An Assessment of Maine's Renewable Portfolio Standard

Prepared for:

the Maine Governor's Energy Office, in collaboration with the Public Utilities Commission

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Table of Contents

Executive Summary

Maine law[1] requires the Governor's Energy Office, in consultation with the Public Utilities Commission, to evaluate and report on the status and impacts of Maine's Renewable Portfolio Standard (RPS). The Governor's Energy Office and Public Utilities Commission retained Sustainable Energy Advantage, LLC (SEA) to conduct this analysis.

Maine's Renewable Portfolio Standard (RPS) has been an important policy tool. It has conveyed the state's policy objectives as they have evolved over time and established a mechanism for accurate accounting of renewable energy attributes. The RPS has supported renewable development resulting in over $100 million in direct investment, approximately $900 million in operations and maintenance spending, and over 1,000 full-time equivalent jobs yielding over $1 billion in worker income between 2008 and 2022. These economic impacts are the result of compliance with Maine's RPS. Maine has also derived significant economic benefits from hosting renewable energy facilities used to satisfy RPS policies in other states. Those economic impacts are additive to the results described herein and are not the focus of this report.

The RPS alone is not responsible for creating these benefits, however. Across New England, long-term procurement policies have also been required to enable financing, drive investment in new renewable generation, and realize the economic impacts described above. In addition to supporting financing, procurement policies are also used to steer location or technology decisions and consider desirable production characteristics. Given Maine's ambitious climate and renewable energy goals, Maine will need to continue to secure renewables for RPS compliance through long term contracts. Based on the SEA team's review of best practices in RPS and procurement policies, Maine policymakers may also wish to consider:

- The role of RPS exemptions towards realizing a 100% policy standard;
- Combining Class I and IA when exemptions expire, since the supply uniquely eligible for these classes is not sufficient to impact REC prices;
- Adjusting the Class II percentage requirement to keep targets neutral on a MWH-basis;
- Aligning the Class I/IA ACP with other states and relative to increasing cost of new entry;
- Consider a range of suggestions for adapting and enhancing future renewable energy procurements, based on industry experience, to lead to improved cost and success outcomes;
- Future procurement statutes should clearly lay out objectives (eligibility, quantity, selection criteria) while granting authority and latitude to Maine's expert agencies to run processes to study and identify optimum approaches, and work out the details with such latitude; and
- When implementing statutory authority, procuring agencies should consider ways in which reducing developer risk can benefit ratepayers.

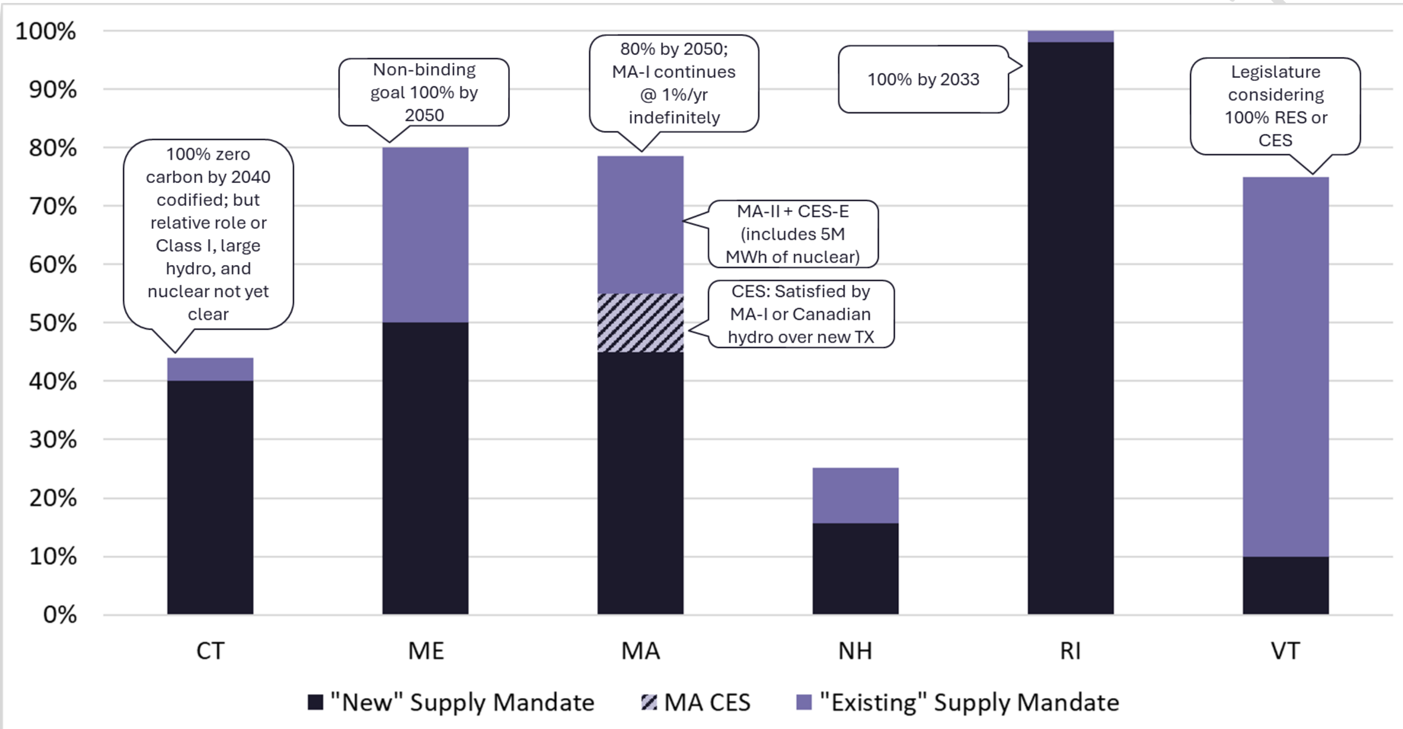
As Maine's renewable energy requirements continue to grow, particularly with increased load from beneficial electrification, a new and greater emphasis on renewable energy contracting and regional coordination will be needed to achieve the RPS and state goals going forward.

