DSIRE Quantitative RPS Data Project

Introduction

DSIRE's *Quantitative RPS Data Project* provides quantitative information about state renewables portfolio standards (RPS). In the RPS Data Spreadsheet, state requirements are defined by year and by resource class and include other key data elements such as monetary penalties or alternative compliance payments, eligibility of new and/or existing facilities, the percentage of the state's electric load covered by the policy, comments to clarify data entries or assumptions, and an update memo to describe recent changes to the data. The RPS Field Definitions document contains detailed descriptions of the data fields and how they are organized. The most current versions are located at the top of the DSIRE RPS Data page (http://www.dsireusa.org/rpsdata/), while past versions are available in the Archive section. This project began in 2008 to support analysis efforts at the National Renewable Energy Laboratory (NREL).

Organization of the Data

The data in the attached spreadsheet is organized to capture key information and quantitative elements of state RPS requirements. The states are organized in rows, with the different policy elements for each state organized in columns. Each state row contains sub-rows that delineate the various components of each state's RPS. The left-most columns contain summary type information while the right-most columns contain the annual RPS compliance schedule as a percentage or as a number of megawatts (MW) depending on the state in question.

The document below provides definitions for each of the data fields, including examples to illustrate the treatment of actual RPS programs. RPS design details vary from state to state, and not all RPS design characteristics conform to neat definitions. Many of the fields are fairly straightforward (e.g. "start year"), but descriptions of special cases that are not well reflected in the numerical data fields can be found in the "Notes" section or as comments in the appropriate data field.

Before reviewing the datasheets, it is important to understand the different types of schedule definitions. Although each of these is described in the document below, they are central to an understanding of this tool so they also emphasized here.

The Treatment of Tiers: RPS policies are increasingly evolving to include tiers, or carve-outs for target resources or technologies, such as photovoltaics. Typically, RPS policies are described by their overall target, and then by their tier, i.e., "20% by 2020, with a 2% carve out for solar". This shorthand does not capture whether the carve-out out is part of the 20% total, or additive to the total, and can sometimes lead to confusion.

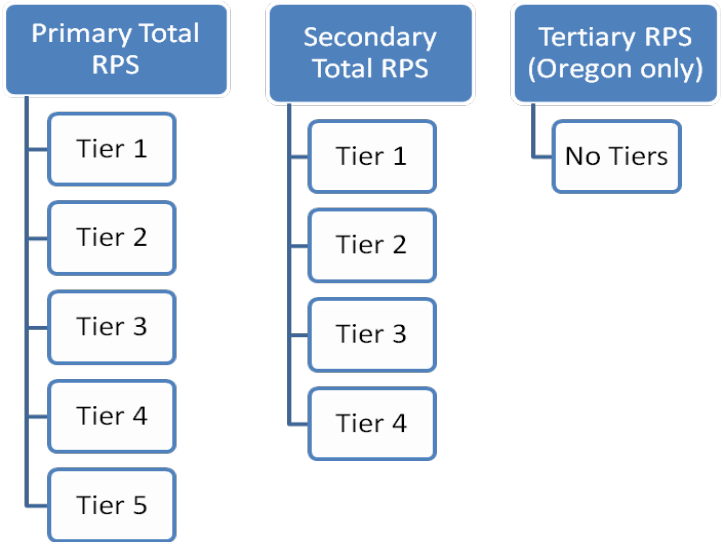
In order to compare RPS policies on equal footing, this tool adopts a standardized approach to tiers. If an RPS has a resource-specific tier, and then a "main" tier in which all other resource types, then both are considered "tiers." Using the above example, and assuming that the 2% carve-out is a part of the 20% target, there are two different RPS schedules captured in the spreadsheet.

- Tier 1 – Tier 1 is not a tier that is explicitly spelled out in the legislation, but is the everything-else-but-solar tier. In this case, Tier 1 is 18% by 2020.
- Tier 2 – Tier 2 is the solar tier, which, in our example, is explicitly set forth in the enabling legislation. The solar tier is 2% by 2020. Together, Tier 1 and Tier 2 add up to the Total RPS.

The Treatment of Primary and Secondary RPS Requirements: In addition to breaking out each tier from the total RPS, the tool also distinguishes between Primary and Secondary RPS schedules. This occurs in states such as Colorado, where there is one RPS schedule for investor-owned utilities (20% by 2020), and a separate schedule for electric cooperatives (10% by 2020). In the spreadsheet the Primary RPS (1) is listed first vertically (including all the tiers as discussed above), and is then followed by the Secondary RPS (2) which also contains any of the sub-tiers that may apply. Oregon is the only state that has *three* classes of utilities, each with a different standard. The "Tertiary RPS" section is included to accommodate this schedule. In this document the term "RPS type" is used generally to describe this distinction.

