

Portfolio Standards and the Promotion of Combined Heat And Power

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Section 1. Introduction

Many states have developed portfolio standards to increase the adoption of renewable energy generation, energy efficiency, and other clean energy technologies. Portfolio standards require utilities and retail energy suppliers (mostly electricity and sometimes gas) to procure a certain minimum quantity of eligible energy (typically from renewable sources and other specified supply-side resources) or achieve a minimum amount of energy efficiency savings (typically from demand-side measures).

Portfolio standards can stimulate market and technology development to help renewable energy and clean energy sources become economically competitive with conventional forms of electric power. In this way, portfolio standards can help overcome barriers and create demand for such sources, enabling states to capture their energy-saving, environmental, and economic benefits.

Combined Heat and Power (CHP), a clean energy technology, is an efficient method of providing electric power and useful thermal energy (heating or cooling) using a single fuel source. As such, it can replace or supplement less efficient conventional separate heat and power. CHP provides environmental and energy benefits due to this higher efficiency and the coincident elimination of transmission losses in delivering electricity from the power plant to the user. With these benefits, CHP is uniquely qualified to contribute to a state's objectives of increasing clean energy mix, both as a supply-side resource and as a demand-side measure. CHP can help achieve multiple policy goals to address energy and environmental issues. CHP's potential to use renewable fuels and decrease environmental impact makes it a candidate for standards designed to encourage renewable and clean energy resources. CHP's energy-efficiency benefits make it a candidate for standards designed to encourage energy-saving measures in a utility's portfolio of services.

This paper discusses the different ways CHP is incorporated in portfolio standards. It presents the basic portfolio standard design approaches (Section II), identifies key CHP-related issues for policymakers to consider when revising or developing portfolio standards (Section II), and provides state-specific information on existing standards allowing for CHP (see Sections III and IV). Additional resources are listed in Section V.

1.1 Background

Portfolio standards have been in place since the late 1990s and early 2000s.¹ As of March 2015, some form of portfolio standards (either an APS, EERS, or RPS) exist in 40 states² and the District of Columbia. Most states have portfolio standards to encourage renewable, clean energy resources and energy-efficiency savings. No two states have the same standards, and some states have several standards. The

¹ Some states have emissions performance standards (EPS) for greenhouse gases (GHGs) that establish minimum performance requirements similar to an energy-efficiency appliance standard. Qualifying facilities and compliance options vary by state. The standards have output-based limits (in lbs CO₂/MWh) and typically apply to electricity-generating plants or the supply portfolio of a load-serving entity (distribution or wires company). A utility can ensure compliance using various approaches, such as by balancing its supply portfolio, trading certificates that are created within the power market, and trading project-based emissions reductions (or carbon offsets) created in other sectors. For more information, refer to *RGGI and EPS in Selected States, RAP Research Brief, August 2010*.

² Some states have established PS, but then later decided to repeal the standards. For example, in February 2015, legislation was signed repealing West Virginia's APS.

first few standards were renewable portfolio standards set in place to encourage renewable energy resources. Several states subsequently added provisions for clean energy or alternative energy sources.³ Restructuring in the electricity market led to an increase in portfolio standards to encourage energy savings through Energy Efficiency Resource Standards. The three main types of portfolio standards include:

- **Renewable Portfolio Standards (RPS)⁴ or Clean Energy Standards (CES)⁴** are portfolio standards designed to increase the contribution of renewable energy and clean energy to the electric supply mix. They are focused on typical renewable energy sources such as wind, solar, hydro, geothermal, and biomass, and on clean energy technologies such as CHP. Some states maintain a broad RPS definition under which renewably fueled CHP systems qualify. There are states that maintain a CES in parallel to a RPS, and others that have a combined RPS that includes clean energy sources such as CHP in addition to renewable through separate tiers or targets for these sources. Examples of states with RPS include California and Connecticut. With all these standards, CHP is treated as a supply resource with prescribed targets and CHP users can engage either in the voluntary or compliance market.
- **Energy Efficiency Resource Standards (EERS)⁵** are designed to meet an energy-savings goal through energy efficiency. They are intended to encourage more efficient generation and transmission by electric and gas utilities. They are usually focused on end-use energy savings, but some include other efficiency measures, such as CHP or other high-efficiency distributed generation (DG) or distribution system improvements. Examples of states with EERS include Massachusetts and Minnesota.
- **Alternative Energy Portfolio Standards (APS)⁶** are hybrid standards developed to allow energy efficiency to qualify within a RPS or a CES, and they do so either through targets for a certain percentage of a supplier's capacity (MW) or generation (MW h) to come from sources such as CHP, coal with carbon capture and storage, or waste-to-energy projects using municipal solid waste. Examples of states with APS include Massachusetts, Ohio, and Pennsylvania.

As there is no consistent terminology in place to refer to each type of portfolio standard, this paper refers to each of the standards by the name assigned by the state.

The standards vary in their structure, administration, size, and eligible applications as well as the types of eligible energy sources. The structure and administration varies based on the state's electric and gas market and whether it is regulated or restructured. Typically, legislation creates the general architecture of the portfolio standard and delegates implementation authority to the state utility regulator (Public Utility Commission [PUC] or Public Service Commission [PSC]), which is responsible for detailed rulemaking; guidelines for implementation; and evaluation, measurement, and verification. In some

³ Refer to Heeter and Bird, Including Alternative Energy Resources in State RPS: Current Design and Implementation Experience, November 2012.

⁴ Also referred to as Renewable Energy Standard (RES) or Renewable Resource Standard (RRS)

⁵ Also referred to as Electricity Reduction Goals (ERG), Energy Optimization Standard (EO), and Energy Portfolio Standard (EPS).

⁶ Also referred to as Alternative Energy Resource Standard (AERS), Alternative and Renewable Energy Portfolio Standard (AREPS), Alternative Energy Portfolio Standard (AEPS), Renewable Energy and Energy Efficiency Portfolio Standard (REPS), and Renewable, Recycled and Conserved Energy Objective.

cases, the PUC or PSC sets the numerical target rather than the state legislature. In some states, the responsibility for implementing the portfolio standard is shared with the state's energy department.

Depending on its objectives, a state sets targets as a percentage of retail sales, but some states set specific energy targets (energy saved [in kWh], energy output [in kWh] or energy capacity [in kW]). Some targets are set as a portion of expected load growth (e.g., as in Texas) or a percentage reduction in peak demand for electricity (e.g., as in Colorado). Depending on the type of standard, qualifying projects demonstrate compliance with energy credits that can be traded in the voluntary or compliance market, or achieve energy savings that are measured and verified. Portfolio standards policies that have binding targets can also include compliance requirements, fulfillment of which must be demonstrated periodically (typically annually).

The approaches used to incorporate resources including CHP into portfolio standards have varied significantly by state. States have used three primary approaches to include CHP and other resources in portfolio standards:

1. Include CHP as a generally eligible resource in a state's portfolio standard. Under this approach, CHP qualifies as one of several resources in the state's portfolio standards, and all qualified resources can meet the compliance target. Typically, all eligible resources are credited at the same value. Indiana is an example of a state that has enacted this type of standard (voluntary RPS goals).
2. Establish separate tiers for CHP within an existing portfolio standard. This approach creates separate targets, or tiers, for CHP, detailing specific targets and defining whether it is treated as a renewable, clean energy, or an energy efficiency measure. With this approach, the standard defines a target under which CHP qualifies and can also include hybrid standards where CHP targets are set in a separate tier based on CHP's energy savings potentials. For example, Connecticut has three separate tiers under its RPS. The third tier, known as "Class III," requires suppliers to obtain 4 percent of their retail load from customer-sited CHP and certain other resources.
3. Establish a separate portfolio standard with specific sub targets for CHP. With this approach, a state establishes a separate portfolio standard with subtargets for CHP (and other resources). For example, Massachusetts established an APS in 2009 that is separate from the state's RPS program but functions in the same general manner. The APS requires 5 percent of the state's electric load to be met with "alternative energy" resources by 2020. In 2012, 99.1 percent of the APS requirement was met by CHP systems.⁷

⁷ The Department of Energy's (DOE's) Lawrence Berkeley National Laboratory (LBNL) has issued reports reviewing existing portfolio standards and their values. For example, a 2008 report found that, assuming full compliance, current mandatory RPS programs will "require the addition of roughly 60 gigawatts (GW) of new renewable capacity by 2025, equivalent to 4.7 percent of projected 2025 electricity generation in the U.S., and 15 percent of projected electricity demand growth." Massachusetts' APS shows the clear increase in CHP, which reflects the state mandate.