[1] 35-A M.R.S. §3210 sub-§11.

Regional Market Considerations

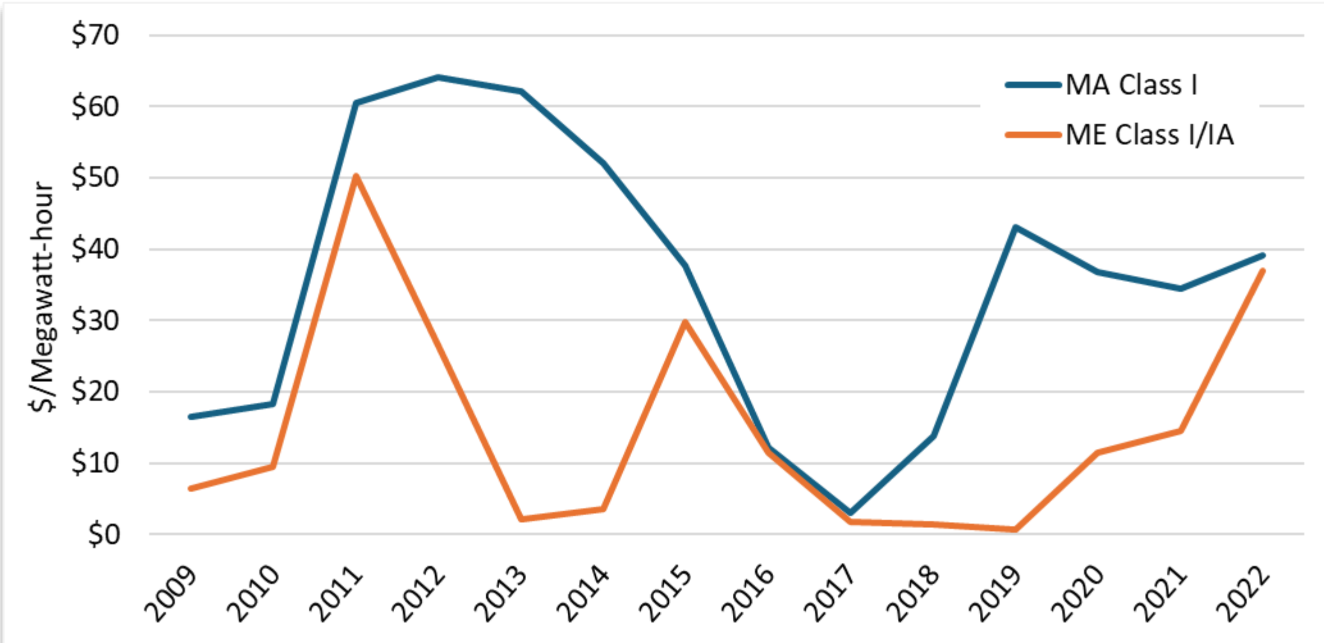
Maine's RPS and procurement policies must be considered within the regional context. All six New England states have RPS and procurement policies. Regional RPS policies vary by percentage target, generator eligibility, and compliance flexibility mechanisms – including Alternative Compliance Payments (ACPs). An overview of New England RPS policy classes and targets is provided in Figure ES-1.

