

Renewable Portfolio Standards

An Effective Policy to Support Clean Energy Supply

A Renewable Portfolio Standard (RPS) provides states with a mechanism to increase renewable energy generation using a cost-effective, market-based approach that is administratively efficient. An RPS requires electric utilities and other retail electric providers to supply a specified minimum amount of customer load with electricity from eligible renewable energy sources. The goal of an RPS is to stimulate market and technology development so that, ultimately, renewable energy will be economically competitive with conventional forms of electric power. States create RPS programs because of the energy, environmental, and economic benefits of

renewable energy and sometimes other clean energy approaches, such as energy efficiency and combined heat and power (CHP).¹

How Does a Renewable Portfolio Standard Encourage Clean Energy?

An RPS creates market demand for renewable and clean energy supplies. Currently, states with RPS requirements mandate that between 4 and 30 percent of electricity be generated from renewable sources by a specified date. While RPS requirements differ across states, there are generally three ways that electricity suppliers can comply with the RPS:

What Are the Benefits of a Renewable Portfolio Standard?

The policy benefits of an RPS are the same as those from renewable energy and CHP:

- Environmental improvement (e.g., avoided air pollution, global climate change mitigation, waste reduction, habitat preservation, conservation of valuable natural resources).
- Increased diversity and security of energy supply.
- Lower natural gas prices due to displacement of some gas-fired generation or a more efficient use of natural gas due to significantly increased fuel conversion efficiencies.
- Reduced volatility of power prices, given stable or non-existent fuel costs for renewables.
- Local economic development resulting from new jobs, taxes, and revenue associated with new renewable capacity.

Because it is a market-based program, an RPS also has several operational benefits:

- Achieves policy objectives efficiently and at a relatively modest cost (ratepayer impacts range from less than 1 percent increases to 0.5 percent savings).
- Spreads compliance costs among all customers.
- Minimizes the need for ongoing government intervention.
- Functions in both regulated and unregulated state electricity markets.
- Provides a clear and long-term target for renewable energy generation that can increase investors' and developers' confidence in the prospects for renewable energy.

¹ CHP is the simultaneous generation of electric and thermal energy from a single fuel source.

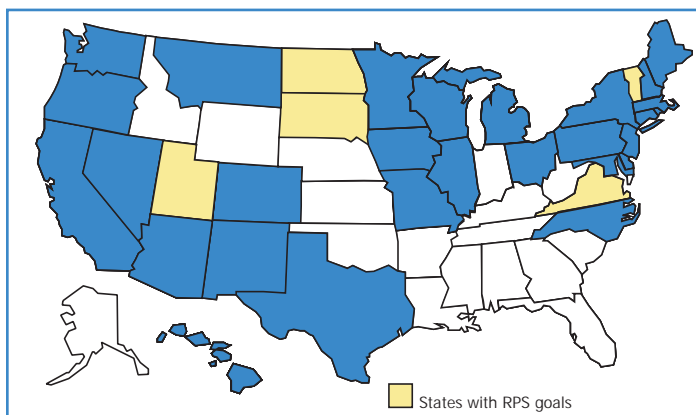
- Owning a renewable energy facility and its output generation.
- Purchasing Renewable Energy Certificates (RECs).²
- Purchasing electricity from a renewable facility inclusive of all renewable attributes (sometimes called “bundled renewable electricity”).

Which States Have Established Renewable Portfolio Standards?

As of March 2009, RPS requirements or goals have been established in 33 states plus the District of Columbia (see Figure 1). Thirteen of these states include CHP or waste heat recovery as an eligible resource, and Arizona explicitly includes renewable fueled CHP systems. More than 2,300 megawatts (MW) of new renewable energy capacity through 2003 was attributable to RPS programs.³ As of February 2009, the Union of Concerned Scientists projects that state standards will provide support for 76,750 megawatts (MW) of new renewable power by 2025—an increase of 570 percent over total 1997 U.S. levels (excluding hydro).⁴

Tremendous diversity exists among these states with respect to the minimum requirements of renewable energy, implementation timing, and eligible technologies and resources (see Figure 2).

