

New Hampshire Public Utilities Commission



Renewable Portfolio Standard 2018 Review

November 1, 2018

Submitted to:

THE NEW HAMPSHIRE GENERAL COURT

Senate President Chuck Morse

Senator Kevin Avard; Chairman, Energy & Natural Resources Committee

Senator Jeb Bradley; Vice Chairman, Energy & Natural Resources Committee

Speaker Gene G. Chandler

Representative Richard Barry; Chairman, Science, Technology & Energy Committee

Representative Herbert Vadney; Vice Chairman, Science, Technology & Energy Committee

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ACRONYMS & ABBREVIATIONS

AC	Alternating Current
ACP	Alternative Compliance Payment
APS	Alternative Portfolio Standard
BTM	Behind-the-Meter
C&I	Commercial and Industrial
CELT	Regional Forecast of Capacity, Energy, Load, and Transmission
CESA	Clean Energy States Alliance
CF	Capacity Factor
CHP	Combined Heat and Power
CO2	Carbon Dioxide
DES	New Hampshire Department of Environmental Services
DGFWG	ISO-NE Distributed Generation Forecast Working Group
EERS	Energy Efficiency Resource Standard
EIA	United States Energy Information Administration
EPA	United States Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GSHA	Granite State Hydropower Association
HB	House Bill
KW	Kilowatt
IMPLAN	Impact Analysis for Planning
ISO-NE	ISO New England, the independent system operator of the New England power grid
MMBTU	Million British Thermal Units
MW	Megawatt
MWh	Megawatt-hour
NEEP	Northeast Energy Efficiency Partnership
NEPOOL GIS	New England Power Pool Generation Information System
NHTOA	New Hampshire Timberland Owners Association
NREL	National Renewable Energy Lab
OSI	New Hampshire Office of Strategic Initiatives
PV	Photovoltaic
REC	Renewable Energy Certificate
REF	Renewable Energy Fund
REMO	Renewable Energy Market Outlook
RES	Renewable Energy Standard
RFP	Request for Proposal
RPS	Renewable Portfolio Standard
RSA	New Hampshire Revised Statutes Annotated
SB	Senate Bill
SEA	Sustainable Energy Advantage, LLC
SLICE	State Leadership in Clean Energy
SREC	Solar Renewable Energy Credit
TREC	Thermal Renewable Energy Credit
W	Watt
ZEC	Zero Emission Credit

EXECUTIVE SUMMARY

The Renewable Portfolio Standard (RPS) law requires the New Hampshire Public Utilities Commission (Commission), the agency responsible for implementing and administering the RPS, to conduct periodic reviews of the class requirements and other features of the program.¹ The report that follows, *Renewable Portfolio Standard 2018 Review*, (2018 Review), contains the findings of the most recent review of the RPS conducted this year. An additional review is required in 2025.

The 2018 Review concludes that the RPS program is accomplishing the statutory goals and purpose defined by the legislature. Specifically, the RPS has increased use of renewable fuels and the development of renewable technologies, and has provided both economic and environmental benefits.

This “Executive Summary” contains an overview of the purposes of the RPS and the benefits that have been realized followed by a summary of the specific legislative recommendations developed through research, analysis, and stakeholder input. The report provides background information on the structure of New Hampshire’s RPS, legislative history, and amendments, followed by a synopsis of the process undertaken by the Commission in the “2018 Review Process and Requirements” section. The report also includes a “Review Topics” section that considers each of the nine topics required for review under the statute and includes legislative and rule recommendations. The report’s conclusion is followed by a summary table of recommendations, references, and supporting data.

In preparation for the 2018 Review, the Commission partnered with the University of New Hampshire Sustainability Institute to research and review New Hampshire’s RPS. Through this partnership, RPS-related amendments, rules, dockets, and data were gathered and summarized. The end product was a retrospective report for program years 2008 through 2015. Commission Staff continued to update the tables and charts from the retrospective report with annual compliance data and included these updates in each subsequent annual Renewable Energy Fund (REF) report. In recent years, Commission Staff has attended study committee meetings² and prepared testimony on how the RPS is structured, the costs and benefits of the RPS, and regional RPS market. The statutory requirements, Commission’s annual REF reports, and study committee’s work provided a starting point for the 2018 Review.

The 2018 Review shows that New Hampshire’s in-state energy resources are increasingly renewable and that technological innovations are helping consumers and businesses produce more of their own energy. The RPS has promoted fuel diversity while providing economic opportunities and environmental benefits.

The report concludes that major changes are not needed at this time to further advance the RPS statutory goals, but limited legislative improvements can provide greater flexibility and efficiency in the administration and operation of the RPS program.

Perhaps most importantly, this report was developed to serve as a resource for decision-makers facing choices about the future of New Hampshire’s renewable energy policies and programs.

¹ RSA 362-F:5.

² SB 51, Laws 2017, 81:1. Established committee to study subsidies for energy projects provided by the renewable portfolio standard.

Purpose of the RPS and Benefits Realized

A Renewable Portfolio Standard requires the inclusion of certain amounts of renewable generation in the electricity mix of retail electricity providers. In most cases, RPS requirements increase gradually over time. **The New Hampshire General Court determined that it is in the public interest to stimulate investment in low emission renewable energy generation technologies within the state and thus enacted legislation to establish the state's first Renewable Portfolio Standard, setting a target of 25.2% by 2025.** The statute set such goals with the expressed intent of providing fuel diversity to New Hampshire and the New England region as a whole, through use of local renewable fuels and resources.

Renewable fuels come from energy sources that are rapidly replaced or renewed through a natural process, including but not limited to: sun, wind, hydropower, biomass, and geothermal.

The statute (RSA 362-F:1)³ includes a purpose statement which details the legislature's expectations and intentions:

Renewable energy generation technologies can provide fuel diversity to the state and New England generation supply through use of local renewable fuels and resources that serve to displace and thereby lower regional dependence on fossil fuels. This has the potential to lower and stabilize future energy costs by reducing exposure to rising and volatile fossil fuel prices. The use of renewable energy technologies and fuels can also help to keep energy and investment dollars in the state to benefit our own economy. In addition, employing low emission forms of such technologies can reduce the amount of greenhouse gases, nitrogen oxides, and particulate matter emissions transported into New Hampshire and also generated in the state, thereby improving air quality and public health, and mitigating against the risks of climate change. It is therefore in the public interest to stimulate investment in low emission renewable energy generation technologies in New England and, in particular, New Hampshire, whether at new or existing facilities.

Nationally, RPS policies have reduced emissions of greenhouse gases, sulfur dioxide, nitrogen oxides, particulate matter, and water use. RPS policies have impacted the economy by supporting domestic renewable energy jobs and increasing gross domestic product.⁴ Refer to Appendix G to view [A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards](#) developed by Lawrence Berkeley National Laboratory.

Use of Local Renewable Fuels and Fuel Diversity

Over the past decade New Hampshire's renewable generation has doubled, reducing reliance on fossil fuels and emissions. In 2007, under 10% of New Hampshire's electricity generation came from renewable sources. In 2017, approximately 20% of New Hampshire's electricity generation was from renewable sources.⁵ Regionally, New England's net generation from all sectors was 11.1% from renewable sources in

³ See <http://www.gencourt.state.nh.us/rsa/html/XXXIV/362-F/362-F-1.htm>.

⁴ Ryan Wiser et al., *A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards*, Lawrence Berkeley National Laboratory and National Renewable Energy Laboratory (January 2016), <https://www.nrel.gov/docs/fy16osti/65005.pdf>.

⁵ *Electricity Data Browser, Net Generation Data Set for all sectors for New Hampshire, 2007 and 2017, Multiple filters/orders applied to extract data for calculations including: Net Generation, All Sectors, All Fuels, New Hampshire; Net Generation, Conventional Hydroelectric, All Sectors, New Hampshire; Net Generation, Other Renewables, All Sectors, New Hampshire*, U.S. Energy Information Administration, www.eia.gov/electricity/data/browser (last visited Oct. 30, 2018).

2007, and in 2017 was 17.8%.⁶

In New Hampshire, the quantity, diversity, and capacity of renewable energy facilities has also increased with the installation of utility scale facilities, and commercial and small scale distributed generation.

Examples of utility scale generation facilities that commenced commercial operation after passage of RSA Chapter 362-F include: Groton Wind, Lempster Wind, Jericho Mountain Wind, and the Burgess BioPower plant.

Examples of recently developed commercial scale distributed generation include: solar electric at the Peterborough Wastewater Treatment facility, Plymouth Wastewater Treatment facility, and Milton Landfill; and small scale hydro facilities such as Steels Pond Hydro in Antrim, Lower Village Hydro in Claremont, and Spaulding Avenue Industrial Hydro in Rochester.

In addition, thousands of small commercial scale and residential distributed generation systems have interconnected to the grid and added to New Hampshire's renewable generation portfolio. At the end of 2017, approximately 83 MW (over 7,400 customers) of net metered, distributed solar, wind and small-scale hydro facilities, all less than one megawatt in capacity, were interconnected to New Hampshire's electric distribution utilities.

Economic Benefits

The RPS provides economic benefits to New Hampshire, its municipalities, businesses, and residents. The industries associated with designing, building, installing, and operating renewable energy systems increase direct and indirect economic activity in the state. A study completed in 2015 found that clean-tech industries had a substantial and growing impact in the state, with 13,000 to 20,000 associated jobs reported, and average salaries 50% higher than the state average.⁷

Over 5,100 new residential and commercial scale solar electric projects have been developed in New Hampshire since 2008 with support from the Renewable Energy Fund.⁸ At the end of calendar year 2017, approximately 70 MW⁹ of solar capacity was installed, providing enough electricity to power 11,080 homes¹⁰ and keeping energy dollars in the state.

From an economic perspective, the demand for solar projects created the need for new businesses to design, install, and service the renewable generation facilities, providing local jobs. Considering only the solar industry, in 2017, there were 86 solar companies operating in New Hampshire, employing just over 1,000 workers.¹¹ Workers in the solar industry are employed in installation, manufacturing, sales, project

⁶ *Id.*

⁷ Seacoast Economics, *The New Hampshire Cleantech Market Report* at 7-8, New Hampshire Clean Tech Council (February 2015), https://docs.wixstatic.com/ugd/c6c29c_fdff209bf9384d568f088bb2aefab3e5.pdf.

⁸ New Hampshire Renewable Energy Fund Annual Report at 19 (October 1, 2018) (Table 9: "Cumulative Rebate Program Results through June 30, 2018") (4,648 [rebates awarded for residential electrical renewable energy] + 470 [rebates awarded for C & I solar technologies] = 5,118 total), <https://www.puc.nh.gov/Sustainable%20Energy/Renewable%20Energy%20Fund/20181001-ref-report-to-legislature-2018-annual-report.pdf>.

⁹ Data derived from U.S. Energy Information Administration. Available at: <https://www.eia.gov/electricity/data/eia861m/> (last visited Oct. 30, 2018).

¹⁰ *Solar Jobs Census 2017: New Hampshire*, The Solar Foundation (2018), <https://www.thesolarfoundation.org/solar-jobs-census-factsheet-2017-nh/> (last visited Oct. 30, 2018).

¹¹ *Id.*

development, and other supporting economic sectors.

Benefits to state and local governments are many and varied. Privately owned solar facilities generate tax revenues for municipalities. Some municipalities are purchasing some or all of their electricity from solar electric projects within their own boundaries. Nineteen schools have installed solar electric facilities,¹² thereby reducing operating expenses.

The State of New Hampshire has installed solar electric facilities at the Division of Motor Vehicles in Concord and at the new Women's Correctional Facility, also in Concord, both with funding from the Renewable Energy Fund. Public projects such as these save taxpayers money, and keep energy and investment dollars in the state to benefit our own economy.

The RPS not only helps develop new renewable energy facilities, but also helps maintain existing ones such as small-hydroelectric facilities that are already sited and providing benefits. Small hydro plants (≤ 5 MW) pay state and local property taxes, business taxes, lease payments for state-owned dams, and water-user fees for state and federal impoundments. Granite State Hydro Association estimates that their members "directly employ more than 50 New Hampshire residents and purchase an estimated \$1 million per year in supplies and services from companies statewide."¹³

In 2017, the College of Business Administration at Plymouth State University completed *Economic Contribution of the Biomass Electric Power Generation Industry in New Hampshire*, a study funded by the New Hampshire Timberland Owners Association (NHTOA). The purpose of the study was "to estimate [the] economic contribution of the 25 MW capacity or less biomass electric power generation industry to New Hampshire's economy"¹⁴ using an IMPLAN model.¹⁵ The study found the six independent biomass electric power plants' contribution spreads across the state's economy by creating and supporting jobs, incomes, and taxes.¹⁶

Biomass energy for thermal heating applications has also had a positive impact on New Hampshire's economy. With the assistance of grants and rebates from the Renewable Energy Fund, more than 450 residential and commercial biomass heating systems are currently operating in the state, including at least 38 publicly owned properties.¹⁷

Biomass fuels, such as wood chips and pellets, are sourced and purchased from companies located in New Hampshire and are used for electric generation and thermal purposes, thereby keeping energy dollars in

¹² Data derived from New Hampshire Public Utilities Commission, REF rebate and grant program databases.

¹³ *Benefits of Hydro*, Granite State Hydropower Association, <http://www.granitestatehydro.org/benefits-of-hydro.html> (last visited Oct. 30, 2018).

¹⁴ Plymouth State University, *Economic Contribution of the Biomass Electric Power Generation Industry in New Hampshire*, College of Business Administration, Project Description, <https://nhtoa.org/files/docs/Economic%20Contribution%20of%20the%20Biomass%20Electrical%20Power%20Gen%20in%20NH%202016.pdf>.

¹⁵ IMPLAN refers to Impact Analysis for Planning software. More information is available at: <http://www.implan.com/software/>.

¹⁶ Plymouth State University, *Economic Contribution of the Biomass Electric Power Generation Industry in New Hampshire*, College of Business Administration, Project Description, Executive Summary and Table 4.

¹⁷ New Hampshire Renewable Energy Fund Annual Report at 19, 21 (October 1, 2018) (Table 9: "Cumulative Rebate Program Results through June 30, 2018"; Table 11: "REF Competitive Grant Program Summary") (380 [rebates awarded for residential wood pellet boiler/furnace] + 59 [rebates awarded for C & I wood pellet boiler/furnace] + 17 [biomass thermal grants awarded] = 456), <https://www.puc.nh.gov/Sustainable%20Energy/Renewable%20Energy%20Fund/20181001-ref-report-to-legislature-2018-annual-report.pdf>.

state. “With 81% of its land wooded, New Hampshire is second only to Maine in its percentage of forested land. Forest products, including wood pellets for space heating, are an important part of the state economy and are the mainstay of New Hampshire’s biomass energy industry.”¹⁸ A review of 116 commercial biomass heating facilities in 2015 estimated that 7.7 million gallons of imported fuel oil were displaced with locally sourced biomass fuel through the use of modern wood heating, resulting in savings for New Hampshire facilities of \$11.8 million. Direct spending on wood pellets and chips in the state in 2015 was \$5.8 million.¹⁹

Environmental Benefits

Renewable sources such as sun, wind, and water are zero emission fuel sources. Biomass, biofuels, and methane have low emissions when strict emission requirements are adhered to as required by the New Hampshire RPS. By encouraging the growth of low emission forms of renewable technologies regionally through RPS policies, New Hampshire has realized a reduction in the amount of greenhouse gases, nitrogen oxides, and particulate matter emissions transported into, and also generated in, the state. Between 2008 and 2015, New Hampshire saw a reduction in its carbon dioxide emissions of 3.6 million metric tons, a reduction of 19.25%.²⁰

To evaluate the environmental impact of New Hampshire’s growing renewable energy sector, the United States Environmental Protection Agency’s (EPA) AVERT web-based modeling tool²¹ was used to estimate the avoided emissions from New Hampshire’s 70 MW of installed solar electric generation. Based on this installed solar capacity, the tool estimates the resulting avoided emissions for each state in the region. The annual amount of avoided carbon dioxide from the New Hampshire-sited 70 MWs of installed solar is estimated to be over 2,800 tons in New Hampshire. The Northeast region, as a whole, will avoid more than 50,000 tons of carbon dioxide emissions annually, as shown in Figure 1.

Figure 1. Model of State Emission Changes: Northeast Region

Annual Reductions Achieved from 70 MWs of New Hampshire-sited Behind-the-Meter Solar PV				
State	SO2 (lbs)	NOX (lbs)	CO2 (tons)	PM2.5 (lbs)
Connecticut	2,399	4,360	4,691	377
Massachusetts	2,952	5,771	8,429	727
Maine	3,243	1,205	2,118	120
New Hampshire	2,035	2,646	2,852	66
New Jersey	26	238	1,528	88
New York	17,407	27,962	26,197	2,798
Rhode Island	96	672	4,027	119
Vermont	2	166	236	1
TOTAL	28,160	43,020	50,078	4,296

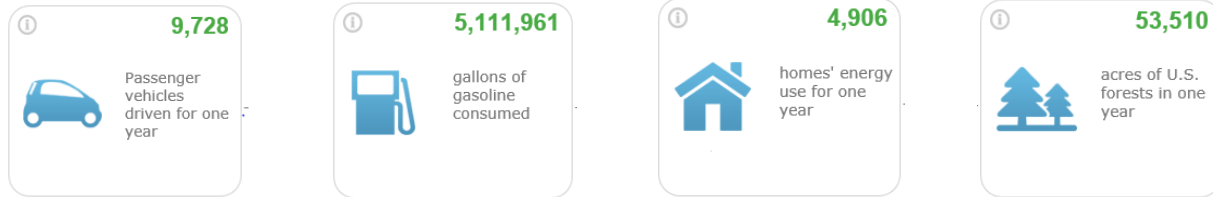
¹⁸ *New Hampshire Profile Analysis*, U.S. Energy Information Administration (June 21, 2018), <https://www.eia.gov/state/analysis.php?sid=NH>.

¹⁹ *Modern Wood Heat: Local Renewable Energy for Commercial and Institutional Building Owners, Benefits to New Hampshire in 2015*, New Hampshire Wood Energy Council, https://docs.wixstatic.com/ugd/c6c29c_bf65bdaae27241e8b4948d8bbca46eda.pdf.

²⁰ *Table 1. State energy-related carbon dioxide emissions by year (2000, 2005–2015)*, U.S. Energy Information Administration, <https://www.eia.gov/environment/emissions/state/analysis/pdf/table1.pdf>.

²¹ U.S. Environmental Protection Agency’s AVERT Tool, <https://www.epa.gov/statelocalenergy/avert-web-edition> (selecting “Northeast” region; selecting “E- Distributed (rooftop) solar photovoltaic,” “Total Capacity” enter 70 MW; select “Get Results”).

To put the 50,078 tons of regional carbon dioxide emission reductions into more concrete terms, it is equivalent to: greenhouse gas emissions from 9,728 passenger vehicles driven for one year; or carbon dioxide emissions from 5,111,961 gallons of gasoline consumed; or one year of electricity use for 4,906 homes; or carbon sequestered by 53,510 acres of forests in one year.²²



Additional New Hampshire environmental benefits result from hydroelectric generating facilities that are located on our waterways. The Granite State Hydro Association “estimates that member plants remove approximately 100 tons of trash per year from the rivers, and many provide and maintain recreational facilities including boat ramps, portage facilities and picnic areas.”²³

New Hampshire’s biomass power plants purchase low-grade timber, providing incremental value to logging operations, and therefore revenue to landowners, in the form of biomass chip purchases. This additional revenue stream encourages forest land retention, which in turn helps to reduce atmospheric carbon through forest uptake of carbon dioxide.

As highlighted above, the New Hampshire RPS has promoted the use of local renewable fuels and fuel diversity while providing economic opportunities and environmental benefits to the state.

Summary of Recommendations

A summary of legislative policy recommendations is presented on the next page, and a complete list of all recommendations is provided in Appendix A. Adopting these recommendations will help ensure that the RPS program continues to advance the established policy goals stated in the law. As with any forward-looking recommendations, market conditions and technologies may change over time and such changes may necessitate further review and refinement of a recommendation.

When considering policy changes, it is important to understand how various recommendations are interrelated. Proceeding with the implementation of some recommendations requires comprehensive planning. Timing and long-term objectives should be considered. To avoid market disruption and to maintain program consistency, gradual and incremental changes are advisable.

Any major changes to the RPS structure or requirements should be preceded by establishment of a study committee to gather further stakeholder input and perform analysis to understand implications. Adding new technologies, expanding facility eligibility requirements, and changing class targets are examples of major changes. Grandfathering should also be discussed and considered as part of any revision. If increased transparency through reporting more details about RECs produced and settled is necessary, then adjustments to report due dates should be considered.

²² Greenhouse Gas Equivalencies Calculator, U.S. Environmental Protection Agency, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (using 50,078 tons CO₂ emissions data) (last visited Oct. 30, 2018).

²³ *Benefits of Hydro*, Granite State Hydropower Association, <http://www.granitestatehydro.org/benefits-of-hydro.html> (last visited Oct. 30, 2018).

Legislative Policy Recommendations

- A.** Consider statutory amendment language that would expressly expand the range of methods by which useful thermal energy may be measured, monitored, and reported for residential and small commercial thermal energy facilities; such methods might include, for example, calculating thermal production using fuel input quantities and unit efficiency determinations or assumptions, while incorporating appropriate discounts for uncertainty.
- B.** Continue to provide a net metering credit toward compliance for interconnected facilities that net meter but do not apply for REC authorization, and consider amending RSA 362-F:6, II-a to reduce the capacity factor rating used to estimate yearly production for customer-sited sources that net meter but not REC-certified for Class I or Class II. Decrease the capacity factor rating to 14%.
- C.** Establish a study committee to further analyze and understand the impact of adjusting the Class IV ACP rate to be equal to, or slightly higher than, the Massachusetts Class II ACP rate.
- D.** Establish a study committee to gather further stakeholder input and perform analysis to understand implications of adding new Class IV eligible facilities by increasing the generation capacity limit for the “fish passage exemption” for the smaller Class IV facilities from 1 MW to 2 MW or 5 MW.
- E.** Due to the passage of legislation that incorporated useful thermal energy into the New Hampshire RPS (SB 218 in 2012), consider repealing RSA 362-F:5, III, which requires the Commission to evaluate the potential for the addition of a thermal energy component to the RPS.
- F.** Consider establishing a study committee to investigate the development of Combined Heat and Power (CHP) provisions, or revision of emissions requirements, to encourage more development of renewable thermal-led CHP facilities.
- G.** Consider amending RSA 362-F:5 to require the Commission to conduct a review of class requirements and other aspects of the RPS in 2021 and report findings to the General Court by November 1, 2021. Other aspects for review, discussion, and recommendation should focus on and include, but are not limited to: transitioning “new” facilities to “existing” facilities, and how corresponding RPS targets might be adjusted; grandfathering current long-term contracts; and increasing RPS requirements beyond 2025. An additional review in 2021 supports market stability by providing advance insight and direction to encourage continued renewable energy development.
- H.** In light of existing utility Energy Efficiency Resource Standard (EERS) programs, consider amending RSA 362-F:5, V to remove the language specific to energy efficiency.
- I.** Consider amending RSA 362-F:10, V to allow the Commission greater flexibility in the residential small renewable generation incentive program design by replacing the requirement for the “one-time incentive payment...” with a requirement for the Commission to administer a residential program “that supports the installation of small renewable generation facilities that would qualify as Class I or Class II sources of electricity.”
- J.** Due to the passage of net metering legislation (HB 1116 in 2016) and the Commission’s subsequent alternative net metering tariff order which removed the cap on net metered capacity, consider amending RSA 362-F:10, IV to remove the requirement for the Commission to report on “the percentage [of net metered capacity installed as compared to] the amount that is allowed to be net metered within each franchise area.”
- K.** Due to the passage of group net metering legislation (SB 367 in 2018), consider amending RSA 362-F:10, IV to remove the requirement for the utilities to report to the Commission, and for the Commission to report on, the generation and group load served by group net metered registered hosts.
- L.** Consider amending RSA 362-F:10, IV to change the Renewable Energy Fund Annual Report due date to November 1st to provide adequate time to include additional data.

BACKGROUND

Renewable Portfolio Standard Overview

New Hampshire's RPS is similar to that of other states in its mechanisms, but is unique in many of its details. Codified as RSA chapter 362-F, the RPS requires that all electric service providers serving New Hampshire customers satisfy a percentage of their electric retail sales load with renewable energy

certificates (RECs), where each REC is created from one megawatt hour (MWh) of electric generation that has been fueled by qualified renewable sources. A REC may be purchased through the established regional trading platform at the New England Power Pool Generation Information System (NEPOOL-GIS) or created through self-generation. Compliance began in 2008 with an obligation for each electric provider to obtain 4% of its load (or have the commensurate number of RECs). The obligation increases to 25.2% by 2025.