Figure ES-1: Summary of New England RPS Mandates, 2035



In general, Class I policies support the construction of new facilities (with some exceptions for repowering, refurbishing, and incremental capacity additions), while Class II policies maintain the existing fleet. For most of the study period, Maine's eligibility criteria allowed for a modest surplus in Class I and a material surplus in Class II, leading to lower REC (and thus RPS compliance) costs than other New England RPS markets. By the end of the study period (i.e., 2021 – 2022), however, the combined effect of higher regional RPS targets, the advent of Maine Class IA, and increasing challenges (and delays) associated with developing, financing, and constructing new resources, resulted in market equilibrium or modest shortages. For Maine Class I and IA, supply uniquely eligible in Maine was no longer able to fulfill the entire obligation. As a result, Maine's RPS-obligated entities began buying from the same pool of multi-state RPS-eligible resources as RPS-obligated entities in other states and REC prices for Maine Class I and IA eventually converged with other regional Class I markets – as shown in Figure ES-2.

Figure ES-2: ME Class I / IA and MA Class I REC Prices, 2009 – 2022[2]



By comparison, the Maine Class II market experienced surplus conditions from 2000 to 2020. By 2021, however, greater regional emphasis on existing sources of supply (e.g., MA CES-E) and increases in voluntary renewable energy purchases by corporate and institutional entities seeking to satisfy environmental and social governance (ESG) objectives began to create demand tension for existing renewables. As a result, Maine Class II REC prices increased significantly. This led the legislature to direct the PUC to establish an ACP rate specific to Class II.

In summary, analysis of Maine RPS compliance should be conducted in the regional context. While the RPS has local benefits, the obligation is met through the retirement of RECs, which is done at a regional level. When considering the state of RPS compliance in Maine or any other individual state, it is important to consider the overall targets, eligibility criteria, flexibility mechanisms, and regional supplies (including imports of energy and RECs from adjacent control areas) to understand consideration for potential adjustments.

The remainder of this Executive Summary reviews the report's key findings.

Key Findings: RPS Status, Impacts, and Policy Considerations

The RPS is a state-wide obligation applicable to retail electricity sales. RPS-obligated load is calculated by subtracting exempted load (see Section 3.1.1) from total retail sales, including line losses, for each load-serving entity (LSE). RPS demand is calculated as the product of RPS-obligated load and class-specific targets, by year. RPS supply can be sourced from throughout New England and from adjacent control areas (so long as both energy and RECs are imported together) provided that all applicable eligibility criteria are met. Figure ES-3 summarizes the renewable energy certificates retired for Maine Class I and IA compliance, by year, and demonstrates that the majority of Maine Class I and IA supply originated in Maine.

[2] Derived from SEA compilation of broker data.

Figure ES-3: Supply Settled for Maine Class I and IA RPS Compliance by Location, by Year