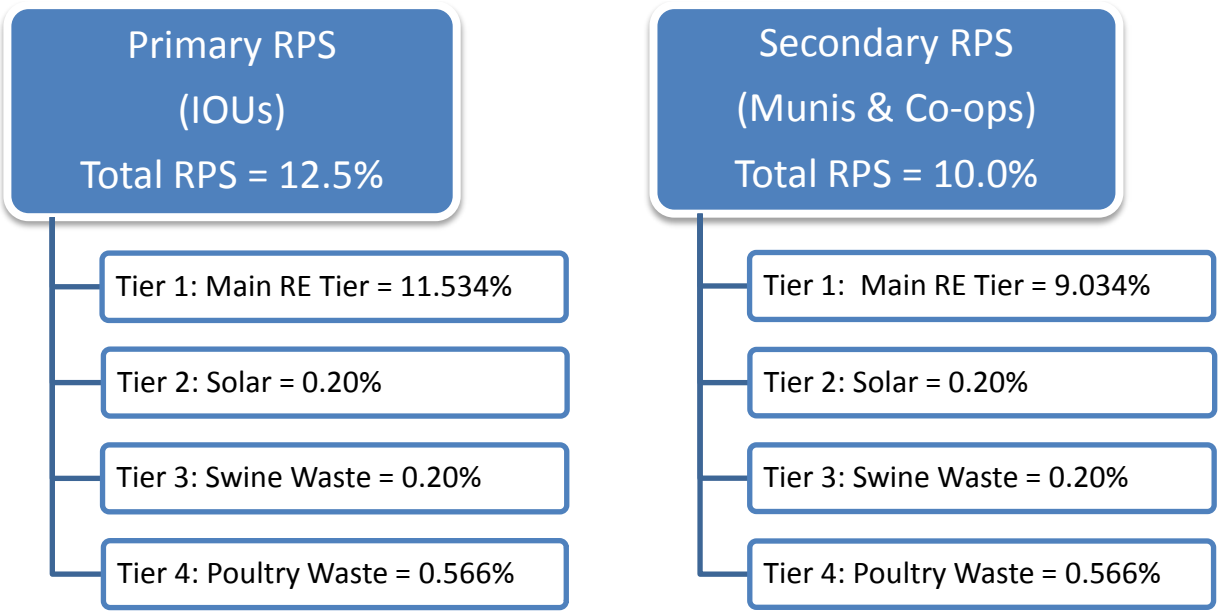
The figures below illustrate the basic structure of the RPS data presented in the spreadsheet.

Structure of RPS Data



North Carolina Example

The figure below illustrates how the tiers are additive to the overall, or total, RPS, for each of the Primary and Secondary RPS requirements. There are specific set-asides for solar, swine waste and poultry waste within the overall RPS under both the Primary and Secondary standards. A "Main" renewables tier was created to represent the renewables other than the resources with specific set-asides.



The next section provides detailed descriptions of the data fields, beginning with the RPS elements and the details that are provided for each Tier. The data fields are the same for Primary, Secondary, and Tertiary RPS's and each sub-Tier that falls within these separate standards.

Data Field Descriptions

STATE (NOTES AS COMMENTS): Name of state, hyperlinked to the Database of State Incentives for Renewables and Efficiency (DSIRE) summary of the policy. Each state also has a comments box attached to clarify data entries or assumptions made, including:

- Utilities/suppliers subject to Primary, Secondary, and Tertiary standards.
- Class of resources associated with Tiers 1 through 5.
- Information about the eligibility of energy efficiency for meeting compliance.
- Additional non-mandatory renewable energy goals.
- Cases where other utilities not subject to the standard must develop their own RPS.
- Other unique characteristics of the state policy as applicable.

MEMO NOTES & UPDATES: This field is used to indicate ALL changes made to the spreadsheet data. Each note includes a date and a short summary of the changes made and how they relate to the overall policy.

RPS TYPE° (PRIMARY, ETC.): This column indicates the type of RPS described by further data columns to the right. The Primary RPS is indicated as a (1), the Secondary RPS by a (2), and so on. Only states which make different requirements for different utility types have multiple RPS types. Oregon for instance, is the only state that has a Primary, Secondary, and Tertiary RPS as described below.

RPS Type Example: Oregon

1. Large utilities -- those with 3% or more of the state's load -- must ensure that a percentage of the electricity sold to retail customers in the state is derived from eligible renewable energy resources according to the following schedule:

- 2011: 5%
- 2015: 15%
- 2020: 20%
- 2025: 25%

PRIMARY RPS

2. Utilities with more than 1.5%, but less than 3% of state load must meet an RPS of:

- 10% RPS by 2025 and thereafter

SECONDARY RPS

3. Smaller utilities are subject to lower standards. Utilities with < 1.5% of state load must meet an RPS of:

- 5% RPS by 2025 and thereafter

TERTIARY RPS

TIER: This column breaks down each type of RPS into their constituent components or tiers. The “Tier” refers to requirements that a specified portion of the renewable energy obligation be met with certain resources or class of resources. A common example is a solar set-aside which mandates that a small percentage of the overall renewable energy target be achieved using solar resources. There may be several tiers within the RPS depending on the details of each state RPS.

The combination of RPS type and Tier results in the table format shown below, where each Tier is a component of the larger RPS Type. The details of each tier of each RPS type are then further described by the data fields to the right.