Figure 1. States With RPS Requirements



Source: Database of State Incentives for Renewable Energy (DSIRE) last accessed March 2009, www.dsireusa.org.

What Are the Key Features of a Renewable Portfolio Standard?

States have tailored their RPS requirements to satisfy particular policy objectives, electricity market characteristics, and renewable resource potential. Consequently, there is wide variation in RPS rules from state to state with regard to the minimum requirement of renewable energy, implementation timing, eligible technologies and resources, and other policy design details. The key features of effective RPS requirements are outlined in the following sections.

Figure 2. State RPS Requirements

State	Target (% of electric sales)	Specific Provisions (% of electric sales)
AZ	15% by 2025	4.5% by 2012 from distributed energy resources
CA	20% by 2010	
CO	IOUs 20% by 2020; electric cooperatives and municipal utilities 10% by 2020	IOUs: 0.4% solar by 2020
CT	27% by 2020	4% Energy Efficiency and CHP by 2010
DC	20% by 2020	0.4% solar by 2022
DE	20% by 2019	2.005% solar by 2019
HI	20% by 2020	
IA	105 MW by 2025	
IL	25% by 2025	18.75% wind by 2013
MA	Class I: 4% by 2009 (+1%/year after); Class II: 3.6% renewable, 3.5% waste energy by 2009; APS: 5% by 2020 increasing by 0.25% each year after.	Class II: 3.6% renewable, 3.5% waste energy by 2009
MD	20% by 2022	2% solar by 2022
ME	30% by 2000; 10% new by 2017	
MI	10% by 2015	
MN	Xcel Energy (utility) 30% by 2020; other utilities 25% by 2025	Xcel Energy: 25% wind
MO	15% by 2021	0.3% solar retail sales by 2021
MT	15% by 2015	
ND [★]	10% by 2015	
NH	23.8% by 2025 (16.3% new)	0.3% solar by 2025
NJ	22.5% by 2021	2.12% from solar by 2021
NM	IOUs: 20% by 2020; rural electric cooperatives 10% by 2020	Wind: 4%; solar: 4%; biomass and geothermal: 2%; distributed renewables: 3% by 2020 (IOU only)
NV	20% by 2015	1% solar by 2015
NY	24% by 2013	0.154% customer-sited by 2013
OH	25% by 2025 (12.5% renewable energy)	1% solar by 2025
OR	Large utilities (>3% state's total electricity sales) 25% by 2025	Smaller utilities 5-10% by 2025 (depending on size)
PA	18% by May 31, 2021 (8% renewable energy)	0.5% solar by 2025
RI	16% by 2020	
SD [★]	10% by 2015	
TX	5,880 MW by 2015	At least 500 MW from renewables other than wind
UT [★]	20% by 2025	
VA [★]	12% of 2007 sales by 2022	
VT [★]	20% by 2017; Total incremental energy growth between 2005-2012 to be met with new renewables (10% cap)	
WA	15% by 2020	
WI	10% by December, 31 2015	

[★]States with RPS goals, not mandatory requirements.

Source: Database of State Incentives for Renewable Energy (DSIRE), accessed March 2009.

² A REC is a tradable right to claim the environmental and other attributes associated with 1 megawatt-hour of renewable electricity from a specific generation facility.

³ Petersick, T. *State Renewable Energy Requirements and Goals* (2004), Status through 2003. U.S. EIA, www.eia.doe.gov/oiaf/analysispaper/rps/index.html.