New Hampshire's Renewable Portfolio Standard statute establishes the renewable energy policy for the state. Common renewable energy sources are solar, wind, hydropower, biomass, and geothermal. These energy sources provide a sustainable and affordable power supply. Renewable energy enables New Hampshire municipalities, schools, businesses, and residents to realize economic and energy security benefits. Renewable energy generation technologies provide fuel diversity to the state and the New England generation supply through the use of renewable fuels sourced locally, lowering regional dependence on fossil fuels. Renewable resources also have the potential to lower and stabilize future energy costs by reducing exposure to rising and volatile fossil fuel prices. Use of local and renewable fuels also allows more energy dollars to be retained in the state rather than being spent on imported fuels. In addition, utilizing renewable technologies can help reduce the amount of greenhouse gases, nitrogen oxides, and particulate matter emissions generated in the state, which helps improve air quality and public health.

New Hampshire RPS Class Definitions*

Class I - New Renewable Energy. Sources producing electricity or "useful thermal energy" (i.e., Class I-Thermal) generated by any of the following resources, provided the generator began operation after January 1, 2006, except as noted below:

- Wind energy;
- Hydrogen derived from biomass fuels or methane gas;
- Ocean thermal, wave, current, or tidal energy;
- Methane gas;
- Eligible biomass;
- Class II solar electric energy not used to satisfy the minimum Class II obligation; The incremental new production of electricity in any year from an eligible biomass, eligible methane source, or hydroelectric generating facility of any capacity, over its historical generation baseline;
- The production of electricity from Class III or IV sources that have been restored through significant investment.

Class I-Thermal - Useful Thermal Energy. Class I-Thermal resources must be used to meet a set percentage of the total Class I RPS obligation as outlined in RSA 362-F:3. Eligible Class I Thermal sources include the following technologies that began operation after January 1, 2013 except as noted below:

- Geothermal systems that began producing thermal energy;
- Solar-thermal systems that produce useful thermal energy only;
- Eligible biomass generators that meet emissions criteria;
- The production of useful thermal energy from certain biomass thermal sources which began operation prior to January 1, 2013 and have been upgraded or replaced through significant investment;
- Methane gas if the output is in the form of useful thermal energy.

Class II - New Solar. Solar technologies; provided the electric generator began operation after January 1, 2006.

Class III - Existing Biomass/Methane. Eligible biomass systems of 25 megawatts (MW) or less, and methane gas, provided the generator began operation before January 1, 2006. Methane gas sources which began operation prior to 2006 and exceed an aggregated gross nameplate capacity of 10 MW at any single landfill site are not eligible.

Class IV - Existing Small Hydroelectric. Hydro facilities up to 5 MW, provided the generator began operation before January 1, 2006, and complies with certain environmental protection criteria; and hydroelectric facilities up to 1 MW that are interconnected to the distribution grid in New Hampshire.

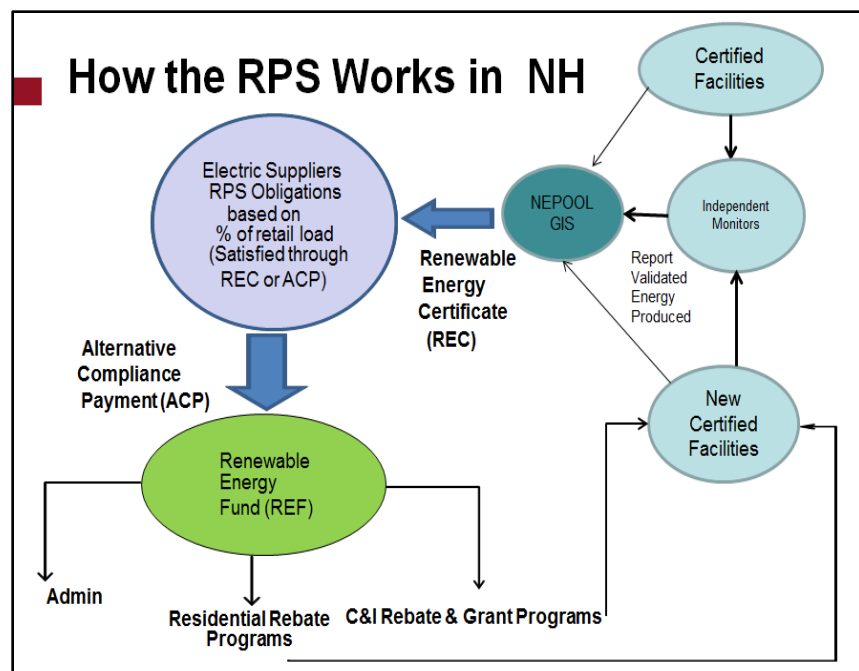
*refer to RSA 362-F for detailed Class definitions

The RPS statute established four classes of renewable energy resources (summarized in the box on the previous page). Electricity providers must obtain RECs for each of the four classes as a set percentage of their retail electric load. One REC represents the renewable attributes of one megawatt-hour of electricity or the equivalent amount of thermal energy (3,412,000 Btu) generated from a renewable source.

RECs are generated by certified renewable energy facilities and sold into a regional market. Renewable energy facilities must apply for New Hampshire RPS eligibility. Facilities submit to the Commission a class-specific application for review and approval. The Commission’s Sustainable Energy Division certifies the systems as eligible under state statutes and rules (Puc 2500 rules) to generate and sell RECs. The Puc 2500 rules require facility owners to purchase and install a revenue quality meter to record the gross output and retain the services of an independent monitor to be eligible for certification. All classes of applications that are considered complete must be approved or rejected within 45 days of receipt.

Upon certification, Commission Staff notifies the New England Power Pool Generation Information System (NEPOOL GIS), which issues and tracks RECs for the region. Gross output from certified customer-sited facilities is verified and reported by independent monitors to NEPOOL GIS. On a quarterly basis, NEPOOL GIS issues RECs for reported generation and administers a two-month trading period. RECs generated in one state may be sold in another, provided the facility is certified in that state as well.

If electricity providers cannot, or choose not to, purchase or obtain sufficient RECs to comply with the RPS law, they must make Alternative Compliance Payments (ACPs) to the Renewable Energy Fund (REF). On an annual basis, the Commission reviews electricity providers’ compliance with the previous calendar year’s RPS requirements. Electricity providers include New Hampshire’s competitive electricity providers and electric distribution utilities (Eversource, Liberty Utilities, Unitil, and the New Hampshire Electric Cooperative).



The REF is a dedicated, non-lapsing fund, the purpose of which is to support electrical and thermal renewable energy initiatives. ACPs are the only source of funding for the REF and fluctuate from year to year, depending on the price and availability of RECs in the regional market.

The Commission’s Sustainable Energy Division administers three residential rebate programs, two commercial and industrial rebate programs, and two competitive grant programs with funding from the REF. Projects installed with incentives from the REF are eligible facilities which may become certified, thereby generating additional RECs to trade in the NEPOOL GIS market. Incentivizing the installation of new renewable facilities enables New Hampshire to continue to meet its increasing RPS goals.

Legislative History and Amendments

Several legislative amendments have been enacted since the 2011 RPS review was conducted. While the information below does not represent a comprehensive overview of all RPS amendments enacted since 2011, the legislation referenced below focuses on amendments that have impacted the RPS class eligibility requirements, compliance requirements, and REF programs.

2012 Legislative Session

In 2012, with the passage of Senate Bill 218 (SB 218), New Hampshire became the first state to add thermal renewable projects as an eligible supply for Class I RECs. The Commission established procedures for the metering, verification, and reporting of useful thermal output. Incentive programs were developed and supported by REF revenues to encourage renewable thermal development in New Hampshire. Later legislative amendments modified the Class I-Thermal annual compliance obligations.²⁴ SB 218 also modified the definition of a Class IV source.²⁵

2013 Legislative Session

In 2013, Senate Bill 148²⁶ modified the Class I-Thermal obligations, and House Bill 542²⁷ adjusted the Class III obligations and established combined heat and power units used for district heating as eligible for Class I biomass certificates when existing thermal energy units are upgraded or replaced.

2016 Legislative Session

In 2016, Senate Bill 386²⁸ amended RSA 362-F:4, I(m) to include the production of biodiesel fuel sold into the New Hampshire thermal energy market as an eligible source for RPS compliance. The RECs associated with the production of biodiesel fuel by any facility located in New Hampshire may be used to meet no more than one-eighth of an electricity provider's non-thermal Class I requirement in any given year. The production facility must meet all applicable air emission and water discharge standards, document the sale of the biodiesel into the thermal energy market and the end-user efficiency rating, or where such documentation is not practicable, assume an average end-user efficiency rating by customer class.

2017 Legislative Session

In 2017, Senate Bill 129, the "New Hampshire Clean Energy Jobs and Opportunity Act of 2017," enacted several amendments to the RPS law to "promote customer choice and energy independence by eliminating market barriers to solar energy that low-to-moderate income residential customers face, by sustaining and promoting local renewable energy resources and New Hampshire jobs in the solar and wood products industries, by promoting the stabilization and lowering of future energy costs with more clean energy supply and greater energy diversification, and by further reducing energy costs by reducing New Hampshire's peak demand, including our share of regional electric transmission costs, which recently went up due to our increased share of the regional peak demand."²⁹

²⁴ SB 218 (2012), available at: <http://www.gencourt.state.nh.us/legislation/2012/SB0218.pdf>.

²⁵ RSA 362-F:4, IV(a), available at: <http://www.gencourt.state.nh.us/rsa/html/XXXIV/362-F/362-F-4.htm>.

²⁶ SB 148 (2013), available at: <http://www.gencourt.state.nh.us/legislation/2013/SB0148.pdf>.

²⁷ HB 542 (2013), available at: <http://www.gencourt.state.nh.us/legislation/2013/HB0542.pdf>.

²⁸ SB 386 (2016), available at:

http://www.gencourt.state.nh.us/bill_status/billText.aspx?sy=2017&id=1135&txtFormat=pdf&v=current.

²⁹ SB 129 (2017), available at: http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2017&id=957&txtFormat=pdf&v=current.

Specifically, this legislation increased electricity providers' RPS Class II (solar) requirement from 0.3% to 0.7% by 2020, and adjusted the Class I-Thermal requirement by 0.2% per year through 2023. In regard to Class III (Existing Biomass/Methane), the Class III alternative compliance payment was increased to \$55 in calendar years 2017, 2018, and 2019, and Class III eligible methane facilities were no longer allowed to exceed a gross nameplate capacity of 10 MW in aggregate at any single landfill site. The statutory amendment includes exemption periods for certain electrical supply contracts.

The legislation also included a new program funding requirement intended to reduce market barriers to solar energy participation by low and moderate income residential customers. Beginning in fiscal year 2018, at least 15% of the REF must be used to benefit low and moderate income residential customers. Program design may include, but is not limited to, financing or leveraging of financing for low and moderate income community solar projects in manufactured housing communities or in multi-family rental housing.

2018 Legislative Session

In 2018, Senate Bill 577³⁰ added useful thermal energy from methane gas as an eligible source for RPS compliance. To be eligible, the facility must have begun operation after January 1, 2013. The RECs associated with the production of thermal energy for an end-use customer in New Hampshire will be issued as Class I-Thermal RECs.

House Bill 225³¹ modified the requirements for RPS annual reports by providers of electricity and the disclosure of RPS compliance information by the Commission. Beginning October 1, 2019, the Commission must disclose the information collected under electric supplier's annual compliance reports as public information in the Commission's Renewable Energy Fund annual report. No information may be disclosed to the public that is confidential as defined by Commission or NEPOOL GIS rules. In addition, the Commission must provide as part of the annual REF report: RPS compliance costs and average electric rate impact; renewable energy certificate versus alternative compliance payments comparison; alternative compliance payments by class and provider of electricity; and the number of renewable energy certificates that were purchased during the prior compliance year by class.

House Bill 1550³² requires providers of electricity to include with customers' December electric bills the Commission's estimated cost on a per kilowatt-hour basis for compliance with the RPS for the prior compliance year. Each customer's bill must identify the cost as an estimate and provide a link to information about the RPS, including its benefits, on the Commission's website.

House Bill 1555³³ requires the Commission to advocate against proposed regional or federal rules or policies that are inconsistent with state policies, rules, or laws. To the extent to which HB 1555 applies to administering the RPS program, the Commission will continue its efforts to protect New Hampshire's interests.

³⁰ SB 577 (2018), available at: http://gencourt.state.nh.us/bill_status/billText.aspx?sy=2018&id=1905&txtFormat=pdf&v=current.

³¹ HB 225 (2018), available at: http://gencourt.state.nh.us/bill_status/billText.aspx?sy=2018&id=327&txtFormat=pdf&v=current.

³² HB 1550 (2018), available at: http://www.gencourt.state.nh.us/bill_status/billText.aspx?sy=2018&id=1050&txtFormat=pdf&v=current.

³³ HB 1555 (2018), available at: http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2018&id=1075&txtFormat=pdf&v=current.

2018 RPS REVIEW PROCESS AND REQUIREMENTS

RSA 362-F:5 requires the Commission to review the class requirements and other aspects of the renewable portfolio standard program in 2018. Specifically, the statute directs the Commission to review, in light of the purpose of the RPS chapter, and with consideration of the importance of stable long-term policies, the following topics:

- I. The adequacy or potential adequacy of sources to meet the class requirements of RSA 362-F:3;
- II. The class requirements of all sources in light of existing and expected market conditions;
- III. The potential for addition of a thermal energy component to the electric renewable portfolio standard;
- IV. Increasing the class requirements relative to Classes I and II beyond 2025;
- V. The possible introduction of any new classes such as an energy efficiency class or the consolidation of existing ones;
- VI. The timeframe and manner in which new renewable Class I and II sources might transition to and be treated as existing renewable sources and if appropriate, how corresponding portfolio standards of new and existing sources might be adjusted;
- VII. The experience with and an evaluation of the benefits and risks of using multi-year purchase agreements for certificates, along with purchased power, relative to meeting the purposes and goals of the [RPS statute] at the least cost to consumers and in consideration of the restructuring policy principles of RSA 374-F:3;
- VIII. Alternative methods for RPS compliance, such as competitive procurement through a centralized entity on behalf of all consumers in all areas of the state; and
- IX. The distribution of the Renewable Energy Fund established in 362-F:10.

In preparation for the 2018 Review, the Commission partnered with the University of New Hampshire's Sustainability Institute Fellowship program in 2016. As a result of this partnership, the *New Hampshire Renewable Portfolio Standard Retrospective 2007 – 2015*, was published.³⁴ The report summarizes New Hampshire's RPS and documents RPS legislative actions and relevant Commission docket orders. The project also included developing materials showing RPS, REC, and ACP trends. Much of the trend data and diagrams are updated annually and incorporated in the Renewable Energy Fund annual report.

In 2017, Senate Bill 51 established a committee to “study subsidies for energy projects provided by the renewable portfolio standard.”³⁵ Commission Staff attended committee meetings and prepared testimony on how the RPS is structured, the costs and benefits of the RPS, and regional RPS market. The committee's final report found:³⁶

- 1) Renewable energy is an important part of the state's energy mix.
- 2) Using local fuels has a positive effect on New Hampshire's economy and jobs.
- 3) Businesses benefit from investment in renewable energy used to control their energy costs.

³⁴ *New Hampshire Renewable Portfolio Standard Retrospective 2007 – 2015*, available at:

<http://www.puc.nh.gov/Sustainable%20Energy/RPS/NH%20RPS%20Retrospective%202007-2015%20Report%20-%20FINAL.pdf>.

³⁵ SB 51, Laws 2017, 81:1.

³⁶ SB 51, Final Report of Committee to Study Subsidies for Energy Projects Provided by the Renewable Portfolio Standard, at pages 3-4 (October 26, 2017) [hereinafter *RPS Study Committee Final Report*], available at:

<http://www.gencourt.state.nh.us/statstudcomm/reports/1334.pdf>.

- 4) The REC market assists renewable generators in covering operating and other costs.
- 5) Given the high price of electricity in New Hampshire and its effect on electricity consumers, the positive contributions of renewable energy requires that a balance be achieved when it comes to costs and benefits of any future changes to the RPS.
- 6) The Commission will undertake an evaluation and review of the RPS in 2018.
- 7) To the extent practical, the actual costs of the RPS should be transparently reflected as a separate charge on a customer's bill.

The committee report also stated two recommendations:³⁷

- 1) The legislature should undertake a complete review of the 2018 PUC RPS report and any of its proposed RPS changes for potential legislative initiatives, with consideration for balancing the various RPS interests, including the economic activity, jobs, and use of local fuels supported by the RPS, the enhanced energy security from using renewables in the generation mix, the use of the RPS initiative by businesses, schools, hospitals and others to address energy costs, potential environmental impacts and benefits of any change, and the cost of the particular RPS initiative on customer bills in comparison to the typical total electric bill.
- 2) The legislature should consider enhancements to transparency in the RPS. HB 225, relative to information collection concerning electric renewable portfolio standards, has been re-referred in the Senate Energy Committee and should be considered.

The Commission's 2018 Review analyzes and addresses many of the committee's findings and recommendations.

The 2018 RPS Review officially commenced in January 2018 and included stakeholder meetings, analysis by Commission Staff and outside consultants, and written comments from stakeholders. The Commission hosted three stakeholder sessions in April, May, and June. During the first stakeholder session, the Clean Energy States Alliance (CESA) presented a national overview of the current status and trends of RPS, and Staff provided a summary of New Hampshire's RPS, and the process and timeline for the 2018 Review. Subsequent stakeholder sessions focused on the nine statutory review topics outlined above.

During the sessions, dozens of stakeholders representing entities such as distribution utilities, competitive suppliers, renewable energy developers, ratepayers, environmental non-profits, residents, and state agencies provided oral comments, with critical information about the performance of the RPS and projections for the future. An opportunity for written comments to be submitted was provided through September 7, 2018. The Commission received written comments from fourteen entities. All presentations, meeting summary notes, and written comments are available on the Commission's 2018 RPS Review webpage.³⁸

Research was conducted almost entirely by Commission Staff, with brief national and thermal RPS analysis provided by CESA at no charge to the state. Under a service agreement, Sustainable Energy Advantage, LLC (SEA) conducted a "what-if" scenario analysis using SEA's proprietary Renewable Energy Market Outlook (REMO) model for New England. Historically, the results from this REMO model have been used

³⁷ RPS Study Committee Final Report, *supra* note 36, available at:

<http://www.gencourt.state.nh.us/statstudcomm/reports/1334.pdf>.

³⁸ 2018 Review of RPS Law, RSA 362-F Webpage, <http://www.puc.nh.gov/Sustainable%20Energy/Review%20RPS%20Law.html>.

⁴⁰ Sustainable Energy Advantage, LLC, *An Analysis of Alternative New Hampshire RPS Scenarios*. [hereinafter *Sustainable Energy Advantage, LLC Report*]. This report will be made available on the Commission's Sustainable Energy webpage at:

<http://puc.nh.gov/Sustainable%20Energy/Review%20RPS%20Law.html>.

by a wide and diverse group of regional subscribers since 2005.³⁹ This qualitative and quantitative analysis illuminates potential market impacts for three alternative scenarios to the current RPS class structure as described below:

- 1) **Scenario 1:** Consolidate and retain current RPS classes as follows:
 - “New” (Classes I & II)
 - Class III
 - Class IV
 - Class I-Thermal Carve-Out
- 2) **Scenario 2:** Consolidate and retain current RPS classes as follows:
 - “New” (Classes I & II)
 - “Existing” (Classes III & VI)
 - Class I-Thermal Carve-Out
- 3) **Scenario 3:** Consolidate and retain current RPS classes into one single class.
 - “Class” (Classes I, II, III & VI)
 - Class I-Thermal Carve-Out

A reference case, or “status-quo,” scenario was used for evaluating the incremental impact of each alternative scenario. SEA’s report of their scenario modeling with their REMO tool summarizes the ratepayer, environmental, and economic impact for each alternative scenario. Some details of the model assumptions and results are presented throughout this report.

Additional reports and resources reviewed by Staff are included in Appendix B. A link to the Sustainable Energy Advantage, LLC [*Alternative Scenario Analysis*](#) report can be found in Appendix C.

REVIEW TOPICS

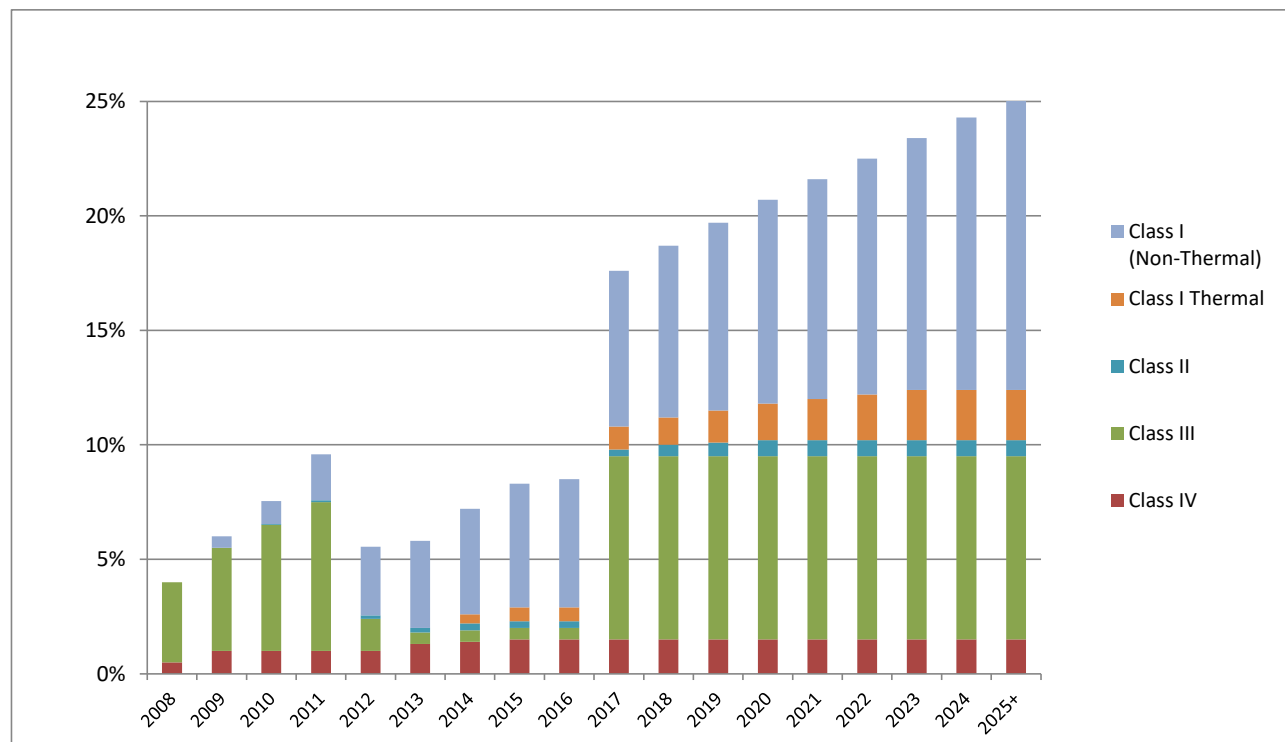
The “Review Topics” section considers each of the nine topics required for review under the statute along with a discussion of “other topics” that were raised in the SB 51 (2017) study committee final report and/or during the 2018 Review stakeholder sessions. Quotes from submitted written comments are contained in green-shaded text boxes. All submitted written comments are available on the Commission’s website.⁴⁰

Each topic discussion concludes with “Recommendations” presented in a blue-shaded box which includes both potential legislative and rule recommendations. For a complete list of all recommendations, please refer to Appendix A.

Adequacy of Sources to Meet Class Requirements (RSA 362-F:5, I)

The RPS requires that all electric service providers serving New Hampshire customers satisfy, on an annual basis, a percentage requirement of their electric retail sales load with renewable energy certificates (RECs), where each REC is created from one megawatt hour (MWh) of electric generation that has been fueled by qualified renewable sources. Compliance began in 2008 with an obligation for each electric provider to acquire and retire certificates from renewable sources corresponding to 4% of load served. The obligation increases to 25.2% by 2025. Annual obligations by RPS class are illustrated in Figure 2.