RPS Tiers Example: Delaware

Delaware has a Primary and Secondary RPS, which use slightly different compliance schedules. Each RPS type in turn contains 3 identical resource tiers. The Primary RPS refers to the "general" RPS requirements that apply in the absence of the circumstances that qualify for the Secondary RPS. The Secondary RPS applies to wholesale renewable energy purchases for Standard Offer Service (SOS) entered into during 2005 and 2006 for the 2007, 2008 and 2009 compliance years. The three tiers are:

Tier 1 = Non-solar, non-existing resources
Tier 2 = Solar-electric resources
Tier 3 = Existing resources

State (Notes as comments)	RPS Type (Primary, etc.)	Tier
Delaware	1	1
	1	2
	1	3
	2	1
	2	2
	2	3

The total RPS requirement, while not described in a separate data field, is the sum of the percentage requirements for each tier within an RPS type. Annual requirements for each tier of each separate RPS type are detailed under the heading of "Yearly Fractional Goals" or "Yearly Capacity Goals (MW)" located on the right side of the spreadsheet. The total RPS requirement for a given year can be arrived at in the same manner.

ELIGIBLE RENEWABLES: Resource eligibility is listed for 9 renewable electricity generation technologies: Wind, Concentrated Solar Thermal (CSP), Distributed PV, Centralized PV, Biomass, Hydroelectric, Geothermal, Landfill Gas, and Ocean. Resources that are not eligible for a specific RPS tier are indicated with a "0". Resources that are eligible and are not subject to any compliance multipliers (i.e., 1 MWh of energy production = 1 Renewable energy credit) are indicated by a "1". In cases where one or more compliance multipliers apply to specific technology the data field will list a number that corresponds to the most reasonable development scenario. For example, in Michigan all solar facilities earn 2 "Michigan RECs" for each MWh of energy production in addition to the standard rate of 1 REC for each MWh of energy production, resulting in a multiplier of 3 for CSP, distributed PV, and centralized PV.

In many cases, the actual resource eligibility and/or compliance multiplier schedules contain exceptions and further eligibility details that are not well represented in a strict numeric format. Comments have been inserted to in many data fields, particularly hydroelectric and biomass, to provide further explanations of how eligibility is determined. In addition, Appendix A contains a series of notes for each state describing some of the broad assumptions that were used in classifying resources as eligible for each tier (e.g., are Tier I resources eligible to fill Tier II requirements).

A Special Note on Hydroelectric Eligibility: Some state definitions relating to hydropower address several different characteristics (e.g., in-service date, size, new impoundments, Low-Impact

classification, etc.) that determine whether a facility is eligible to participate in one or more tiers of the RPS. For the purpose of this summary, hydropower was deemed eligible if new or existing facilities of larger than 10 megawatts (MW) are potentially eligible to participate in the RPS. This treatment is used regardless of whether there are restrictions on new dams or impoundments provided there is not a specific size limitation associated with capacity additions at existing dams or for run-of-river schemes.

A Special Note on Biomass Eligibility: Biomass is generally defined to include only technologies based on the use of biomass solids such as waste woods, energy crops, forest thinnings, etc. Landfill gas is treated as separate resource category regardless of whether landfill gas is only deemed eligible by virtue of inclusion as an eligible biomass technology. Similarly, if a state permits *only anaerobic digesters or other biogas technologies* as an eligible resource for a specific tier (e.g., the New York Customer-Sited Tier), biomass is not indicated as an eligible technology.

LOAD COVERED (%): The load covered indicates the percentage of retail sales that are covered by each type of RPS. Most state RPS policies do not cover 100% of the state load either because often some utilities are exempted from the RPS or because exemptions exist for some other portion of state load. The % of load covered does not change within the bounds of the RPS type. For instance, all tiers of a Primary RPS will have the same value for the load covered. For states with multiple RPS types, the percentage of load covered by the total RPS is the sum of the load covered by all RPS types added together.

Values are generally calculated using the retail electricity sales data from the Energy Information Administration (http://www.eia.doe.gov/cneaf/electricity/esr/esr_sum.html) based on the entities obligated to comply with the RPS as dictated by each state's RPS policy. While in most cases the load covered values rely on 2006 EIA data, in other instances the values have been updated based on more recent EIA data or information from RPS compliance reports. Some entries also contain further explanatory notes as comments (e.g., data source if not 2006 EIA).

EXISTING RE ALLOWED (%): This column describes the percentage of renewable energy generated from existing RE facilities that qualifies for RPS compliance. The "Existing RE Allowed" = 0 if only renewable energy from new facilities is eligible (e.g. AZ, OH, WA). For states that allow renewables from both new and existing facilities to qualify or that do not specify a percent allowed from existing facilities, the % = 100. Additional notes provide clarification or comments regarding eligibility where applicable.

For states that specify a maximum percent of existing RE allowed, the value is provided in the field; additional notes describe exceptions or applicability. In addition, a separate "Tier" for existing resources (see below) is created if there is not already an explicit tier specified in the RPS. For example, in Delaware, 1% of the target may come from "existing" resources. This is effectively a tier, although it is not explicitly described as such in the law. Conversely, Class III and Class IV in New Hampshire are explicitly set forth as separate resource tiers for existing resources in the legislation. Note that some states (e.g. Wisconsin) may specify that only new generation is eligible to receive RE *credits*.

NEW RE DATE (mm/dd/yyyy): The date on or after which a renewable resource facility becomes operational to be considered "new" according to the RPS requirement. Note that this refers to new *facilities* rather than energy *generated*. Information in this field applies to Primary, Secondary, and

Tertiary standards as well as all Tiers, hence the rows in the field are merged together. In cases where the "new" date varies by resource or facility size, explanatory notes are provided.

