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RENEWABLE PORTFOLIO STANDARD PRIMER

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You asked for a primer on renewable portfolio standards (RPS). You wanted a description of (1) Connecticut's RPS and how it has evolved over time, (2) other states' RPS and recent changes regarding the standard and the definition of renewable resources, and (3) a discussion of the potential rate impact of the scheduled increases in Connecticut's standard.

SUMMARY

The legislature adopted Connecticut's RPS as part of [PA 98-28](#), the law permitting competition in the electric industry. The RPS requires electric companies and competitive suppliers to procure part of their power from renewable and other clean energy resources. The companies and suppliers can meet the RPS by buying renewable energy credits (RECs) on the regional wholesale market.

The law defines three classes of resources: I, II, and III ([CGS § 16-1](#)). Class I resources include solar and wind power, power from fuel cells, and certain biomass and hydropower resources, among other things. Power from biomass resources counts as class I if the facility uses sustainably-produced biomass and meets other requirements. Power from other types of biomass facilities, as well as from trash-to-energy facilities, counts as class II. Power

from small hydropower facilities is class I or II, depending on when the facility went into service. Class III resources are the power produced from certain cogeneration and waste heat recovery systems and the energy saved from certain conservation programs.

The requirement for utilization of class I resources increase over time, rising to 20% in 2020. The companies and suppliers must obtain an additional 3% of their power from either class I or II resources; in practice they obtain class II resources because they are less expensive. Finally, they must meet 4% of their need with class III resources. The latter two requirements do not change over time.

A utility or supplier that does not meet the RPS must pay 5.5 cents per kilowatt-hour for the shortfall. The Public Utilities Regulatory Authority (PURA) must transfer the payments to the state's Clean Energy Fund for the development of class I resources.

According to a 2011 [study](#) conducted for the New Hampshire Public Utilities Commission, Connecticut's RPS has undergone more revisions than any other state's standard. These include

1. expanding the definition of class I renewables, modifying the RPS schedule to reduce the total amount of renewable resources that a supplier must obtain but increasing the proportion that must be class I, and extending the RPS to electric companies as well as competitive suppliers (2003);
2. adding requirements to procure Class III resources (2005); and
3. substantially increasing the RPS class I requirements (2007).

There have also been several changes in the treatment of biomass under the RPS.

Maine, Massachusetts, New Hampshire, New York, New Jersey, and Rhode Island, among other states, have mandatory RPS programs. Vermont's program has a nonbinding goal of meeting 20% of 2017 demand with renewable resources that were placed in service after 2005. Each state has its own definition of eligible renewable resource.

Among the northeastern states with mandatory programs, the ultimate targets for all classes of renewable resources range from 16% by 2020 in Rhode Island to 40% by 2017 in Maine. The number of resource classes ranges from one to four, and the definitions of classes vary significantly by state.

New Hampshire, New Jersey, and New York have expanded their definitions of renewable resources in recent years. New York increased its ultimate target, while New Jersey required that part of its class I standard be met by using solar energy.

Historically, the rate impact of Connecticut's RPS has been modest, often less than \$2 per month per residential customer. However, class I REC prices have increased in recent years, and the RPS could cost the average residential ratepayer \$10 per month by 2020.

CONNECTICUT'S RPS

Initial Provisions

[PA 98-28](#) restructured the state's electric market to allow consumers to choose their electric supplier. It required competitive suppliers to obtain at least 0.5% of their power from sources such as the sun, wind, and fuel cells (class I renewable resources). They had to obtain an additional 5.5% from these or other (class II) renewable resources, including hydropower and resources recovery facilities. The RPS initially rose annually over 10 years until at least 6.0% of the supplier's power came from class I resources and an additional 7.0% from either resource class ([CGS §§ 16-245a](#)). Suppliers could meet the RPS by buying part of their power from renewable resources or by participating in a REC trading program

As discussed in [OLR Report 99-R-1153](#), the Department of Public Utility Control (DPUC, PURA's predecessor) held that the RPS did not apply to the standard offer service the utilities provide to customers who did not choose suppliers.

PA 03-135

This act expanded the definition of Class I renewables, modified the schedule to reduce the total amount of renewable class I and class II resources that a supplier needed to obtain, but increased the percentage of resources that must be class I. It also required electric companies as well as suppliers to meet the revised RPS schedule, and modified the penalty for noncompliance.

Definition of Renewable Resources. The act expanded class I to include ocean thermal, wave, or tidal power; low-emission advanced renewable energy conversion technologies; and distributed generation. The latter generates electricity on a customer's premises using technologies such as fuel cells, photovoltaic systems, and small wind turbines. The act also added run-of-the-river hydropower with a capacity of up to five megawatts that begins operation on or after July 1, 2003, so long as it does not cause an appreciable change in the river's flow.