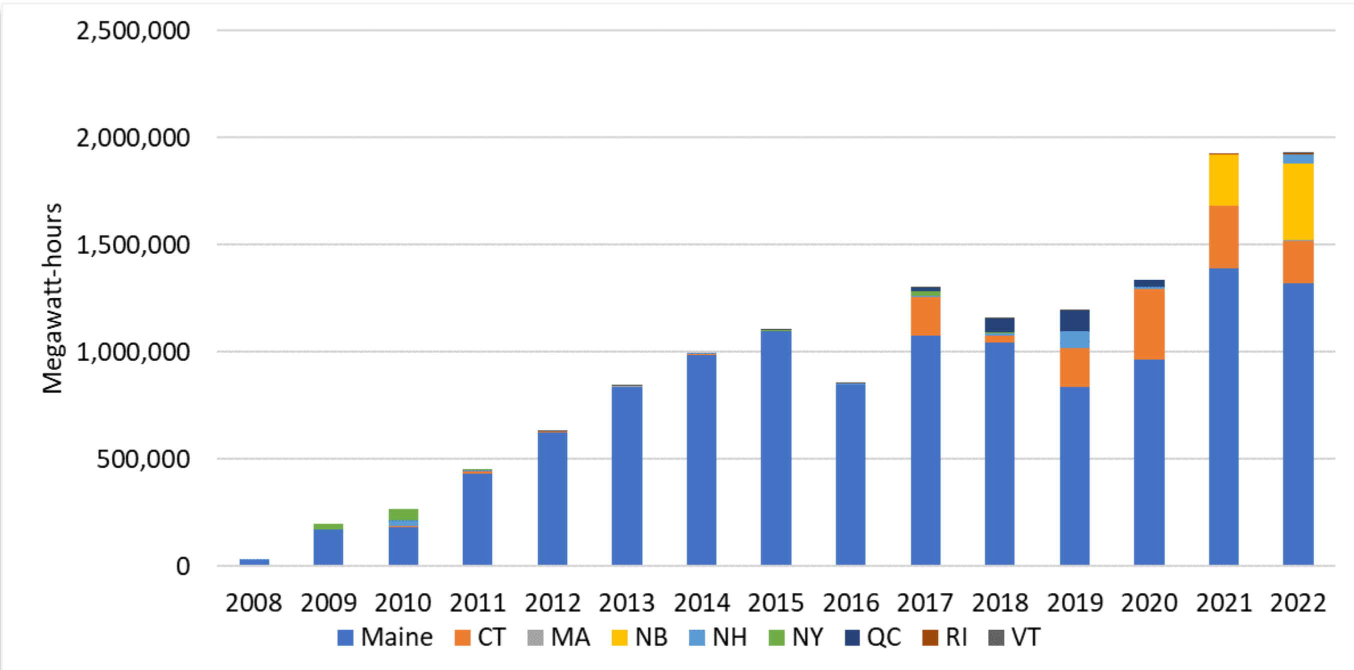
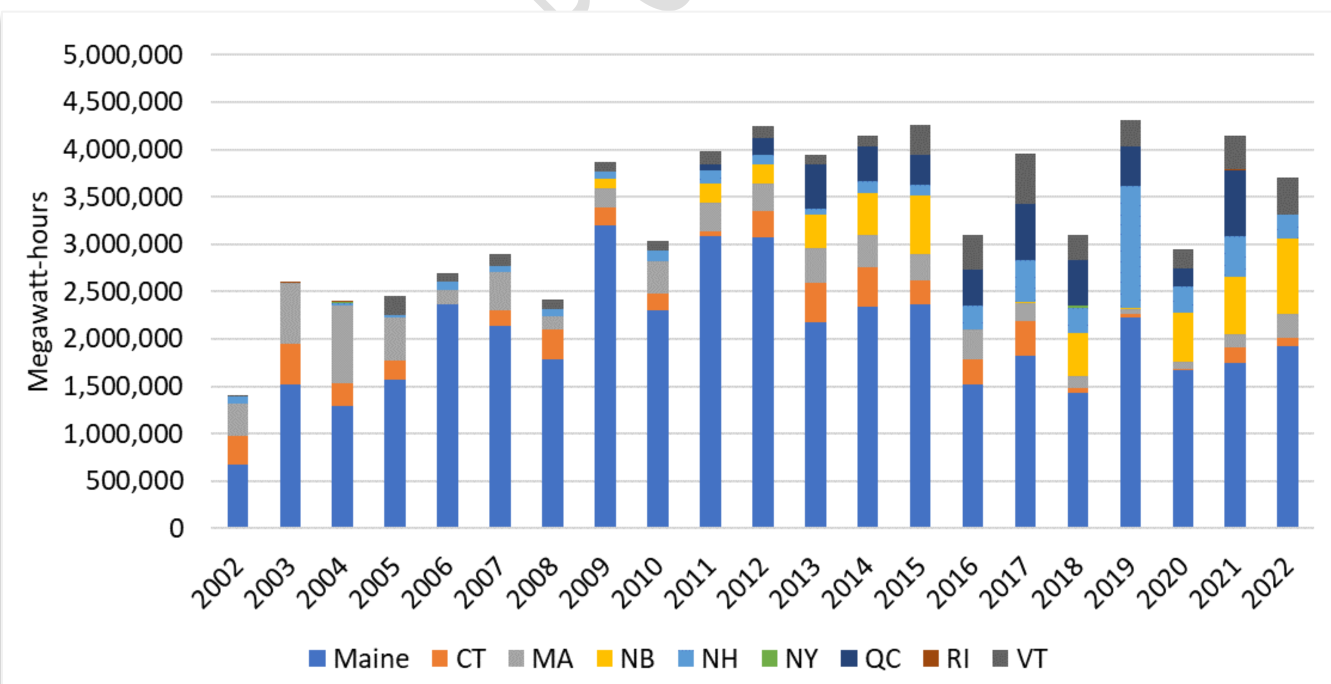


Figure ES-4 summarizes the renewable energy certificates retired for Maine Class II compliance, by year. Maine Class II demonstrates broader geographic diversity than Class I and IA. This is partially due to the ability of refurbished facilities to access the Class I market and otherwise driven by least-cost purchasing and competitive market dynamics.