Figure 2. New Hampshire RPS Requirements 2008 to 2025+



⁴⁰ Written Comments Submitted, <http://www.puc.nh.gov/Sustainable%20Energy/Review%20RPS%20Law.html>.

RECs are generated by certified renewable energy facilities and sold into a regional market. Renewable energy facilities must apply for New Hampshire RPS certification. Facilities submit to the Commission a class-specific application for review and approval. Generation facilities eligible for New Hampshire certification are located in New Hampshire and within the ISO-NE region. The Sustainable Energy Division reviews applications and certifies facilities as eligible to generate RECs under state statutes and administrative rules (Puc 2500 RPS rules). Facility owners must purchase and install a revenue quality meter to record the gross output and retain the services of an independent monitor to be eligible for certification.

Upon certification, Commission Staff notifies the New England Power Pool Generation Information System (NEPOOL GIS), which issues and tracks RECs for the region. Gross output from certified customer-sited facilities is verified and reported by independent monitors to NEPOOL GIS. On a quarterly basis, NEPOOL GIS issues RECs for reported generation and administers a two-month trading period. RECs generated in one state may be sold in another provided the facility is certified in that state as well.

The class structure of New Hampshire’s RPS helps promote fuel diversity. In New Hampshire, Class I represents new eligible renewable facilities of a variety of technologies. The quantity and capacity of Class I renewable energy facilities have increased dramatically since 2011. For example, the number of Class I certified facilities has almost tripled from 29 certified facilities in 2011 to 83 in 2018. Examples of newly certified facilities include Groton Wind (48 MW), Lempster Wind (24 MW), Jericho Mountain Wind (12 MW), and Burgess BioPower (76.5 MW). Class II, solar electric, has seen the most expansive growth from 156 certified facilities in 2011 to over 2,700 certified facilities in 2018; most of which are located in New Hampshire. Solar PV examples include: Peterborough Wastewater Treatment facility, Plymouth Wastewater Treatment facility, Durham Town Solar, Milton Landfill Solar; and thousands of small commercial scale and residential distributed generation systems certified as eligible for New Hampshire Class II.

Class III represents existing biomass and methane facilities. Class III saw the number and capacity of eligible certified facilities increase modestly between 2011 and 2017. Class IV, existing small hydroelectric, saw a significant increase in eligible certified facilities over the past seven years, with most facilities becoming eligible in 2012. This is primarily due to a legislative amendment (SB 218), enacted in 2012, to the fish passage requirement.

Figure 3 shows a comparison between 2011 and 2017 of certified facilities located in New Hampshire by RPS Class.

“GHSA believes that the RPS program is working as designed and that there is no need for significant changes to the overall program.”

**Granite State Hydropower
Association**

“Energy supply projects require long-term planning and, therefore, benefit from long-term certainty in the market.”

**New Hampshire
Department of Environmental
Services**

Figure 3. Certified Facilities Located in New Hampshire; Nameplate Generating Capacity (MW) in 2011 and 2017

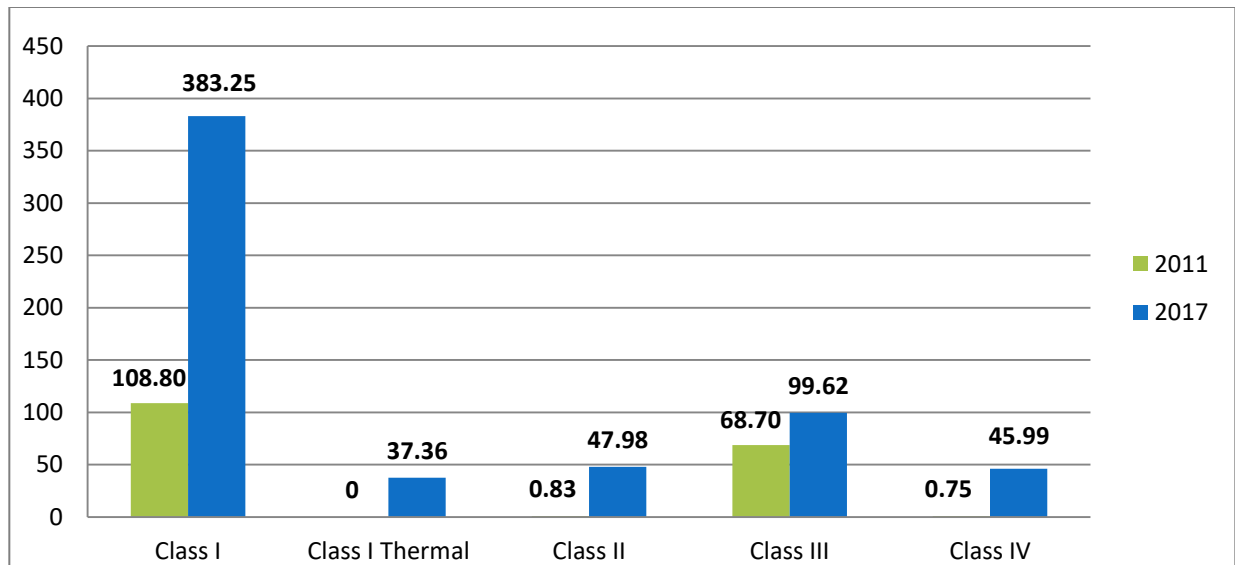


Figure 4 presents, for each RPS Class, the total number and nameplate capacity of New Hampshire certified facilities located in New Hampshire, New England and New York, illustrating the fuel diversity of the RPS. A complete list of certified, eligible, facilities is available on the Commission’s website.⁴¹

Figure 4. Number & Capacity of Approved RPS Certified Facilities by Location as of 9/28/18

	Certified Facilities				Nameplate Capacity (MW)			
	NH	NE*	NY	Total	NH	NE*	NY	Total
Class I	27	32	24	83	383.25	470.66	1,064.7	1,918.61
Class I - Thermal	48	n/a	n/a	48	37.36	n/a	n/a	37.36
Class I- Biodiesel	0	n/a	n/a	0	0	n/a	n/a	0
Class II	2,697	7	0	2,704	47.98	30.97	0	78.95
Class III	9	9	5	23	99.62	60.75	20.2	180.57
Class IV	50	11	0	61	26.0	19.99	0	45.99
Total	2,831	59	29	2,919	594.21	582.37	1,084.90	2,261.48

*Rest of New England other than New Hampshire

Because Class I, Class I-Thermal and Class III represent multiple eligible renewable technologies, Figures 5, 6 and 7 are provided to illustrate the breakdown of facilities by technology, by both number of facilities and nameplate capacity.

⁴¹ Renewable Energy Certification and Eligible Facilities, http://www.puc.nh.gov/Sustainable%20Energy/Renewable_Energy_Source_Eligibility.htm.

Figure 5. Class I Certified Facilities by Technology

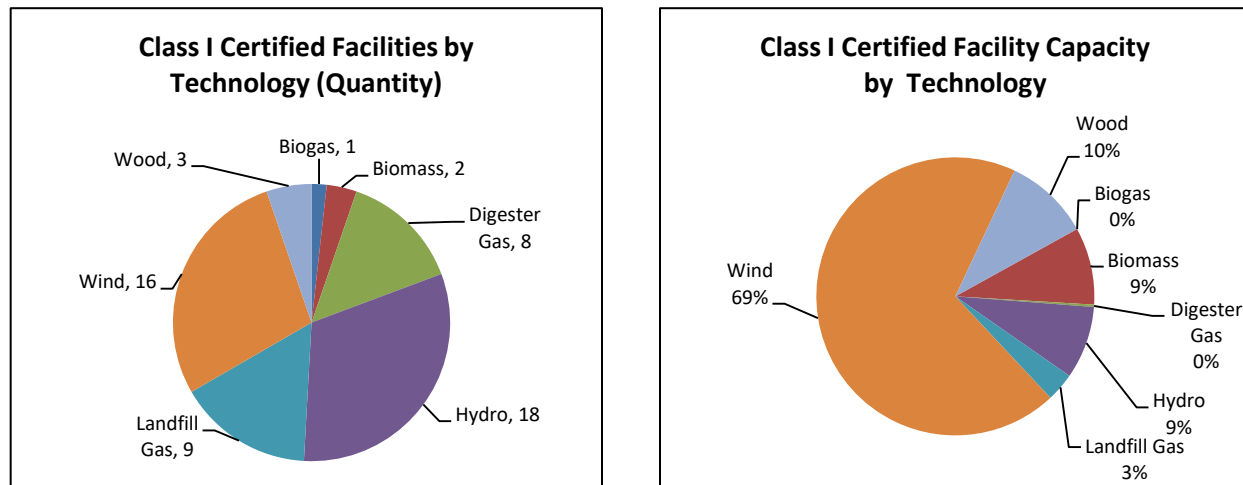


Figure 6. Class I-Thermal Certified Facilities by Technology

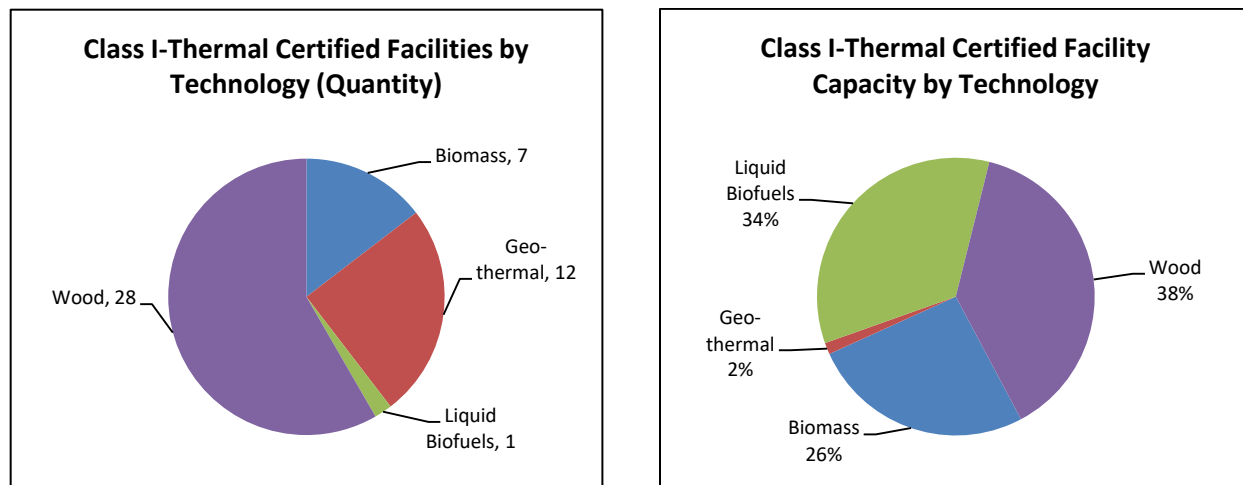
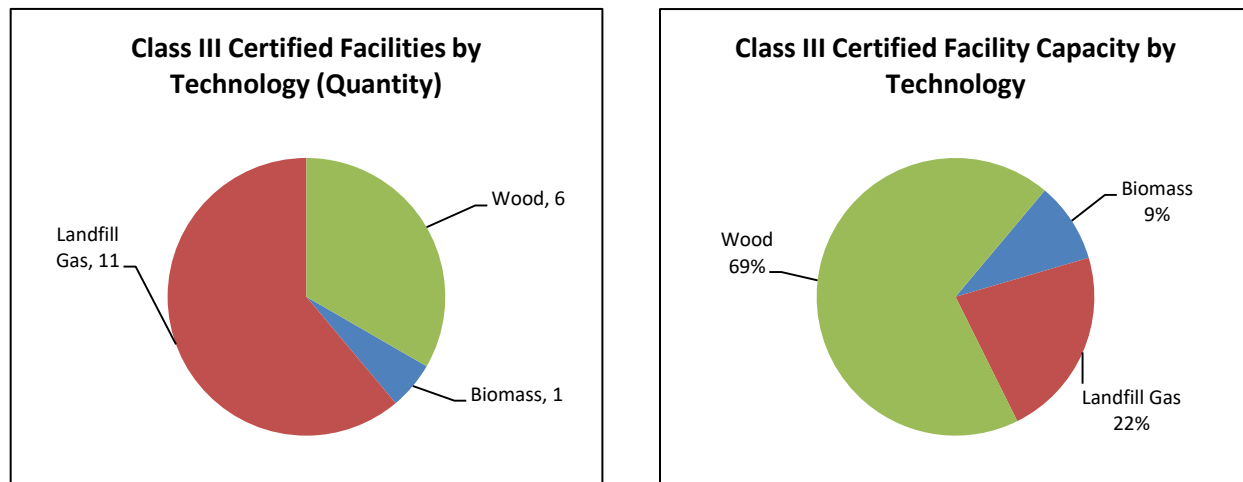
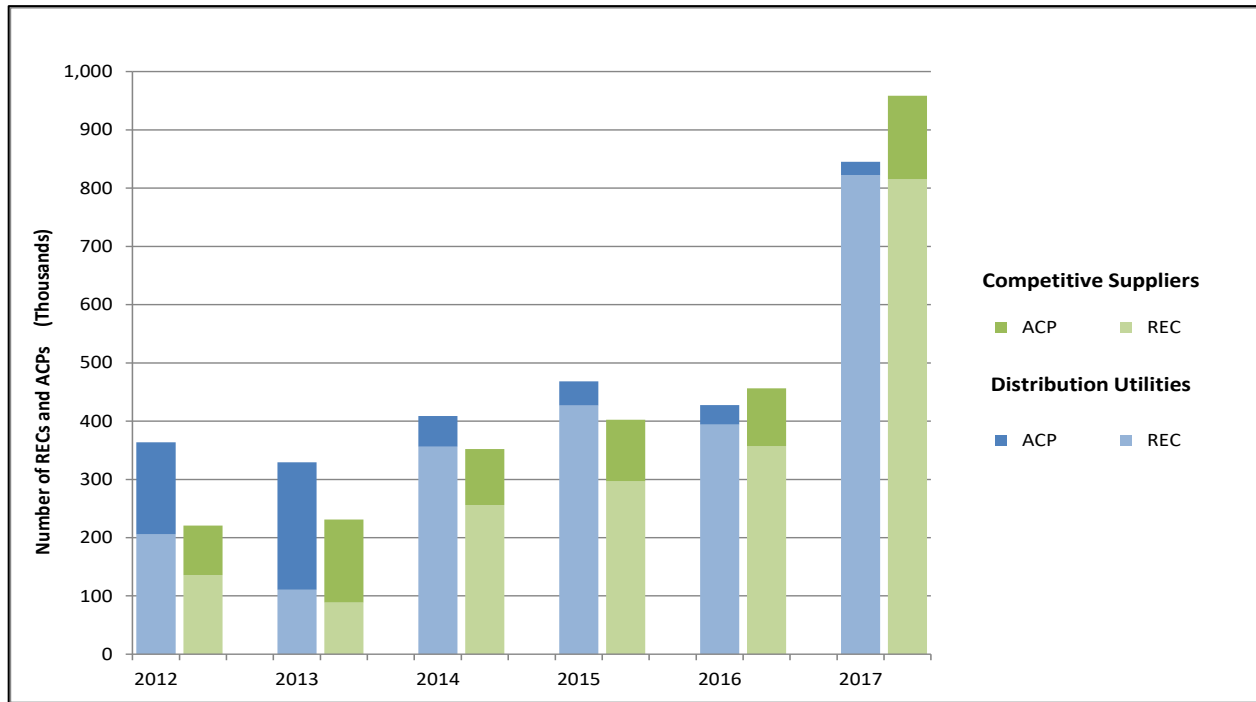


Figure 7. Class III Certified Facilities by Technology



The number and capacity of New Hampshire certified renewable generation facilities have increased since the inception of the RPS. With increased development and certification, the electricity providers have been able to meet much of their annual obligation through the purchase of RECs, especially in 2014, 2015, 2016 and 2017 compliance years. Figure 8, on the next page, illustrate the quantities of RECs and ACPs used for compliance in each compliance year. This figure further provides a disaggregated comparison for distribution utilities and competitive suppliers.

Figure 8. RPS Compliance by RECs and ACPs for Distribution Utilities and Competitive Suppliers



Given the overall increase in New Hampshire certified renewable energy facilities and continued project development in resource classes where there is currently a slight shortage, there should be adequate sources for electricity providers to meet much of their annual obligation through the purchase of RECs. This expectation is confirmed by the reference case modeled using SEA’s REMO modeling tool, which “predicts an RPS market in surplus, both short and long-term.”⁴² For these reasons, it is recommended that the existing class obligations be maintained for policy consistency and predictability.

Adequacy of Sources to Meet Class Requirements (RSA 362-F:5, I)

Recommendation:

Maintain the existing class obligations for policy consistency and predictability for the renewable energy industry, particularly given the limited ability of New Hampshire to significantly affect the regional REC market and the potential for increased rate impacts if the class obligations were to increase.

⁴² Sustainable Energy Advantage, LLC Report, supra note 40.

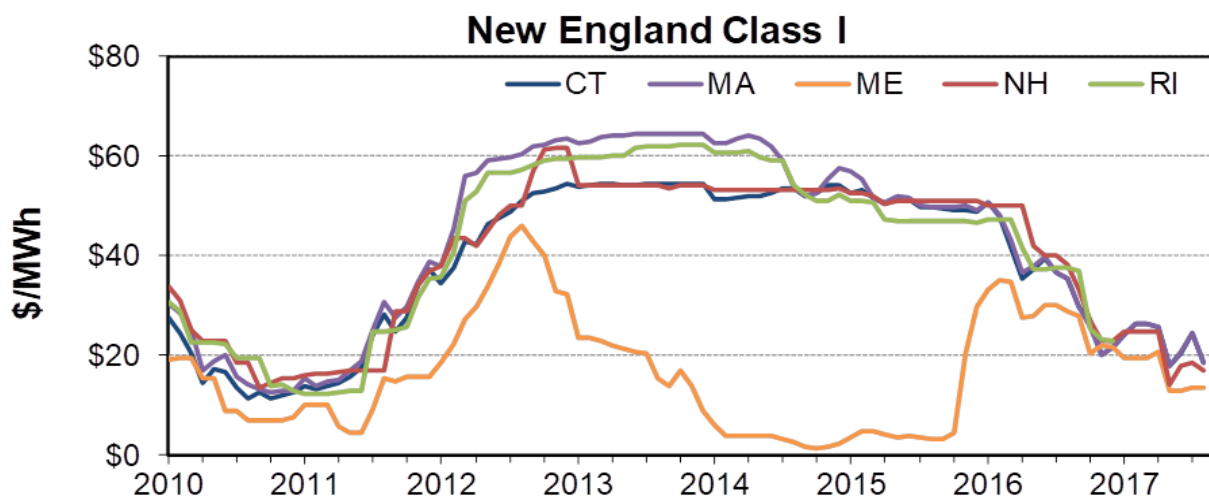
Class Requirements and Market Conditions (RSA 362-F:5, II)

2011 through 2017 REC Market Conditions

The structure of the RPS in New Hampshire, as in many other state RPS programs, is market-based. For example, when the demand for RECs in a particular Class is greater than supply, the price of a REC rises to approach the ACP rate. Conversely, when the supply substantially exceeds the demand, the REC market may drop to a price approaching zero. This is because, if every entity that must comply with an RPS requirement has met that requirement, then the remaining unsold RECs have little or no market value, aside from banking RECs for future compliance periods.

REC prices are a function of ACP rates and current/expected supply and demand. REC prices in the New England region have generally declined in recent years. Figure 9, from Lawrence Berkeley National Laboratory, presents REC prices for Class I (new renewables) between 2010 and 2017. The New Hampshire Class I REC market (prices) tends to track the Connecticut, Massachusetts, and Rhode Island market prices.

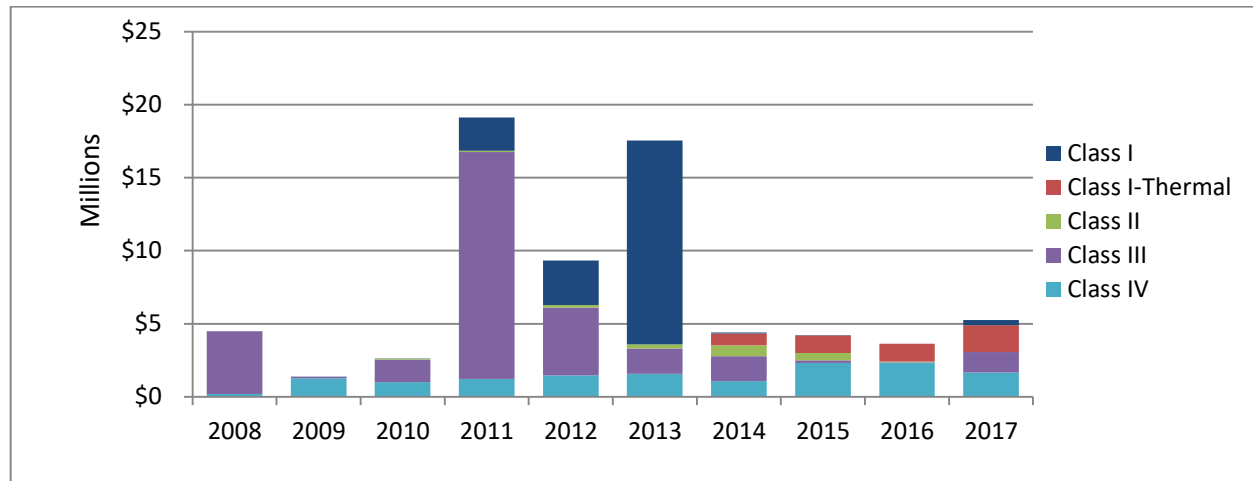
Figure 9. New England Class 1 REC Prices (2010 - 2017)



Source: Lawrence Berkeley National Laboratory

For example, the most recent New Hampshire RPS compliance reporting periods, for 2014 – 2017, showed that electric providers made relatively small, or no, alternative compliance payments in lieu of purchasing Class I RECs, which is reflective of adequate supply and corresponding lower REC prices. Similarly, Class II ACPs were minimal in most compliance years and zero in 2016 and 2017 due in large part to the credit provided for net metered facilities that are not REC certified. The Commission has monitored Connecticut’s RPS policy in relation to biomass and adjusted Class III’s obligation if the market caused Class III RECs to sell primarily into Connecticut. Class IV saw compliance by ACPs annually due to the competition for these RECs from Massachusetts and from constrained REC production due to hydrological conditions. And Class I-Thermal saw compliance by ACPs annually due to the annual increase in the class obligation and the lead time necessary to develop and certify qualified facilities. Figure 10 illustrates the annual ACPs used for compliance by class.

Figure 10. ACP Compliance by Class and Compliance Year (2008 – 2017)

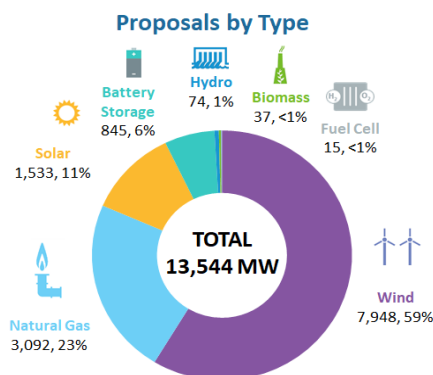


Expected REC Market Conditions

Predicting the future supply and price dynamics of New Hampshire’s REC market, as well as the regional REC market, is difficult. The New Hampshire and regional REC markets are inextricably linked to each other. For example, changes in the Connecticut and Massachusetts RPS policies affect the New Hampshire REC market, as those states comprise the largest loads for the New England control region (ISO-NE).

REC supply has generally been provided by solar, hydroelectric and biomass; however, with the growth of on-shore and off-shore wind and large-scale solar development due to cost declines, policy modifications, resource potential, and consumer demand, the regional renewable resource portfolio may shift. “By examining new generator proposals submitted to ISO-NE, it is easy to see how public policy and economics are driving the industry’s choices for tomorrow’s fuel sources. As of January 29, 2018, about 14,800 MW have been proposed in the ISO-NE Generator Interconnection Queue.”⁴³

Figure 11. ISO-NE Project Queue Resource Mix August 2018, by Type and By State⁴⁴



Note: Some natural gas proposals include dual-fuel units (oil); some wind and solar proposals include battery storage; megawatts represent nameplate capacity ratings; megawatts have been rounded for each proposal. Proposals in the queue for facilities sited in New Hampshire equal 243 MW.

⁴³ Resource Mix, ISO New England, <https://www.iso-ne.com/about/key-stats/resource-mix#on-the-way-in> (last visited Oct. 29, 2018).

