Impacts of a 15-Percent Renewable Portfolio Standard", (Washington DC: Energy Information Administration, 2007).
7. Energy Information Administration, *Natural Gas Annual 2006.* (Washington, DC, U.S. Department of Energy, 2007).
8. Energy Information Administration, "Impacts of a 15-Percent Renewable Portfolio Standard", (Washington DC: Energy Information Administration, 2007).
9. Energy Information Administration, "Electric Power by Fuel Type, 2006"
10. "Co-firing" is the combustion of multiple fuels, such as sawdust and coal, to heat a boiler.
11. U.S. Environmental Protection Agency, "Municipal Solid Waste in the United States: 2005 Facts and Figures," Table ES-4. Washington, DC: U.S. Environmental Protection Agency.
12. U.S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, AP-42, Vol. I, CH 2.1: Refuse Combustion." Washington, DC: U.S. Environmental Protection Agency.
13. Although large hydropower typically does not qualify for RES compliance, some programs allow utilities to subtract hydropower from their baseline. As a result, hydropower can help reduce the amount of new renewable energy required for compliance.
14. Preferential hydropower in EIAs definition, does not include additional electricity generated as a result of operational changes to an existing facility not directly associated with efficiency improvements or capacity additions.
15. Union of Concerned Scientists. October 2007. "Cashing in on Clean Energy." Washington, DC: Union of Concerned Scientists.
16. For more information, see Hanson, C. and V. Van Son. 2003. *Renewable Energy Certificates: An Attractive Means for Corporate Customers to Purchase Renewable Energy.* Washington, DC: World Resources Institute.
17. Energy Information Administration, "Electric Sales and Revenue – 2005", Table 10, November 2006.
18. Wiser, R. 2003. "Design and Implementation Experience with State RES Policies", Presentation at the New York DPS RES Proceeding, April 7, 2003.
19. Massachusetts Alternative Compliance Payments, http://www.mass.gov/doer/rps/acp.htm

Addressing Frequently Asked Questions

Several questions are frequently raised when considering a national RES:

- *Would a federal RES unfairly redistribute wealth from states with few renewable resources to states with abundant renewable resources?* No. Our existing fossil fuel-dependency already leads to significant wealth transfers between states. 80 percent of natural gas comes from 6 states, 60 percent of U.S. coal comes from states with 2 percent of U.S. population, and Texas, California and Alaska are responsible for 56 percent of U.S. crude oil production.[1] Renewable resources can be found in every region of the country. Solar is available in the Southwest and Southeast; biomass in the Pacific-Northwest, Northeast and Southeast; geothermal in the intermountain west; and wind in the Great Plains and East coast.[2] Additionally, the House RES has a provision to meet 27 percent of the RES goal with energy efficiency, which can be the least-cost local resource. The Union of Concerned Scientists has estimated that the RES passed by the House would result in net energy bill savings for consumers in all 50 states.
- *Wouldn't a RES raise energy bills?* No. EIA estimates have consistently shown that a national RES is likely to reduce or have minimal impacts on energy expenditures due to lower demand for natural gas.[3] The Union of Concerned Scientists has found that the RES passed by the House would reduce combined expenditures on electricity and natural gas by $27.7 billion to $31.8 billion compared to business as usual by 2030.[4] A 2005 review of Federal and state RES proposals by Lawrence Berkeley National Laboratory consistently found that increased deployment of renewables and energy efficiency resulted in lower natural gas prices.[5]
- *Since many states have already implemented their own standards, wouldn't a national RES be redundant?* No. Existing state renewable portfolio standards cover only 45 percent of U.S. power sales.[6] A federal RES would expand the use of renewable power nationally without limiting the ability of states to set their own standards above and beyond federal requirements.

Notes

1. Energy Information Administration, Annual Coal, Natural Gas and Petroleum Reports — 2005.
2. NREL,United States Atlas of Renewable Resources
3. Energy Information Administration, "Impacts of a 15-Percent Renewable Portfolio Standard", (Washington DC: Energy Information Administration, 2007). and: Energy Information Administration. "Analysis of a 10-percent Renewable Portfolio Standard," Report #: SR/OIAF/2003-01. (Washington, DC: U.S. Department of Energy, 2003).
4. Union of Concerned Scientists. October 2007. "Cashing in on Clean Energy." Washington, DC: Union of Concerned Scientists.
5. Wiser, R., M. Bolinger, and M. St. Clair. 2005. *Easing the Natural Gas Crisis: Reducing Natural Gas Prices through Increased Deployment of Renewable Energy and Energy Efficiency*. LBNL-56756. Berkeley, Calif: Lawrence Berkeley National Laboratory.
6. Energy Information Administration, Electric Power Annual 2005.; and Union of Concerned Scientists, "Renewable Electricity Standards Toolkit: Classes of Electric Power Providers Required to Meet the Renewable Electricity Standard", accessed at http://go.ucsusa.org/cgi-bin/RES/state_standards_search.pl?template=main on November, 11 2007.

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