Section 2. CHP Design Features and Key Policy Considerations

States have accounted for CHP in portfolio standards based on the overall program objectives, such as promote more efficient generation, reduce GHG emissions, or encourage supply diversity. CHP-related design features, therefore, vary among state portfolio standards:

1. **Voluntary or Mandatory Standards.** States have either mandatory or voluntary portfolio standards. Mandates have created a clear pathway to increase the use of resources such as CHP.⁸ Voluntary goals typically carry nonbinding targets with no penalties for failure to comply.
2. **CHP System Attributes in Portfolio Standards.** Some standards define CHP system characteristics, such as specific power-to-heat ratios, cost-effectiveness thresholds, and other eligibility requirements that systems be installed before or after specific dates. Most standards define the following CHP attributes:
 - a. **CHP System Type.** States have varying definitions concerning CHP eligibility in their portfolio standards. For example, in some states, all CHP types using a variety of fuels, not just renewables, qualify as eligible technology, while in other states (e.g., Colorado, Nevada, North Dakota), waste heat-to-power qualifies as an eligible CHP technology, but typical CHP does not.
 - b. **Size Limits.** Some states have minimum and/or maximum system size limits under their portfolio standard programs. For example, New York allows only CHP systems of 50 kW or larger to qualify under its RPS.
 - c. **Efficiency Threshold.** Some states have incorporated various CHP efficiency metrics into their standards. A handful of states have minimum CHP operating efficiency requirements, such as the minimum level of 50 percent set in the Connecticut RPS. In certain states, more efficient systems earn more credit per unit of output (e.g., Connecticut RPS,⁹ Massachusetts APS). Massachusetts' APS provides credit for CHP based on the efficiency of the system compared to that of grid-supplied electricity and an onsite boiler producing the same electric and thermal output as the CHP system.
 - d. **Fuel Use.** In a number of states, CHP would qualify under a renewable portfolio standard irrespective of fuel type used. Some portfolio standards, however, only recognize certain fuel-type CHP systems, such as Arizona's Renewable Electricity Standard (RES), which allows only renewably fueled CHP to qualify.¹⁰
3. **Accounting for CHP's Benefits in Portfolio Standards.** A CHP system's benefits are accounted for based on its energy output, energy capacity, or energy savings. Some portfolio standards encourage eligible resources such as CHP by issuing tradable credits for the energy generated. These are commonly seen with RPS, where credits can be sold at market prices to utilities or other entities to demonstrate compliance with the portfolio targets. Typically, one MW h of eligible generation or energy savings may earn one credit. The value of credits differs based on

⁸ Massachusetts Department of Energy Resources. "Massachusetts RPS & APS Annual Compliance Report for 2012." April 22, 2014. <http://www.mass.gov/eea/docs/doer/rps-aps/rps-aps-2012-annual-compliance-report-042214.pdf>.

⁹ Where the revenue from the renewable energy credits for qualifying facilities are divided between the customer and the state Conservation and Load Management Fund, depending on when the Class III systems are installed.

¹⁰ It is important to note that Arizona's EERS may allow fossil-fueled CHP to qualify.

the stringency of the portfolio standard targets, eligibility guidelines, and other factors. Other portfolio standards encourage eligible resources by providing financial incentives based on system performance or energy savings and are commonly seen in EERS. Measurement and verification is a critical component to CHP's inclusion in a portfolio standard. There are various ways to account for CHP:

- a. **Accounting for CHP Electrical and Thermal Output.** A CHP system provides electrical and thermal outputs that may be taken into account in assessing its benefits. Some states account for only the electric output from CHP systems (typically based on a metered output [e.g., MW h]) in determining credit for the portfolio standards. Other states account for both the electrical and thermal output (typically based on measured heat produced [Btu] converted to MW h or other equivalents).
- b. **Credit In Comparison to Other Resources.** CHP can receive full credit on par with other resources in the standard (e.g., Michigan, Pennsylvania) or partial credit (e.g., Massachusetts APS). States that want to provide a significant incentive for CHP have applied a credit multiplier (1.5 or 2 credits) for each MW h of eligible CHP generation. If a state goal is to encourage diverse electricity supply, then that state may credit CHP systems on par with renewable sources of generation. If the objective is to encourage GHG emission reductions, then the state may credit the CHP system based on a measure that reflects actual reductions. How CHP is credited under portfolio standards can be a function of the overall program objectives.
- c. **Accounting for CHP's Efficiency.** A CHP system's efficiency plays a role in portfolio standards, either in defining a CHP system's eligibility (for instance, for a performance-based incentive) or in assessing energy savings (such as in an EERS). Various efficiency metrics exist for a CHP system that pertain to electricity generation and heat production (the electrical and thermal output), or an overall operating or system efficiency. The type of efficiency that is used will depend on the type of portfolio standard.

As these design features demonstrate, policymakers can promote CHP in their portfolio standards through several different approaches, based on the energy savings and environmental benefits CHP can provide in producing electricity and thermal energy.

States can benefit from a holistic approach as they develop portfolio standards that support CHP to ensure that they are taking optimal advantage of CHP's benefits and to address any conflicting requirements. As an example, an RPS or an APS can be structured to capture the value of the supply-side attributes of CHP—the electric and thermal outputs—while an EERS may be designed to recognize the demand-side benefits of CHP—the energy-efficiency savings (e.g., North Carolina combined RPS/EERS).

Recognizing the variability in state portfolio standards, a state can benefit from consistently attributing CHP in the portfolio standards by addressing the following key concepts:

1. **Define CHP Eligibility Explicitly.** Portfolio standards may not sufficiently promote CHP unless CHP is explicitly identified as an eligible resource (e.g., Massachusetts APS, Connecticut RPS). Lack of formal recognition of CHP under standards creates uncertainty, which may deter some projects due to concerns about the timing and cost of the approval process that determines eligibility. States with specific and distinct tiers and targets for CHP provide well-defined goals to encourage its use.

2. **Define CHP Eligibility Holistically.** Currently, there are varying state definitions of CHP eligibility. Some states allow for waste heat-to-power as an eligible technology within their portfolio standards, and others only qualify renewably fueled CHP. To secure the energy and environmental benefits from CHP, it is best to consider all types of CHP systems as eligible technologies. Assembling the right mix of efficiency requirements, size limits, eligible system types, start dates, and performance-based incentives for CHP systems will allow a state to achieve its economic, environmental, and energy supply objectives.
3. **Account for CHP's Benefits Appropriately.** As CHP systems vary based on prime mover technology, fuel, application, and efficiency (total system and electrical),¹¹ their benefits have to be carefully evaluated so as to provide adequate incentive and safeguards. Important questions to consider include:
 - a. How would each of these benefits be accounted for in a portfolio standard? Would they be accounted for in the same portfolio standard?
 - b. How would generation and energy savings be measured in the different standards that are adopted?
 - c. How can CHP's electricity and thermal output be effectively credited in an RPS or APS?
 - d. How can CHP's savings be effectively accounted for in an EERS? Are there complementary policies in place, such as public benefit funds, cost-recovery for energy-efficiency measures, or reducing or eliminating throughput incentives, that will make the EERS more effective?

