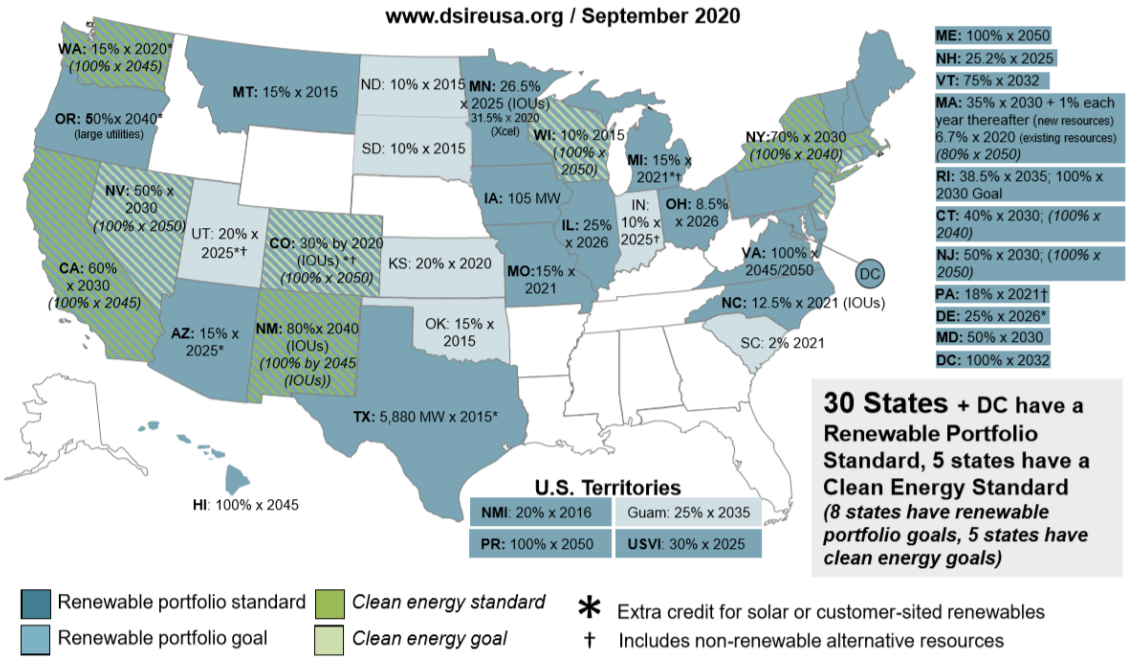
Energy 101: Clean and Renewable Standards

Portfolio standards require utilities and other energy suppliers to procure a certain minimum amount of their energy portfolio from eligible resources. These policies create demand for targeted energy resources, increase their development and use, and help to overcome market barriers to adoption, thereby enabling society to capture the environmental, economic, and other benefits associated with these resources.[1] Portfolio standards can come in many forms and cover different energy resources. For example, energy efficiency standards help drive adoption of energy saving technologies and practices,[2] and low-carbon or clean fuel standards help incentivize innovation and adoption of less carbon intensive direct-use or transportation fuels.[3] Two similar types of portfolio standards are in use today in the electricity sector: Renewable Portfolio Standards (RPS) and Clean Energy Standards (CES).[i] Currently 30 states and the District of Columbia have some form of RPS, CES, or a combination of the two; a further eight states have non-binding renewable portfolio goals.[4]

Figure 1: Renewable and Clean Energy Standards in the United States



Note: Virginia and Maine 100% RPS programs have unclear guidelines about qualifying resources and may be considered 100% clean energy standards.

In addition to states, sub-state jurisdictions like municipalities and counties, as well as individual electricity suppliers also set electricity portfolio standards or goals.[5] While RPS and CES policies are similar in their goals, there are key differences between them. This section describes and compares RPS and CES policies. For a discussion of emerging trends in RPS and CES policies see the Renewable and Zero-Emissions Standards Policy Brief.

[i] Renewable portfolio standards may also be referred to as renewable energy standards or renewable electricity standards. Likewise, alternative names for clean energy standards include clean electricity standards and zero-emission standards.