The act expanded the biomass facilities that count as class I. These facilities already counted as class I, if they went into operation on or after July 1, 1998 and met certain other criteria. The act additionally counted the energy produced at older plants, if their nitrogen oxides emissions were equal to or less than .075 pounds per million British Thermal Units (mmBTU) in the previous calendar quarter.

The act limited the hydropower resources that count as class II to those that began operation before July 1, 2003, but that otherwise met the class I criteria. Under prior law, all hydropower resources were considered class II as long as they met U.S. or Canadian regulatory standards. The act also limited the biomass resources that count as class II to facilities that began operation before July 1, 1998 and that emit no more than 0.2 pounds of nitrogen oxides per mmBTU. Under prior law, any biomass resources that did not count as class I counted as class II.

Penalty for Non-compliance. Under prior law, if a supplier failed to comply with the RPS, DPUC could impose a civil penalty of up to \$10,000 per offense, with each day's violation constituting a separate offense. DPUC could also suspend or revoke a supplier's license or bar it from accepting new customers.

Under the act, DPUC must instead require a utility or supplier that does not meet the RPS to pay 5.5 cents per kilowatt-hour (\$55 per megawatt-hour) for the shortfall. DPUC must transfer the payments to the state's Clean Energy Fund for the development of class I resources. This alternative compliance payment provision effectively acts as a cap on the price of class I RECs, because if the market price of class I resources exceeds \$55 per megawatt-hour (5.5 cents per kilowatt-hour), a utility or supplier could make the payment instead.

[PA 05-1](#)

This act required electric companies to obtain 4% of the needs from class III resources, which it defined as electricity from CHP systems and savings from new energy efficiency programs.

[PA 06-74](#)

This act (1) eliminated the option of purchasing power to meet the RPS requirement, (2) ended the initial REC trading program, and (3) established criteria for meeting the RPS requirement under a new REC trading program. It also modified the type of wood and other biomass products that count as class I resources.

REC Program. Under the new REC program, electric companies and suppliers must meet the RPS requirements by buying certificates issued by the New England Power Pool generation information system. These certificates must be for (1) energy produced from class I or class II resources at generating plants in New England or (2) energy from such resources imported into the region.

Biomass as a Class I Resource. The act generally excluded from the resources that count as class I under these provisions: (1) construction and demolition waste; (2) finished biomass products from sawmills, paper mills, and stud mills; (3) organic refuse derived from municipal solid waste; and (4) biomass from old growth timber stands. However, these resources can be used:

1. for a biomass gasification plant that received funding from the state's Clean Energy Fund before May 1, 2006;
2. if the energy derived from this biomass is subject to a long-term power purchase contract under "Project 100" (by law, electric companies must enter into such contracts with large renewable resources facilities); or
3. if before July 1, 2007, the biomass is used in a renewable energy facility that DPUC approved before October 1, 2005.

PA 07-242

RPS Schedule. Under prior law, the RPS required electric companies and suppliers to obtain at least 3.5% of their power from class I renewable resources in 2007, 5% in 2008, 6% in 2009, and 7% in 2010 and subsequent years. The act increased the RPS for class I resources starting in 2011, as described in Table 1, which also describes the requirements for class III resources established by the act. These requirements are currently in effect.

Table 1: Percent of Power that Must Come from Clean Resources

Year	Class I	Class I or II	Class III
2009	6	3	3
2010	7	3	4
2011	8	3	4
2012	9	3	4
2013	10	3	4
2014	11	3	4
2015	12.5	3	4
2016	14	3	4
2017	15.5	3	4
2018	17	3	4
2019	19.5	3	4
2020	20	3	4

Class III. The act expanded class III resources to include (1) systems that recover waste heat or pressure from commercial and industrial processes installed on or after April 1, 2007 and (2) electricity savings from all conservation programs that started on or after January 1, 2006. The act entitles a customer who implements energy conservation or distributed resources on or after January 1, 2008 to class III credits equal to at least one cent per kilowatt-hour.

PA 08-175

This act further modified when power derived from such biomass sources as construction and demolition waste counts as a class I resource, narrowing one provision and creating a new provision.

PA 11-80

This act established a program that requires electric companies to enter into long-term contracts to buy class I RECs from zero-emission generators

(e. g., solar or wind) and a similar program for low-emission technologies (e.g., fuel cells). In both cases, the RECs count towards the companies RPS obligations.