At this time, the type and the manner in which CHP is integrated varies by state. Different approaches are in place to account for CHP electrical and thermal outputs as well as to calculate CHP efficiency savings.

¹¹ www.epa.gov/chp/basic/methods.html.

Section 3. National Overview and State Examples

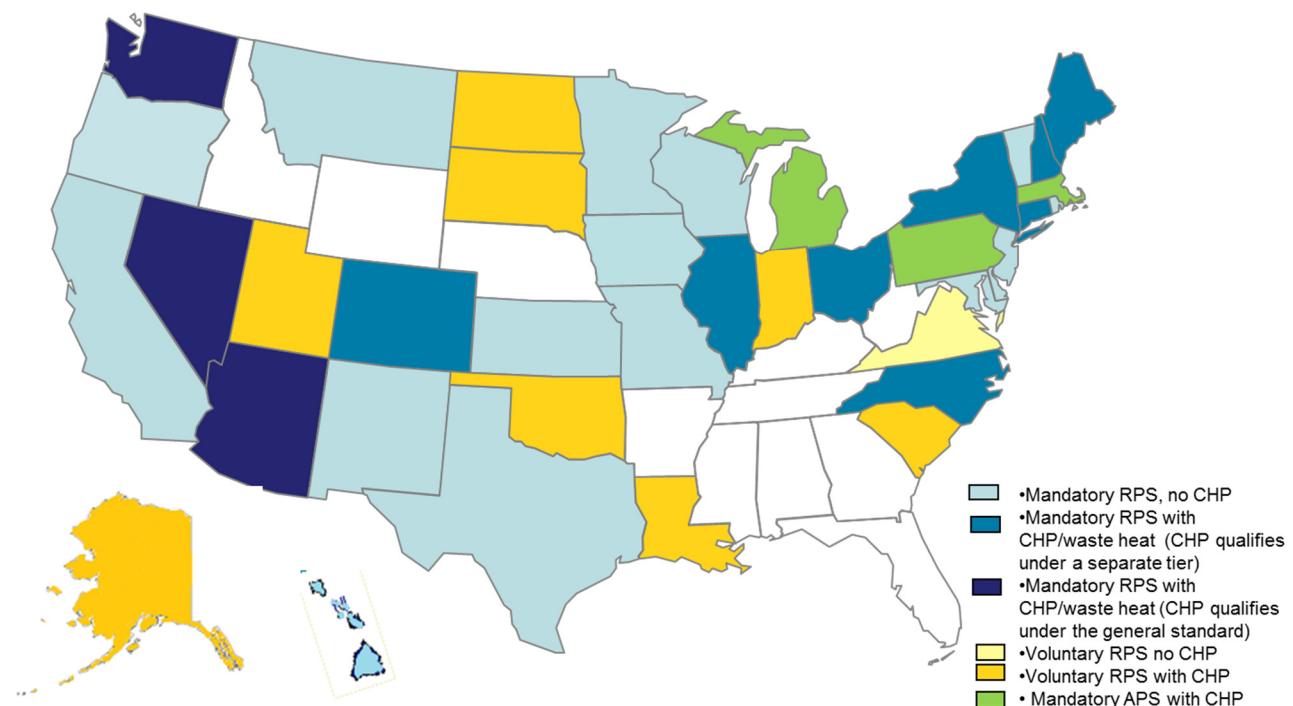
This section and the more detailed table that follows in Section IV present a national overview on how CHP is incorporated in state portfolio standards, a range of state examples, selected state case studies, and state-specific data. A list of additional resources is also provided.

3.1 States with RPS, CES, and APS Requirements for CHP

Currently, 39 states and the District of Columbia have some form of APS or RPS (either voluntary or mandatory), as shown in Figure 1. Of these states, 20—Arizona, Connecticut, Colorado, Hawaii, Indiana, Maine, Massachusetts, Michigan, Nevada, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Utah, Vermont and Washington—specifically call out CHP and/or waste heat-to-power (WHP) as eligible under their RPS or APS program guidelines.

The other 19 states and the District of Columbia do not explicitly mention CHP; however, they may allow these systems to qualify if they use an eligible fuel. For instance, if biomass is a qualifying fuel under an RPS, and a CHP system is biomass-fired, then that CHP system would potentially be eligible to receive credit under the portfolio standard.

Figure 1: States with RPS, CES, and APS Requirements for CHP

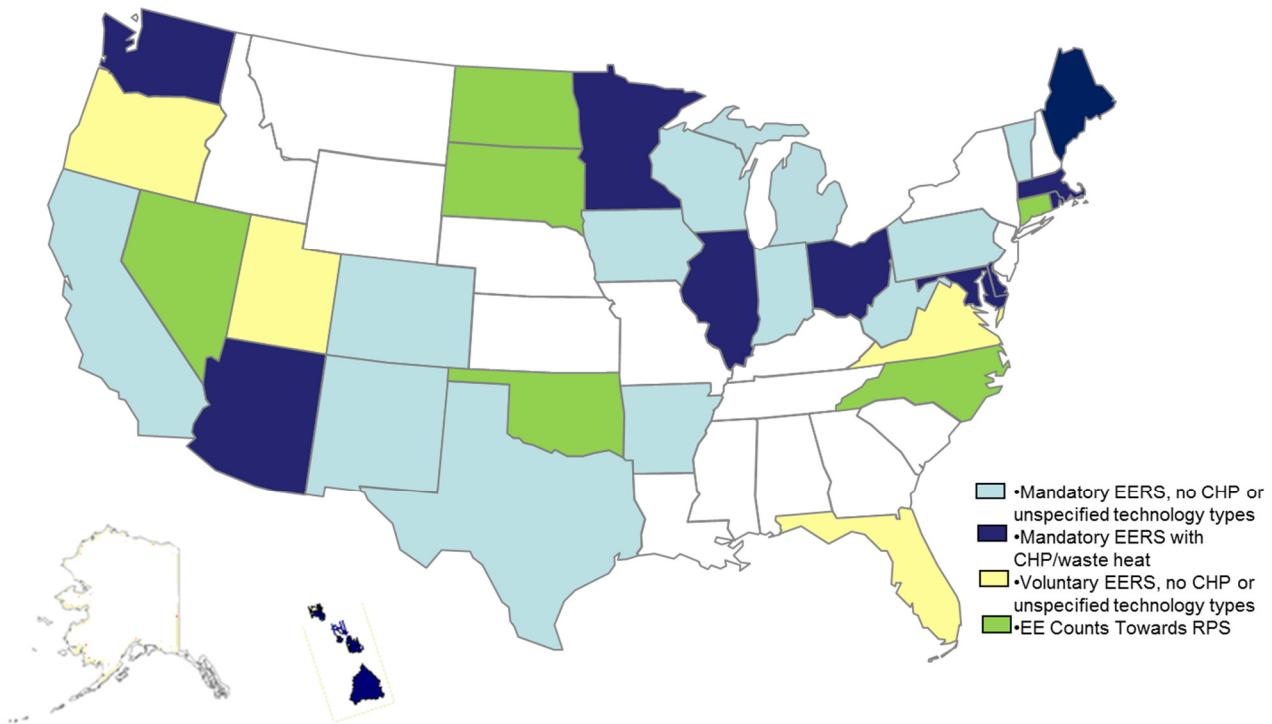


Source: ICF International, C2ES, and the DSIRE database, 2015.