Renewable Portfolio Standards

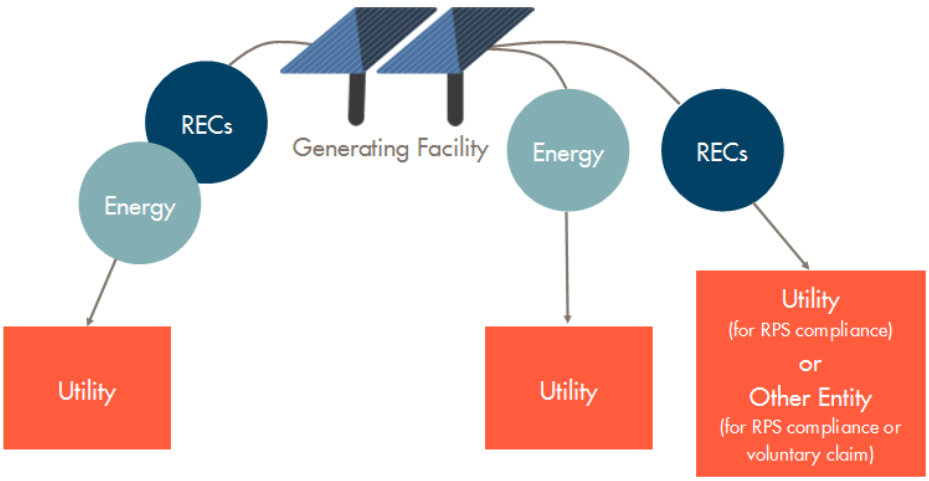
An RPS requires electricity suppliers to procure a minimum amount of electricity from eligible *renewable resources.*[ii] [6] The primary purpose of an RPS is to increase the development and use of renewable energy sources for electricity generation. There are a number of reasons why a state or jurisdiction might want to increase renewable electricity generation, including reducing emissions of pollutants to meet environmental and climate goals, diversifying the electricity grid, developing new industries, and providing new opportunities for local workforces. It is important to note that while an RPS can be a key policy in supporting climate change mitigation and economic goals, the primary purpose of an RPS is to increase generation from renewable energy resources; an RPS does not specifically target climate goals like reducing emissions.

State RPS policies can vary widely across several design elements including RPS targets, the sectors and electricity suppliers they include, and resource eligibility. Many states, like Oregon, set RPS targets as a percentage of retail electric sales.[7] Other states, like Iowa and Texas, require specific amounts of renewable electricity capacity rather than percentages.[8] RPS policies target the electricity sector, but do not address other parts of the energy sector such as direct-use fuels or transportation fuels. RPS requirements generally apply to retail energy suppliers and frequently apply only to investor-owned utilities (IOUs), though many states also include requirements for energy service suppliers, municipalities, and electric cooperatives – sometimes with lower targets.

Resources eligible for an RPS can vary depending on the goals of the policy, the types of resources jurisdictions want to promote, and how jurisdictions define a renewable resource. Eligible resources for an RPS always include wind, solar, and geothermal resources. Several states also include resources such as biomass, landfill gas, hydrokinetic marine (wave and tidal) energy, combined heat and power, and even energy efficiency. Hydropower resource eligibility is frequently determined based on the type and age of the facility. Many RPS policies aim to incentivize the development of *new* renewable resources, and therefore make older facilities ineligible, such as Oregon's treatment of its legacy hydropower.[9] Some RPS policies include more specific requirements, called carve-outs, which require a certain percentage of the overall renewable electricity requirement to be met with a specific technology to incentivize the deployment of particular technologies, resources, or market segments.

RPS policies use a renewable energy certificate (REC) trading system to track compliance with RPS goals and to reduce the cost to comply with the RPS. A REC is a tradeable certificate that represents the ownership property rights (similar to intellectual property rights) to renewable attributes

Figure 2: Bundled vs. Unbundles Renewable Energy Certificates



[ii] An alternative to an RPS, which requires compliance, is a renewable energy goal which is non-binding.

of one-megawatt hour (1 MWh) of qualifying renewable electricity delivered to the grid. Once electricity is on a utility grid it is not possible to physically trace the electricity back to its origin, so RECs play an important role in accounting, tracking, and assigning ownership to renewable electricity generation and use. A REC can be sold together with electricity delivered, called a "bundled REC," and the buyer can make a claim of consuming renewable electricity. A REC can also be sold separately from the associated electricity, called an "unbundled REC," in which case the buyer of the REC can make a claim of consuming renewable electricity while the buyer of the physical electricity cannot. An electricity supplier that generates more renewable electricity than its RPS requirement may either trade or sell RECs to other electricity suppliers who do not have enough RPS-eligible electricity to meet their RPS requirements. Depending on the state, RECs can also be banked for future compliance use.