⁴⁴ Resource Mix, ISO New England, ISO Generator Interconnection Queue (August 2018) FERC and Non-FERC Jurisdictional Proposals, <https://www.iso-ne.com/about/key-stats/resource-mix#on-the-way-in> (last visited Oct. 29, 2018).

The scenario analysis performed by SEA used a reference case as the basis for comparison of impacts of three other scenarios. The reference case was a model of the current regional RPS supply and demand taking into account current, quantifiable policy initiatives, renewable energy solicitations, and the 2018 regional forecast of capacity, energy, load, and transmission (CELT) by ISO-NE. A detailed discussion of the model assumptions is available in Section 4 of the SEA report (see Appendix C). The reference case forecast of the New Hampshire RPS produced for the period 2020-2029 shows, in general, a Class 1 RPS market which is in surplus (i.e., has more RECs than required for regional compliance) in both the short and long term. SEA also forecasts there is a sufficient supply of Class III RECs from certified facilities, and this condition is expected to continue absent policy or market changes. Class IV RECs may continue to be in short supply, as these facilities are usually certified in other states (i.e., Massachusetts, Maine, and Rhode Island), and the RECs will compete in those other markets.

"The market is somewhat different for each RPS class and varies over time."

"The PUC should have more discretion to suspend RPS increases."

Constellation NewEnergy

Commission Staff analysis calculates Class II will have sufficient REC supply to meet RPS requirements. Excess supply of Class II RECs is available for use in Class I compliance as needed. Staff also expects the Class I-Thermal market will experience continued growth in compliance by RECs rather than ACPs as supply continues to develop.

The remainder of the presentation for this review topic provides a more detailed discussion for each class.

Class I (New or Expanded Non-Thermal Renewable Generation)

The Class I non-thermal REC requirements are designed to stimulate investment in new sources of renewable energy in New Hampshire and other northeast states. The Class I requirement ramps up incrementally from 0.5% of retail load in 2009 to 12.8% by 2025 and thereafter.

The Class I non-thermal requirement is essentially technology neutral; nearly every form of renewable electricity is eligible. Allowable technologies include: wind; hydrogen derived from biomass fuels or methane gas; ocean thermal, wave, current, or tidal energy; methane gas; eligible biomass technologies; and incremental generation from an eligible biomass or methane source or hydroelectric generating facility. Biodiesel manufactured in New Hampshire and used by a New Hampshire end-user to generate thermal energy may also be used to satisfy up to one-eighth of an electricity provider's Class I obligation.

Numerous renewable energy facilities have been developed in New Hampshire that are eligible to produce Class I RECs. Several biomass and methane gas facilities are certified, including: Schiller Station's 50 MW wood boiler; Burgess BioPower's 75 MW biomass plant in Berlin; the University of New Hampshire's 8 MW combined heat and power facility and its 5 MW generating unit, both of which are fueled in part with landfill methane gas; and Indeck's 16 MW biomass power plant in Alexandria. In addition, several wind facilities have become operational and are certified to produce Class I RECs. These include the 24 MW Lempster Wind farm, the 12 MW Jericho Mountain Wind facility, and the 48 MW Groton Wind project. Under development is the 28.8 MW Antrim Wind project, which likely will be an eligible Class I resource.

New England Class I REC prices (per MWh) have generally decreased since 2011 due to an adequate supply of RECs available to meet regional demand. The corresponding downward trend in New Hampshire Class I REC prices also indicates that there is an adequate regional supply of RECs relative to the demand. The SEA Alternative Scenario Analysis reference case modeling results show that Class I will continue to experience sufficient supply over the study period (2020-2029). The SEA report states “[d]ue to regional surplus, it is possible for New Hampshire Class I RPS target increases to be fulfilled cost-effectively with excess RECs from Massachusetts, Connecticut, and Rhode Island procurements.”⁴⁵

Class I Biodiesel

In 2016, the Renewable Portfolio Standard law was amended to include useful thermal energy from the production of biodiesel fuel sold into the thermal energy market as an eligible source for RPS compliance.⁴⁶ The RECs associated with the production of biodiesel fuel by any facility located in New Hampshire may be used to meet no more than one-eighth of an electricity provider’s non-thermal Class I requirement in any given compliance year, and only if all applicable air emission and water discharge standards are met by the biodiesel production facility. The biodiesel production facility must document the sale of the biodiesel fuel into the thermal energy market and provide documentation of end-user efficiency rating; or, where such documentation is not practicable, assume the average end-user efficiency rating by customer class. The legislation required the Commission to establish procedures for the metering, verification, and reporting of useful thermal energy output for producers of biodiesel fuel.

On October 18, 2016, the Commission opened a rulemaking proceeding, Docket DRM 16-829,⁴⁷ with respect to potential amendments of the Commission’s rules relative to the RPS administrative rules (Puc 2500 rules⁴⁸). Several technical sessions were held to solicit stakeholder input regarding potential amendments to the rules. Staff worked with the New England Power Pool (NEPOOL) Markets Committee to establish changes required to be made to NEPOOL’s Generator Information System (GIS) operating rules in order to accommodate the creation, tracking, and sale of biodiesel production RECs. The NEPOOL Markets Committee has approved the necessary revisions to the GIS operating rules. On September 12, 2017, draft rules were filed with the Office of Legislative Services Administrative Rules Division. The amended rules were adopted on February 1, 2018. To date, no facilities have applied for certification.

Class I-Thermal

The Class I-Thermal Class, established in 2014, is a carve-out of Class I and includes new facilities generating thermal energy from renewable sources. The Class I-Thermal requirement has been modified over the years but it began at 0.4% of load in 2014 and increases by 0.2% annually until reaching a maximum of 2.2% of load by 2023 and thereafter. The Class I-Thermal REC market was slow to start up, but targeted financial support from the REF in recent years has resulted in a significant increase in the number of certified facilities and thermal REC generation capacity. Over the past five years (2013-2018) more than 40 projects have become eligible to generate and sell Class I-Thermal RECs. Most of the projects are large commercial wood biomass facilities, but there are nine geothermal projects generating RECs and, in 2018, Keene State College became the first facility to generate RECs from a liquid biofuel.

⁴⁵ *Sustainable Energy Advantage, LLC Report* at 8, *supra* note 40.

⁴⁶ SB 386 (2016), available at:

http://www.gencourt.state.nh.us/bill_status/billText.aspx?sy=2017&id=1135&txtFormat=pdf&v=current.

⁴⁷ NH PUC Docket No. DRM 16-829, available at: <http://www.puc.nh.gov/Regulatory/Docketbk/2016/16-829.html>.

⁴⁸ N.H. Code Admin. Rules Puc chapter 2500, available at: <http://www.puc.nh.gov/Regulatory/Rules/Puc2500.pdf>.

In 2017, 30% of the Class I-Thermal RPS obligation was met with RECs and the remaining portion with ACPs. Roughly 33% of the thermal requirement was generated by certified facilities in the state, but some RECs were banked by electric providers rather than being retired for RPS compliance in 2017. Such market allocation issues may continue to exist for a variety of reasons. A review of thermal generation capacity of recently certified facilities and those known to be under development suggests that 2018's Class I-Thermal requirement could be met with approximately 75% RECs.

Senate Bill 577 of 2018 allows thermal energy generated from renewable methane from landfills to be eligible for Class I-Thermal RECs. The Commission will need to develop rules to implement this change, but this new qualifying fuel source for thermal generation will likely result in a significant increase in the supply of Class I-Thermal RECs beginning as early as 2020. In 2025, the Class I-Thermal requirement is 2.2%, which equates to a need for an estimated 220,000 RECs. Staff estimates that 50% of that demand could come from a single currently proposed renewable methane project. Both the ongoing biomass thermal market development and the new renewable methane thermal component will help meet increasing obligation for thermal RECs.

Nonetheless, more can be done to assist with the expansion of the thermal market. While many large commercial thermal facilities are becoming certified as Class I-Thermal eligible facilities, certification of residential and small commercial thermal facilities remains low. Stakeholders indicated that, for small thermal facilities, the costs associated with metering requirements and independent monitoring effectively serve as barriers to RPS market entry, especially when compared to potential REC revenue. Stakeholders further indicated that the registration and certification process is complex and, in addition to the aforementioned costs, has contributed to low levels of residential and small commercial thermal facility certification. The Commission may consider revisions to the registration and application processes through Puc 2500 rule changes. Legislation, including express language designed to provide greater flexibility regarding the process for measuring useful thermal energy from small facilities, may result in adoption of less costly methods, thereby effectively mitigating the perceived economic barriers. This, in turn, could increase the number of certified eligible residential and small commercial scale thermal energy sources.

"[R]ecommend legislative steps be taken to create more equilibrium in the supply and demand for thermal RECs. This could be accomplished through, among other actions, adjustments to the thermal REC obligations, broadening the technology/resource types that can be certified to produce thermal RECs, or both."

New Hampshire Electric Cooperative

"[A]dd qualified sources to the approved list of technologies eligible to generate TRECs (thermal RECs). Air source heat pumps should be made eligible now."

Joint Commenters

New Hampshire Clean Tech Council

Class Requirements and Market Conditions (RSA 362-F:5, II)

Legislative Recommendation:

Consider statutory amendment language that would expressly expand the range of methods by which useful thermal energy may be measured, monitored, and reported for residential and small commercial thermal energy facilities; such methods might include, for example, calculating thermal production using fuel input quantities and unit efficiency determinations or assumptions, while incorporating appropriate discounts for uncertainty.

Class Requirements and Market Conditions (RSA 362-F:5, II), continued

Recommendation:

The Commission will continue to monitor the eligibility and sources of Class I-Thermal RECs and, if necessary, recommend increasing the requirement. Ongoing monitoring and analysis may be necessary due to new sources qualifying with the passage of House Bill 577 (2018), which establishes renewable methane as an eligible source for Class I-Thermal RECs.

Recommendation:

The Commission will consider Puc 2500 rule revisions to further simplify the registration and certification processes for Class I-Thermal eligible facilities.

Class II (New Solar)

Class II includes solar technologies that became operational and began producing electricity after January 1, 2006. Currently, the obligation for purchasing Class II RECs is 0.3% and did not change from 2014 until 2018. The requirement is increasing to 0.5% in 2018, 0.6% in 2019, and 0.7% in 2020, and then remains at 0.7% until 2025 and thereafter.

At the end of calendar year 2017, approximately 70 MW of New Hampshire sited net-metered solar was installed by more than 7,000 customers.⁴⁹

Figure 12 shows the solar facilities that are interconnected with the New Hampshire grid and net metered as of December 31, 2010 and December 31, 2017. During that time period, the number of facilities interconnected increased from 546 to 7,277 with capacity increasing from approximately 2 MW to almost 70 MW.

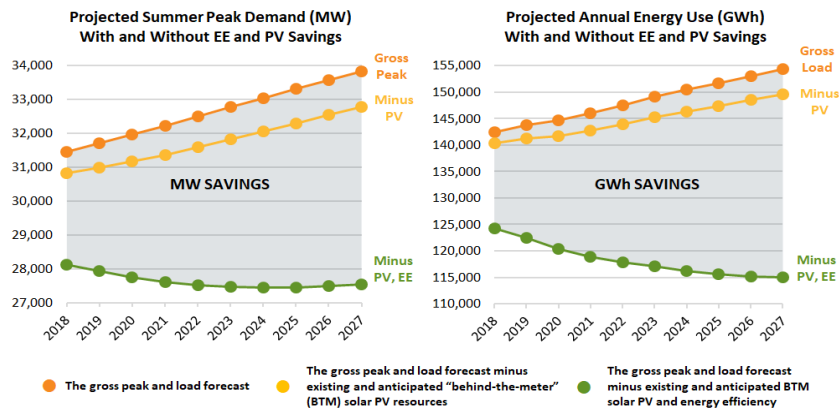
Figure 12. Net Metered Solar Facilities in New Hampshire by Utility in 2010 Compared with 2017

Electric Distribution Utility	Number of Net Metered Solar PV Installations 12/31/2010	Total Installed Capacity (MW) 12/31/2010	Number of Net Metered Solar PV Installations 12/31/2017	Total Installed Capacity (MW) 12/31/2017
New Hampshire Electric Cooperative	141	0.456	848	7.182
Liberty Utilities	44	0.145	416	4.032
Eversource Energy	329	1.463	5,272	51.712
Unitil Energy Systems, Inc.	32	0.284	741	6.495
Total	546	2.348	7,277	69.421

⁴⁹ See *Final 2018 PV Forecast* at 13, ISO New England (May 1, 2018) (Table entitled “December 2017 Year-to-Date Installed PV by Distribution Owner”), <https://www.iso-ne.com/static-assets/documents/2018/04/final-2018-pv-forecast.pdf>.

Solar electric energy, when interconnected with a local distribution grid, may help avoid transmission charges and distribution and transmission capacity investments, because it tends to produce substantial amounts of power, close to where it is consumed, at times of high electric demand. New Hampshire and New England experience “peak demand” in the summer largely because of air conditioning. Summer peaking hours are generally in the mid to late afternoon. These are daylight hours when solar tends to be generating electricity. ISO-NE estimates that behind the meter PV generation results in summer peak load reductions which can, in turn, reduce New Hampshire’s share of regional network load used to allocate regional transmission costs. See Figure 13 and Appendix E for more information.

Figure 13. ISO-NE Forecast with Energy Efficiency and Solar PV



Note: Summer peak demand is based on the “90/10” forecast, which accounts for the possibility of extreme summer weather (temperatures of about 94° F).
Source: ISO New England 2018-2027 Forecast Report of Capacity, Energy, Loads, and Transmission (2018 CELT Report) (April 2018)

ISO-NE projects New Hampshire electric utility customers will continue to interconnect 13-14 MW annually of new solar PV between 2018 and 2027, leading to a total installed capacity of approximately 200 MW by 2027.⁵⁰ ISO-NE has also developed a PV energy forecast at the state level, using state monthly nameplate forecasts along with state average capacity factors (CF) developed from four (4) years of PV performance data (2014-2017). ISO-NE solar performance data shows the generation capacity factor to be 14.2% based on the AC size of the PV installation.⁵¹

Given the predictions for growth in solar capacity, the REC market may see unbalanced levels in the supply and demand of Class II RECs. New Hampshire’s Class II REC market has recently experienced a decline in REC prices as the demand for these RECs has declined. In addition, all electricity providers can claim a credit, calculated by the Commission, using capacity from interconnected net metered facilities that do not apply for REC authorization for their Class II compliance obligation. The credit has grown annually and, in compliance year 2017, exceeded the obligation.

There was no consensus among the stakeholders on the necessity of the net metering credit for Class II. Some stakeholders argued in favor of retaining the credit because it reduces the overall cost of compliance for electric providers, thereby reducing the impact of RPS compliance costs on ratepayers. Others thought the credit should be eliminated to increase the market for Class II RECs, or reduce administrative burden, or stated that the credit distorts the market and is difficult to predict.

⁵⁰ *Id.* at 31, <https://www.iso-ne.com/static-assets/documents/2018/04/final-2018-pv-forecast.pdf>.

⁵¹ *Id.* at 35.

The Commission agrees the net metering credit, like the one in current law, is a reasonable policy component of the RPS designed to recognize the renewable attributes of all eligible solar PV sited in New Hampshire, including those that are not REC-certified. Further, because the PV facilities for which the credit is being claimed likely received support from the Renewable Energy Fund, the energy generated from non-REC certified, net metered solar electric facilities should contribute to the State’s renewable energy goal of 25.2% by 2025.

Currently, the credit is calculated using a 20% capacity factor, as defined in statute. Reducing the capacity factor to 14% based on the ISO-NE solar performance data will reflect more accurate load production and help to increase the market for Class II RECs.⁵² Calculations show that this change alone would have made enough of a difference in the credit in the 2017 compliance year that there would have been a small positive demand for Class II RECs.

Staff also expects more Class II eligible facilities will be certified, thereby slowing the growth of the credit. Staff’s prediction and the Commission’s recommendation are based on several additional factors including:

1. the Commission has developed and deployed a new REC application, certification, and tracking database in 2018 which, among other things, has resulted in faster approval of submitted REC applications;
2. the introduction of Commission-approved electronic generation monitoring systems has increased the number of Commission-certified independent monitors;
3. indications that a larger percentage of completed solar PV projects are submitting timely REC applications;
4. Commission Order No. 26,029 “approve[d] the proposal for the utilities to serve as independent monitors for DG system owners, at the option of the customers, and certify their systems with the Commission and report their electricity production at least quarterly to NEPOOL-GIS, as well as the proposal for the utilities to install production meters at the option of the DG system owners, all at no cost to those customers. We also approve the proposal for the utilities to facilitate REC program promotion and customer education, and direct the utilities to coordinate with Staff in connection with those efforts;”⁵³ and
5. a scheduled increase in the Class II obligation for 2018 (up from 0.3% to 0.5%).

The cumulative impact of these changes is likely to be an increase in demand for Class II RECs in 2019, and continuing into the future.

⁵² See *id.* at 35, <https://www.iso-ne.com/static-assets/documents/2018/04/final-2018-pv-forecast.pdf>.

⁵³ Order No. 26,029 at 57-58 (June 23, 2017), http://www.puc.nh.gov/Regulatory/Docketbk/2016/16-576/ORDERS/16-576_2017-06-23_ORDER_26029.PDF.

“The PUC should focus its recommendations on specific policy adjustments that will alleviate this burden on the ratepayer and focus on decreasing the cost of compliance while still achieving the legislative goals set forth in the statute.”

New Hampshire Office of Strategic Initiatives

“New Hampshire currently uses a capacity factor of 20% (to calculate the net metering credit). This number is too high and is not supported by any empirical data.

[C]omplete elimination of the net metering credit. At a minimum, the capacity factor should be calculated off of read data and adjusted as soon as possible.”

Knollwood Energy

Finally, both the RPS statute and PUC rules clearly state that Class II RECs may be used to satisfy Class I obligations or may be sold out of state if the resource is also registered in other jurisdictions. This should provide an additional market opportunity for Class II RECs.

Retaining the credit for net metered facilities that are not REC certified may create a downward pressure on Class II REC prices; however, Class II RECs, for facilities that are REC certified, should maintain some market value.

Class Requirements and Market Conditions (RSA 362-F:5, II)

Recommendation:

Continue to provide a net metering credit toward compliance for interconnected facilities that net meter but do not apply for REC authorization.

Legislative Recommendation:

Consider amending RSA 362-F:6, II-a to reduce the capacity factor rating used to estimate yearly production for customer-sited sources that net meter but are not REC certified for Class I or Class II. Decrease the capacity factor rating from 20% to 14%.

Class III (Existing Generation from Biomass/Methane)

Another local energy resource important for New Hampshire is biomass. Not only do biomass energy resources provide heat and electricity to the state, the industry also provides significant tax revenues and jobs. The Class III requirement, which includes production of electricity from existing biomass facilities with a gross nameplate capacity of 25 MW or less, began at 3.5% of electric retail load in compliance year 2008, and increased to 8% in 2012, where it will remain through 2025 and thereafter.

Class III also includes existing electric generation from methane gas facilities. Legislation was enacted in 2017 to exclude aggregated landfill gas facilities with an aggregate capacity greater than 10 MW.

Class III REC supply, due to the temporary or permanent closure of regional biomass plants and/or the sale of New Hampshire Class III RECs into the Connecticut or Massachusetts Class I markets, is monitored closely by Commission Staff. Regional RPS policy and market dynamics may also shift market activity. For example, during the 2013 - 2016 compliance years, New Hampshire Class III RECs were being sold into the Connecticut Class I market, where they had a higher market value due to a higher ACP rate. If a deficit of RECs is expected, the Commission has the authority to open a proceeding to review class requirements in

“Existing facilities provide significant numbers of jobs and statewide economic activity.”

“[T]he RPS seeks to promote renewable generation while mitigating the environmental effects of generation. ... Class III biomass eligibility is subject to maintaining quarterly air emissions of NOx and particulate matter at levels below those allowed under Title V Clean Air Act permits.”

The Biomass Generation Group

light of market conditions. Per several Commission Orders,⁵⁴ after public hearing and comment, the Commission reduced the Class III requirement to 0.5% for compliance years 2013 through 2016. In compliance year 2017, as a result of regional policy and market changes, the requirement returned to its originally planned 8% level.

The SEA Alternative Scenario Analysis reference case modelling results show a modest surplus of Class III RECs over the study period. Please see Appendix C for additional details.

Class Requirements and Market Conditions (RSA 362-F:5, II)

Recommendation:

Maintain the existing Class III obligation for policy consistency and predictability. The Commission will continue to monitor the eligibility of available sources, other state's RPS policies, and anticipated supply of Class III RECs. If necessary, the Commission will open a docket to determine if it is necessary to modify the Class III requirement for the calendar year, such that the requirement equals 85% to 95% of the reasonably expected potential generation from certified facilities after taking into account demand from RPS programs in other states.

Class IV (Existing Small Hydroelectric)

Class IV was created to acknowledge the value of our state's hydroelectric generation resource base, and to support the continued operation of existing small hydroelectric facilities. In order to qualify to produce Class IV RECs, the hydroelectric facility must have begun operation prior to January 1, 2006, meet applicable state water quality certification when required, and have either (1) a total nameplate capacity of 5 MW or less, actually installed upstream and downstream diadromous fish passage, with such installations approved by FERC, or (2) a total nameplate capacity of 1 MW or less, is in compliance with applicable FERC fish passage restoration requirements and is interconnected with an electric distribution system located in New Hampshire.

Small hydro generators that are eligible for New Hampshire Class IV certification are also likely

"There are adequate sources to meet the Class IV REC requirements."

Granite State Hydropower Association

"Class 4 should be eliminated. ... The time and effort of all these individuals (traders, lawyers, credit specialists, compliance officers, etc.) is simply not justified by the potential savings associated with purchasing Class 4 RECs as opposed to meeting compliance obligations through the ACP."

Constellation NewEnergy

⁵⁴ [Order No. 25,844](#) (December 2, 2015) in Docket No. DE 15-477 (changing Class III obligations in 2016); [Order No. 25,768](#) (March 13, 2015) in [Docket No. DE 15-035](#) (changing Class III obligations in 2014 and 2015); [Order No. 25,674](#) (June 3, 2014) in [Docket No. DE 14-104](#) (changing Class III obligations in 2013); [Order No. 25,484](#) (April 4, 2013) in [Docket No. DE 13-021](#) (changing Class III obligations in 2012 and 2013).

eligible for Maine Class II and Massachusetts Class II certification. New Hampshire Class IV generators can sell into any market in which they are certified. In recent compliance years, many have sold into the Massachusetts REC market because the market price has been slightly higher. Roughly 75,000 Class IV RECs were retired for 2017 New Hampshire RPS compliance. The volume of currently certified facilities suggests that closer to 200,000 RECs were produced from the certified facilities in 2017 when the total Class IV compliance requirement was 160,700.

Figure 14. Class IV Certified Facilities

RPS Certification	Size ≤ 1 MW		Size 1 - 5 MW	
	Qty	Total MW	Qty	Total MW
NH-Sited Class IV Facilities	49	23.03	1	3.00
All Class IV Facilities	53	25.78	9	24.22
NH Class IV & ME Class II	35	16.76	6	13.22
NH Class IV & MA Class II	4	3.60	4	10.92

Stakeholder comments have suggested options to encourage more Class IV RECs to be available and settled in New Hampshire. One suggestion is setting the ACP rate for New Hampshire Class IV equal to, or slightly higher than, Massachusetts Class II.

Currently, the Massachusetts Class II ACP rate is \$28.30, whereas New Hampshire’s Class IV ACP rate is \$28.00. While this could result in attracting additional Class IV RECs to settle in the New Hampshire market, it would not impact the total supply of Class IV RECs in the regional market. As has been suggested by at least one stakeholder, one way to increase the supply of Class IV RECs would be to increase the generation capacity limit for the “fish passage exemption” for the smaller Class IV facilities from the current value of 1 MW. If the limit were raised to 2MW, a review of GIS registered hydroelectric facilities in New England shows the potential pool of certifiable Class IV generation would increase to 277 facilities with a total generating capacity of 196 MW. If such an expansion of the exemption applied only to facilities sited in New Hampshire, the increased pool of eligibility would encompass an additional 10 facilities with total capacity of 14.97 MW. This latter change would likely increase the supply of RECs by roughly 65,000.

“GSHA believes that adjusting the Class IV ACP to be equal to or slightly higher than the MA ACP would ensure that additional Class IV RECs would be sold into New Hampshire.”