Figure ES-4: Supply Settled for Maine Class II Compliance by Location, by Year



The body of this report also shows RPS compliance resources by technology.

The Thermal REC (TREC) market was established in 2021. TRECs are derived from the use of renewable fuels to displace fossil fuels in heating and cooling applications. All TRECS retired for compliance to date have been sourced from installations located in Maine.

RPS policies incent the development and operation of resources that create price-suppressive effects in the regional wholesale market. Price suppression benefits are derived from new (i.e., Class I and Class IA) resources and include both value that accrues to Maine ratepayers and value that accrues to other New Englanders. Both values are included in this report. If each state elected to not consider values that accrue out of state, the region would systematically undervalue real, financial benefits of RPS policies. Figure ES-5 summarizes REC costs and price suppression benefits between 2011 and 2022 and demonstrates net economic benefits in every year except 2012.

Figure ES-5: Price Suppression Benefit, REC Cost and Net Gain

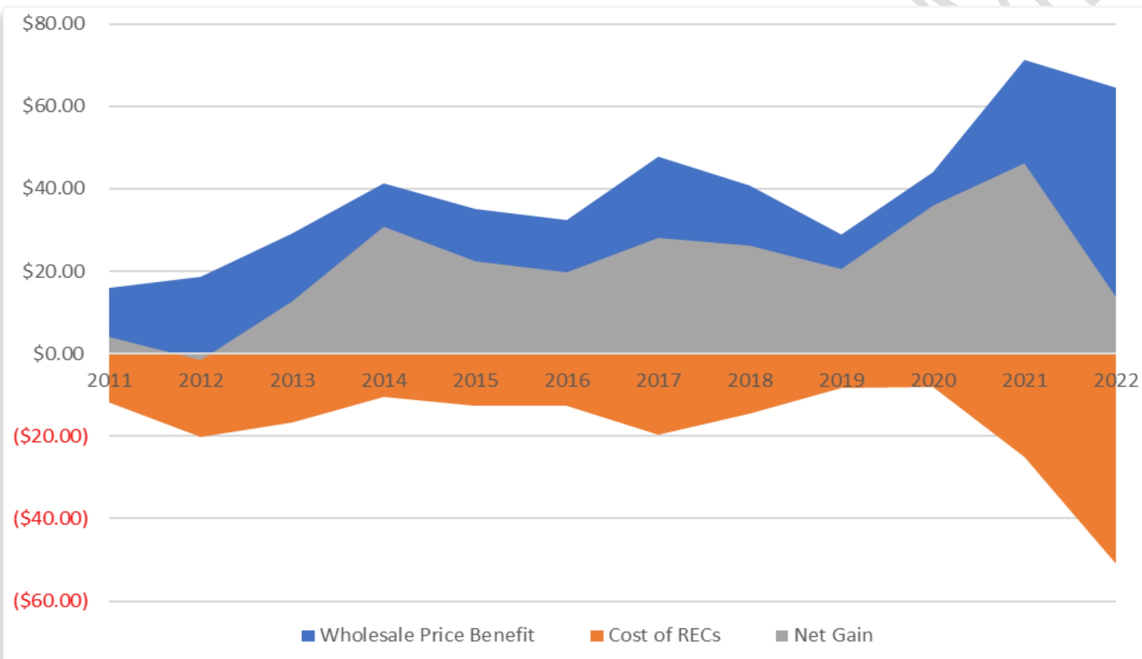


Figure ES-6 summarizes Maine job impacts related to the resources purchased and retired specifically for Maine RPS compliance. Additional job benefits, which are not quantified in this report, also accrued in Maine at facilities whose RECs were retired in satisfaction of other states' RPS policies. These represent additional benefits to Maine as a function of regional RPS policies but cannot be attributed specifically to Maine's RPS policy.