⁴ UCS. *Renewable Electricity Standards at Work in the States* (February 2009). http://www.ucsusa.org/assets/documents/clean_energy/RES_in_the_States_Update.pdf

Figure 3. Eligible Technologies Under State RPS Requirements

	Biofuels	Biomass	CHP/Waste Heat	Energy Efficiency	Fuel Cells†	Geothermal	Hydro	Landfill Gas	Municipal Waste	Ocean Thermal	Photovoltaics	Solar Thermal Electric	Tidal	Waste Tire	Wave	Wind
AZ	●	●	●*			●	●	●			●	●				●
CA	●	●				●	●	●	●	●	●	●	●	●	●	●
CO	●	●	●			●	●	●			●					●
CT	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●
DE	●	●				●	●	●		●	●	●	●		●	●
DC	●	●				●	●	●	●	●	●	●	●		●	●
HI	●	●	●	●		●	●	●	●	●	●	●	●		●	●
IA	●	●					●	●	●		●					●
IL	●	●		●			●	●			●	●				●
MA	●	●	●			●	●	●	●	●	●	●	●	●	●	●
MD	●	●				●	●	●	●	●	●	●	●		●	●
ME	●	●			●	●	●	●			●	●	●		●	●
MI	●	●	●	●		●	●	●	●		●	●	●		●	●
MN	●	●			●**		●	●	●		●	●				●
MO	●	●				●	●	●	●		●	●				●
MT	●	●				●	●	●			●	●				●
NC	●	●	●	●		●	●	●			●	●	●		●	●
ND*	●	●	●			●	●	●			●	●				●
NH	●	●			●	●	●	●	●	●	●	●	●		●	●
NJ	●	●			●	●	●	●	●	●	●	●	●		●	●
NM	●	●				●	●	●			●	●				●
NV	●	●	●	●		●	●	●	●		●	●		●		●
NY	●	●			●		●	●		●	●		●		●	●
OH	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
OR	●	●			●	●	●	●		●	●	●	●	●	●	●
PA	●	●	●	●	●	●	●	●	●		●	●				●
RI	●	●				●	●	●		●	●		●	●	●	●
SD*	●	●	●			●	●	●	●	●	●	●	●		●	●
TX	●	●				●	●	●		●	●	●			●	●
UT*	●	●	●			●	●	●		●	●	●	●	●	●	●
VA*	●	●				●	●	●		●	●	●	●		●	●
VT*	●	●				●	●	●	●		●	●				●
WA	●	●	●	●		●	●	●		●	●	●	●		●	●
WI	●	●				●	●	●			●	●	●		●	●

Goals and Objectives. To produce the best RPS design for the state, it is important to articulate goals and objectives early in the process. Clear goals serve as a guide for design choices and avoid protracted rule implementation debate. There can be multiple goals for an RPS, and some states aim for a broader set of objectives than others. Examples of broader goals and objectives include local, regional, or global environmental benefits; local economic development goals; hedging fossil fuel price risks; and advancing specific technologies.

Applicability. RPS requirements are most commonly applied to investor-owned utilities and electric service providers. It is unusual for mandatory RPS requirements to extend to municipal utilities and cooperatives, as these entities are predominately self-regulated. However, some states have included provisions for municipal utilities and cooperatives to voluntarily join the RPS program or to “self certify.”

Eligibility. States are finding that defining which energy resources and technologies qualify as eligible under RPS requirements (see Figure 3) can be a complex process. Eligibility usually depends on whether or not an energy resource or technology supports the goals and objectives established for the RPS. Issues that states typically have considered include:

- What fuel sources and technologies are eligible?
- Do existing renewable sources count toward compliance?
- What geographic areas are eligible (e.g., generation within the state boundary or within a regional power pool)?
- Are central and customer-sited systems treated differently?

Structure. The structure of an RPS can influence investor confidence, the ability of markets to develop, and opportunities for project developers and investors to recover capital investments. The critical structural elements include:

- Method of accounting for renewable energy (e.g., energy production versus installed capacity requirements; RECs or bundled energy only).
- Time horizons for compliance periods.
- Mandatory or voluntary participation.
- Flexible compliance mechanisms to guard against high prices or the lack of supply of renewable energy (e.g., credit for early compliance, forward compliance banking, deficit banking, establishment of true-up periods, alternative compliance payments).
- Coordination with other energy policies at the federal level (e.g., Federal Production Tax Credit) and state level (e.g., system benefit charges, interconnection standards).

*States with RPS goals not mandatory requirements.