Granite State Hydropower Association

“[S]trongly supports enhancements to the current RPS program to expand participation of valuable small-scale hydropower facilities located in New Hampshire. Specifically, we recommend the following changes to the Class IV program:

- 1. Increase the project size cap for eligible Class IV hydropower facilities from 5 MW to 10 MW for in-state hydropower facilities; and,*
- 2. Extend the fish passage exemption to all Class IV hydropower facilities located in-state where not required by the Federal Energy Regulatory Commission (FERC).”*

Brookfield Renewable

Another suggestion is to extend the fish passage exemption to all Class IV hydro facilities located in-state where not required by the Federal Energy Regulatory Commission (FERC). The Commission is unable to estimate the impact of this suggestion, because it does not have facility specific information about FERC-required fish passages and so cannot determine how much additional hydroelectric generation would be eligible for Class IV certification.

The SEA Alternative Scenario Analysis report describes how the status quo reference case model includes the reality that a certain portion of New Hampshire Class IV RECs from facilities which are also registered as MA Class II are retired in Massachusetts due to slight value premium. Please see Appendix C for additional details.

Class Requirements and Market Conditions (RSA 362-F:5, II)

Legislative Recommendation:

Establish a study committee to further analyze and understand the impact of adjusting the Class IV ACP rate to be equal to, or slightly higher than, the Massachusetts Class II ACP rate.

Legislative Recommendation:

Establish a study committee to gather further stakeholder input and perform analysis to understand implications of adding new Class IV eligible facilities by increasing the generation capacity limit for the “fish passage exemption” for the smaller Class IV facilities from 1 MW to 2 MW or 5 MW.

Potential for Thermal Energy Component (RSA 362-F:5, III)

Thermal Energy Component

During the 2011 RPS Review process, the Commission recommended further study of renewable thermal inclusion in the RPS and consideration of thermal output from combined heat and power (CHP) systems on an energy equivalent MWh basis.

New Hampshire has since led the nation with the first comprehensive program for renewable thermal technology in a Renewable Portfolio Standard.⁵⁵ In 2012, landmark legislation (SB 218) was enacted to include obligations for “useful thermal energy” as part of the New Hampshire RPS by creating a carve-out which dedicates a portion of the existing Class I requirement to qualifying thermal facilities. Since 2013, this legislation has required electricity providers to purchase thermal energy referred to as Class I-Thermal RECs to meet a specified portion of their Class I obligation.

Useful thermal energy includes energy that can be metered and that is delivered as heat, steam, or hot water directly to the New Hampshire consumer and used for heating, cooling, humidity control, process (manufacturing), or other valid thermal end uses. Facilities must be located in New Hampshire and must

⁵⁵ Jenny Heeter, et al., *Case Studies of RPS Best Practices: Solar Carve-Outs, SREC Tracking, and Thermal Inclusion* at 22, Clean Energy States Alliance (“CESA”) (July 20, 2018), <https://www.cesa.org/resource-library/resource/case-studies-of-rps-best-practices-solar-carve-outs-srec-tracking-and-thermal-inclusion>.

deliver the useful thermal energy in-state. Certified facilities can produce thermal RECs from geothermal, eligible biomass technologies, methane, and solar thermal, and must meet certain emissions requirements as defined in statute and rules.⁵⁶

In support of this legislation, and through a public process, rules were developed to govern the metering, monitoring, emissions verification, and quantification of thermal RECs. In an effort to address significant metering costs, the rules differentiate metering requirements by system capacity or “size threshold”.

Systems with capacity up to and including 1 MMBtu/hour can be measured through auger metering and run time calculations depending on technology. Larger systems (greater than 1 MMBTU/hour, or 83-ton equivalent, in capacity) require heat meters, which must be installed according to metering protocols and metering specifications to ensure accuracy.

Note: There was general consensus at the May 2018 stakeholder session that a thermal energy component had been added into the New Hampshire RPS. Discussion of the thermal program is presented within the “Class Requirements and Market Conditions (RSA 362-F:5, II) section.

The Commission, after public notice and hearing, established REF-funded thermal rebate programs to incentivize development of Class I-Thermal facilities in the state. The Residential Wood Pellet Central Boilers and Furnace Rebate Program, the Commercial and Industrial (C&I) Bulk-Fed Wood Pellet Heating Systems Rebate Program, and the Solar Hot Water Heating System Rebate Program were all developed after inclusion of thermal energy in the RPS. The wood pellet programs offer rebates to consumers installing whole-building pellet heating systems and offer additional incentives for REC eligible meter installation at the commercial and industrial level. The C&I Competitive Grant Program is also open to thermal technologies not eligible for the existing rebate programs. The competitive grant program has awarded grant funding to 17 biomass projects spurring over \$15 million of private investment in thermal energy systems.⁵⁷ As of June 30, 2018 the wood pellet rebate programs have awarded 59 C&I and 380 residential rebates totaling approximately \$3.8 million, for applicant investments in thermal technologies of over \$10 million.⁵⁸

Over the past five years approximately 40 thermal projects have become eligible to generate and sell Class I-Thermal RECs. Most of the projects are large commercial wood biomass facilities. There are also nine geothermal projects generating Class I-Thermal RECs and, in 2018, Keene State College became the first facility to generate Class I-Thermal RECs from a liquid biofuel.

States across the country look to New Hampshire as a model for supporting renewable thermal technologies, with the Thermal REC program being featured in case studies and educational webinars.⁵⁹ In

⁵⁶ N.H. Code Admin. Rules Puc chapter 2500, available at: <http://www.puc.nh.gov/Regulatory/Rules/Puc2500.pdf>.

⁵⁷ New Hampshire Renewable Energy Fund Annual Report at 2 (October 1, 2018), available at: <http://puc.nh.gov/Sustainable%20Energy/Renewable%20Energy%20Fund/20181001-ref-report-to-legislature-2018-annual-report.pdf>.

⁵⁸ *Id.* at 19 (Table 9: “Cumulative Rebate Program Results through June 30, 2018”) (\$2,166,249 + \$1,681,078 & \$4,179,000 + \$6,161,000), <https://www.puc.nh.gov/Sustainable%20Energy/Renewable%20Energy%20Fund/20181001-ref-report-to-legislature-2018-annual-report.pdf>.

⁵⁹ See, e.g., Val Stori, *State Leadership in Clean Energy: Award-Winning Programs in New Hampshire and Rhode Island*, CESA (July 13, 2016), <https://cesa.org/webinars/state-leadership-in-clean-energy-award-winning-programs-in-new-hampshire-and-rhode-island/>.

2016 New Hampshire’s program was recognized with a State Leadership in Clean Energy award for leadership, effectiveness, and innovation in advancing renewable energy and other clean energy technologies.⁶⁰

Class Requirements and Market Conditions (RSA 362-F:5, III)

Legislative Recommendation:

Due to the passage of legislation that incorporated useful thermal energy into the New Hampshire RPS (SB 218 in 2012), consider repealing RSA 362-F:5, III, which requires the Commission to evaluate the potential for the addition of a thermal energy component to the RPS.

Combined Heat and Power (CHP)

While current legislation does not address combined heat and power (CHP), it also does not preclude renewably-powered CHP facilities from REC eligibility in multiple Classes. CHP offers another viable option for incorporating electric and thermal energy into the RPS, as CHP technologies produce both electricity and useful thermal energy. Systems can be electrically-led, using waste heat for additional applications, or thermal-led, using waste heat to generate some level of electricity as a by-product. Incentivizing renewable electric or thermal technologies to enhance systems with CHP capability increases overall energy capture and efficiencies of a facility. CHP can be inclusive of many fuel inputs, including biomass, fossil fuels, and hydrogen.

There are currently no electric- or thermal-led CHP facilities certified eligible for the New Hampshire RPS. One possible reason there are no thermal-led CHP facilities is because renewable thermal facilities interested in CHP would need, under current legislation, to meet stricter electric emissions requirements in order to qualify to produce Class I non-thermal (i.e., electric) RECs.

A 2016 paper on inclusion of CHP in state RPS programs, published by the Environmental Protection Agency (EPA), reports that twenty states, including all other New England states, have incorporated CHP systems directly into their portfolio programs.⁶¹ In contrast, the New Hampshire RPS does not specifically define or address CHP facilities, beyond a narrow exception to the

“[A] pellet boiler is available in NH which can generate electricity and due to its small size, it can qualify for thermal RECs no problem, no stack test required, but if an owner wanted to generate Class I electric RECs, they would need to perform quarterly stack tests (not possible for such a small stack), as well as install an industrial-scale continuous NOx emissions monitoring system on it.”

Innovative Natural Resources Solutions

⁶⁰ 2016 State Leadership in Clean Energy (SLICE) Awards, CESA, <https://cesa.org/projects/state-leadership-in-clean-energy/2016/>.

⁶¹ *Portfolio Standards and the Promotion of Combined Heat and Power*, EPA Combined Heat and Power Partnership (March 2016), https://www.epa.gov/sites/production/files/2015-07/documents/portfolio_standards_and_the_promotion_of_combined_heat_and_power.pdf.

date restriction otherwise applicable to eligible thermal energy facilities in RSA 362-F:4, I, (I)(5).⁶² No other section of RSA Chapter 362-F currently addresses CHP facilities.

If thermally-led CHP is to be included specifically in the New Hampshire RPS, CHP should be limited to those technologies that use renewable fuel sources. Legislative changes expressly addressing the eligibility of CHP sources and/or the applicable emissions requirements may increase the potential resource base of sources generating Class I and Class I-Thermal, and possibly even Class III, RECs available for New Hampshire RPS compliance.

Class Requirements and Market Conditions (RSA 362-F:5, III)

Legislative Recommendation:

Consider establishing a study committee to investigate the development of Combined Heat and Power (CHP) provisions, or revision of emissions requirements, to encourage more development of renewable thermal-led CHP facilities.

⁶² Under RSA 362-F:4, I (I)(5), added by House Bill 542 (2013), in order to be eligible to produce Class I thermal RECs, a unit that is an upgrade or replacement to an existing source of thermal energy that used biomass as its primary fuel source in its normal operation prior to January 1, 2013, must be a CHP unit that provides district heating, and at least 80 percent of the resulting tax basis of the unit's plant and equipment, but not its property and intangible assets, shall be derived from capital investments directly related to the upgrade or replacement and made on or after January 1, 2013.

Increasing Class I and II Requirements Beyond 2025 (RSA 362-F:5, IV)

The current New Hampshire RPS law specifies that each resource class requirement be met through 2025 and thereafter with an overall renewable energy target of 25.2% by 2025. Across the United States, each state’s RPS is unique and the date by which the maximum RPS target must be achieved differs by state.

The map below shows the year in which individual state RPS targets meet their maximum target.⁶³ In the New England region, with the exception of Maine and New Hampshire, states have RPS targets ending in 2030 and beyond.

Figure 15. RPS Policies Map

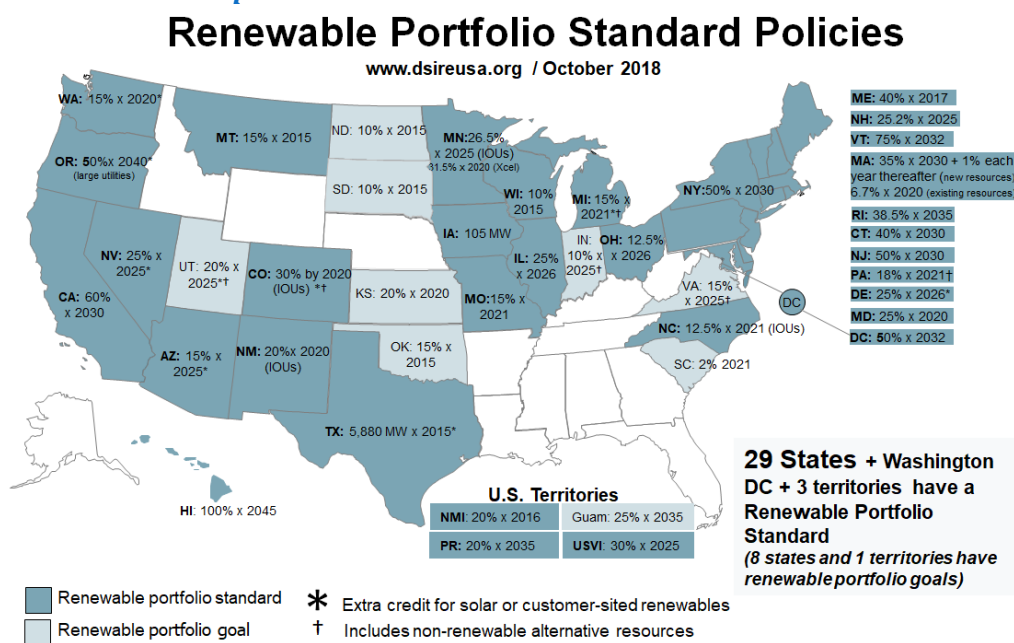


Figure 16 lists the other New England states’ RPS maximum target year to achieve the renewable goal with the corresponding goal for renewable percent of total energy delivered indicated in parentheses.

Figure 16. New England States RPS Targets

State	Maximum Renewables Target Year and Goal
Connecticut	2030 (goal 40%) ⁶⁴
Massachusetts	No end date (goal 35% by 2030 + 1% annually) ⁶⁵
Maine	2017 (goal 40%)
Rhode Island	2035 (goal 38.5%)
Vermont	2032 (goal 75%)

⁶³ NC Clean Energy Technology Center, DSIRE, <http://www.dsireusa.org/resources/detailed-summary-maps/>.

⁶⁴ Connecticut [Public Act No. 18-50](#) extended the renewable portfolio standard to year 2030.

⁶⁵ Massachusetts has also enacted a Clean Energy Standard (17% by 2032) and an Alternative Portfolio Standard for thermal renewable sources.

Although many states nationally have introduced bills to reduce, repeal, or freeze their RPS, only two (Kansas, Ohio) have been enacted. More than half of all RPS states have raised their overall RPS targets, or carve-outs, since initial RPS adoption; and all of the other New England states have maximum targets above New Hampshire's. With the exception of Maine and New Hampshire, all New England states have established targets beyond 2025.

New Hampshire's retail electricity market accounts only for approximately 9.5% of the total load for the New England region, as defined by the independent system operator of New England's power grid (ISO-New England). Given that relatively small share of the load for the ISO-New England region, and the correspondingly small share of the regional demand for RECs, significantly altering New Hampshire's RPS requirements would not necessarily impact regional REC market prices, although it may affect the rates paid by New Hampshire consumers due to changes in the quantity of RECs to be acquired. Increasing New Hampshire's RPS targets, however, may contribute to a modest increase in demand for RECs, which in turn could spur the development of new renewable energy facilities in the region. Such incremental diversification would further the "fuel diversity" portion of the purpose statement of RSA 362-F, which states that:

It seems premature to specify any increase for the Class I and II requirements beyond 2025. Nonetheless, well in advance of 2025, New Hampshire should consider increasing these class requirements beyond 2025.

"[C]ost challenges lie largely in the high transmission and distribution costs of the entire region. Local renewable energy investment and energy efficiency are key tools to reduce high transmission costs, shave peak electric demand (when the dirtiest power plants must be turned on), and increase our energy independence."

"[R]ecommend the continuation and strengthening of the existing program and classes to accelerate our [the state of New Hampshire's] transition to clean, local renewable energy."

Ceres Member Businesses

"[I]ncrease the RPS targets to better align with neighboring states."

Joint Commenters

**New Hampshire Clean Tech Council
and Innovative Natural Resource Solutions**

"[C]onsider proposing additional requirements for legislative consideration beyond 2025."

New Hampshire

Department of Environmental Services

"[E]xpand the goal from 25% by 2025 to 100% by 2030."

Patricia Martin, Resident

Increasing Class I and II Requirements Beyond 2025 (RSA 362-F:5, IV)

Legislative Recommendation:

Consider amending RSA 362-F:5 to require the Commission to conduct a review of class requirements and other aspects of the RPS in 2021 and report findings to the General Court by November 1, 2021. Other aspects for review, discussion, and recommendation should focus on and include, but are not limited to: transitioning "new" facilities to "existing" facilities, and how corresponding RPS targets might be adjusted; grandfathering current long-term contracts; and increasing RPS requirements relative to Class I and Class II beyond 2025. An additional review in 2021 supports market stability by providing advance insight and direction to encourage continued renewable energy development.

Introduction of New Classes or Consolidation of Existing Classes (RSA 362-F:5, V)

When established, each of the resource classes within the RPS was created with a particular economic or environmental policy objective in mind. During the review process, there were a range of suggestions from the public in regard to consolidation of classes. Some contended that continuing with the current classes is important to achieving energy diversity, others supported consolidating classes into a single “New” and a single “Old” or “Existing,” and others suggested eliminating all classes and vintage dates.

Introduction of New Class - Energy Efficiency into the RPS

In 2011, the question of whether to include a new Class for energy efficiency in the RPS law or incorporate it as an eligible resource into Class I was answered by nearly all stakeholders with a resounding “no.” From utility representatives, to state agency analysts, to non-profit memberships and leading experts on best practices in state energy policy, there was consensus that energy efficiency and renewable energy are two different resources and should not be looked at interchangeably; and energy efficiency is supported in New Hampshire through the system benefits charge (SBC) and ISO-NE’s demand response program. Instead of putting energy efficiency into the RPS, several entities, including the Northeast Energy Efficiency Partnership (NEEP), the Clean Energy States Alliance (CESA), and the Vermont Energy Investment Corporation (VEIC), all recommended establishing a separate energy Efficiency Resource Standard.”⁶⁶

In September 2014, what was then known as the Governor’s Office of Energy and Planning released a 10-year State Energy Strategy, which recognized the need for an EERS and recommended that the Commission open a proceeding to direct the utilities, in collaboration with other interested parties, “to establish ‘energy efficiency savings goals based on the efficiency potential of the State, aimed at achieving all cost-effective efficiency over a reasonable time frame.’”⁶⁷ The 10-year State Energy Strategy was updated in April 2018 by the Governor’s Office of Strategic Initiatives and continued an emphasis on energy efficiency.⁶⁸

On May 8, 2015, the Commission opened a proceeding, Docket DE 15-137, to establish an EERS, a framework within which the Commission’s energy efficiency programs shall be implemented, and examine issues related to implementation of this policy. The Commission issued Order No. 25,932 approving the settlement agreement submitted by a diverse group of stakeholders, to implement an EERS in New Hampshire

“Along with technologies currently included in the RPS, adding energy efficiency would better enable utilities [to] avoid costly ACPS and reach set targets using energy efficiency credits.”

**New Hampshire
Office of Strategic Initiatives**

“Most notably, increasing the class requirements relative to classes I and II beyond 2025; the possible introduction of any new classes such as an energy efficiency class or the consolidation of existing ones; and/or other potential RPS changes that may impose new and unanticipated costs on customers already under contract with a CEPS.”

Direct Energy

⁶⁶ 2011 RPS Review Report at 25-26, available at: <http://www.puc.nh.gov/Sustainable%20Energy/RPS/2011-review-rps-law.html>.

⁶⁷ Order No. 25,932 at 45-46 (August 2, 2016), http://www.puc.nh.gov/Regulatory/Docketbk/2015/15-137/ORDERS/15-137_2016-08-02_ORDER_25932.PDF.

⁶⁸ *New Hampshire 10-Year State Energy Strategy*, New Hampshire Office of Strategic Initiatives (April 2018), <https://www.nh.gov/osi/energy/programs/documents/2018-10-year-state-energy-strategy.pdf>.

beginning in 2018.⁶⁹ In September 2017, the utilities submitted the State’s first EERS three-year plan (2018-2020), and in December the Commission issued Order No. 26,095 approving the plan.⁷⁰ The three year energy efficiency plan for program years 2018-2020 established specific annual energy savings goals of: Year 2018 Electric 0.80%, Gas 0.70%; Year 2019 Electric 1.00%, Gas 0.75%; Year 2020 Electric 1.30%, Gas 0.80%.⁷¹

The plan also called for the establishment of stakeholder working groups to further analyze key issues including: evaluation, measurement, and verification of the approved energy efficiency programs; alternate sources of funding and financing of programs; the benefit/cost test used to screen energy efficiency programs; potential changes to the calculation of performance incentives; and the calculation of demand savings in connection with lost base revenues.⁷²

Since New Hampshire has established an EERS, which is supported by the system benefits charge, energy efficiency should not be included in the New Hampshire RPS.

Introduction of New or Consolidation of Existing Classes (RSA 362-F:5, V)

Recommendation:

Energy efficiency goals and programs should remain outside the scope of the RPS.

Legislative Recommendation:

In light of existing utility Energy Efficiency Resource Standard (EERS) programs, consider amending RSA 362-F:5, V to remove the language specific to energy efficiency.

Zero Emissions Credits for Nuclear

During RPS Review stakeholder session #3, the Office of Strategic Initiative (OSI) presentation suggested “Zero-carbon resources such as nuclear power and large hydropower should be included among eligible technologies.”⁷³ OSI suggested that such inclusion would be consistent with the recently released 10 Year State Energy Strategy as well as the purpose of the RPS statute, would reduce impacts on ratepayers, allow for greater market selection within a framework which insulates from competitive markets, and would better protect the viability of low emissions resources.

“Keep nuclear power and large-scale hydro out of the RPS.”

Joint Commenters

New Hampshire Clean Tech Council

⁶⁹ Order No. 25,932 (August 2, 2016), http://www.puc.nh.gov/Regulatory/Docketbk/2015/15-137/ORDERS/15-137_2016-08-02_ORDER_25932.PDF.

⁷⁰ *New Hampshire Statewide Energy Efficiency Plan 2018-2020* (September 1, 2017), available at: http://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/INITIAL%20FILING%20-%20PETITION/17-136_2017-09-01_NHUTILITIES_EE_PLAN.PDF.

⁷¹ *Id.*

⁷² Order No. 26,095 (January 2, 2018), http://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/ORDERS/17-136_2018-01-02_ORDER_26095.PDF.

⁷³ Alex LaBrie and Chris Ellms, *2018 RPS Review* at 8, New Hampshire Office of Strategic Initiatives, available at: https://www.puc.nh.gov/Sustainable%20Energy/RPS/2018-rps_review_061418_osi_presentation.pdf.

In light of changing market conditions, a number of states have considered subsidizing existing nuclear generation plants. New York, New Jersey, Illinois, and Connecticut have adopted some level of subsidy for nuclear power plants.⁷⁴ While nuclear support programs have been framed within state clean energy programs and goals, no states have included nuclear energy directly within an RPS, but rather have created separate, limited programs specifically targeting at-risk nuclear facilities.

To follow is a summary of other states nuclear initiatives, all of which are outside of their state RPS.

In July 2016, New York regulators approved a Zero Emissions Credit (ZEC) to incentivize retention of the state's existing nuclear power plants from 2017-2029 largely based on the greenhouse gas emissions they help avoid as part of a new clean energy standard. ZEC requirements are separate from the requirement for renewable energy called the Renewable Energy Standard (RES).⁷⁵

In Connecticut, after legislation and a ruling by Connecticut Public Utilities Regulatory Authority allowed nuclear facilities to enter into auctions for fixed-price contracts alongside renewable generation facilities in a "zero-emissions" procurement. Millstone Power Station submitted a proposal in response to Connecticut's Department of Energy and Environmental Protection (DEEP)'s "zero-emissions" procurement RFP.⁷⁶

Illinois passed a bill that provides \$235 million in annual credits for 13 years to support carbon-free energy produced by two reactors owned by Exelon Corporation.⁷⁷ This legislation also faced challenge and was upheld by a federal appellate court in September of 2018. The Zero Emission Standard established by the legislation operates separately from the Renewable Portfolio Standard which was also strengthened as part of the bill.⁷⁷

New Jersey in May of 2018 became the fourth state to offer subsidies to its nuclear facilities estimated to equal \$280 million per year.⁷⁸ In a plan that will be revisited after three

"NHDES recommends adopting a policy of 'do no harm,' and adjustments to the RPS should strengthen it, such that existing nuclear plants may be retained and any nuclear plant closures may be offset by new renewable generation, rather than natural gas fired generation."

**New Hampshire
Department of Environmental Services**

"[R]EC market would be flooded by the RECs produced by these larger-scale power plants.... Including large-scale hydro and/or nuclear power in the RPS would also result in a lack of renewable energy diversity."

Granite State Hydropower Association

"Keep nuclear power and large-scale hydro out of the RPS. The intent of the RPS is to increase the state's development and use of renewable energy."

Innovative Natural Resources Solutions

"[N]uclear facilities should not be RPS eligible facilities."

The Biomass Generation Group

"[T]he RPS should remain limited to renewable energy resources to preserve the integrity and intent of the program."