PENALTY or ACP ($/MWh): Monetary penalty for non-compliance or Alternative Compliance Payment (ACP) for shortfalls of renewable energy under the RPS requirement. This value may or may not be the same for all Tiers of the RPS. A blank field indicates that no monetary penalty or ACP has been specified. Values that change over time are updated according to the applicable ACP schedule or the most recent data available in cases where the ACP is only specified after the end of a compliance period (e.g., Pennsylvania's 1° Tier 3 ACP). Comment boxes indicate the compliance year to which a specific ACP value applies and provide other explanatory notes on ACP levels.

CREDIT MULTIPLIER: The extra credit awarded to specific resources or applications for RPS compliance purposes. For example, in Delaware, "prior to 1/1/2007 electricity suppliers received 120% credits for energy generated by wind or solar." In Arizona, "extra credit multipliers, up to 200%, may be earned for early installation of certain technologies, in-state solar installation, and in-state manufactured content." This field indicates has a "yes" or "no" value to indicate whether or not a state awards extra compliance credits. Comments provide a comprehensive list and description of how the multipliers are applied.

DURATION (YEARS): Number of years the renewables % or capacity must be maintained after the target % or capacity is reached. Most state RPS policies require that the renewable energy % or capacity is maintained indefinitely, in which case "100" is recorded in the field. If there is no explicit requirement to maintain the target % or capacity after the target date is reached, the duration is indicated as "0". Tiers within an RPS sometimes have different *durations* after the target has been met. The example of New Hampshire's RPS on the following page illustrates this methodology.

RPS Duration Example: New Hampshire

***NH's RPS does not explicitly require that the annual targets will continue beyond 2025; therefore the overall duration* (1° DURATION) = 0.**

2008: 4.0%	0.0% Tier 1;	0.0% Tier 2;	3.5% Tier 3;	0.5% Tier 4
2009: 6.0%	0.5% Tier 1;	0.0% Tier 2;	4.5% Tier 3;	1.0% Tier 4
2010: 7.5%	1.0% Tier 1;	0.04% Tier 2;	5.5% Tier 3;	1.0% Tier 4
2011: 9.6%	2.0% Tier 1;	0.08% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2012: 10.7%	3.0% Tier 1;	0.15% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2013: 11.7%	4.0% Tier 1;	0.20% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2014: 12.8%	5.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2015: 13.8%	6.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2016: 14.8%	7.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2017: 15.8%	8.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2018: 16.8%	9.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2019: 17.8%	10.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2020: 18.8%	11.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2021: 19.8%	12.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2022: 20.8%	13.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2023: 21.8%	14.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2024: 22.8%	15.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4
2025: 23.8%	16.0% Tier 1;	0.30% Tier 2;	6.5% Tier 3;	1.0% Tier 4

Tier 1 Duration = 0 yrs
Tier 2 Duration = 11 yrs
Tier 3 Duration = 14 yrs
Tier 4 Duration = 16 yrs

The shading indicates the Target Date; that is, where the Target RPS % occurs. The 1° Tier 1 Duration = 0 because the Tier 1 Target RPS of 15% occurs in 2025 and does not have to be maintained after that point as the RPS is currently written. However, the Tier 2 Target RPS % of 0.30% is achieved in 2014 must be maintained for 11 years – through 2025.

STARTING RPS (%): Percentage of retail electricity sales covered by the RPS that must be sourced from renewables during the start year (first compliance year). Note that this number *does not* account for the fact that the load covered by most RPS policies is not 100%.

STARTING MANDATE (MW): The capacity of renewables in megawatts (MW) required to be installed for the first compliance year. This field applies only to states that express their RPS standard in terms of installed capacity (MW). At the time of this writing, this included only TX, IA, and MI.

START YEAR (yyyy): The first compliance year for each tier of the RPS requirements. Years used in this field refer to the year that the compliance period *ends*. Most states specify a calendar year (i.e. January 1-December 31), but occasionally the start and end dates may have a different time frame. For instance, in NJ where the first compliance year ended on May 31, 2005, the start year is listed as 2005. In cases where a state has amended its RPS, the start date associated with the current law is provided.

TARGET RPS (%): Final renewables target as a percentage of retail electricity sales covered by the RPS. As with the "Starting RPS (%)", this number *does not* account for the fact that the load covered by most RPS policies is not 100%.

TARGET MANDATE (MW): The capacity of renewables in megawatts (MW) required to be installed for the last compliance year. This field applies only to states that express their RPS standard in terms of

installed capacity (MW). At the time of this writing, this included only TX, IA, and MI.

CUSTOMER SITED (%): Describes the total percentage of resources that must be derived from customer-sited resources as a percentage of retail electricity sales covered by the RPS. In a state such as Connecticut that has a specific customer sited tier (1° Tier 3), the value in this field will equal the total requirement for the applicable tier (e.g., 4% in Connecticut). In states where only a portion of a Tier is dedicated to customer-sited resources, the value will equal total Tier Target % multiplied by the percentage set aside for customer sited resources. The Arizona example below illustrates this calculation.