RPS IN OTHER NORTHEASTERN STATES

Maine, Massachusetts, New Hampshire, New York, New Jersey, and Rhode Island, among other states, have mandatory RPS programs. Vermont has a nonbinding goal of meeting 20% of 2017 demand with renewable resources that were placed in service after 2005. Vermont encourages utilities to enter into long-term contracts with renewable energy generators to meet this goal.

Table 2 compares Connecticut's RPS with other northeastern states. The programs are broadly similar, but each state has its own definition of renewable resources. Connecticut generally does not consider when a resource was placed in service in determining whether it counts towards the RPS, whereas a resource's "vintage" is an important factor in Maine, Massachusetts, and New York.

Massachusetts, New Hampshire, New Jersey, and New York have modified their mandatory RPS programs in recent years. Massachusetts required that a small part of its class I RPS be met by solar resources that meet several criteria. New Hampshire expanded its definitions of renewable resources. New Jersey added small-scale hydroelectric systems to class I. New York increased its ultimate RPS target from 25% to 30% in 2015 and allowed certain biomass from mixed demolition debris to qualify as a renewable resource.

Table 2: RPS Standards and Changes in Other Northeastern States

State	RPS Standard	Eligible Technology	Recent Changes to Standards or Eligible Technology
CT	<ul style="list-style-type: none"> • 2013: 17% (10% class I, 3% class I or II, 4% class III) • 2020: 27% (20% class I, 3% class I or II, and 4% class III) 	<ul style="list-style-type: none"> • Class I: solar, wind, fuel cells, methane gas from landfills and anaerobic digestion, ocean thermal power, wave or tidal power, low-emission advanced renewable energy conversion, certain run-of-the-river hydropower under 5 megawatts (MW), sustainable biomass with emissions limits • Class II: trash-to-energy, biomass not included in class I, and certain older run-of-the-river hydropower • Class III: customer-sited CHP with at least 50% efficiency installed after 1/1/06, electricity savings from conservation and load management programs begun after 1/1/06, and commercial or industrial waste heat or pressure recovery systems installed after 4/1/07 	<ul style="list-style-type: none"> • None
ME	<ul style="list-style-type: none"> • 2013: 36% (6% class I and 30% class II) • 2017: 40% (10% class I and 30% class II) 	<ul style="list-style-type: none"> • Class I: any class II resources that come on-line after 9/1/05, except municipal solid waste facilities and CHP facilities • Class II: fuel cells, tidal, solar, wind, geothermal, hydro, biomass or municipal solid waste in conjunction with recycling, and certain CHP and other systems that qualify as “small power production facilities” under the federal Public Utility Regulatory Policies Act of 1978 	<ul style="list-style-type: none"> • None
MA	<ul style="list-style-type: none"> • 2013: 15.1% (8% class I, 3.6% class II, and 3.5% class II waste energy) • 2020: 22.1% (15% class I, 3.6% class II, and 3.5% class II Waste Energy) 	<ul style="list-style-type: none"> • Class I (must be from resources installed after 12/31/97): photovoltaics, solar thermal-electric, wind, ocean thermal, wave or tidal energy, fuel cells using renewable fuels, landfill gas, certain new hydroelectric, certain existing hydroelectric with increased capacity or efficiency improvements, low-emission advanced biomass power conversion, and geothermal • Class II: same as Class I, but must be from resources installed before 12/31/97 • Class II waste energy (from municipal solid waste combustion): eligible generation must maintain a state approved recycling program, comply with state air pollution and solid waste management regulations, and allocate at least 50% of revenue from RECs to its recycling programs 	<ul style="list-style-type: none"> • 2010: “Solar Carve Out” requires a portion of the class I requirement (0.2744% in 2013) to come from in-state, interconnected solar facilities

Table 2 (continued)