Brookfield Renewable

⁷⁴ Steven Mufson, *Competition Drives Nuclear Industry to Look for Millions in Subsidies*, The Washington Post (May 24, 2018), https://www.washingtonpost.com/business/economy/competition-drives-nuclear-industry-to-look-for-millions-in-subsidies/2018/05/24/737e800c-5f60-11e8-a4a4-c070ef53f315_story.html?noredirect=on&utm_term=.ac1b3e97cdd4.

⁷⁵ Clean Energy Standard, New York State Energy Research and Development Authority (NYSERDA) <https://www.nyserd.org/All-Programs/Programs/Clean-Energy-Standard> (last visited Oct. 31, 2018).

⁷⁶ Matt Pilon, *Millstone Casts Bid for State Contract*, Hartford Business.Com (Sept. 19, 2018), <http://www.hartfordbusiness.com/article/20180919/NEWS01/180919883/millstone-casts-bid-for-state-contract>.

⁷⁷ See Rod Walton, *Illinois Passes Subsidy Bill to Save State's Nuclear Power Plants*, Electric Light & Power (Dec. 2, 2016), <https://www.elp.com/articles/2016/12/illinois-pass-subsidy-bill-to-save-state-s-nuclear-power-plants.html>.

⁷⁸ Mufson, *supra* note 74.

years, the New Jersey Commission will issue zero emissions credits to assure that 40% of the state's electricity continues to come from nuclear power. Plants will be required to provide evidence they are at risk of closure within three years, are required to maintain staffing levels, and the Commission will have access to financial information in order to tailor ZEC payments to actual financial need.⁷⁹

Nuclear initiatives in other states have been addressed outside of their state RPS. Given the lack of stakeholder support and the unknown financial status of these nuclear facilities, the recommendation is to not include nuclear as an eligible resource in the RPS.

Introduction of New or Consolidation of Existing Classes (RSA 362-F:5, V)

Recommendation:

Do not include nuclear energy in the New Hampshire RPS.

Large-Scale Hydroelectric

As stated in the prior section, the OSI's presentation at stakeholder session #3 suggested including large scale hydropower in the RPS.

On July 21, 2011, the Federal Energy Regulatory Commission (FERC) issued Order No. 1000 (FERC Order 1000). For New England, FERC Order 1000 requires that ISO-New England's transmission planning processes consider transmission needs driven by public policy requirements established by state or federal laws or regulations. Adding large-scale hydro to the list of RPS-eligible renewable technologies may make New Hampshire ratepayers responsible for a percentage of the cost of non-reliability transmission facilities throughout New England, if those transmission facilities are necessary for the transport of hydroelectric power. FERC Order 1000 refers to transmission projects driven by public policy requirements as "Public Policy Transmission" (PPT) projects. These PPT projects are meant to accomplish energy-related goals of each region's states aside from electric-system reliability. Such goals may include the satisfaction of state renewable portfolio standards, satisfaction of state fuel-diversity goals, or the satisfaction of clean air goals. In Order No. 1000, FERC sets out a series of principles meant to govern how the costs of PPT projects are allocated among states in multi-state transmission regions, including the principle that states that demonstrably benefit from a given PPT project should pay a share of the costs that is commensurate with the benefits. For additional information about how introducing large-scale hydroelectric into the RPS raises FERC Order 1000 concerns, see *FERC Order No. 1000 Implementation in New England: Public Policy Transmission Project Cost Allocation* in Appendix F.

Most stakeholders were not supportive of including large-scale hydro in the RPS for a number of reasons, including: oversupplying the REC market, facility economies of scale, and lack of fuel diversity. Given the concerns regarding FERC Order 1000, the recommendation is to not include large-scale hydroelectric as an eligible resource in the RPS.

⁷⁹ *Id.*

“Keep nuclear power and large-scale hydro out of the RPS.”

Innovative Natural Resources Solutions

“Diverting REC payments to large-scale hydro and nuclear plants would be a cost to New Hampshire ratepayers without providing any new or additional value...Large-scale hydro and nuclear power plants have substantial economies of scales and do not require REC revenues to remain financially viable.”

Granite State Hydropower Association

“[O]pen to reconsideration of the financial status of [large-scale hydro and nuclear] technologies. However, as part of any such reconsideration the PUC should require such sources to share their financial information and demonstrate economic hardship.”

New Hampshire Department of Environmental Services

“Keep nuclear power and large-scale hydro out of the RPS.”

“Large-scale hydropower, while renewable, similarly does not fit the parameters defined by the legislature. It is a long-established resource with ample available markets and economies of scale.”

Joint Commenters – New Hampshire Clean Tech Council

“[A] large hydroelectric facility or nuclear unit, can supply the entirety of the RPS demand and thereby eliminate fuel diversity.”

The Biomass Generation Group

“[When considering] policy changes enabling large-scale hydropower to participate in the current program, such changes – absent program target changes – should be limited to new or existing hydropower resources up to 100 MW utilized solely for “backstopping” annual RPS program requirements in any year.”

Brookfield Renewable

Introduction of New or Consolidation of Existing Classes (RSA 362-F:5, V)

Recommendation:

Do not include large-scale hydroelectric generation in the New Hampshire RPS.

Consolidation of Classes

Combining any one or all of the resource classes may make sense from the perspective of electricity providers because one class would increase administrative efficiency in contracting, purchasing, and compliance, but may not support New Hampshire’s long-term goals of fuel diversity and the use of locally sourced fuel. A primary concern with a single class system is that New Hampshire resources under the current classes, namely solar, existing biomass/methane, and small hydroelectric, would lose targeted financial support currently earned from REC revenue.

During the stakeholder sessions several consolidation options were mentioned, including:

- Consolidate current RPS classes into three classes: “New”, “Existing”, and “Thermal Carve-Out”;
- Consolidate current RPS classes into one single class; and
- Consolidate current RPS classes into one single class and add nuclear and large-scale hydroelectric as eligible sources.

In order to evaluate certain regional and New Hampshire-specific market impacts of some alternate scenarios, the Commission engaged the services of Sustainable Energy Advantage, LLC (SEA) to conduct alternate RPS scenario analyses using SEA’s proprietary Renewable Energy Market Outlook (REMO) model. Their qualitative and quantitative analysis provided potential market impacts for each of three potential revisions (scenarios) to the current RPS structure described below. The three scenarios that SEA modeled were:

Scenario 1: Combine Class I and Class II into a single “New” class, retain existing Class III, Class IV and Class I-Thermal Carve-Out;

Scenario 2: Combine Class I and Class II in a single “New” class, combine Class III and Class IV into a single “Existing” class and retain the Class I-Thermal Carve-Out; and

Scenario 3: Consolidate all current RPS classes into one single class with the exception of the Class I Thermal Carve-Out, which would remain separate.

A status-quo reference case scenario was used to evaluate the incremental impact of each alternate scenario. The impact of each scenario was evaluated with three metrics: ratepayer impact, environmental impact, and economic impact. The REMO models are proprietary to SEA and are business sensitive. The models include assumptions regarding regional RPS standards, and related and supporting policies. They are based on current statutes and policies in place across New England. As many generators are certified in various classes of renewable energy in more than one state, the models take into account these complexities. For example, a small hydroelectric generator may be eligible and certified to produce New Hampshire Class IV RECs, Massachusetts Class II RECs, Maine Class II RECs, and Rhode Island New Renewables Certificates. Thus, our New Hampshire RPS and market are interconnected to other New England states.

“Do not collapse the four existing REC classes into a single REC class.... Such a step would create chaos for the financial vehicles established to support those classes, and for existing and planned projects designed consistent with those classes.”

**Joint Commenters
New Hampshire Clean Tech Council**

“Changing to a single class system would result in a lack of renewable energy diversity. The four class structure of New Hampshire’s RPS was carefully and purposefully designed to ensure that a diversity of both new and existing renewable energy sources of varying fuel types, technologies, and locations will be developed and maintained.”

Granite State Hydropower Association

“Do not collapse the four existing classes into a single REC class.... Such a step would create chaos for existing and planned projects designed and financed based on the current class structure and anticipated REC pricing.”

Innovative Natural Resources Solutions

“The Four Electric Renewable Energy Classes Should Not Be Consolidated Into Fewer Classes Or A Single Class.... These changes will eliminate the effectiveness of the existing RPS in promoting a diverse set of renewables and meeting its other goals.”

The Biomass Generators Group

The ratepayer impact for each scenario was evaluated to calculate the total net present value of ratepayer impact over the time period from 2020, when hypothetical scenario changes would take effect, through 2029. Brief descriptions of each scenario are provided here:

Scenario 1: In this scenario, Class I and II are combined while Classes III, IV and Class I-Thermal remain intact. The model results in an overall savings to ratepayers of \$385,000, in 2018 dollars, over the 10 year period mainly due to reduced cost of Class II compliance.

Scenario 2: Here, Class I is combined with Class II, and Class III is combined with Class IV. Class I-Thermal remains intact. The “New” Class uses the current Class I ACP. The “Existing” Class is assumed to have the current Class III ACP. The overall impact is an additional cost to ratepayers estimated at \$1.8 million, over the 10 year period in 2018 dollars.

Scenario 3: In this “Consolidate All” scenario, Classes I, II, III, and IV are all combined with only the Class I-Thermal Carve-Out remaining separate. The combined Class is assumed to have an ACP of \$40/MWh. The net impact of the numerous interacting changes is a modeled additional cost to ratepayers of \$3.85 million, over the 10 year period in 2018 dollars.

“[A] Renewable Portfolio Standard should not discriminate against technologies or favor older or newer generation by the creation of classes or bifurcating the RPS with vintage dates. Instead, New Hampshire should have an RPS that both supports renewables and protects ratepayers from paying more than they need to by eliminating all classes and all vintage dates.”

New England Rate Payers Association

“[I]n support of consolidating existing separate classes into a single class for all types of renewable energy. The current system stifles competition between technologies by assigning them to isolated classes.”

“If a technology is able to surpass the target for its determined class, that should be viewed as a success to continue championing. In a revised system, the value of a particular class of REC should not be artificially depressed because of arbitrary categories.”

**New Hampshire
Office of Strategic Initiatives**

Figure 17. Summary of Alternative Scenarios Modeling Results

	Reference Case	Consolidate I & II	Consolidate New, Consolidate Existing	Consolidate All
Ratepayer Impact Relative to Reference Case	Not applicable	\$390,000 Savings <i>(Total over the 10 year period in 2018 dollars)</i>	\$1.8 Million Cost <i>(Total over the 10 year period in 2018 dollars)</i>	\$3.85 Million Cost <i>((Total over the 10 year period in 2018 dollars)</i>
Environmental Impact	Not applicable	New Hampshire RPS restructuring does not alter the course of renewable energy additions between 2020 and 2029.		
Economic Impact	Not applicable	No change in biomass operation relative to Reference Case.	Addition equivalent to 6 years of production at a 15 MW biomass facility.	Reduction equivalent to 2 years of production at a 15 MW biomass facility.

The model results indicate that, from among these modeled scenarios, there is no significant savings to ratepayers from combining any of the current RPS Classes. In fact, changes that may appear to simplify the RPS may result in additional cost to ratepayers. Therefore, the recommendation is to retain the current existing classes of renewable energy without any consolidation or combination of classes.

For a more extensive and detailed presentation of model assumptions, operational details and results, please consult the full SEA *Alternative Scenario Analysis* report included via a web link in Appendix C.

Introduction of New or Consolidation of Existing Classes (RSA 362-F:5, V)

Recommendation:

Retain current Class structure as it supports policy consistency and market predictability. A multiple class structure also maintains policy flexibility.

Timeframe and Manner to Transition Class I and II to Existing Sources (RSA 362-F:5, VI)

Transitioning Class I and II facilities to an “existing” resource Class involves a detailed study of the amortization of the original financing and depreciation of each technology, as well as possible ongoing operating costs. It may make sense to sunset new generation into existing generation after the amortization of original financing, but that should occur only after many years. Stakeholders were in agreement that this is an important question and expressed needing more time to perform analysis to better understand the implications and amendments necessary to institute such a revision.

Note: There was general consensus at the June 2018 stakeholder session that discussion of this topic was premature; however, careful consider of this topic should be performed prior to the 2025 RPS review.

Consideration of this issue may be more appropriate starting in 2021 in preparation for the next RPS Review in 2025.

Timeframe and Manner to Transition Class I and II to Existing Sources (RSA 362-F:5, VI)

Legislative Recommendation:

Consider amending RSA 362-F:5 to require the Commission to conduct a review of class requirements and other aspects of the RPS in 2021 and report findings to the General Court by November 1, 2021. Other aspects for review, discussion, and recommendation should focus on and include, but are not limited to: transitioning “new” facilities to “existing” facilities, and how corresponding RPS targets might be adjusted; grandfathering current long-term contracts; and increasing RPS requirements relative to Class I and Class II beyond 2025. An additional review in 2021 supports market stability by providing advance insight and direction to encourage continued renewable energy development.

Experience with Multi-Year Purchase Agreements (RSA 362-F:5, VII)

New Hampshire’s method of compliance for its RPS is flexible and market-based. Electricity providers comply with the RPS through the purchase and retirement of RECs. The regional clearinghouse for REC transactions occurs within the NEPOOL-GIS system, which is administered by ISO-New England. RECs can be purchased in the market during a quarterly trading period or through bilateral contracts, or produced by merchant-owned (or utility-owned) generation.

All providers of electricity in New Hampshire, other than municipal suppliers, must comply with the RPS requirements each year. Providers of electricity include distribution companies providing default service and competitive electricity suppliers. They may purchase RECs through bilateral contracts that range from one or two years to fifteen or twenty years, depending on the purchaser’s goals or length of the RPS.

While this market-based REC system is common in many states with RPS programs, there are other methods of compliance such as long-term power purchase agreements for energy and RECs. In general, stakeholders indicated that they prefer the current method of compliance, which grants them significant flexibility in terms of how they choose to procure RECs.

“Do not mandate multi-year REC contracts.

[T]he established REC trading market already provides participants with options for multi-year trading contracts that are and can be structured to each party’s desired outcome.”

Joint Commenters

New Hampshire Clean Tech Council

“[N]eed for a permanent exemption or “grandfathering” provision applicable to existing contracts.”

Direct Energy

Note: There was little consensus at the June 2018 stakeholder session on whether or not multi-year purchases benefit ratepayers or producers; however, there was general consensus that the current statute allows for long-term purchase agreements and no statutory change is needed. However, it was noted that if RPS obligations are revised, current long-term contracts should be grandfathered.

Experience with Multi-Year Purchase Agreements (RSA 362-F:5, VII)

Recommendation:

The current statute provides sufficient flexibility. Based on the experience with multi-year contracts to date, the Commission recommends no change regarding their use.

Alternative Methods for Compliance (RSA 362-F:5, VIII)

RSA 362-F:5, VIII states that this 2018 RPS Review will consider “[a]lternate methods for renewable portfolio standard compliance, such as competitive procurement through a centralized entity on behalf of all consumers in all areas of the state.” During the course of this review process, there have been no suggestions that a centralized entity should oversee all renewable energy procurement.

Further, Commission Staff is not aware of any compelling reasons why significant changes to the current methods of compliance by REC procurement and retirement and/or making ACP payment should be changed. It is reasonable, therefore, to conclude that the current methods for RPS compliance are operating well in that they utilize a market-based approach which provides each entity with compliance obligations the opportunity to either purchase RECs or make ACP payments as best suits their preference, given market and transactional considerations. The current compliance approaches should also ensure there is reasonable opportunity for renewable project owners/managers to participate in the REC market. Toward that end, a number of suggestions have been made by stakeholders that could improve the opportunity for market participation of certain types and sizes of renewable energy projects.

There are several areas where certification rules and/or processes could be modified to allow expanded participation for renewable project owner/managers while maintaining program integrity. These include:

- 1) Consider methods that would better facilitate the participation of residential and small commercial biomass boiler systems in the Class I-Thermal REC market.
- 2) Consider methods that would improve participation of small solar PV installations in the Class II REC market.

“Allow greater flexibility to satisfy heat metering requirement with innovative alternative methodologies.... A similar approach was taken in Massachusetts ... has allowed ... greater flexibility in approving alternative heat verification methodologies.”

“Clarify the date biomass thermal systems are certified as REC eligible after stack testing.... Rules delay eligibility until the next quarter. We recommend that emissions certification for eligibility allow for eligibility as of the date of the stack test.”

Innovative Natural Resources Solutions

“Qualifying for RECs ... is a complex and expensive process that leads many homeowners [with] smaller systems not to register.”

Patricia Martin, Resident

Alternative Methods of Compliance (RSA 362-F:5, VIII)

Recommendation:

The Commission, with stakeholder input, should consider Puc 2500 rule changes to improve efficiency for both renewable project owners/managers and program administrators, including: improve the process that has been developed for compliance with RSA 362-F:6, II-a (net metering credit); and develop methods that would increase the participation of residential and small commercial biomass boiler systems in the thermal energy market.

Renewable Energy Fund Distribution (RSA 362-F:5, IX)

The Renewable Energy Fund (REF), RSA 362-F:10, is a non-lapsing special fund used to support thermal and electrical renewable energy initiatives. The Commission manages the REF, guided by the statute, and distributes funds to incentivize renewable energy projects in New Hampshire. A portion of the fund is used for administration costs. Past REF reports, submitted to the legislature each October 1st, detail how the REF has been utilized during the past fiscal year. Funding for the REF comes from Alternative Compliance Payments (ACPs) made by the electric service providers in lieu of purchasing RECs. ACPs are made once per year, on or before July 1st.

In addition to the requirement that the REF be used to support renewable energy initiatives in New Hampshire, RSA 362-F:10 also mandates that:

- REF amounts expended, allocated, or obligated between the residential and non-residential sectors over each two-year period are reasonably balanced in proportion to each sector's share of total retail electricity sales;
- no more than 40% of the REF can be allocated to the residential rebate program for solar electric panels and wind turbines, measured over each two-year period;
- Class II ACPs primarily be used to support solar energy technologies;
- no less than 15% of the REF annually to program(s) that benefit low-moderate income residential customers; and
- the Commission issue competitive RFP for the non-residential sector no later than March 1st each year.

"Continue to use the Renewable Energy Fund (REF) solely as a dedicated funding source for further eligible renewable energy development, as intended under the statute....The ACP is an important complement to the core RPS and its renewable resource targets, and funds collected through the ACP should be used to advance the purposes of the RPS."

Innovative Natural Resources Solutions

"ACP should be used to advance the purposes of the RPS. ... ACP funds are intended to be used to help stimulate new investment that will generate additional RECs in future years, keeping costs down and ensuring continued growth of renewable energy."

Joint Commenters

New Hampshire Clean Tech Council

"Rather than adjusting the requirements such that Alternative Compliance Payments (ACPs) are reduced, the Commission could use any additional funds resulting from the unadjusted ACP for additional future grants to develop additional REC production from new renewable energy projects."

New Hampshire

Department of Environmental Services

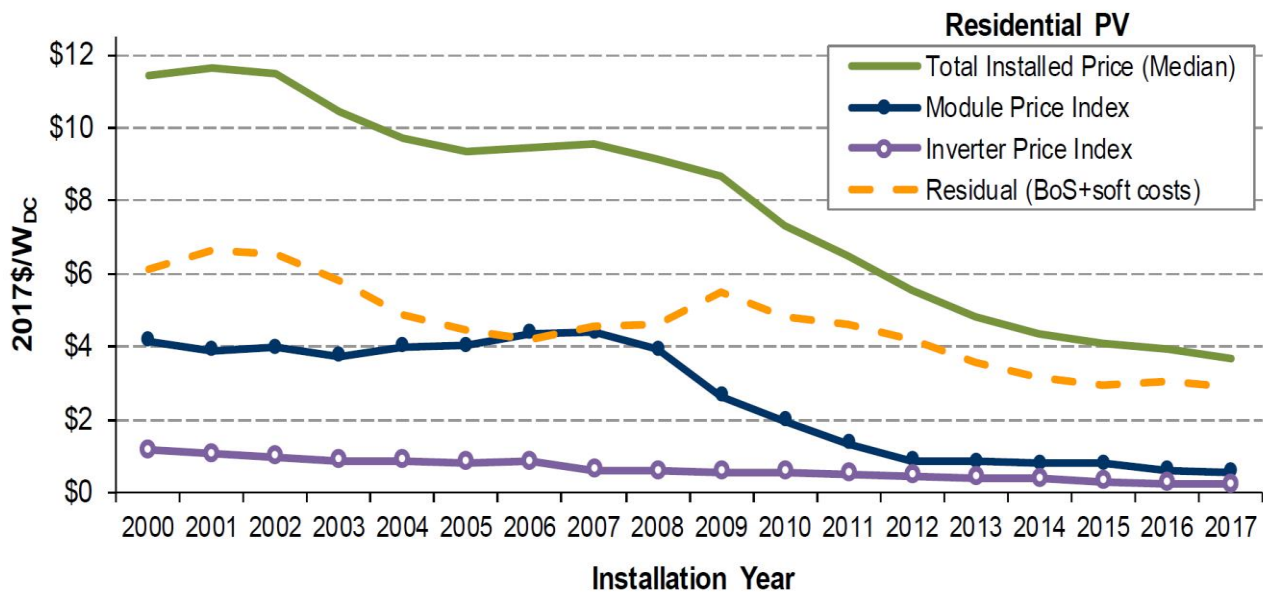
Since its inception in July 2009, the Renewable Energy Fund has been used to establish seven grant and rebate programs that have experienced substantial demand and growth. Specifically, the REF funds three residential rebate programs, one for small electric generation systems such as wind or solar electric (photovoltaic), one for solar water heating systems, and one for bulk-fed wood pellet central boilers/furnaces. In addition, the REF supports two non-residential rebate programs; one for solar electric and solar thermal technologies, and one for wood pellet central heating systems. The REF also funds two additional programs: non-residential competitive grant and low-moderate income residential program.

The REF has been utilized to fund over 6,000 rebates for renewable energy systems to New Hampshire homeowners, businesses, schools, towns, non-profit organizations, and other eligible entities. In addition, the competitive grant program has provided more than \$10 million in funding for 37 renewable energy projects for schools, businesses, and municipalities, featuring technologies from biomass heating systems to hydroelectric project upgrades to photovoltaic arrays and solar hot air, among others. Municipalities, schools, and non-profit organizations do not qualify for federal tax incentives and therefore rely heavily on the REF funds to complete projects.

As the annual REF reports illustrate, demand for rebates and grant awards continues to be strong. Rebate and grant funds have leveraged over \$240 million in private investment, providing a boost to the state’s economy, and creating jobs for electricians, plumbers, and alternative energy businesses. In addition, there has been substantial growth in distributed generation renewable energy systems that serve to diversify energy sources, reduce reliance on fossil fuels, reduce greenhouse gas emissions, and increase our energy independence. These new renewable energy facilities also generate RECs which are available in the market for electric providers to purchase for RPS compliance; thereby, keeping compliance costs down.

Commission Staff monitors the renewable energy industry, renewable energy certificate market trends, and technological developments to ensure programs are effective in incentivizing new development. With limited funding, program waitlists and continued strong demand for programs, legislative amendments related to the program requirements may be warranted at this time. Nationally, partly due to increased module efficiencies and affordability of solar PV (i.e., \$/W), the size of installed residential solar electric system nationally has grown steadily, increasing from 2.4 kW per system in 2000 to 6.3 kW in 2017.⁸⁰

Figure 18. Installed Price for Residential Solar Electric (PV) (National)



⁸⁰ Galen Barbose and Naim Darghouth, *Tracking the Sun*, Lawrence Berkeley National Laboratory (Sept. 2018) at 12, Figure 3; at 21, Figure 13. https://emp.lbl.gov/sites/default/files/tracking_the_sun_2018_edition_final_0.pdf.

In New Hampshire, similar market changes have occurred as shown in Figure 19.⁸¹

Figure 19. Residential Solar Electric Market Data (2011 Compared to 2017)

	2011	2017
Average System Size	3.26 KW	7.49 KW
Average Price per Watt (W)	\$6.28	\$3.57

Note: 1 kW = 1,000 watts (W)

RSA 362:F10, V specifies “The public utilities commission shall make and administer a one-time incentive payment” As system costs decreased, the Commission, after public comment and hearing, issued orders that reduced the dollar per watt rebate rate, reduced the maximum rebate amount, and reduced the allowed rebate amount as a percentage of total system cost. With the decrease in system cost, limited program funding, frequent waitlists, and market maturity, it may be time to revise the requirement for a residential solar one-time incentive payment (i.e., rebate) program. Many options exist for alternative incentive program design including: incentives other than a one-time payment, adding a requirement to pair solar electric with storage, adding income eligibility restrictions, etc.