Customer Sited Requirement Example: Arizona

2025 Target: 15.00% (30% DR = 4.5%)
1° Tier 2 represents the Distributed Resources (DR) set-aside.
1° Tier 2 Final %: 4.5% of retail sales
One-half of the distributed renewable energy requirement must come from residential applications.
Therefore, the "1° Tier 2 % Customer-sited" = 50% of 4.5% = 2.25%
This means that 2.25% of retail electricity sales must be derived from residential DR in the final compliance year in 2025.

TARGET YEAR (yyyy): The last compliance year for each tier of the RPS requirement. As with the start year, the values used in this field refer to the year that the compliance period *ends*.

YEARLY FRACTIONAL GOALS: These fields collectively detail the annual requirements for each tier of each state RPS as a fraction (1 = 100%) for the years 2000 – 2030. Blank fields indicate that there is no requirement for a particular tier during that year. This does not apply to IA or TX, which are defined by capacity targets (see below).

Yearly Fractional Goals										
2000	2001	2002	2003	2004	...	2026	2027	2028	2029	2030

The North Carolina Tier 4 (poultry waste, included in both the Primary and Secondary RPS) and the New Jersey Tier 3 (solar-electric) requirements are special cases not found in any other RPS policy. In both cases the target is defined by law as a megawatt-hour (MWh) goal. For our purposes the North Carolina Tier 4 target has been converted to a % using projections of retail electricity sales. As of this writing the New Jersey Tier 3 target has not been formulated in this way pending the adoption of administrative rules which clarify how this target will fit into the overall RPS target as a whole.

YEARLY CAPACITY GOALS (MW): These fields collectively detail the annual requirements for each tier of each state with a renewable energy capacity (MW) requirement. As of the writing of this guide, this method is only used in IA, TX, and MI.

Appendix A: Resource Eligibility Notes

The text below provides additional details on how resource eligibility was specified in the quantitative spreadsheet for each RPS tier in each state. The explanations below are typically more general in nature than the notes provided within the spreadsheet itself, addressing cross-cutting issues not related to a specific technology, although in some cases they are duplicative of the spreadsheet notes. Both sets of notes should be used together in order to generate a complete understanding of why a resource was deemed eligible (1), ineligible (0), or as a multiple credit resource (1+).

Arizona: The distributed resources tier (Tier II) generally does not differentiate among eligible technologies. Thus to the extent that a Tier I resource serves on-site energy needs, it can be considered a Tier II resource. Wind (1 MW) and hydropower (10 MW) are the only technologies with explicit size limits as criteria for Tier II eligibility. Only wind and distributed PV have been indicated as eligible although geothermal, biomass, hydro, and landfill gas could conceivably qualify with under the right circumstances. No multipliers have been indicated as they currently only apply to certain installations in existence prior to December 31, 2005 (and in some cases only from 2001 – 2003). Direct combustion of municipal solid waste (MSW) resources is not permitted although certain other waste-to-energy processes are permitted.

California: Some issues exist for distributed PV, although these may be resolved in the near future. The basic problem is that there is currently no mechanism for customer-generators to supply RECs (which the customer owns) to utilities for RPS compliance purposes. As described in the California Energy Commission's (CEC) Resource Eligibility Guidebook, the CEC will certify customer-sited resources as eligible if and when the California Public Utilities Commission (CPUC) allows tradable RECs under the standard. The CPUC has now authorized the use of tradable RECs, but as of this writing the CEC had not issued any revised guidelines for customer-sited resource eligibility. Distributed resources owned by utilities or using wholesale purchase contracts are eligible. Combustion of municipal solid waste (MSW) is not permitted except under a very specific circumstance, but MSW conversion is permitted.

Colorado: The state has a 1.25 multiplier for all in-state generation, but this multiplier does not apply to "retail distributed generation", a definition which encompasses all customer-sited systems. It also has community renewable energy multiplier of 1.5, but does not have any technology specific multipliers for the primary RPS. The distributed resources tier (Tier II) places a general capacity limit of 30 MW on eligible facilities and requires that at least 50% be met with customer-sited resources. Projects of 30 MW or less interconnected to the transmission or distribution system of a cooperative or municipal utility at 69 kV or less on or before December 31, 2014 can receive a 2.0 multiplier. The multiplier can only be claimed for up to 100 MW of capacity in aggregate among electric cooperatives and municipal utilities, but is not limited for investor-owned utilities. If the multiplier is claimed, the resource is not eligible to be counted under the distributed resources tier (Tier II).

The utilities covered by the secondary RPS (cooperatives and munis) receive triple credit for solar electric generation installed prior to July 1, 2015. Distributed generation technologies would be eligible for the primary tier because the carve-out is defined as a component of the larger tier and described as an "at least" amount. A given project is only eligible to receive one multiplier.

Connecticut: The state does not have any credit multipliers. The biomass definitions are much more detailed and extensive than those included in the comments. Trash to energy facilities qualify as Tier II resources. Tier I resources universally qualify for fulfillment of the Tier II standard, but Tier III resources are distinctly separate

from Tiers I and II. No technologies are checked for Tier III (CHP, waste-heat, and demand-side management) as any renewable generation would presumably fall under the one of the renewables tiers.