Figure ES-6: Maine Jobs Supported by RPS-Driven Capital Investment, 2008-2022

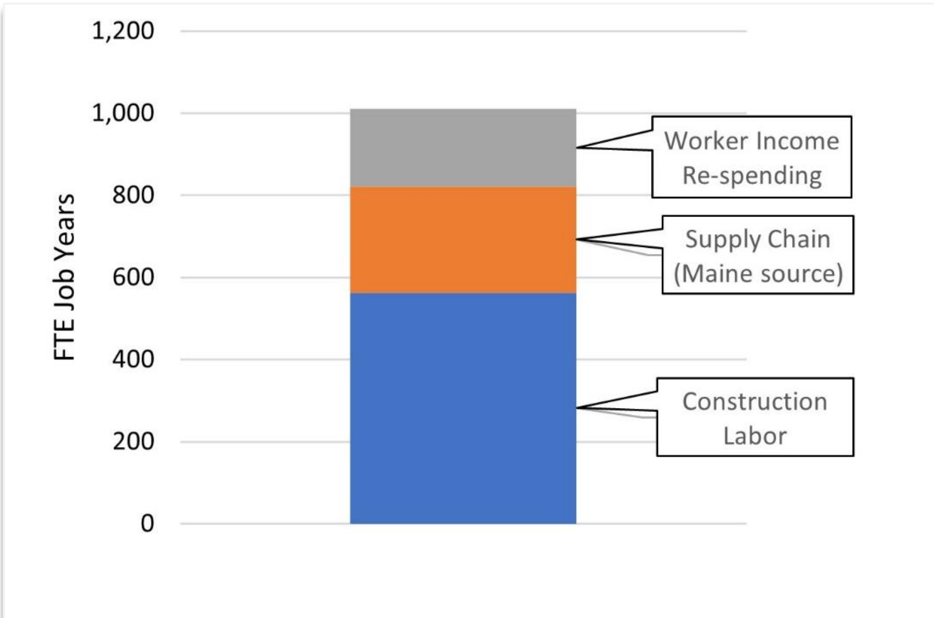


Table ES-1 summaries overall impacts of Maine's RPS on the Maine economy across four categories: (1) Investment in constructing new renewable power plants, attributable to Maine RPS; (2) Operations and maintenance spending for renewable power plants supported by Maine RPS; (3) Net electricity price reduction, attributable to Maine RPS; and (4) Import substitution gain, attributable to Maine RPS.

Table ES-1: Summary of Maine RPS Impacts on the Maine Economy (2023$)

Impact of Maine RPS on the Maine Economy	GDP Impact ($ millions)		Job Impact (FTE job-years)	
	10-yr. Average*	Cumulative 2008-2022	**10-yr Average***	Cumulative 2008-2022
(1) Capital Investment (Renewable Gen.)	$6	$87	67	1,001
(2) Operations + Maintenance Spending	$131	$1,520	779	10,627
(3) Net Electricity Price Reduction	$26	$254	153	1,511
(4) Import Substitution Gain	$30	$333	178	1,982
Total Maine Economic Activity Attributable RPS (1+2+3)	$163	$1,861	999	13139
Maine benefit from RPS, compared to Non-RPS Scenario (1+3+4)	$62	$674	398	4,494

There are two ways to view these results: **Maine Economic Activity Attributable to RPS** (sum rows 1+2+3) identifies the level of economic activity occurring in Maine that is a direct or indirect consequence of RECs purchased for Maine RPS compliance. **Maine benefits from RPS** (sum rows 1+3+4) identifies the incremental benefit of RPS on growth of the state economy, compared to a counter-factual case of conventional electric generation.

RPS Policy Considerations

Renewable Portfolio Standards have been active in New England for over 20 years, and the renewable energy sector has matured substantially during that time. Table ES-2 summarizes RPS policy topics where Maine may wish to consider enhancements or evolutions to support the continued successful implementation of its RPS.