Renewable Energy Fund Distribution (RSA 362-F:5, IX)

Legislative Recommendation:

Consider amending RSA 362-F:10, V to allow the Commission greater flexibility in the residential small renewable generation incentive program design by replacing the requirement for the “one-time incentive payment ...” with a requirement for the Commission to administer a residential program “that supports the installation of small renewable generation facilities that would qualify as Class I or Class II sources of electricity.”

⁸¹ Data derived from the New Hampshire Public Utilities Commission, REF’s Residential Solar Electric Rebate Program.

Other Review Topics

The following section summarizes topics raised in the Senate Bill 51⁸² (2017), RPS Study Committee report⁸³ and by commenters during this review.

REF / RPS Annual Reporting Requirements

Due to the passage of net metering legislation (HB 1116 in 2016)⁸⁴ and the Commission's subsequent alternative net metering tariff order, and the passage of group net metering legislation (SB 367 in 2018),⁸⁵ certain required annual renewable energy fund annual reporting subject matter is no longer relevant. For example, the Commission's alternative net metering tariff order⁸⁶ removed the cap on net metered capacity; therefore, reporting on the percentage of net metered capacity installed as compared to the amount that is allowed to be net metered within each franchise area is no longer necessary.

Similarly, with the recent amendment to group net metering, the requirement for group hosts with systems less than 15 kW in size to report production and group member load annually was eliminated. Without these annual reports, the requirement for the utilities to report to the Commission, and for the Commission to report on, the generation and group load served by group net metered registered hosts is no longer possible.

Legislative amendments should be considered to remove the aforementioned reporting requirements.

House Bill 225 (2018), the RPS Study Committee (SB 51), and stakeholders participating in the 2018 RPS review discussed transparency enhancements for the RPS. Suggestions

"Under the current ISO-NE generator information system ("GIS"), there is no mechanism enabling the REC generator, as REC seller, to limit a sale to retirement of that REC in a particular REC market. This GIS construct means that a REC generator-seller can sell RECs at a price based on a sale into one market, and the ultimate buyer can retire the RECs into a higher-priced market without having paid value to the REC seller for that use."

"Providers of Electricity' should publicly report the number of banked RECs... 'Banking', does provide some liquidity to the market, but also makes evaluation of REC demand in any compliance year difficult due to the amount of banking allowed and because the "providers of electricity" (as defined in the RPS) do not publicly report the number of banked RECs."

The Biomass Generators Group

"In general, NHDES supports greater transparency, provided that it can be achieved simply and cost-effectively."

**New Hampshire
Department of Environmental Services**

"Additional reporting on the flow of RECs to better inform the PUC, the legislature, buyers/sellers of RECs, and the public, assist in connecting REC buyers and sellers, and generally inform policy adjustments."

**Windaction Presentation
May 2018 RPS Stakeholder Session**

⁸² SB 51 (2017), available at:

http://www.gencourt.state.nh.us/bill_status/billText.aspx?sy=2017&id=871&txtFormat=pdf&v=current.

⁸³ RPS Study Committee Final Report, *supra* note 36, <http://www.gencourt.state.nh.us/statstudcomm/reports/1334.pdf>.

⁸⁴ HB 1116 (2016), available at: http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2016&id=293&txtFormat=pdf&v=current.

⁸⁵ SB 367 (2018), available at: http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2018&id=1877&txtFormat=pdf&v=current.

⁸⁶ *Development of New Alternative Net Metering Tariffs and/or Other Regulatory Mechanisms and Tariffs for Customer-Generators*, Order No. 26,029, (June 23, 2017), http://www.puc.nh.gov/Regulatory/Docketbk/2016/16-576/ORDERS/16-576_2017-06-23_ORDER_26029.PDF.

revolved around increasing transparency by providing additional annual data reporting, in particular in the area of REC generation and settlement. Specific suggestions included:

- 1) Provide insight into the fuel type being used to meet New Hampshire compliance obligations, particularly for Class I, Class I-Thermal, and Class III.
- 2) Provide information on banked RECs by Class.
- 3) Provide additional information to be able to see to whom the generator is selling their RECs; specifically how many RECs are produced, and to which state(s) are RECs being sold.
- 4) Provide additional information to understand from whom electric providers are buying RECs; specifically, generator names, REC quantity purchased, generator location, and fuel type.

Data required to report on suggestions #1 and #2 are available and could be included in the REF Annual Report provided the data is aggregated by Class.

Suggestions #3 and #4 require the reporting of non-aggregated, competitively sensitive, market data. Suggestion #3 would require new authorization from generators to access generation data in NEPOOL GIS, or would require generators to report generation data directly to the Commission. Suggestion #4 would require the Commission to analyze, and report on data provided in the electric providers' "My Settled Certificate" reports which contain competitively sensitive data. Annually, over 40 electric providers file "My Settled Certificate" and E-2500 compliance reports to the Commission. In 2017, electricity providers settled over 1.8 million RECs. These paper, or electronic PDF, reports do not include the generator location or the fuel type. Therefore, to include this data in the REF Annual Report would require generator consent, and either changes to GIS, or a database solution designed by the Commission. Storing, analyzing, and reporting this data would be time intensive and possibly require new software.

Stakeholders have opposing positions on Suggestions #3 and #4. Some claim this level of transparency is necessary for the public to understand how RECs flow between electric providers and generators, and with this information policies could be enacted to encourage RECs to stay in New Hampshire; thereby making New Hampshire's RPS more productive. Others contend that this data is competitive in nature and should remain confidential. Further, those opposing Suggestions #3 and #4 note that the data reported would be dated because compliance data for a previous calendar year is not known until the following July, and then time would be needed for the Commission to reconcile and report the data. It is estimated that the time required to reconcile and report this level of data would be several months.

Other Recommendations - REF / RPS Annual Reporting Requirements

Legislative Recommendation:

Due to the passage of net metering legislation (HB 1116 in 2016) and the Commission's subsequent alternative net metering tariff order which removed the cap on net metered capacity, consider amending RSA 362-F:10, IV to remove the requirement for the Commission to report on "the percentage [of net metered capacity installed as compared to] the amount that is allowed to be net metered within each franchise area."

Other Recommendations - REF / RPS Annual Reporting Requirements, continued

Legislative Recommendation:

Due to the passage of group net metering legislation (SB 367 in 2018), consider amending RSA 362-F:10, IV to remove the requirement for the utilities to report to the Commission, and for the Commission to report on, the generation and group load served by group net metered registered hosts.

Legislative Recommendation:

Consider amending RSA 362-F:10, IV to change the Renewable Energy Fund Annual Report due date to November 1st to provide adequate time to include aggregate data on compliance by fuel type and REC banking.

REC Banking

REC banking is a process whereby a utility that has met its obligation to secure a certain amount of RECs for a particular year may save, or “bank,” any of the RECs it has acquired that year that are in excess of the obligation target. RPS REC banking rules vary by state, but all include a time limit and a maximum.

New Hampshire REC Banking rules limit banking of RECs for two years and allow a maximum of 30% of a compliance obligation to be met with banked RECs. Banking limits help to maintain an orderly and non-distorted market. Established banking limits also prevent hoarding of RECs for future years’ compliance.

Banking rules by state

Connecticut

Each electric distribution company and licensed electric supplier is allowed to bank excess Class I, II, and III RECs for up to 2 years, provided that the banked RECs in each class in any year are limited to no more than 30% of the company’s REC obligation in each respective class.⁸⁷

Maine

A competitive electricity provider may satisfy up to one-third of the portfolio requirements in any year through certificates associated with electricity production in the prior year.⁸⁸

Note: Banking requirements were discussed during stakeholder sessions; however, no written comments were received. During the session, comments were mixed both in support of change and maintaining the current rules.

⁸⁷ Conn. Agencies Regs. § 16-245a-1e (“Reporting requirement. Operating rules. Renewable energy portfolio deficiencies”), available at: <https://eregulations.ct.gov/eRegsPortal/Browse/RCSA?id=Title%2016|16-245a|16-245a-1|16-245a-1>.

⁸⁸ Maine Public Utilities Commission Rules, chapter 311, §7B, available at: <https://www.maine.gov/mpuc/legislative/rules/part3-electric.shtml>.

Massachusetts

Massachusetts’ banked certificates in any year are good the following two years for compliance.⁸⁹ Banking limits over and above any supplier’s annual obligation for RPS and Alternative Portfolio Standard (APS) are shown in Figure 20.

Figure 20. Massachusetts’ Banking Limits

RPS Class	Banking Limit
Class I Renewables	30% (net of SCO and SCOII)
Solar Carve Out (SCO)	10%
Solar Carve Out II (SCOII)	10%
Class 2 Renewables	30%
Class 2 Waste-to-energy	5%
Alternative Portfolio Standard	30%

Vermont

In Vermont, there is no limit on the amount of RECs that an electricity provider may bank, but any RECs that are banked through reserves, or retirement transactions, must be used within three years.⁹⁰

Given no written comments were received and comments during the stakeholder session were mixed, no specific banking rule changes are recommended at this time. When the Puc 2500 rules are open, public comment and discussion can occur.

Other Recommendations – REC Banking

Recommendation:

Do not change current limits on REC banking.

Regional Market & State-Specific RPS

To increase the market and create more market stability, some have suggested that states within the New England region harmonize REC classes by developing consistent class definitions and eligibility requirements across states as much as possible. Commission Staff will continue to work regionally to investigate opportunities.

⁸⁹ 225 Mass. Code Regs. §§14.08(2), 15.08(2), and 16.07(2), available at: <https://www.mass.gov/law-library/225-cmr>.

⁹⁰ *Investigation re: Establishment of the Renewable Energy Standard Program*, Interim Order in Docket No. 8550 (Vt. Pub. Serv. Bd., March 15, 2016), available at: https://puc.vermont.gov/sites/psbnew/files/doc_library/8550-interim-order.pdf.

CONCLUSION

There are specific modifications that can be made through legislative and regulatory processes to improve the New Hampshire RPS pursuant to its goals. The 2018 Review of New Hampshire's RPS revealed valuable information about the policy and its performance, as well as a good deal of information about renewable energy and its supporting sectors within the state.

The stakeholder sessions, research, and analysis answered many questions and provided necessary background to make the recommendations contained in this report. Although RSA 362-F does not require another review to be conducted until 2025, it may be wise to conduct another review in 2021, after the passage of three more compliance years, coupled with on-going analysis and documentation of trends.

In its ten years of operation, the New Hampshire RPS has made real progress accomplishing the statutory purposes identified by the legislature. The RPS has supported the development of thousands of new renewable energy systems, developed a broader project installation and support services market, and contributed toward the diversification of the regional power portfolio. Diversifying New Hampshire's energy portfolio, stabilizing energy costs, and hedging against long-term energy market uncertainty are achievable long-term benefits from this statewide renewable energy policy.

APPENDIX

A. Summary of Recommendations

Appendix A provides a list of all recommendations contained within the Renewable Portfolio Standard 2018 Review report. The “Topic” column denotes the statutory review topic in which the recommendation was discussed. To read the full analysis for the topic, please refer to the “Review Topic” section that contains the statutory reference noted in the “Topic” column. The appendix also provides a summary of the recommendation and assigns a recommendation category. The types of recommendations include: no change, legislative, and rule.

Topic	Review Topic Section Title
RSA 362-F:5, I	Adequacy of Sources to Meet Class Requirements
RSA 362-F:5, II	Class Requirements and Market Conditions
RSA 362-F:5, III	Potential for Thermal Energy Component
RSA 362-F:5, IV	Increasing Class I and II Requirements Beyond 2025
RSA 362-F:5, V	Introduction of New Classes or Consolidation of Existing Classes
RSA 362-F:5, VI	Timeframe and Manner to Transition Class I and II to Existing Sources
RSA 362-F:5, VII	Experience with Multi-Year Purchase Agreements
RSA 362-F:5, VIII	Alternative Methods for Compliance
RSA 362-F:5, IX	Renewable Energy Fund Distribution
Other Review Topics	Other Review Topics

Topic	Recommendation	Type of Recommendation
RSA 362-F:5, I	Maintain the existing class obligations for policy consistency and predictability for the renewable energy industry, particularly given the limited ability of New Hampshire to significantly affect the regional REC market and the potential for increased rate impacts if the class obligations were to increase.	No change
RSA 362-F:5, II	Consider statutory amendment language that would expressly expand the range of methods by which useful thermal energy may be measured, monitored, and reported for residential and small commercial thermal energy facilities; such methods might include, for example, calculating thermal production using fuel input quantities and unit efficiency determinations or assumptions, while incorporating appropriate discounts for uncertainty.	Legislative
RSA 362-F:5, II	The Commission will continue to monitor the eligibility and sources of Class I-Thermal RECs and if necessary, recommend increasing the requirement. Ongoing monitoring and analysis may be necessary due to new	No change

Topic	Recommendation	Type of Recommendation
	sources qualifying with the passage of House Bill 577 (2018), which establishes renewable methane as an eligible source for Class I-Thermal RECs.	
RSA 362-F:5, II	The Commission will consider Puc 2500 rule revisions to further simplify the registration and certification processes for Class I-Thermal eligible facilities.	Rule
RSA 362-F:5, II	Continue to provide a net metering credit toward compliance for interconnected facilities that net meter but do not apply for REC authorization.	No change
RSA 362-F:5, II	Consider amending RSA 362-F:6, II-a to reduce the capacity factor rating used to estimate yearly production for customer-sited sources that net meter but not REC-certified for Class I or Class II. Decrease the capacity factor rating to 14%.	Legislative
RSA 362-F:5, II	Maintain the existing Class III obligation for policy consistency and predictability. The Commission will continue to monitor the eligibility of available sources, other state’s RPS policies, and anticipated supply of Class III RECs. If necessary, the Commission will open a docket to determine if it is necessary to modify the Class III requirement for the calendar year, such that the requirement equals 85% to 95% of the reasonably expected potential generation from certified facilities after taking into account demand from RPS programs in other states.	No change
RSA 362-F:5, II	Establish a study committee to further analyze and understand the impact of adjusting the Class IV ACP rate to be equal to, or slightly higher than, the Massachusetts Class II ACP rate.	Legislative
RSA 362-F:5, II	Establish a study committee to gather further stakeholder input and perform analysis to understand implications of adding new Class IV eligible facilities by increasing the generation capacity limit for the “fish passage exemption” for the smaller Class IV facilities from 1 MW to 2 MW or 5 MW.	Legislative
RSA 362-F:5, III	Due to the passage of legislation that incorporated useful thermal energy into the New Hampshire RPS (SB 218 in 2012), consider repealing RSA 362-F:5, III, which requires the Commission to evaluate the potential for the addition of a thermal energy component to the RPS.	Legislative
RSA 362-F:5, III	Consider establishing a study committee to investigate the development of Combined Heat and Power (CHP) provisions, or revision of emissions requirements, to encourage more development of renewable thermal-led	Legislative

Topic	Recommendation	Type of Recommendation
	CHP facilities.	
RSA 362-F:5, IV	Consider amending RSA 362-F:5 to require the Commission to conduct a review of class requirements and other aspects of the RPS in 2021 and report findings to the General Court by November 1, 2021. Other aspects for review, discussion, and recommendation should focus on and include, but are not limited to: transitioning “new” facilities to “existing” facilities, and how corresponding RPS targets might be adjusted; grandfathering current long-term contracts; and increasing RPS requirements beyond 2025. An additional review in 2021 supports market stability by providing advance insight and direction to encourage continued renewable energy development.	Legislative
RSA 362-F:5, V	Energy efficiency goals and programs should remain outside the scope of the RPS.	No change
RSA 362-F:5, V	In light of existing utility Energy Efficiency Resource Standard (EERS) programs, consider amending RSA 362-F:5, V to remove the language specific to energy efficiency.	Legislative
RSA 362-F:5, V	Do not include nuclear energy in the New Hampshire RPS.	No change
RSA 362-F:5, V	Do not include large-scale hydroelectric generation in the New Hampshire RPS.	No change
RSA 362-F:5, V	Retain current Class structure as it supports policy consistency and market predictability. A multiple class structure also maintains policy flexibility.	No change
RSA 362-F:5, VI	Consider amending RSA 362-F:5 to require the Commission to conduct a review of class requirements and other aspects of the RPS in 2021 and report findings to the General Court by November 1, 2021. Other aspects for review, discussion, and recommendation should focus on and include, but are not limited to: transitioning “new” facilities to “existing” facilities, and how corresponding RPS targets might be adjusted; grandfathering current long-term contracts; and increasing RPS requirements beyond 2025. An additional review in 2021 supports market stability by providing advance insight and direction to encourage continued renewable energy development.	Legislative
RSA 362-F:5, VII	The current statute provides sufficient flexibility. Based on the experience with multi-year contracts to date, the Commission recommends no change regarding their use.	No change
RSA 362-F:5, VIII	The Commission, with stakeholder input, should consider Puc 2500 rule changes to improve efficiency for both	Rule

Topic	Recommendation	Type of Recommendation
	renewable project owners/managers and program administrators, including: simplify and improve the process that has been developed for compliance with RSA 362-F:6,II-a (net metering credit); and develop methods that would increase the participation of residential and small commercial biomass boiler systems in the thermal energy market.	
RSA 362-F:5,IX	Consider amending RSA 362-F:10, V to allow the Commission greater flexibility in the residential small renewable generation incentive program design by replacing the requirement for the “one-time incentive payment ...” with a requirement for the Commission to administer a residential program “that supports the installation of small renewable generation facilities that would qualify as Class I or Class II sources of electricity.”	Legislative
Other Review Topics	Due to the passage of net metering legislation (HB 1116 of 2016) and the Commission’s subsequent alternative net metering tariff order which removed the cap on net-metered capacity, consider amending RSA 362-F:10, IV to remove the requirement for the Commission to report on “the percentage [of net metered capacity installed as compared to] the amount that is allowed to be net metered within each franchise area.”	Legislative
Other Review Topics	Due to the passage of group net metering legislation (SB 367 in 2018), consider amending RSA 362-F:10, IV to remove the requirement for the utilities to report to the Commission, and for the Commission to report on, the generation and group load served by group net metered registered hosts.	Legislative
Other Review Topics	Consider amending RSA 362-F:10, IV to change the Renewable Energy Fund Annual Report due to November 1 st to provide adequate time to include aggregate data on compliance by fuel type and REC banking.	Legislative
Other Review Topics	Do not change current limits on REC banking.	Rule

B. Resources

New Hampshire Public Utilities Commission Pages ([puc.nh.gov](http://www.puc.nh.gov))

1. Sustainable Energy Division
<http://www.puc.nh.gov/Sustainable%20Energy/SustainableEnergy.htm>
2. Renewable Portfolio Standard
http://www.puc.nh.gov/Sustainable%20Energy/Renewable_Portfolio_Standard_Program.htm
3. Renewable Portfolio Standard; Certified Facilities
http://www.puc.nh.gov/Sustainable%20Energy/Renewable_Energy_Source_Eligibility.htm
4. Renewable Energy Fund Annual Reports
<http://www.puc.nh.gov/Sustainable%20Energy/RenewableEnergyFund.html>
5. Renewable Portfolio Standard Retrospective (2007 - 2015)
<http://www.puc.nh.gov/Sustainable%20Energy/RPS/NH%20RPS%20Retrospective%202007-2015%20Report%20-%20FINAL.pdf>
6. 2018 Renewable Energy Portfolio Standard Review
<https://www.puc.nh.gov/Sustainable%20Energy/Review%20RPS%20Law.html>

New Hampshire Public Utilities Commission Dockets and Orders

1. DE 13-021; Order No. 25,484
<http://www.puc.nh.gov/Regulatory/Docketbk/2013/13-021.html>
2. DE 14-104; Order No. 25,674
<http://www.puc.nh.gov/Regulatory/Docketbk/2014/14-104.html>
3. DE 15-035; Order No. 26,768
<http://www.puc.nh.gov/Regulatory/Docketbk/2015/15-035.html>
4. IR 15-296; Order No. 25,877
<http://www.puc.nh.gov/Regulatory/Docketbk/2015/15-296.html>
5. DE 15-477; Order No. 25,844
<http://www.puc.nh.gov/Regulatory/Docketbk/2015/15-477.html>
6. DE 15-137; Order No. 25,932
<http://www.puc.nh.gov/Regulatory/Docketbk/2015/15-137.html>
7. IR 16-714; Order No. 25,919
<http://www.puc.nh.gov/Regulatory/Docketbk/2016/16-714.html>
8. DE 16-576; Order No. 26,029
<http://www.puc.nh.gov/Regulatory/Docketbk/2016/16-576.html>
9. DRM 16-829; Puc 2500 RPS Administrative Rules
<http://www.puc.nh.gov/Regulatory/Docketbk/2016/16-829.html>
10. DE 17-136; Order No. 26,095
http://www.puc.nh.gov/Regulatory/Docketbk/2017/17-136/ORDERS/17-136_2018-01-02_ORDER_26095.PDF

New Hampshire Public Utilities Commission Administrative Rules

1. Public Utilities Commission Rules, Chapter 2500: Electric Renewable Portfolio Standard
<http://www.puc.nh.gov/Regulatory/Rules/Puc2500.pdf>

Legislation (<https://gencourt.state.nh.us/>)

1. New Hampshire Statute 362-F: Electric Renewable Portfolio Standard
<http://www.gencourt.state.nh.us/rsa/html/NHTOC/NHTOC-XXXIV-362-F.htm>
2. Senate Bill 218: relative to electric renewable portfolio standards (2012)
<http://www.gencourt.state.nh.us/legislation/2012/SB0218.pdf>
3. House Bill 542: relative to electric renewable portfolio standards (2013)
<http://www.gencourt.state.nh.us/legislation/2013/HB0542.pdf>
4. Senate Bill 148: relative to electric renewable portfolio standards (2013)
<http://www.gencourt.state.nh.us/legislation/2013/SB0148.pdf>
5. House Bill 1116: relative to information collection concerning electric renewable portfolio standards (2016)
http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2016&id=293&txtFormat=pdf&v=current
6. Senate Bill 386: adding biodiesel to electric renewable energy sources (2016)
http://www.gencourt.state.nh.us/bill_status/billText.aspx?sy=2016&id=1135&txtFormat=pdf&v=current
7. Senate Bill 51: establishing a committee to review subsidies for energy projects provided by the renewable portfolio standard (2017)
<http://www.gencourt.state.nh.us/statstudcomm/details.aspx?id=1334&rbl=1&txtyear=2017&txtbillnumber=sb51>
8. Senate Bill 129: relative to electric renewable portfolio standards (2017)
http://www.gencourt.state.nh.us/bill_status/billText.aspx?sy=2017&id=957&txtFormat=pdf&v=current
9. House Bill 225: relative to public utilities commission review of group host agreements (2018)
http://gencourt.state.nh.us/bill_status/billText.aspx?sy=2018&id=327&txtFormat=pdf&v=current
10. House Bill 1550: requiring electric bills to include the cost of compliance with renewable energy standards (2018)
http://www.gencourt.state.nh.us/bill_status/billText.aspx?sy=2018&id=1050&txtFormat=pdf&v=current
11. Senate Bill 367: relative to public utilities commission review of group host agreements (2018)
http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2018&id=1877&txtFormat=pdf&v=current
12. Senate Bill 577: requiring the public utilities commission to revise its order affecting the Burgess BioPower plant in Berlin, prohibiting the import of certain liquid fuels, and relative to the production of useful thermal energy (2018)
http://gencourt.state.nh.us/bill_status/billText.aspx?sy=2018&id=1905&txtFormat=pdf&v=current

U.S. Energy Information Administration (eia.gov)

1. New Hampshire State Profile
<http://www.eia.gov/state/?sid=NH>
2. Electricity Data Browser
<http://www.eia.gov/electricity/data/browser/>
3. State Renewable Electricity Profiles 2010
<http://www.eia.gov/renewable/state/pdf/srp2010.pdf>

4. Rankings: Total Carbon Dioxide Emissions, 2014
<http://www.eia.gov/state/rankings/?sid=NH#series/226>
5. Annual Energy Outlook
<http://www.eia.gov/outlooks/aeo/>
6. International Energy Outlook
<http://www.eia.gov/outlooks/ieo/>
7. Today in Energy, “Renewables Share of North America Electricity Mix Expected to Rise”
<http://www.eia.gov/todayinenergy/detail.php?id=27332>