3.2 States with EERS Requirements

Figure 2 shows the states with EERS programs and states that include energy-efficiency targets in their RPS programs (effectively functioning as EERS). Eighteen states—Arizona, Connecticut (administered as part of RPS),¹² Delaware, Hawaii (administered as part of RPS until 2015), Illinois, Maryland, Massachusetts, Minnesota, Michigan (administered as part of RPS), Nevada (administered as part of RPS), New York, North Carolina (administered as part of AEPS), North Dakota (administered as part of RPS), Ohio, Oklahoma (administered as part of RPS), Rhode Island, South Dakota (administered as part of RPS) and Washington (administered as part of RPS)—specifically call out CHP or WHP as eligible in some form under their EERS regulations.

Figure 2: States with EERS Programs for CHP



Source: ICF International, C2ES, and the DSIRE database, 2015.

3.3 State Examples

Below are examples of how several states have incorporated CHP into their standards:

Connecticut is an example of an RPS program that includes separate tiers for specific categories of resources. The state's RPS was originally promulgated in 1998 and was revised in 2005 and 2007. In 2005, Connecticut added a third tier to the resource requirements, establishing a new RPS Class III which included CHP, demand response, and electricity savings from conservation and load management

¹² Connecticut's Class III requirement under their RPS is oftentimes referred to by organizations such as DSIRE as an EERS. However, this efficiency tier is implemented under the RPS structure.

(C&LM) programs. In 2007, the Class III standard was expanded to include waste heat recovery systems.¹³

The RPS requires electric suppliers and distribution companies to obtain 1 percent of their generation from Class III resources beginning in 2007, increasing by 1 percent per year until leveling out at 4 percent in 2010 and thereafter. The Class III targets effectively serve as an EERS. Specific elements of the Class III standard include:

1. Eligible CHP systems must have been developed on or after January 1, 2006.
2. Eligible systems that recover waste heat or pressure from commercial and industrial processes must have been installed on or after April 1, 2007.
3. Existing units that have been modified on or after January 1, 2006 may earn certificates only for the incremental output gains.
4. A CHP system must meet an overall efficiency level of at least 50 percent.
5. The sum of all useful electrical energy output must constitute at least 20 percent of the system's total usable energy output.
6. The sum of all thermal energy outputs must also constitute at least 20 percent of the technology's usable energy output.
7. Annual fuel-conversion efficiency and percentages of production are assessed quarterly for the first year after initial certification. Customers that install Class III resources on or after January 1, 2008, are entitled to Class III credits equal to at least 1 cent per kW h. The revenue from these credits must be divided between the customer and the state C&LM fund based on when the Class III resources are installed, whether the customer is residential or nonresidential, and whether the resources received state support or not.¹⁴

More information can be found at <http://www.ct.gov/pura/cwp/view.asp?a=3354&q=415186>.

New York is an example of a state portfolio standard program with a separate tier under which CHP is eligible (although only certain CHP technologies are eligible).

The New York State PSC adopted an RPS in September 2004 and issued implementation guidelines in 2005. The RPS was originally set at 25 percent of state electricity sales by 2013 but was expanded in January 2010 to 30 percent by 2015. Two tiers are used to meet the RPS: 1) a main tier, and 2) a customer-sited tier (CST). The CST was revised when the overall RPS target was increased in 2010, and it now includes CHP systems of 50 kW or larger.

New York's RPS is managed differently than most other state programs and works through a central procurement model. Electric utilities collect a surcharge on electricity sold to consumers. These funds

¹³ Class III is defined as: "the electricity output from combined heat and power systems with an operating efficiency level of no less than fifty percent that are part of customer-side distributed resources developed at commercial and industrial facilities in this state on or after January 1, 2006, a waste heat recovery system installed on or after April 1, 2007, that produces electrical or thermal energy by capturing preexisting waste heat or pressure from industrial or commercial processes, or the electricity savings created in this state from conservation and load management programs begun on or after January 1, 2006."

¹⁴ BGC Environmental Brokerage Services, www.bgcebs.com/Renewables/.

are turned over to the New York State Energy Research and Development Authority (NYSERDA), which purchases renewable energy credits (RECs) on behalf of all the regulated entities to fulfill the RPS.

In addition, there is a separate pool of funds designated for the CST, with specific funding allocations for different technologies. Funding for CHP systems will be provided for eligible technologies through a combination of capacity- and performance-based incentives. Eligible technologies include CHP systems fueled by anaerobic digestion biogas, systems fueled by renewable biogas (including systems co-fired with renewable biogas), and fuel cells fueled by any fuel. Incentives can be based on either capacity (kW) or output (kWh) and are awarded through competitive solicitations.¹⁵

More information can be found at

<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={C05CD0D6-8EA5-4CB9-A9FA-6ADD3AECB739}>.

New York's RPS stopped accepting new customers in 2016, as the state transitions to the Clean Energy Fund, but many RPS projects are still receiving funding from NYSERDA, and the program has provided support to a large number of CHP installations in both the main and customer-sited tiers.

Massachusetts has established an APS and an EERS, in addition to the state's RPS. CHP qualifies under both the APS and EERS (renewably fueled CHP can qualify under the RPS), and CHP projects are eligible to pursue credit under both programs. The state- passed Green Communities Act in 2008 called for an APS that includes CHP and an EERS that sets separate targets for demand-side resources, including behind-the- meter CHP systems.

3.3.1 Treatment of CHP under the APS

The APS establishes a target of 5 percent of retail electricity suppliers' sales being from alternative energy sources by December 31, 2020, and defines an alternative energy source as one that generates electricity using any of the following: CHP, gasification with capture and permanent sequestration of carbon dioxide, flywheel energy storage, paper- derived fuel sources, or energy-efficient steam technology. Under Massachusetts' APS regulations, CHP must have begun operation on or after January 1, 2008. Existing units can receive credit for their added incremental useful thermal energy or useful electrical energy. Only those additions made on or after January 1, 2008, qualify. A net CO₂ emissions rate of 890 lbs/MW h also applies.¹⁶

CHP and other eligible projects can receive one credit, referred to as the "APS Alternative Energy Certificates" (AEC) for one MWh of electrical energy output or for thermal output using a conversion factor of 3.412 MMBtus = 1 MW h. The Alternative Energy Certificates (AECs) earned by a CHP unit represent the energy saved by operating the CHP unit compared to separately operating an on-site

¹⁵ State of New York Public Service Commission (PSC). Case 03-E-0188 – Proceeding on Motion of the Commission Regarding Retail Renewable Portfolio Standard (RPS). Order Authorizing Customer-Sited Tier Program Through 2015 and Resolving Geographic Balance and Other Issues Pertaining to the RPS Program. April 2, 2010.

<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={30CFE590-E7E1-473B-A648-450A39E80F48}>

¹⁶ The term "net" refers to the sum of emission increases and decreases. For a generation unit, it includes carbon dioxide emissions related to combustion, gasification, fuel processing, and sequestration, whether or not such activities occur at the generation unit or another location; in the case of a CHP unit, it also includes emissions from thermal delivery.

thermal plant while drawing electricity from the grid.¹⁷ AECs are granted for eligible CHP units equal to the result, if positive, of the following calculation:

1. Take the sum of the following two:
 - a. The electrical energy generated divided by the overall efficiency of electrical energy delivered to the end-use from the electrical grid (0.33 for this purpose).
 - b. The useful thermal energy, expressed in MW h, divided by the overall efficiency of thermal energy delivered to the end-use from a standalone heating unit (0.80 for this purpose).
2. Then, subtract from this sum: The total of all fuel and any other energy consumed by the CHP unit in that quarter expressed in MW h and calculated using the energy content of the fuel based on its higher heating value.