Table ES-2: RPS Policy Considerations

Parameter	Class I / IA	Class II	Thermal
Obligated Load and Exemptions	**Exemptions**: The role of exemptions should be considered when setting policies to achieve a 100% RPS or CES. **BTM Generation**: Today, BTM facilities reduce the RPS obligation while also generating RECs that can be used for RPS compliance in other jurisdictions. Policymakers should consider adding BTM production quantities to RPS-obligated load.		
Targets	**Option:** Consider combining I and IA once all exemptions have sunset. **Drivers/Implications:** Supply uniquely eligible in Maine no longer fills the obligation. As Class IA targets continue to increase, Maine will always need to compete for "multi-state supply" and Class I / IA REC prices will remain converged with the rest of the region.	**Option**: Consider adjusting the Class II percentage requirement to keep targets neutral on a MWH-basis (as is done by for the MA CES-E). **Drivers/Implications**: If load increases dramatically w/ electrification, a 30% Class II target could outpace available supply because, by definition, the 'existing' fleet cannot be expanded. This would result in a prescribed shortage and, if the ME Class II ACP was lower than other regional Class II ACPs (as it is now), ME would experience compliance via ACPs rather than RECs.	The Thermal market is young, and it is appropriate to allow additional time to determine whether the targets and ACPs are sufficient to incent market entry and new construction. To date, supply has not kept pace with demand, but this is typical in the early stages of this type of market.
Eligibility	Is refurbishment part of the long-term solution? If yes, should portion of percentage target shift from Class II to I?	Review for alignment with GHG objectives. Require PUC certification, as consumer protection mechanism as compliance costs increase?	
ACPs	Consider alignment of Class I/IA ACP with other states. Consider effectiveness of regional ACPs relative to increasing cost of new entry, and preference for compliance via RECs.	Alignment with regional markets may be required to achieve policy objectives. Lowest rate in regional will result in RECs going to other markets with higher ACPs.	
Structure	In longer-term, consider potential merits of 'Forward Clean Energy Market'-type structure to encourage competitive market dynamics, ease procurement burden and better integrate RPS and procurement.		

Key Findings: Large-Scale Renewable Energy Procurement Results to Date and Policy Considerations

Legislators and policymakers in competitive market states, including Maine, have frequently elected to complement RPS policies with procurement co-policies designed to accomplish what RPS does not, by design or experience, fully accomplish on its own: support financing of incremental investment, steer location or technology decisions, and consider desirable production characteristics. To date, Maine has accumulated experience soliciting, procuring, authorizing term sheets, and ordering the state's investor-owned utilities to enter into power purchase agreements (PPAs) with renewable energy generators. Programs, and the procurements pursued thereunder to date, are summarized in Figure ES-7, and detailed in report Section 6.1.

Figure ES-7

Section 3210-C Procurements

- Procurements to lower & stabilize rates without explicit targets
- 6 procurement events spanning 2008, 2010, 2012, 2014, 2015, 2018 with varying characteristics

Community-based Renewable Energy Pilot Program (CBRE)

- Provide incentives for "locally owned" CBRE projects in ME <=10 MW
- RFPs in 2011, 2013, and 2015

Section 3210-G Procurements

- Qualifying Class 1A renewable generation resources for 14% of load, 75%/25% new/existing
- RFPs in 2020, 2021