Benefits and Costs of RPS Policies

RPS policies, along with other state and federal policies and federal tax credits, are one of the key policy drivers for renewable energy growth in the United States. States have generally met established RPS goals, and approximately half of renewable energy deployment since 2000 is associated with state RPS requirements.[iii] [10] However, the role of RPS policies as a driver of renewable electricity deployment has diminished over time as states with RPS programs have met or exceeded targets and states without RPS programs have also deployed renewable resources, in part due to favorable economics for renewables.[11] In 2018, renewable electricity deployment associated with meeting RPS requirements represented just under 30 percent of all U.S. renewable energy capacity additions.[12]

Research estimating the costs and benefits of RPS policies has identified that benefits tend to outweigh costs. A study by the Lawrence Berkeley National Laboratory (LBNL) found that national costs of RPS compliance between 2010 and 2013 were approximately $1 billion, which is on average less than 2 percent of average statewide electricity rates. At the same time, estimated benefits from reduced carbon emissions and public health benefits came to an average of $5.2 billion (a more than 5 to 1 benefit to cost ratio).[13] A second LBNL study forecasted future costs and benefits under existing RPS policies in 2016 compared to a scenario of no RPS policies.[14] The study found that between 2015 and 2050 RPS benefits outweighed costs even when considering the highest cost and lowest benefit outcomes; the study estimated high-end costs of 0.75¢ per kWh, while air pollution benefits, health benefits, and greenhouse gas reduction benefits totaled at least 2.4¢ per kWh (a more than 3 to 1 benefit to cost ratio).[15] Most RPS policies also have cost containment provisions. For example, the Oregon RPS has two mechanisms that serve as cost protections for Oregon consumers: a compliance cost cap of 4 percent of the utility's annual revenue requirement, and an alternative compliance payment (ACP) mechanism that sets an annual per megawatt-hour rate utilities can pay in lieu of procuring renewable resources.[16]

[iii] A Lawrence Berkeley National Laboratory study identified that while state RPS policies are associated with increased renewable deployment, it is challenging to directly attribute this increase to RPS policies.

Oregon's Renewable Portfolio Standard

Oregon established its RPS in 2007 with Senate Bill 838. The RPS required Oregon's large utilities to provide 25 percent of retail sales from eligible renewable sources by 2025, with interim goals along the way. The RPS defines large utilities as those that provide 3 percent or more of total state retail electricity sales; currently Portland General Electric, PacifiCorp, and the Eugene Water & Electric Board meet this threshold. The state's smaller utilities had lower targets, depending on the percent share of the state's total retail electricity load they supplied. In 2016, Oregon increased its RPS requirements from 25 percent by 2025 to 50 percent by 2040 in Senate Bill 1547 (Oregon Clean Electricity and Coal Transition Plan). The 50 percent target only applies to large investor-owned utilities that provide 3 percent or more of total state retail electricity sales. Compliance for consumer-owned utilities, including EWEB and small investor-owned utilities supplying less than 3 percent of total state retail electricity sales, was capped at 25 percent by 2025.

Eligible resources for the Oregon RPS include solar, wind, marine hydrokinetic, geothermal, certain biomass sources, some hydropower, and hydrogen gas. The Oregon RPS restricts eligibility in most cases to facilities built after January 1, 1995 to encourage development of new renewable resources. SB 1547 also created another type of REC (Thermal RECs or T-RECs). Thermal energy generated at a facility that also generates electricity using RPS-eligible biomass sources is also eligible for the RPS (for more information about the Oregon RPS, see the 2018 ODOE *Biennial Energy Report*).