Eligible CHP units must provide for the metering of electrical energy generated, useful thermal energy produced, and fuel consumed, and for calculating the net quantity of MW h for which AECs are awarded. Further details on this calculation can be accessed at www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/rps-aps/rps-and-aps-program-summaries.html.

At the end of 2012, 99.1 percent of the standard was met through CHP systems. The total APS target for 2012 was 1,185,236 MWh.¹⁸ Massachusetts AECs were priced at \$21.02/MW h in 2012.¹⁹

More information can be found at www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/rps-aps/rps-and-aps-program-summaries.html.

Legislation passed in August 2012 requires that the state's executive office of energy and environmental affairs study adding technologies that generate "useful thermal energy" to the list of eligible technologies under this standard. In 2014 legislation was passed, H. 4385, which now includes "useful thermal energy" as eligible under the APS. "Useful thermal energy" is defined as "energy in the form of direct heat, steam, hot water or other thermal form that is used in production and beneficial measures for heating, cooling, humidity control, process use or other valid thermal end use energy requirements and for which fuel or electricity would otherwise be consumed."²⁰

3.3.2 Treatment of CHP under the EERS

Massachusetts also has a program that effectively functions as an EERS, as it has energy savings targets. This program provides a rebate payment to help meet the energy-efficiency targets and does not provide a tradable credit system (i.e., it is not market-based). The program stipulates that the state meet at least 25 percent of electric load by 2020 with demand-side resources, including: "energy efficiency,

¹⁷ Department of Energy Resources (DOERS). Massachusetts Renewables and Alternative Energy Portfolio Standards (RPS & APS) Annual Compliance Report for 2010. January 11, 2012. www.mass.gov/eea/docs/doer/rps/rps-aps-2010-annual-compliance-rpt-jan11-2012.pdf.

¹⁸ Department of Energy Resources (DOERS). Massachusetts Renewables and Alternative Energy Portfolio Standards (RPS & APS) Annual Compliance Report for 2012. April 22, 2014. <http://www.mass.gov/eea/docs/doer/rps-aps/rps-aps-2012-annual-compliance-report-042214.pdf>.

¹⁹ Ibid.

²⁰ House Committee on Ways and Means. H. 4385. 2014. <https://malegislature.gov/Bills/188/House/H4385/>.

load management, demand response, and generation that is located behind a customer's meter²¹, including a combined heat and power system with an annual efficiency of 60 percent or greater, with the goal of 80 percent annual efficiency for combined heat and power systems by 2020." The EERS program, which started as a pilot in 2009, is known as the Mass Save Ratepayer-Funded Energy Efficiency program. CHP systems can qualify under both the APS and the EERS if they meet all necessary criteria under both programs.

Under the Mass Save Ratepayer-Funded Energy Efficiency program, CHP systems are eligible for the following incentives:

- Payments for feasibility studies, procurement, and installation.
- For projects $\leq 150 \text{ kW}$, a payment of \$750/kW h capacity, up to a maximum incentive of \$112,000.
- For projects $>150 \text{ kW}$, the payment amount is determined by the utility administrator, but it can be 50 percent of the installed cost for small to medium- sized projects.
- For systems greater than 2 MW , the incentive amount is determined by the funds available.²²

To qualify, CHP systems must also have a minimum efficiency of 60 percent, with fuel input expressed on a higher heating value (HHV) basis, and must also pass a cost- effectiveness screening threshold established by the Massachusetts Department of Public Utilities (DPU), which results in a benefit to cost ratio ≥ 1.0 .²³

North Carolina is an example of a state portfolio standard program with a separate target for energy efficiency under which CHP is eligible. In August 2007, North Carolina enacted a Renewable Energy and Energy Efficiency Portfolio Standard (REPS) requiring all investor-owned utilities to supply 12.5 percent of 2020 retail electricity sales from eligible energy resources by 2021. Municipal utilities and electric cooperatives must meet a target of 10 percent eligible energy resources by 2018. Up to 25 percent of the requirements may be met through energy-efficiency measures, including CHP. After 2018, up to 40 percent of the standard may be met through energy efficiency, including CHP.

Under the REPS, no minimum efficiency requirement exists for CHP. Energy from CHP is included to the extent that the system "uses waste heat to produce electricity or useful, measurable thermal or mechanical energy for the retail customers' use and results in less energy used to perform the same function or provide the same level of service at the retail customer's facility." Thermal energy that is not

²¹ John Ballam, Massachusetts Department of Energy Resources, "Use of an Alternative Energy Standard Portfolio Standard by Mass for the Support of CHP," MA Department of Energy Resources.http://www.energy.ca.gov/2012_energypolicy/documents/2012-02-16_workshop/presentations/11_Ballam_Mass_DER.pdf.

²² Massachusetts Department of Energy Resources (DOER). "Use of an Alternative Energy Standard Portfolio Standard by Mass for the Support of CHP."

²³ Mass Save: Savings through Energy Efficiency. "Combined Heat and Power ("CHP") Program: Guidebook for Submitting CHP Applications for an Energy Efficiency Incentive in Massachusetts."November 18, 2010. *November 18, 2010.* <http://www.masssave.com/business/building-or-equipment-upgrades/find-incentives/~/media/Files/Business/Applications%20and%20Rebate%20Forms/CHP%20Incentive%20Guidebook%20-%20dated%2011-18-10.ashx>.

used to generate electric power, and is measured accurately in Btus, earns equivalent RECs using a conversion factor of 3,412 Btu per kW h. Renewable energy and CHP must be installed after January 1, 2007, to be considered eligible.

Utilities may meet their obligations through actual generation of electricity with eligible fuels and technologies, through the purchase of RECs (each equivalent to 1 MW h) from in-state or out-of-state renewable energy facilities, or through the implementation of energy-efficiency measures.

The North Carolina Utilities Commission issued final REPS regulations under Order, Docket No. E-100, Sub 113, on February 28, 2009. This Order can be found at:

<http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=84e6ed39-314a-41b0-bd8a-ac69c4ad0a84>.

Ohio is an example of a state that has included different forms of CHP under separate portfolio standards. In May 2008, Ohio enacted S.B. 221 creating an Alternative Energy Portfolio Standard (AEPS) that contains “alternative energy resource” requirements for investor-owned utilities, and includes CHP. S.B. 221 also established a separate energy efficiency portfolio standard (EEPS). However, legislation passed in 2014, SB 310, significantly weakened both the AEPS and EEPS. Concerning the AEPS, SB 310 froze the renewable targets for two years, removed the in-state requirement for renewable energy procurement, and pushed back the final renewable benchmark of 12.5% from 2024 to 2026.²⁴ Regarding the EEPS, SB 310 froze the energy savings requirements for two years, now allows large customers the option of opting out of the energy savings targets, and expands the types of activities eligible under the targets.

3.3.3 Treatment of CHP under the AEPS

Under the AEPS, electric utilities must provide 25 percent of the total kWh's of electricity sold in 2025 from “alternative energy resources.” Both “advanced energy resources” and “renewable energy resources” qualify under the AEPS. Of the total AEPS requirement of 25 percent, at least half must come from renewable energy resources and half from advanced energy resources. Renewable energy resource targets began in 2009 and increase annually, reaching 12.5 percent by the end of 2026. Legislation passed in 2012 (S.B. 289 and S.B. 315) added certain new technologies to the list of eligible renewable energy resources; S.B. 289 added CHP using landfill gas/biogas to this definition and S.B. 315 added waste energy recovery systems (WER) which includes waste-heat-to- power. Topping-cycle CHP systems using eligible renewable fuels qualify as a renewable resource under the original authorization. Any type of CHP, including fossil fuel-fired systems, qualifies as an “advanced energy resource.” However, there are no annual compliance targets for advanced energy resources prior to 2025. Renewable and solar resources are eligible for renewable energy credits (RECs); advanced energy resources are expected to be eligible for advanced energy credits (AECs) starting in 2025. Eligible resources must have been placed into service starting January 1, 1998 or after.