*Renewable CHP systems are eligible; fossil-fueled CHP systems are not eligible.

†Includes only those states that allow fuel cells using nonrenewable energy sources of hydrogen. Some states allow only renewable fuel cells (Arizona, California, Colorado, Delaware, Massachusetts, Maryland, Missouri, New Mexico, New York, Rhode Island, South Dakota, Utah, Wisconsin) as eligible technologies.

Source: Database of State Incentives for Renewable Energy (DSIRE), accessed March 2009.

- Cost recovery mechanisms for utilities.
- Enforcement mechanisms for noncompliance.
- The incorporation of “technology tiers” and/or “credit multipliers” to encourage particular technologies (e.g., solar photovoltaic).

Elements of a Successful Policy

Based on the experiences of states that have instituted an RPS, a number of best practices have emerged for designing and implementing an effective RPS. These best practices include:

- Develop broad support for an RPS, including top-level support of the governor and/or legislature.
- Hold facilitated discussions among key stakeholders regarding appropriate RPS design. Key stakeholders include:
 - State legislatures.
 - Public utility commissions.
 - Electric utilities and competitive electric service providers.
 - Developers of CHP and renewable energy systems.
 - Other stakeholders such as state and local government officials, environmental organizations, ratepayer advocates, and labor unions.
- Clearly articulate all RPS goals and objectives because these will drive RPS rules and structure.
- Specify which renewable energy technologies and resources will be eligible, driven by the stated goals and objectives. Also, consider state and regional resource availability if a goal is to encourage resource diversity through a technology tier.
- Determine the mix and amount of renewable energy desired. Careful analysis and modeling of the expected impacts prior to establishing the targets are the keys to success.
- Consider using energy generation (not installed capacity) as a target; establish a long timeline to encourage private investment; make compliance mandatory for all retail sellers; allow utility cost recovery; and establish cost caps.
- Consider adopting (or improving) net metering and interconnection standards to facilitate customer-sited clean DG projects that might be eligible technologies under an RPS.
- Establish a transparent and easy-to-use accounting system for compliance.

- Make sure a credible noncompliance mechanism is in place in the form of penalties, but provide retail suppliers with some flexibility in their compliance.
- Select the most appropriate lead agency or organization to implement the RPS.
- Conduct a mid-course performance review, identify the reasons for any delay in meeting targets, and enact program modifications as needed to meet the original intent of the RPS.

EPA Assistance Available

The U.S. Environmental Protection Agency (EPA) CHP Partnership is a voluntary program that seeks to reduce the environmental impact of power generation by promoting the use of cost-effective CHP. The partnership helps states identify opportunities for policy developments (energy, environmental, economic) to encourage energy efficiency through CHP. The partnership can provide information and assistance to states considering including CHP or waste heat recovery in their RPS requirements. See www.epa.gov/chp.

The EPA Green Power Partnership provides assistance to renewable generators in marketing RECs and helps educate potential REC buyers about resources. The partnership may be of assistance to states that employ RECs as a compliance measure for their RPS requirements but also allow for purchase and retirement of RECs for organizational “green power” designation. See www.epa.gov/greenpower.

Additional Resources

EPA has created *The Clean Energy-Environment Guide to Action*. The guide provides an overview of clean energy supply technology options and, in addition to RPSs, presents a range of policies that states have adopted to encourage continued growth of clean energy technologies and energy efficiency. The guide is available at www.epa.gov/cleanenergy/documents/gta/guide_action_full.pdf

The *Database of State Incentives for Renewable Energy (DSIRE)* is a comprehensive source of information on state, local, utility, and selected federal incentives that promote renewable energy. See www.dsireusa.org. The National Association of Regulatory Utility Commissioners’ report, *The Renewable Portfolio Standard: A Practical Guide*, provides detailed guidance on designing and implementing an RPS. See www.naruc.org.

For more information, contact:



Katrina Pielli
 U.S. Environmental Protection Agency
 Phone: (202) 343-9610
 e-mail: pielli.katrina@epa.gov