Federal Agencies and Labs

1. U.S. Environmental Protection Agency
epa.gov
2. Greenhouse Gas Equivalencies Calculator, U.S. Environmental Protection Agency
<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>
3. U. S. Environmental Protection Agency’s AVERT Tool
<https://www.epa.gov/statelocalenergy/avert-web-edition>
4. My Environment: New Hampshire
<https://ofmpub.epa.gov/myenv/MyClimate.html?minx=-77.67334&miny=41.96766&maxx=-65.47852&maxy=45.99696&ve=6,43.68552,-71.57760&cLat=&cLon=&pSearch=New%20Hampshire#a>
5. Portfolio Standards and the Promotion of Combined Heat and Power, EPA Combined Heat and Power Partnership
https://www.epa.gov/sites/production/files/2015-07/documents/portfolio_standards_and_the_promotion_of_combined_heat_and_power.pdf
6. Tracking the Sun, Lawrence Berkeley National Laboratory
https://emp.lbl.gov/sites/default/files/tracking_the_sun_2018_edition_final_0.pdf

Database of State Incentives for Renewables and Efficiency (dsireusa.org)

1. New Hampshire State Programs
<http://programs.dsireusa.org/system/program?state=NH>
2. Renewable Portfolio Standard
<http://programs.dsireusa.org/system/program/detail/2523>

Clean Energy States Alliance (cesa.org)

1. Potential RPS Markets for Renewable Energy Generators, (July 18, 2016)
<http://www.cesa.org/assets/2016-Files/Potential-RPS-Markets-Report-Holt.pdf>
2. Does Energy Storage Fit in an RPS, (July 29, 2016)
<http://cesa.org/assets/2016-Files/Energy-Storage-and-RPS-Holt.pdf>
3. State Leadership in Clean Energy: Award-Winning Programs in New Hampshire and Rhode Island; Stori, V. (2016)
<https://cesa.org/webinars/state-leadership-in-clean-energy-award-winning-programs-in-new->

[hampshire-and-rhode-island/](#)

4. Case Studies of RPS Best Practices: Solar Carve-Outs, SREC Tracking, and Thermal Inclusion; Heeter et al. (2018)

<https://www.cesa.org/resource-library/resource/case-studies-of-rps-best-practices-solar-carve-outs-srec-tracking-and-thermal-inclusion>

New England Power Pool Generation Information System ([nepoolgis.com](#))

ISO-New England ([iso-ne.com](#))

1. Final 2018 PV Forecast, ISO NE

<https://www.iso-ne.com/static-assets/documents/2018/04/final-2018-pv-forecast.pdf>

2. Resource Mix, ISO New England, ISO Generator Interconnection Queue

<https://www.iso-ne.com/about/key-stats/resource-mix#on-the-way-in>

Economic Research

1. New Hampshire Cleantech Council; New Hampshire Cleantech Market Report

https://docs.wixstatic.com/ugd/c6c29c_fdf209bf9384d568f088bb2aefab3e5.pdf

2. The Solar Foundation; Solar Jobs Census 2017

<https://www.thesolarfoundation.org/solar-jobs-census-factsheet-2017-nh/>

3. Granite State Hydropower Association; Benefits of Hydro,

<http://www.granitestatehydro.org/benefits-of-hydro.html>

4. New Hampshire Wood Energy Council; Modern Wood Heat: Local Renewable Energy for Commercial and Institutional Building Owners, Benefits to New Hampshire in 2015

https://docs.wixstatic.com/ugd/c6c29c_bf65bd8ae27241e8b4948d8bbca46eda.pdf

Other Resources

1. Competition Drives Nuclear Industry to Look for Millions in Subsidies; The Washington Post Mufson, S. (2018)

https://www.washingtonpost.com/business/economy/competition-drives-nuclear-industry-to-look-for-millions-in-subsidies/2018/05/24/737e800c-5f60-11e8-a4a4-c070ef53f315_story.html?noredirect=on&utm_term=.ac1b3e97cdd4

2. NYSERDA, Clean Energy Standard

<https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard>

3. Millstone Casts Bid for State Contract; Hartford Business. Pilon, M. (2018)

<http://www.hartfordbusiness.com/article/20180919/NEWS01/180919883/millstone-casts-bid-for-state-contract>

4. Illinois Passes Subsidy Bill to Save State's Nuclear Power Plants; Electric Light and Power; Walton, R. (2016)

<https://www.elp.com/articles/2016/12/illinois-pass-subsidy-bill-to-save-state-s-nuclear-power-plants.html>

5. Court Upholds Illinois Nuclear Power Subsidy Law; WQAD Channel 8 News (2018)

<https://wqad.com/2018/09/18/court-upholds-illinois-nuclear-power-subsidy-law/>

C. Alternative Scenario Analysis Report, by Sustainable Energy Advantage, LLC

Sustainable Energy Advantage, LLC “2018 Review of the New Hampshire Renewable Portfolio Standard, Alternative Scenario Analysis”, October 2018

<http://www.puc.nh.gov/Sustainable%20Energy/Review%20RPS%20Law.html>

D. Supporting Data Tables

*New Hampshire RPS Registered Renewable Energy Generators **

	Class I		Class I T		Class II		Class III		Class IV	
	Qty	Capacity (MW)	Qty	Capacity (MW)	Qty	Capacity (MW)	Qty	Capacity (MW)	Qty	Capacity (MW)
Biogas	1	0.1								
Biomass	2	76.7	7	9.7			1	15		
Digester Gas	8	2.3								
Geothermal			12	0.5						
Hydroelectric	18	72.2							62	49.9
Landfill Gas	9	28.4					11	35.6		
Liquid Biofuels			1	12.8						
Solar PV					2714	91.28				
Wind	16	588.3								
Wood	3	84.8	28	14.3			6	109.8		

*Data effective 10/10/2018

Renewable Energy Certificates Purchased by Load Serving Entities, by Year and Class

	Class I Non-Thermal	Class I-Thermal	Class II	Class III	Class IV	Total
2012	232,255	Not Applicable	8,849	910	62,875	304,889
2013	150,998	Not Applicable	6,469	21	79,694	237,182
2014	503,189	9,909	2,091	0	116,370	631,559
2015	635,730	16,476	6,840	57,437	67,576	784,059
2016	725,796	19,977	12,622	195,963	73,086	1,027,444
2017	802,784	30,684	14,405	839,625	93,834	1,781,332

* Values do not represent number of RECs retired per year as some RECs purchased may be banked for later use

E. ISO-NE Information Regarding Transmission Costs, Demand Patterns, Solar and Energy Efficiency

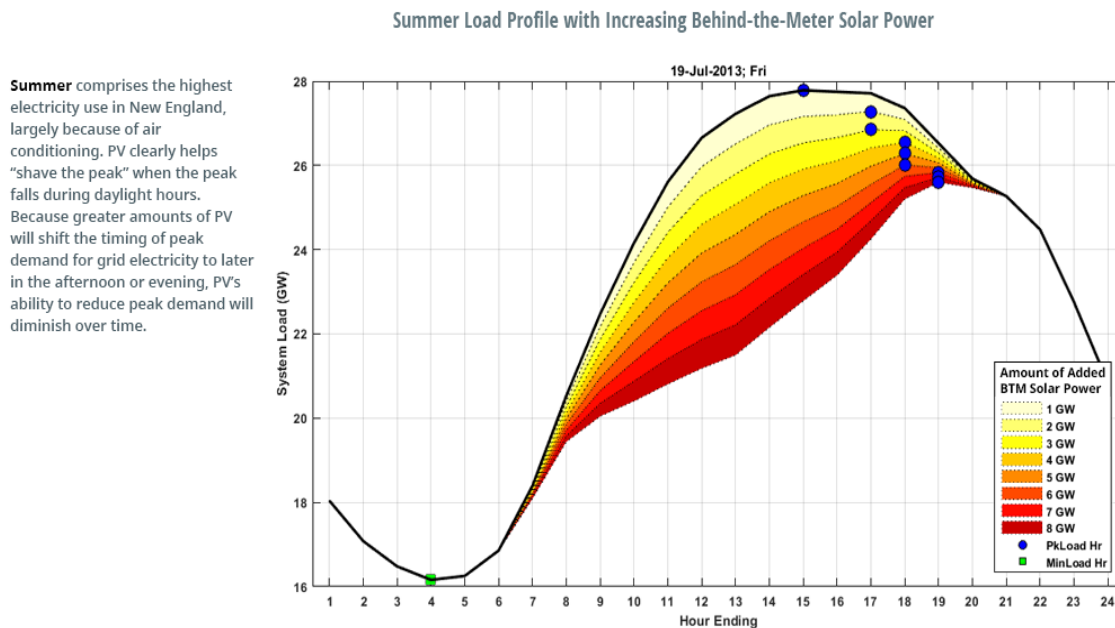
Note: Data and charts in this appendix were provided by ISO-NE in October 2018 for the Commission’s use in the 2018 RPS review. Where applicable, links to ISO-NE webpages and documents are provided.

Demand patterns in the New England region are changing

- **7.2 million** retail electricity customers drive the demand for electricity in New England (14.8 million population)
 - Region’s all-time summer peak demand: **28,130 MW** on August 2, 2006
 - Region’s all-time winter peak demand: **22,818 MW** on January 15, 2004
- Energy efficiency (EE) and behind-the-meter (BTM) solar are **reducing** peak demand growth and overall electricity use over the next ten years
 - **-0.2%** annual growth rate for summer peak demand (with EE and BTM solar)
 - **-0.9%** annual growth rate for overall electricity use (with EE and BTM solar)
- BTM solar is **shifting** peak demand later in the day in the summertime

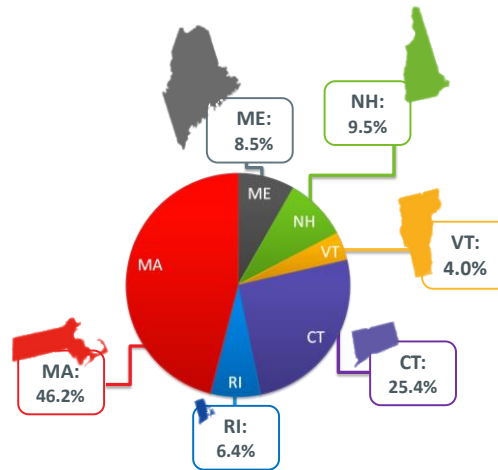
Note: Without energy efficiency and solar, the region’s peak demand is forecasted to grow 0.8% annually and the region’s overall electricity demand is forecasted to grow 0.9% annually. Summer peak demand is based on the “90/10” forecast for extreme summer weather.

The chart below illustrates the impact of behind the meter solar during the summer.⁹¹



⁹¹ *Solar Power in New England: Concentration and Impact*, ISO New England, <https://www.iso-ne.com/about/what-we-do/in-depth/solar-power-in-new-england-locations-and-impact> (last visited Oct. 31, 2018).

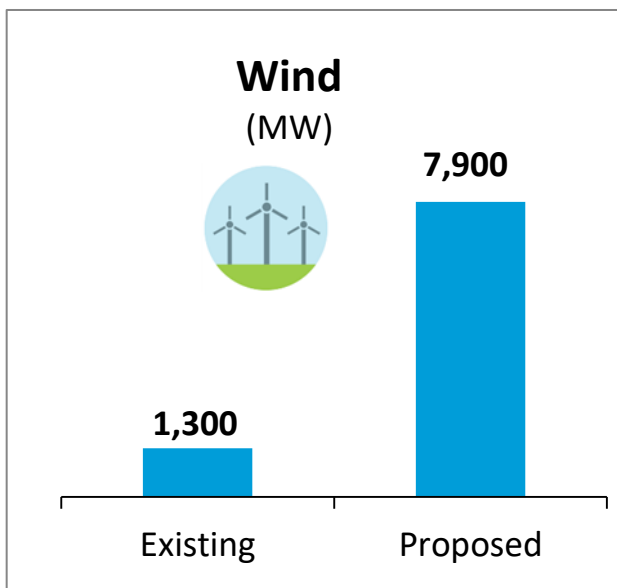
The New England electric grid is a **tightly interconnected** system; each state shares in the benefits of reliability upgrades. The amount of electricity demand in an area (state) determines its **share** of the cost of new or upgraded transmission facilities needed for reliability. The chart below illustrates the current cost-share percentage by state.



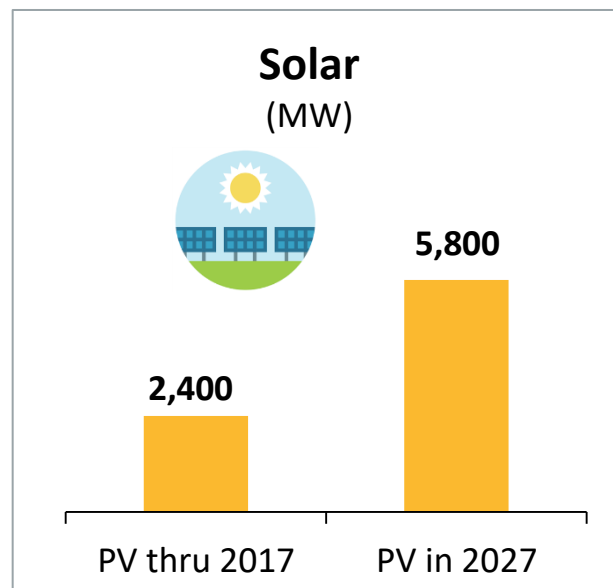
Source: ISO-NE 2017 Network Load by State

Each state’s share of the cost changes over time. A state’s energy efficiency and renewable energy installations and policies may impact future cost-share allocations. The charts below illustrate wind and solar projects in the ISO-NE queue.

Renewable Resources Are Trending Up in New England



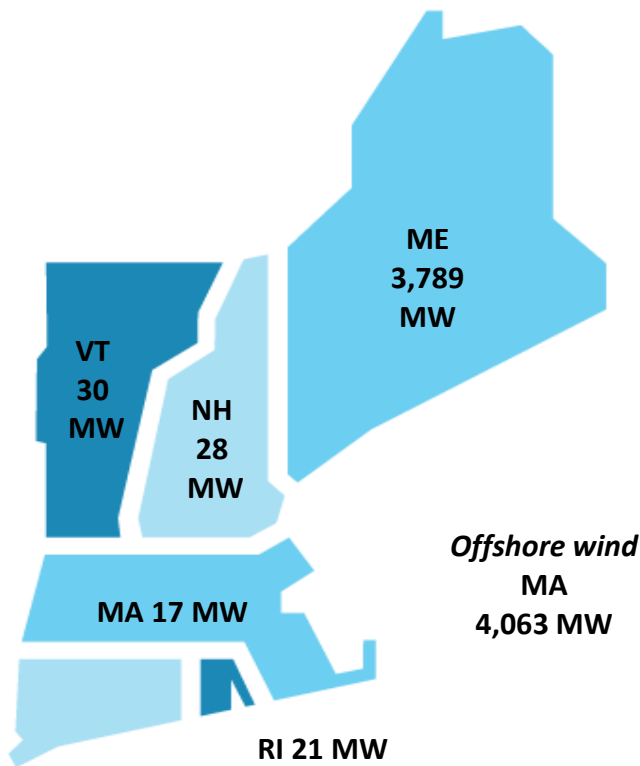
Nameplate capacity of existing wind resources and proposals in the ISO-NE Generator Interconnection Queue; some wind proposals include battery storage.



Final 2018 ISO-NE PV Forecast, AC nameplate capacity from PV resources participating in the region’s wholesale electricity markets, as well as those connected “behind the meter.”

On- and Off-Shore Wind Is Being Proposed by State
Represents more than half of proposed generation

Solar and wind projects are being developed in New Hampshire as shown in the map of proposed wind projects by state and by the 2018 Final PV Forecast.



Source: ISO Generator Interconnection Queue (August 2018)
FERC and Non-FERC Jurisdictional Proposals; Nameplate Capacity Ratings

2018 FINAL PV FORECAST

<https://www.iso-ne.com/static-assets/documents/2018/04/final-2018-pv-forecast.pdf>, slide 31

States	Annual Total MW (AC nameplate rating)											Totals
	Thru 2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
CT	365.6	88.6	86.8	89.8	80.6	72.9	53.7	52.2	50.6	49.0	47.4	1,037.3
MA	1602.3	296.7	228.0	228.0	215.3	215.3	215.3	215.3	135.1	130.9	126.7	3,608.9
ME	33.5	10.2	10.2	10.2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	131.4
NH	69.7	13.8	13.8	13.8	13.1	13.1	13.1	13.1	13.1	13.1	13.1	202.7
RI	62.2	34.5	34.5	31.4	29.6	29.6	29.6	29.6	29.6	29.6	29.6	370.2
VT	257.2	31.5	22.5	22.5	21.3	21.3	21.3	21.3	21.3	21.3	21.3	482.5
Regional - Annual (MW)	2390.5	475.3	395.8	395.8	369.5	361.9	342.7	341.1	259.3	253.5	247.7	5,832.9
Regional - Cumulative (MW)	2390.5	2865.8	3261.6	3657.4	4026.9	4388.8	4731.4	5072.5	5331.8	5585.3	5832.9	5,832.9

Notes:

- (1) Forecast values include FCM Resources, non-FCM Energy Only Generators, and behind-the-meter PV resources
- (2) The forecast values are net of the effects of discount factors applied to reflect a degree of uncertainty in the policy-based forecast
- (3) All values represent end-of-year installed capacities
- (4) Forecast does not include forward-looking PV projects > 5MW in nameplate capacity

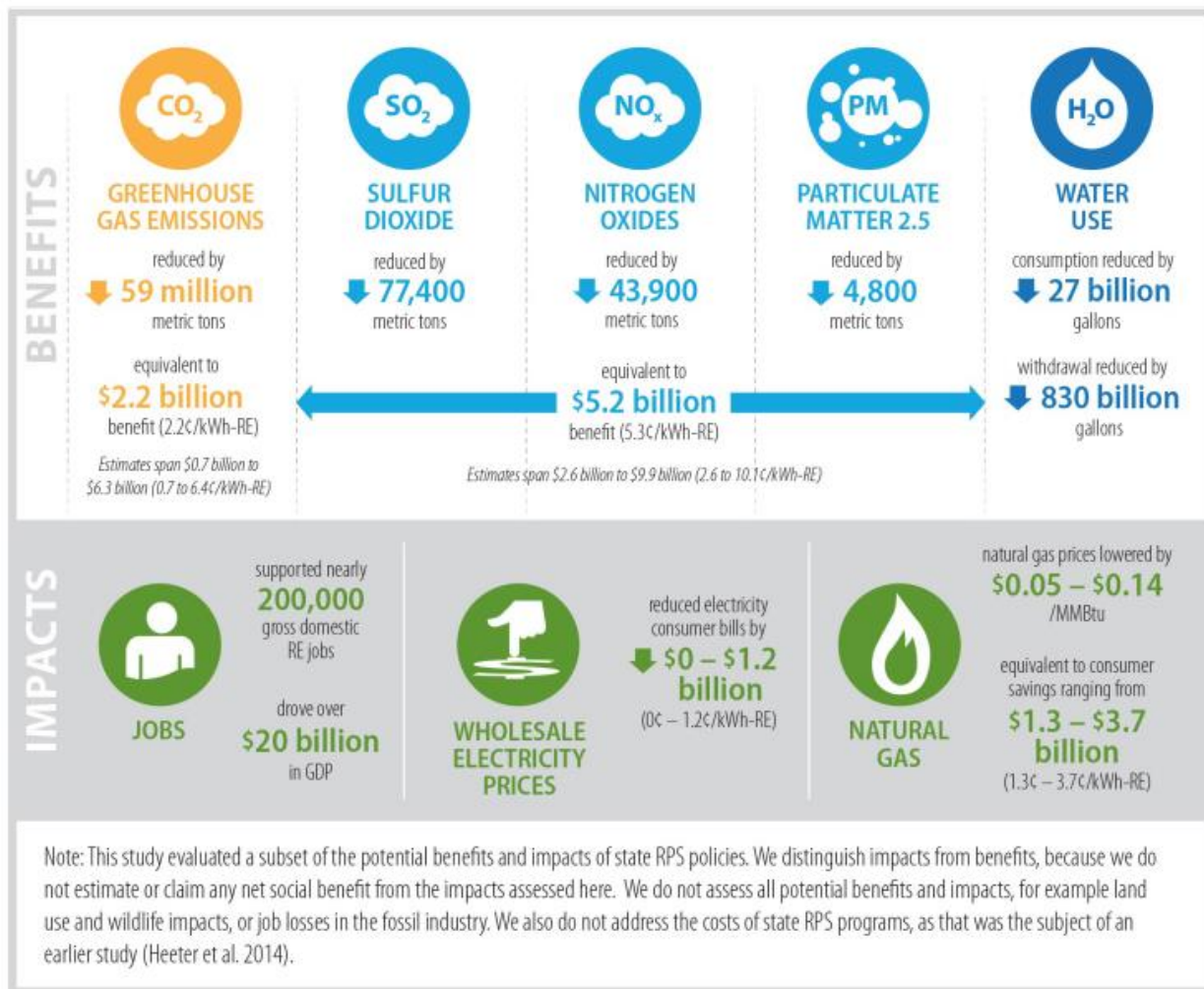
F. FERC Order No. 1000 Implementation in New England: Public Policy Transmission Project Cost Allocation

NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION January 27, 2015

FERC Order No. 1000 Implementation in New England: Public Policy Transmission Project Cost Allocation

- Adding large-scale hydroelectric to the list of RPS-eligible renewable technologies may make NH ratepayers responsible for a percentage of the cost of non-reliability transmission facilities throughout New England, if those transmission facilities are necessary for the transport of hydroelectric power.
- On July 21, 2011, the Federal Energy Regulatory Commission (FERC) issued Order No. 1000. For New England, Order 1000 requires that the regional electric transmission provider ISO-New England's (ISO-NE) transmission planning processes consider transmission needs driven by public policy requirements established by state or federal laws or regulations. For example, state renewable portfolio standard (RPS) laws may drive the development of new remotely located wind generation resources that, in turn, may require the construction of new transmission lines to transport the energy generated to load centers. Under the FERC order the need for these lines must be taken into account by ISO-NE when developing its transmission plan for the region.
- Order No. 1000 refers to transmission projects driven by public policy requirements as "Public Policy Transmission" (PPT) projects. These PPT projects are meant to accomplish energy-related goals of each region's states aside from electric-system reliability. Such goals may include the satisfaction of state renewable portfolio standards, satisfaction of state fuel-diversity goals, or the satisfaction of clean air goals. FERC, in Order No. 1000, sets out a series of principles meant to govern how the costs of these PPT projects are allocated among states in multi-state transmission regions, including the principle that States that demonstrably benefit from a given PPT project should pay a share of the costs that is commensurate with the benefits.
- FERC has charged ISO-NE with developing an acceptable default methodology for inter-state cost allocation for PPT projects, for instances where the ISO-NE participant states cannot come to a project-specific agreement on cost allocation.
- In November 2013, at FERC's direction ISO-NE filed its second attempt at compliance with the terms of Order No. 1000. The filing includes a PPT default cost allocation mechanism that is opposed by NH, RI, and VT on the basis that it violates the principle that costs assessed to states' electric customers must have a nexus with the benefits that accrue to each state. ISO-NE's default proposal allocates 70% of a PPT project's cost among the states using each state's ratio share of total ISO-NE electric load (9% for NH), without any reference to actual benefits. Only 30% of the PPT project cost is allocated based on actual expected benefits, as derived from expert studies of the specific project in question. In December 2013, NH, RI, and VT filed a joint protest with FERC asking that FERC reject ISO-NE's proposal.
- As currently proposed by ISO-NE, for a given transmission project, ISO-NE would be left to decide for the states if they have a public policy similar to the one that the transmission project is meant to fulfill. Under the ISO-NE default proposal, if the states are unable to decide upon a cost allocation approach for a given project then the automatic 70% cost assessment by load and 30% by expected benefits across all New England states would be triggered regardless of each state's specific public policy. NH, RI, and VT argued in their joint protest to FERC that only 30% of the cost assessment should be allocated by load while 70% of a PPT project's cost should be allocated based on benefits validated by expert studies. NH has and will continue to oppose ISO-NE's default proposal and will continue to exercise its legal options regarding FERC Order 1000.

G. Historical Benefits of National RPSs



Ryan Wiser, et al., *A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards*, Lawrence Berkeley National Laboratory and National Renewable Energy Laboratory (January 2016).



New Hampshire Public Utilities Commission • 21 South Fruit Street, Suite 10 • Concord, NH 03301

Phone: (603) 271-2431 • FAX: (603) 271-3878 • TDD Access: Relay NH (603) 1-800-735-2964

Internet: <http://www.puc.nh.gov>