3.3.4 Treatment of CHP under the EERS

Ohio’s EEPS targets took effect in 2009, requiring electric distribution utilities to implement energy efficiency programs that achieve energy savings equivalent to at least 0.3 percent savings from a baseline that is the average of the total kWh's sold in the preceding three years. Savings requirements

²⁴ Ohio 129th General Assembly. S.B. 315. http://www.legislature.state.oh.us/bills.cfm?ID=129_SB_315.

start at 1 percent per year in 2009 and have been frozen at 4.2% for the 2015 and 2016 compliance periods. The final target requires cumulative annual energy savings in excess of 22 percent by the end of 2027. There is also a separate target that began in 2009 which requires electric distribution utilities to implement peak demand reduction programs designed to achieve a 1 percent reduction in peak demand in 2009 and an additional 0.075 percent each year through 2018.

Recognizing that the AEPS does not provide incentives for non-renewable CHP until 2025, S.B. 315 passed in 2012 added CHP and waste energy recovery (WER) as qualified efficiency measures under the EEPS. The legislation specifies that WER systems that receive credit under Ohio's EEPS do not also qualify under the AEPS. All types of CHP and waste heat-to-power qualify under the EEPS. Under the energy savings component of the EEPS, projects must have commenced operation or have been retrofitted on or after September 10, 2012 to qualify. Topping-cycle CHP systems at state institutions of higher education may qualify if they were placed into service between January 1, 2002 and December 31, 2004. Ohio legislation requires that CHP systems must be "designed to achieve thermal-efficiency levels of at least sixty percent, with at least twenty percent of the system's total useful energy in the form of thermal energy."

In July 2012, The PUCO opened [*Docket 12-2156-EL-ORD*](#) in order to implement the changes from S.B 315, which include both AEPS and EERS provisions.

Section 4. CHP's Eligibility in State Portfolio Standards

Table 1 provides a summary of CHP eligibility in state portfolio standards. For each state, the table indicates if there is an RPS, EERS, or APS in place, and the type of CHP eligible under the standard(s). As there is no consistent terminology in place to refer to each type of portfolio standard, the table refers to them by the name assigned by the state. In some states, fossil-fueled topping-cycle CHP (e.g., combustion turbine, steam turbine, reciprocating engine-based systems) and bottoming-cycle (i.e., W HP systems) are explicitly called out as eligible resources under the portfolio standard(s). Some states, however, include only waste heat to power systems as eligible. Other states do not explicitly identify CHP as an eligible resource, but CHP systems can qualify as long as they are powered with a qualifying renewable fuel/technology.

Note: Typical CHP in this table is defined as fossil-fueled topping-cycle CHP. Under this form of CHP, fuel is combusted in a prime mover, such as a gas turbine or reciprocating engine, to generate electricity. Energy normally lost in the prime mover's hot exhaust and cooling systems is instead recovered to provide useful thermal energy.

Table 1. Summary of CHP Eligibility

Key:

X – Mandatory Standard

▲ – Voluntary Standard or Goal

| State | Portfolio Standard | | | CHP Eligibility | | |
|------------|--------------------|------|-----|--|---|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Alaska | ▲ | | | RPS: <ul style="list-style-type: none">● Not eligible. | RPS: <ul style="list-style-type: none">● Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none">● Not eligible. |
| Arizona | X | X | | RPS: <ul style="list-style-type: none">● Not eligible. EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none">● Renewably-fueled CHP specifically called out as an eligible resource.● CHP system must have an operation date on or after January 1, 1997 to qualify for credit under the portfolio standard. EERS: <ul style="list-style-type: none">● Energy savings from CHP installations that do not qualify under the RPS may count toward the EERS. | RPS: <ul style="list-style-type: none">● Not eligible. EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. |
| Arkansas | | X | | EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. | EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. | EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. |
| California | X | X | | RPS: <ul style="list-style-type: none">● Not eligible. EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none">● Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none">● Not eligible. EERS: <ul style="list-style-type: none">● May qualify as custom/other technology, subject to approval. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|-------------|--------------------|------|-----|--|--|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Colorado | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible (defined as “recycled energy”). Systems must have a nameplate capacity of 15 MW or less and convert the otherwise lost energy from the heat from exhaust stacks or pipes to electricity and not combust additional fossil fuel. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. |
| Connecticut | X | X | | <p>RPS/EERS (combined standard):</p> <ul style="list-style-type: none"> Eligible under separate tier as a Class III Resource Must be installed on or after January 1, 2006, and have a minimum operating efficiency of 50 percent. | <p>RPS/EERS (combined standard):</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology, and eligible under separate tier as a Class III Resource Must be installed on or after January 1, 2006. | <p>RPS/EERS (combined standard):</p> <ul style="list-style-type: none"> Eligible under separate tier as a Class III Resource Must recover waste heat or pressure from commercial and industrial processes, and be installed on or after April 1, 2007. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|----------------------|--------------------|------|-----|--|--|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Delaware | X | X | | RPS: <ul style="list-style-type: none"> ● Not eligible. EERS: <ul style="list-style-type: none"> ● Eligible. | RPS: <ul style="list-style-type: none"> ● Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none"> ● Eligible. | RPS: <ul style="list-style-type: none"> ● Not eligible. EERS: <ul style="list-style-type: none"> ● Eligible (defined as “recycled energy”). ● Recycled energy must be from a modification of an industrial or commercial system that commenced operation before July 29, 2009. |
| District of Columbia | X | | | RPS: <ul style="list-style-type: none"> ● Not eligible. | RPS: <ul style="list-style-type: none"> ● Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none"> ● Not eligible. |
| Florida | | ▲ | | EERS: <ul style="list-style-type: none"> ● May be eligible with approval. | EERS: <ul style="list-style-type: none"> ● May be eligible with approval. | EERS: <ul style="list-style-type: none"> ● May be eligible with approval. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|--------|--------------------|------|-----|--|--|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Hawaii | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> • CHP was formerly eligible for Hawaii's RPS, but the technology was moved to the EERS on January 1, 2015. <p>EERS:</p> <ul style="list-style-type: none"> • Eligible under the EERS starting in 2015. • Implementing rules are under development. | <p>RPS:</p> <ul style="list-style-type: none"> • Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> • Eligible under the EERS starting in 2015. | <p>RPS:</p> <ul style="list-style-type: none"> • May be eligible if waste heat is from CHP; Renewable Electrical Energy defined as “electric energy savings brought about by the use of rejected heat from co-generation and combined heat and power systems.” • Excludes fossil-fueled qualifying facilities that sell electricity to electric utility companies and central station power projects.” <p>EERS:</p> <ul style="list-style-type: none"> • May be eligible under the EERS starting in 2015. |