Clean Electricity Standards

A clean electricity standard refers to a portfolio standard that requires electricity suppliers to procure a certain amount of electricity from "*clean" zero- or low-carbon emitting resources*.[17] CES policies are typically technology-neutral, and may include procurement from resources including hydropower, nuclear energy, coal or natural gas fitted with carbon capture, and other low- or zero-emission technologies, as well as renewables. The primary purpose of a CES is to increase the use of carbon-free sources for electricity generation in order to set and meet more ambitious carbon reduction and climate policies. Like RPS policies, CES can help achieve other goals such as increasing renewable electricity generation, diversifying the electricity grid, developing new industries, and providing new opportunities for local workforces. However, the primary goal is to decarbonize electricity generation. The argument for CES policies is that they allow jurisdictions a wider scope to set and meet more ambitious targets for carbon-free electricity, create a backstop against future growth of fossil fuels, and signal demand for emerging carbon-free technologies to the market.[18]

Compliance tracking and cost containment for CES policies may vary depending on the goals of a jurisdiction. One method is to adopt a similar credit system as an RPS that assigns credits per MWh of clean electricity generation to represent ownership property rights associated with clean electricity attributes. Alternatively, CES policies could adopt a tiered credit structure that awards credits of different values to different resource types, as is the case in New York which uses both RECs and Zero Emission Credits.[19] Another alternative, which some research suggests could increase efficiency, is a

credit system based on emissions rates rather than technology type.[20] Under this method, facilities would be compared on an emissions rate basis to a reference type of emitting generator, either a new coal plant or some type of natural gas plant, and would receive credits accordingly. Some jurisdictions may opt to forego credit systems and mandate compliance without a credit trading plan. Regardless of the design, policymakers will face several tradeoffs and must consider the most appropriate path to meet their specific goals.

Benefits and Costs of CES Policies

CES policies have not been in place for as long as RPS policies, so detailed research on costs and benefits is less available. That said, in theory a CES has potential to achieve an equivalent level of emissions reductions as an RPS at lower cost because a greater number of technologies will compete to reduce emissions, which increases market efficiency and lowers overall compliance costs for a given level of emissions reduction.[21] CES policies can, however, include non-emitting generation resources like nuclear power, or fossil generation with carbon capture; which can have associated economic, environmental, and public health costs.

Washington Clean Electricity Standard[22]

In 2019, Washington state passed the Clean Energy Transformation Act (CETA). CETA requires all retail sales of electricity be "greenhouse gas neutral" by 2030, and by 2045, 100 percent of retail sales of electricity must be from either RPS-eligible renewables or from "non-emitting" resources. The bill defines "non-emitting" resources as resources that do not emit greenhouse gases as a by-product of energy generation. The difference between the 2030 target and the 2045 target is that, for the period between 2030 and 2045, utilities can meet up to 20 percent of their compliance with alternative compliance measures, including alternative compliance payments, purchasing unbundled RECs, or investing in additional energy efficiency projects.

Clean Energy Standards[23]

The term Clean Energy Standard is often used synonymously with Clean Electricity Standard. A Clean Energy Standard, however, can apply to energy resources beyond those used for electricity generation. The purpose of a Clean Energy Standard is to have a policy that requires clean energy targets across all energy resources, including electricity but also energy resources for direct use like space heating, industrial processes, and transportation. Many states have multiple standards to cover all energy sectors, like energy efficiency standards and clean fuel standards, but an umbrella Clean Energy Standard would cover all sectors. While there are no states with an umbrella Clean Energy Standard, there are municipalities that have adopted Clean Energy *Targets*. For example, in 2017, Multnomah County and the City of Portland adopted a resolution to meet 100 percent of community-wide electricity needs with renewable resource by 2035, and all energy needs by 2050.

Comparison of RPS and CES Policies

While the terms RPS and CES are sometimes used interchangeably, there are meaningful material differences between the two policies. Primarily, RPS policies aim to incentivize the development of *new* renewable resources, and exclude generation sources that are not considered "renewable," but that may be low-carbon or zero-carbon emitting resources such as nuclear power or fossil fuel-generated electricity with carbon capture and storage (CCS) technology. CES policies, on the other hand, aim more directly to reduce carbon emissions by incorporating low- or zero-carbon emitting resources regardless of whether or not they meet the definition of renewable energy.

Table 1: Primary and Secondary Objectives of Different Standards

Policy	Objectives
Renewable Portfolio Standard	Primary: Increase renewable electricity resources Secondary: Meet climate, environmental, and other goals
Clean Electricity Standard	Primary: Reduce GHG emissions in electricity generation Secondary: Technology adoption goals (e.g., renewable energy resources)
Clean Energy Standard	Primary: Reduce GHG emissions in all energy use (electricity, direct use, and transportation fuels) Secondary: Technology adoption goals (e.g., renewable energy resources)

**Note: Some jurisdictions have renewable goals or clean goals, which have the same objectives but are voluntary rather than mandatory.*

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