Delaware: Delaware's triple credit multiplier for customer-sited, in-state PV may only be applied to the main renewable energy Tier (Tier I) and existing renewable energy tier (Tier III) requirements. In other words, an SREC counts only once under the PV tier (Tier II) portion, but gets triple credit under the more general RE requirements if it is generated by an in-state, customer-sited facility. The definition of "solar photovoltaic" is contradictory in the rules, referring to both PV and solar thermal that produce electricity or displace electricity use. However, additional language requiring a solar photovoltaic facility to be "interconnected" on the customer side of a retail electricity meter has been interpreted to this point to mean that Tier II is limited to electricity generation resources.

Wind multipliers are somewhat problematic as they apply to either (1) a specific offshore wind project (350%) or (2) only to in-state wind (150%) installed on or before December 31, 2012. It might be appropriate to just leave this field as a 1 because this is how all out-of-state resources would be counted. In state solar and wind resources also receive an additional 10% credit (i.e., 1.1 credits per MWh) for facilities constructed using at least 50% Delaware-sourced equipment, and an additional 10% credit for facilities constructed using at least a 75% Delaware-sourced workforce.

District of Columbia: All Tier I technologies are eligible to meet the Tier II requirement. Tier II also allows municipal solid waste (i.e., incineration of unsegregated waste) and non-pumped storage hydroelectric facilities. Municipal solid waste incineration may only be used to meet 20% of standard and will no longer be eligible beginning in 2013. There were formerly small multipliers for solar and wind generated from 2007 – 2009 and for methane (landfill or wastewater) energy generated through 2009. The definition of solar is broad enough to include almost any solar resource, including domestic solar water heating.

Hawaii: The state does not have any multipliers and only has the most basic definition for hydropower ("falling water" with not additional restrictions). Municipal solid waste qualifies as a biomass resource. Through 2014 customer-sited renewable resources count as electricity displacement technologies rather than as renewable energy generation resources. Displacement technologies (including other energy efficiency measures) are limited to fulfilling 50% of the standard. Beginning in 2015, customer-sited renewables will count as renewable energy generation resources and energy efficiency and electricity displacement resources will be addressed under a separate energy efficient resource standard (EERS).

Illinois – The state does not have any multipliers. The resource definitions allow for "other alternative sources of environmentally preferable energy…" which could presumably include some of the other generally accepted renewable technologies that are not specifically identified (i.e., geothermal and ocean). Landfill gas is only eligible if it is produced at an in-state facility. The definition of eligible renewable resources specifically excludes "the incineration or burning of tires, garbage, general household, institutional, and commercial waste, industrial lunchroom or office waste, landscape waste other than tree waste, railroad crossties, utility poles, or construction or demolition debris, other than untreated and unadulterated waste wood."

Iowa – Although a variety of other resources are eligible, the covered utilities (IPL and Mid-American) utilities have designated a combination of wind and waste derived methane (landfill and wastewater treatment) to meet their goals. Any changes to these designated facilities require IUB approval.

Kansas – The state has a 1.1 multiplier exists for all in-state resources installed on or after January 1, 2000. There are no technology specific multipliers.

Maine: Except for new wind energy facilities, renewable energy facility capacity is limited to 100 MW. The state has a 1.5 credit multiplier for community-based renewable energy resources of 10 MW or less. The multiplier is not limited to any specific renewable resource, but is limited to 50 MW in aggregate among all community-based projects, with 10 MW reserved for projects of 100 kW or less, or those located within the service territory of a consumer-owned electric utility. The multiplier may only be claimed if the facility is not enrolled in the separate community-based renewables long-term contract program. For ocean-based resources, only tidal power is specifically identified as eligible. Municipal solid waste facilities are eligible in conjunction with recycling, but only for the existing renewables tier (Tier II).

Maryland – All renewable eligible for the main renewables tier (Tier I) and the solar PV tier (Tier III) are eligible for the "other" renewable tier (Tier II). PV resources generally must be connected to the distribution grid serving Maryland, which may mean that some central PV installations would not qualify. Note that while the statute refers to solar as an electricity generation resource without any further description, the administrative regulations and certification documents appear to limit the qualification of solar resources to PV facilities (e.g., CSP would not qualify). Small multipliers initially existed for wind and methane resources, but all of these multipliers expired at the end of 2008. The Tier I definition of biomass does not include certain waste resources such as un-segregated solid waste; however, the Tier II portion does allow waste to energy facilities in addition to all Tier I qualifying biomass resources.

Massachusetts – Geothermal is not specifically identified in the statute, but is addressed in the administrative rules. Biomass technologies must meet an extensive set of Massachusetts Department of Energy Resources (DOER) established emission guidelines in order to be eligible, but these guidelines indicate that traditional solid-fuel boilers qualify if they meet the standards. Biomass and hydroelectric eligibility requirements for Tiers I and II are distinctly different from one another. Notably, for hydroelectric Tier I is for new resources and Tier II is for existing resources. Tier III lists no eligible technologies as it is an existing MSW tier which may not be met with other resources.