Table 1. Summary of CHP Eligibility

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| State | Portfolio Standard | | | CHP Eligibility | | |
|----------|--------------------|------|-----|--|--|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Illinois | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> CHP qualifies. “Energy efficiency measures also includes measures that reduce the total Btus of electricity and natural gas needed to meet the end use or uses.” | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> CHP qualifies. | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> WHP may be eligible based on the following definition: “Energy efficiency measures also includes measures that reduce the total Btus of electricity and natural gas needed to meet the end use or uses.” |
| Indiana | ▲ | | | <p>RPS:</p> <ul style="list-style-type: none"> Eligible. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible (defined as “waste heat recovery from capturing and reusing the waste heat in industrial processes for heating or for generating mechanical or electrical work”). |
| Iowa | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. |
| Kansas | X | | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|----------|--------------------|------|-----|---|--|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Maine | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Eligible as a Class II resource (Efficient Resources). Must have been constructed prior to January 1, 1997, and have a minimum efficiency of 60%. Must be a qualifying cogeneration facility under the Public Utility Regulatory Policies Act of 1978 (PURPA). <p>EERS:</p> <ul style="list-style-type: none"> Eligible, but only applies to state facilities. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible as a Class I (new renewably-fueled) resource if the system began operation after September 1, 2005. <p>EERS:</p> <ul style="list-style-type: none"> Eligible, but only applies to state facilities.. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible. Must be a qualifying cogeneration facility under the Public Utility Regulatory Policies Act of 1978 (PURPA). Must meet the Class I and II start dates based on fuel use. <p>EERS:</p> <ul style="list-style-type: none"> Not eligible. |
| Maryland | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> CHP qualifies. CHP systems typically have to meet a minimum efficiency of 65%. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> CHP qualifies. CHP systems typically have to meet a minimum efficiency of 65%. | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|---------------|--------------------|------|-----|---|--|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Massachusetts | X | X | X | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> Eligible. CHP targets part of Green Communities Act. Must meet an efficiency threshold \geq 60 percent. <p>APS:</p> <ul style="list-style-type: none"> Eligible using natural gas. Units must deliver their useful thermal energy to a load in Massachusetts. Must have a start date after January 1, 2008. Both electric and thermal energy qualify. <p>Net CO₂ emissions rate can't exceed 890 lbs/MWh.</p> | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> Eligible. CHP targets part of Green Communities Act. <p>APS:</p> <ul style="list-style-type: none"> Eligible. <p>Must have a start date after January 1, 2008.</p> | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> Eligible. CHP targets part of Green Communities Act. <p>APS:</p> <ul style="list-style-type: none"> Not explicitly included. |

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▲ – Voluntary Standard or Goal

| State | Portfolio Standard | | | CHP Eligibility | | |
|-----------|--------------------|------|-----|---|---|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Michigan | | X | X | APS/EERS(combined): <ul style="list-style-type: none"> May be eligible with approval. | APS/EERS (combined): <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. Must have a start date of October 6, 2008, or later. | APS/EERS (combined): <ul style="list-style-type: none"> Eligible (defined as “Industrial cogeneration facility” – ‘a facility that generates electricity using industrial thermal energy or industrial waste energy’). Must have a start date of October 6, 2008, or later. |
| Minnesota | X | X | | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> CHP is eligible, subject to approval. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none"> CHP is eligible, subject to approval. | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> Eligible (“Waste heat recovery converted into electricity”). |
| Missouri | X | ▲ | | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. |
| Montana | X | | | RPS: <ul style="list-style-type: none"> Not eligible. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none"> Not eligible. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|---------------|--------------------|------|-----|---|---|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Nevada | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> Eligible. Energy efficiency savings can meet up to a quarter of the RPS in any given year. Portfolio Energy Credits are used for compliance and energy efficiency gets a credit multiplier of 1.05 (i.e., # of credits = number of kWh saved x 1.05). | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> Eligible. Energy efficiency savings can meet up to a quarter of the RPS in any given year. Portfolio Energy Credits are used for compliance and energy efficiency gets a credit multiplier of 1.05 (i.e., # of credits = number of kWh saved x 1.05). | <p>RPS:</p> <ul style="list-style-type: none"> Eligible. Must have nameplate capacity of 15 MW or less and startup date on/after January 1, 2005. <p>EERS:</p> <ul style="list-style-type: none"> Eligible. Energy efficiency savings can meet up to a quarter of the RPS in any given year. Portfolio Energy Credits are used for compliance and energy efficiency gets a credit multiplier of 1.05 (i.e., # of credits = number of kWh saved x 1.05). |
| New Hampshire | X | | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | <p>RPS:</p> <ul style="list-style-type: none"> “Useful thermal energy,” defined as renewable energy delivered from Class I sources that can be metered and for which fuel or electricity would otherwise be consumed is eligible. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|------------|--------------------|------|-----|--|--|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| | | | | | <ul style="list-style-type: none"> • “Useful thermal energy,” is credited, defined as renewable energy delivered from Class I sources that can be metered and for which fuel or electricity would otherwise be consumed. • Thermal energy that is not used to generate electric power earns equivalent RECs based on the end-use energy value of electricity – 3.412 MMBtus of useful thermal energy is equivalent to one megawatt-hour. • Systems must have begun operation after January 1, 2006. | |
| New Jersey | X | | | RPS: <ul style="list-style-type: none"> • Not eligible. | RPS: <ul style="list-style-type: none"> • Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none"> • Not eligible. |
| New Mexico | X | X | | RPS: <ul style="list-style-type: none"> • Not eligible. EERS: <ul style="list-style-type: none"> • May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none"> • Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none"> • May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none"> • Not eligible. EERS: <ul style="list-style-type: none"> • May qualify as custom/other technology, subject to approval. |

Table 1. Summary of CHP Eligibility

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| State | Portfolio Standard | | | CHP Eligibility | | |
|----------|--------------------|------|-----|--|--|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| New York | X | | | <p>RPS:</p> <ul style="list-style-type: none"> Digester-gas-fired CHP and fuel cells using any fuel type are eligible under the Customer Sited Tier (CST). Must be greater than 50 kW. New York is transitioning away from the RPS towards the Clean Energy Fund – new projects will not eligible for RPS funding. <p>EERS:</p> <ul style="list-style-type: none"> New York's EERS expired in 2015, and is being replaced by the Clean Energy Fund, a public benefits fund | <p>RPS:</p> <ul style="list-style-type: none"> Eligible under CST and under the main tier with any qualifying fuel/technology. Must be greater than 50 kW. New York is transitioning away from the RPS towards the Clean Energy Fund – new projects will not eligible for RPS funding. <p>EERS:</p> <ul style="list-style-type: none"> New York's EERS expired in 2015, and is being replaced by the Clean Energy Fund, a public benefits fund | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. |

Table 1. Summary of CHP Eligibility

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X – Mandatory Standard

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| State | Portfolio Standard | | | CHP Eligibility | | |
|----------------|--------------------|------|-----|--|---|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| North Carolina | X | X | | <p>RPS/EERS (combined standard):</p> <ul style="list-style-type: none"> • Eligible. • Up to 25% of the requirement may be met through energy efficiency technologies, including CHP systems powered by non-renewable fuels. • After 2018, up to 40% of the standard may be met through energy efficiency, including CHP. • Thermal energy that is not used to generate electric power earns equivalent RECs based on the end-use energy value of electricity of 3,412 Btu per kWh. 1 REC = 1 MWh. • 1 MWh of electricity avoided through efficiency measure = 1 REC. • Must be installed on/after January 1, 2007. | <p>RPS/EERS (combined standard):</p> <ul style="list-style-type: none"> • Eligible with qualifying fuel/technology. • Up to 25% of the requirement may be met through energy efficiency technologies, including CHP. • After 2018, up to 40% of the standard may be met through energy efficiency, including CHP. • Thermal energy that is not used to generate electric power earns equivalent RECs based on the end-use energy value of electricity of 3,412 Btu per kWh. 1 REC = 1 MWh. • 1 MWh of electricity avoided through efficiency measure = 1 REC. • Must be installed on/after January 1, 2007. | <p>RPS/EERS (combined standard):</p> <ul style="list-style-type: none"> • Eligible. • Up to 25% of the requirement may be met through energy efficiency technologies, including CHP systems powered by non-renewable fuels. • After 2018, up to 40% of the standard may be met through energy efficiency, including CHP. • Must be installed on/after January 1, 2007. |
| North Dakota | ▲ | | | <p>RPS:</p> <ul style="list-style-type: none"> • Not eligible. | <p>RPS:</p> <ul style="list-style-type: none"> • Eligible with qualifying fuel/technology. | <p>RPS:</p> <ul style="list-style-type: none"> • Eligible (defined as "recycled energy"). (The term "recycled energy system" does not include waste heat captured from any system designed primarily to generate electricity.) |