State	RPS Standard	Eligible Technology	Recent Changes to Standards or Eligible Technology
NH	<ul style="list-style-type: none"> • 2013: 12% (4% class I, 0.2% class II, 6.5% class III, and 1.3% class IV) • 2025: 24.6% (15% class I, 0.3% class II, 8% class III, and 1.5% class IV) 	<ul style="list-style-type: none"> • Class I (must be from resources that began operating after 1/1/06; applies to electricity or 'useful thermal energy' generation): wind; hydrogen derived from biomass fuels or landfill gas; ocean thermal, wave, current or tidal energy; methane gas; geothermal systems that began after 1/1/13; solar-thermal systems that begin after 1/1/13; certain biomass; solar-electric not used in class II; incremental new production of electricity in any year from eligible biomass, methane, or hydroelectric; electricity from Class III or IV sources that have been repowered or upgraded through significant investment; and 'useful thermal energy' from class I sources that can be metered and for which fuel or electricity would otherwise be consumed • Class II: solar electricity that began operating after 1/1/06 • Class III: eligible biomass systems in operation before 1/1/06 • Class IV: hydroelectric systems under 5MW, in operation before 1/1/06, and meeting environmental protection criteria 	<ul style="list-style-type: none"> • 2012: loosened restrictions on class IV eligibility; allowed greater flexibility in meeting class III emissions requirements; added 'useful thermal energy' to class I
NJ	<ul style="list-style-type: none"> • 2013: 9.643% (7.143% class I and 2.5% class II) • 2021: 20.38% (17.88% class I and 2.5% class II) 	<ul style="list-style-type: none"> • Class I: solar, wind, wave or tidal, geothermal, landfill gas, anaerobic digestion, fuel cells using renewable fuel, and authorized sustainable biomass. It also includes small-scale hydroelectric projects put in service after 7/23/12, located in-state, and certified as low-impact. • Class II: medium-scale hydropower and resource recovery (municipal solid waste) 	<ul style="list-style-type: none"> • 2012: added hydroelectric systems to class I
NY	<ul style="list-style-type: none"> • 2015: 30% (20.7% existing renewable energy facilities, 8.3% new eligible resources, 1% voluntary green power sales in 2015) 	<ul style="list-style-type: none"> • Solar water heat, photovoltaics, landfill gas, wind, biomass, hydroelectric, fuel cells, cogeneration, anaerobic digestion, tidal energy, wave energy, ocean thermal, ethanol, methanol, biodiesel, and fuel cells using renewable fuels • New eligible resources must begin operating after 1/1/03 	<ul style="list-style-type: none"> • 2010: increased the RPS from 25% in 2013 to 30% in 2015; allowed certain biomass from mixed demolition debris to qualify

Table 2 (continued)

State	RPS Standard	Eligible Technology	Recent Changes to Standards or Eligible Technology
RI	<ul style="list-style-type: none"> • 2013: 7.5% (only 2% can be from resources in operation before 12/31/97) • 2020: 16% (only 2% can be from resources in operation before 12/31/97) 	<ul style="list-style-type: none"> • Direct solar radiation, wind, the ocean's movement or latent heat, geothermal, hydroelectric (up to 30MW), certain biomass facilities compliant with air permits, and fuel cells using renewable resources 	<ul style="list-style-type: none"> • None
VT	<ul style="list-style-type: none"> • 2017: 20% 	<ul style="list-style-type: none"> • Vermont does not have an RPS, but instead has a program with a goal that 20% of a utility's sales come from new renewable resources by 2017. The program encourages utilities to enter into long-term contracts with renewable energy generators. A binding RPS will be initiated if the state's Public Service Board determines that the program is not achieving its goal. The board determined that adequate progress was being made as of January 2012. 	<ul style="list-style-type: none"> • 2012: established a target that each utility meet 55% of its annual sales with existing and new resources starting in 2017; the target is not legally binding

Sources: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CT04R;
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ME01R;
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA05R;
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NH09R;
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NJ05R;
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY03R;
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=RI08R;
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VT04R

POTENTIAL IMPACTS OF FUTURE RPS INCREASES

The focus of the potential rate impact of Connecticut's RPS has been on class I, since the class I standard increases over time reaching 20% in 2020. There are similar increases in class I requirements in other nearby states, increasing demand on a regional basis. In contrast, Connecticut's requirements for class II and III resources are flat over time and historically the price for class II and III RECs have generally been lower than those for class I RECs.

Until recently, the price of class I RECs in Connecticut and other northeastern states had been flat, after falling earlier this decade. The price in 2010 and 2011 was \$13.50 per Connecticut class I REC (1.35 cents per kilowatt-hour) according to a survey of REC brokers compiled by Sustainable Energy Advantage LLC and cited in a review by New Hampshire Public Utilities Commission. However, since 2011, the class I REC price has increased to between \$35 and \$50 for 2012 and 2013 vintage RECs (these RECs can be used until June of the following year).

A 2011 [study](#) of Connecticut's RPS conducted for the Connecticut Energy Advisory Board by Rutgers University found substantial uncertainty in the future cost of class I RECs, with estimates ranging from \$11 to \$50 per REC in 2020. A \$50 per class I REC would cost the average residential customer approximately \$7.50 per month. If the class I RECs equaled the alternative compliance mechanism cost, their cost to the average residential ratepayer would be approximately \$8.25 per month. If class II and class III RECs maintained their current price, the total cost of the RPS could approach \$10 per average residential customer.

KM/LH:mp