The in-state PV tier (Tier IV) is limited to facilities of 6 MW or less thus some central station PV facilities will not qualify. Utility-owned PV systems are however eligible if they otherwise meet the requirements. While the Tier IV eligibility requirements include a provision that a portion of the energy generated be used on-site, the DOER guidelines indicate that this on-site use requirement may be met with small amounts of energy used to meet auxiliary equipment requirements of the PV facility itself or other relatively small on-site loads.

Michigan – Solar power receives 2 "Michigan incentive RECs in addition to the 1 REC/MWh standard credit rate. A smaller credit add-on exists for non-wind power produced at peak times (0.2 credit), which would presumably give solar a 3.2 multiplier for at least part of its generation. There is also an add-on for any renewable energy produced at off-peak and stored for peak use (0.2). Additional credits (0.1) are available for using Michigan components and the Michigan workforce.

The standard allows a limited amount (10%) of the standard for a given year to be met through Energy Optimization Credits (EOCs) and Advanced Cleaner Energy Credits (ACECs) with Michigan Public Service Commission (PSC) approval. EOCs (i.e., energy efficiency) credits may be substituted at a 1:1 ratio for renewable energy credits (RECs) and ACECs may be substituted for RECs at a rate of 10 ACECs: 1 REC, except for plasma

arc gasification and industrial cogeneration which receive a 1:1 ratio treatment. The use of ACECs is limited to 70% of the 10% of the standard that may be met using ACECs and EOCs. In other words, in any given year ACECs may be used to meet 7% of the standard. The use of ACECs derived from industrial cogeneration does not require PSC approval.

The Michigan Public Service Commission (PSC) has determined that scrap tires do not qualify as municipal solid waste but might be able to qualify as a biomass resource based on the natural rubber content, or as a resource for the creation of ACECs if the use meets the other qualifications.

Minnesota – Minnesota's tiers appear to be designed as exclusive, meaning that wind and solar do not qualify for the other renewables tier (Tier I). This could potentially change in the future as the PUC further defines the exact details of the standard, but for the time being the Tier I and Tier II are being considered exclusive of one another. While the language associated with municipal solid waste facilities is slightly confusing, several municipal solid waste incinerators which generate electricity are currently listed as eligible under the standard.

Missouri – All in-state generation receives a multiplier of 1.25, but no technology specific multipliers exist. While solar does have a specific carve-out (Tier II), it is also eligible to meet the general Tier I requirements. Geothermal and Ocean-based resources are not specifically identified as eligible, but the DNR has leeway to designate additional renewable energy resources. Traditional municipal solid waste (MSW) incineration does not appear to be eligible, but depolymerization and pyrolysis of waste resources are specifically defined as eligible. The definitions refer to solar thermal as eligible, but only in the context of electricity generation from solar thermal resources.

Montana – Montana has no credit multipliers and the definitions are generally straightforward. The state does notably specifically allow compressed air energy storage facilities powered by eligible renewable energy resources to qualify for the standard.

Nevada – Solar resources (Tier II) are eligible for the Tier I portion of the standard. It appears that the customer-sited PV multiplier of 2.45 would apply both towards the Tier I (main) and Tier II (solar) standards. Energy efficiency resources may be used to meet up to 25% of the standard during a given year, and within this at least 50% must be on residential sites. Energy efficiency measures in general receive a 1.05 multiplier, but for electricity saved during peak period the multiplier is 2.0. Biogas is eligible under the standard and the definition of biogas includes landfill gas. The definition of biomass includes municipal wastes.

New Hampshire – The existing biomass/methane tier (Tier III) and the existing small hydro tier (Tier IV) are exclusive from the other tiers. The tier III existing biomass standard includes landfill gas as it references methane gas, which includes landfill gas in its definition. Solar resources (Tier II) may be used for the main renewable tier (Tier I) to the extent that they are not used to satisfy the Tier II standard. No credit multipliers exist in New Hampshire.

New Jersey – The main renewable energy tier (Tier I) includes solar and photovoltaic technologies. Solar technologies and other Tier I technologies are also eligible to meet the hydroelectric and municipal solid waste portion (Tier II) of the standard. New Jersey does not have any credit multipliers. As the rules currently stand, customer-sited and solar (without any qualifications) resources must be connected to the distribution grid serving New Jersey. As of this writing, discussions are ongoing about changing this rule, but it would presumably limit the size of CSP and central PV generating stations unless it is changed. The offshore wind carve-out is defined in

such a way (the requirement is based on expected production from operating facilities) that offshore wind renewable energy credits (ORECs) would not be used to meet other portions of the standard.

New Mexico: The RPS is split into several technology tiers and has a separate distributed resources tier (Tier V) for distributed generation/customer-sited resources. Overall the resource eligibility definitions are light on details. The Main Tier (Tier I) for the primary RPS (IOU's) includes all eligible renewable energy technologies, including those that have minimum requirements under the Tier II (solar), Tier III (wind), and Tier IV (non-solar, non-wind RE). Only wind and PV have been listed as eligible under Tier V (DG/customer-sited resources) although it is possible that other technologies could be eligible if they serve on-site loads. The secondary RPS (rural electric coops) does not contain any resource differentiation incentives or other measures. Ocean resources have been indicated as ineligible, but could potentially qualify as "low or zero emissions generation technology".