Table 1. Summary of CHP Eligibility

Key:

X – Mandatory Standard

▲ – Voluntary Standard or Goal

| State | Portfolio Standard | | | CHP Eligibility | | |
|-------|--------------------|--------------|-----|--|--|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Ohio | | X/ ▲ a | X | <p>EERS:</p> <ul style="list-style-type: none"> • Eligible. • Must be installed or retrofitted on/after September 10, 2012. • Must have efficiency of \geq 60 percent. • Must have \geq 20 percent of system output in the form of useful thermal energy. <p>APS/RPS:</p> <ul style="list-style-type: none"> • Eligible as an “advanced energy resource” but compliance with targets does not have to be demonstrated until 2025. • Must have efficiency of at least 60%. • At least 20% of system output must be in the form of useful thermal energy. | <p>EERS:</p> <ul style="list-style-type: none"> • Eligible. • Must be installed or retrofitted on/after September 10, 2012. <p>APS/RPS:</p> <ul style="list-style-type: none"> • Eligible with qualifying fuel/technology. • Systems must have been placed into service on or after January 1, 1998. | <p>EERS:</p> <ul style="list-style-type: none"> • Eligible (defined as “waste energy recovery”) - can only qualify under one standard). • Must be installed or retrofitted on/after September 10, 2012. <p>APS/RPS:</p> <ul style="list-style-type: none"> • Eligible (defined as “waste energy recovery”) - can only qualify under one standard). • Must be installed or retrofitted on/after September 10, 2012. |

^aS.B. 310 passed in 2014 now allows for large customers an option of opting out of the energy efficiency requirements.

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| State | Portfolio Standard | | | CHP Eligibility | | |
|--------------|--------------------|------|-----|---|---|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Oklahoma | ▲ | ▲ | | RPS/EERS (combined): <ul style="list-style-type: none"> Not eligible. | RPS/EERS (combined): <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. DG systems using renewable fuels are limited to ≤ 5 MW. | RPS/EERS (combined): <ul style="list-style-type: none"> Eligible. Up to 25% of the renewable energy goal can be met with demand side management (DSM) and energy efficiency. WHP qualifies as a DSM measure. DSM includes industrial by-product technologies consisting of the use of a by-product from an industrial process, including the reuse of energy from exhaust gases or other manufacturing by-products that are used in the direct production of electricity at the facility of a customer. |
| Oregon | X | | | RPS: <ul style="list-style-type: none"> Not eligible. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none"> Not eligible. |
| Pennsylvania | | X | X | EERS: <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. APS: <ul style="list-style-type: none"> Eligible. Tier II resources include new and existing demand-side management and DG systems, including CHP. | EERS: <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. APS: <ul style="list-style-type: none"> Eligible. CHP with eligible fuel/technology counts as Tier I resource. | EERS: <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. APS: <ul style="list-style-type: none"> Eligible. Tier II resources include new and existing demand-side management and DG systems, including waste heat to power. |

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| State | Portfolio Standard | | | CHP Eligibility | | |
|----------------|--------------------|------|-----|--|--|--|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Rhode Island | X | X | | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> Eligible. Utilities must establish energy efficiency procurement plans which include target percentages for CHP. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none"> Eligible. Utilities must establish energy efficiency procurement plans which include target percentages for CHP. | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> Eligible. Utilities must establish energy efficiency procurement plans which include target percentages for CHP. |
| South Carolina | ▲ | | | RPS: <ul style="list-style-type: none"> Not eligible. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none"> Not eligible. |
| South Dakota | ▲ | | | RPS: <ul style="list-style-type: none"> Not eligible. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none"> Eligible (defined as “recycled energy”). |
| Texas | X | X | | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> CHP systems up to 10 MW in size are eligible. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none"> CHP systems up to 10 MW in size are eligible. | RPS: <ul style="list-style-type: none"> Not eligible. EERS: <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. |
| Utah | ▲ | | | RPS: <ul style="list-style-type: none"> Not eligible. | RPS: <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. | RPS: <ul style="list-style-type: none"> Eligible (defined as “waste gas or waste heat capture or recovery system”). |

Table 1. Summary of CHP Eligibility

Key:

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| State | Portfolio Standard | | | CHP Eligibility | | |
|------------|--------------------|------|-----|--|---|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Vermont | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Not Eligible. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. Eligible as a “conservation measure” under energy efficiency targets. Thermal output must be at least 33% of total energy output, and system must be in place on/after March 31, 1999. | <p>RPS</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. Systems must have come into service after December 31, 2004. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. Eligible with qualifying fuel/technology. DG with output of 5 MW or less may be counted as double the facility's electrical output under certain conditions. | <p>RPS:</p> <ul style="list-style-type: none"> Not explicitly included. <p>EERS:</p> <ul style="list-style-type: none"> May qualify as custom/other technology, subject to approval. Eligible as a “conservation measure” under energy efficiency targets. |
| Washington | X | X | | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> Highly efficient <i>CHP</i> systems – that is, systems with a useful thermal energy output of no less than 33% of the total energy output – count towards a utility's conservation target. | <p>RPS:</p> <ul style="list-style-type: none"> Eligible with qualifying fuel/technology. <p>EERS:</p> <ul style="list-style-type: none"> Highly efficient <i>CHP</i> systems – that is, systems with a useful thermal energy output of no less than 33% of the total energy output – count towards a utility's conservation target. | <p>RPS:</p> <ul style="list-style-type: none"> Not eligible. <p>EERS:</p> <ul style="list-style-type: none"> May be eligible, subject to approval. |

Table 1. Summary of CHP Eligibility

Key:

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▲ – Voluntary Standard or Goal

| State | Portfolio Standard | | | CHP Eligibility | | |
|-----------|--------------------|------|-----|---|---|---|
| | RPS | EERS | APS | Typical CHP | Renewably-Fueled | Waste Heat to Power |
| Wisconsin | X | X | | RPS: <ul style="list-style-type: none"> ● Not eligible. EERS: <ul style="list-style-type: none"> ● May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none"> ● Eligible with qualifying fuel/technology. EERS: <ul style="list-style-type: none"> ● May qualify as custom/other technology, subject to approval. | RPS: <ul style="list-style-type: none"> ● Not eligible. EERS: <ul style="list-style-type: none"> ● May qualify as custom/other technology, subject to approval. |

Section 5. Additional Resources

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4. Center for Climate and Energy Solutions (C2ES). Energy Efficiency Standards and Targets. www.c2es.org/us-states-regions/policy-maps/energy-efficiency-standards.
5. Center for Climate and Energy Solutions (C2ES). Renewable & Alternative Energy Portfolio Standards. <http://www.c2es.org/us-states-regions/policy-maps/renewable-energy-standards>.
6. Clean Energy States Alliance. www.cleanenergystates.org/resource-library/.
7. Database of State Incentives for Renewables & Efficiency (DSIRE). www.dsireusa.org/.
8. Elliott, R. Neal, et al. "CHP Savings and Avoided Emissions in Portfolio Standards." 2009 American Council for an Energy-Efficient Economy (ACEEE) Summer Study on Energy Efficiency in Industry. www.aceee.org/proceedings-paper/ss09/panel04/paper11.
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