New York: The Customer-Sited Tier (Tier II) of New York's RPS permits only solar PV, solar water heating, wind, fuel cells, and anaerobic digesters to qualify under the current structure. There is no specific size limit on CST facilities but they must be used primarily to meet on-site load as opposed to being stand-alone electricity generating stations. There is no differentiation between resources eligible for the Main Tier (Tier I) and those that are considered to be Existing or Baseline Resources (Tier III). However, per the PSC proceedings, the only appreciable existing generators as of January 1, 2003 were hydroelectric, biomass, and wind. These technologies, plus landfill gas as a biomass technology, have been indicated as eligible for the existing tier. Existing resources may be eligible for financial support necessary to keep such facilities in commercial operation (within certain limitations).

North Carolina: The primary and secondary RPS resource definitions are identical, except large hydro (>10 MW) is eligible for the secondary RPS while it is not eligible for the primary RPS. In contrast to many other states that allow ocean powered technologies, North Carolina does not indicate OTEC as an eligible technology, but does allow wave and tidal resources to qualify. The swine waste (Tier III) and poultry waste (Tier IV) portions of both the primary and secondary RPS do not list any eligible technologies, although these could be considered biomass resources.

Ohio: The Public Utilities Commission of Ohio (PUCO) is permitted to classify any new technology as a renewable energy resource. Ocean technologies are not specifically defined as eligible and have been indicated as ineligible despite the PUCO's authority described above. Waste resources are eligible, but only in the context of facilities that employ "fractionation, biological decomposition, or other process that does not principally involve combustion". The state does not have any multipliers.

Oregon: The Primary, Secondary, and Tertiary standards all use the same set of eligible resource definitions. The ODOE may approve other technologies as eligible, excluding petroleum, natural gas, coal or nuclear fission based resources. The state has a double credit multiplier for PV facilities from 500 kW to 5 MW installed before January 1, 2016. This feeds into a requirement that the state's investor-owned utilities meet an in-state PV target of 20 MW-AC by 2020 through either system ownership or energy purchase contracts. Eligible hydro definitions differ for facilities on-line before 01/01/1995 and those placed in service after this date. Municipal solid waste resources are eligible in a very limited fashion. For facilities placed into service beginning in 1995, up to 9 average MWs may qualify. For pre-1995 facilities, up to 11 average MWs may be used for compliance in 2026 and beyond. For the latter, RECs may accrue prior to 2026 but can only be used for compliance beginning in 2026. Pre-1995 biomass facilities are not governed by the aggregate capacity limit used for pre-1995 MSW

resources, but RECs associated with such facilities are limited to compliance use in 2026 and beyond although they may accrue to generators in earlier years.

Pennsylvania: Solar thermal electric is an eligible Tier I resource, but the solar carve-out is for PV only. In contrast to many other states, Tier I resources may not be used to comply with the Tier II standard. However, both Tier I and Tier II contain elements related to hydroelectric resources and biomass. The treatment of distributed generation (DG) systems is slightly unclear, as solar techs are identified as Tier I, but DG is identified as a Tier II resource. The spreadsheet assumes that distributed generation refers to systems that do not otherwise qualify as Tier I or Tier II systems. The state does not have any multipliers or any general limitations on existing vs. new resources. However, the exception to this is municipal solid waste (MSW) facilities, which only includes existing waste to energy facilities. Although a new renewable date is not specifically defined in the law, the effective date of the original enactment of the RPS was February 28, 2005 which would appear to be the cut-off date for MSW facilities.

Rhode Island: The Tier I and Tier II definitions are identical as Tier II is an existing (pre-1998) tier as opposed to a resource tier. Rhode Island does not have any compliance multipliers for any technology. Ocean technologies are interpreted as eligible as the definitions allow for resources arising from the "movement or the latent heat of the ocean". Municipal solid waste (MSW) in any form is not considered an eligible technology.

Texas: All non-wind renewables certified by the PUCT after 09/01/05 receive a double credit multiplier for RPS compliance purposes. However, the generation from such facilities only accrues for generation which takes place after 12/31/2007. Ocean thermal technologies are not specifically identified as eligible (tidal and wave are); however, they would appear to qualify as resources derived directly or indirectly from "other natural movements and mechanisms of the environment…".

Washington: Washington has a double credit multiplier for distributed generation technologies of 5 MW or less, including an integrated cluster of generation units. This multiplier has only been applied to the distributed PV technology field although it could apply to other technologies as well (e.g., wind, landfill gas, biomass, hydro, etc.).A further multiplier of 1.2 exists for renewable energy facilities for which the developer uses certain approved apprenticeship programs, but this does not apply differently by resource. Municipal solid waste is specifically excluded from qualifying for the standard by statute.

Wisconsin: Wisconsin does not have any multipliers. Definitions are generally very straightforward without much detail. The PSC may designate additional renewable resources at their discretion, but may not include any derived from coal, oil, nuclear, or natural gas (except possibly for fuel cells). Thermal resources which displace electricity (e.g., solar water heating, geothermal heat pumps, biogas, etc.) are eligible to generate renewable resource credits, but specific details on how the credits will be calculated are not available as of this writing. Resource eligibility does not include direct combustion of garbage or non-vegetation based waste streams; however, plasma arc gasification and pyrolysis of waste resources is permitted, as is use of densified fuel pellets with certain limitations.