Section 3210-I Northern Maine Generation & Transmission RFP

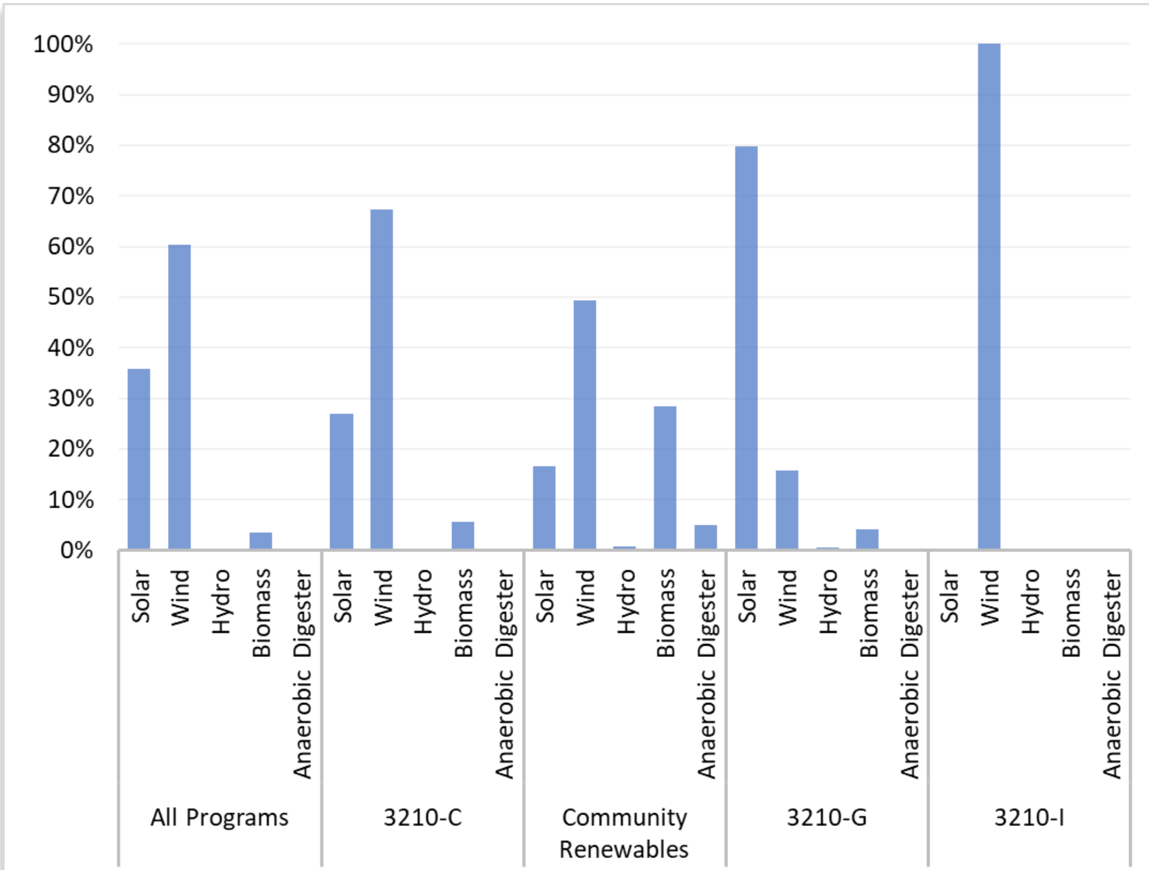
- 2021 RFP for unspecified MW of new renewable generation (or storage) in Northern Maine + transmission line(s) to connect generation to ISO-NE transmission system

Wood-fired Combined Heat and Power Program

- RFPs in 2022/2023 seeking up to 20/30 MW from <=10/15 MW wood waste-fueled CHP in Maine

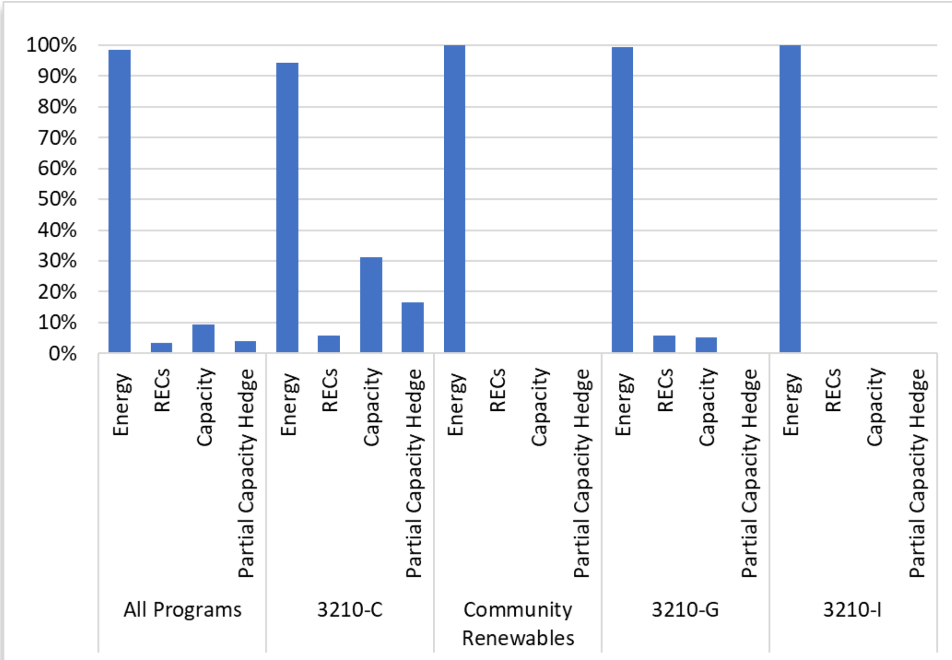
The results from these past procurements are summarized in the following figures, and further detailed in report Section 6.2. Figure ES-8 summarized the MW selected as a result of all past procurements by MW (no projects have yet been selected under the Wood-Fired CHP procurement under its first round, and round 2 evaluation is underway).

Figure ES-8: Distribution of Technology by MW, Past Maine PUC Procurements



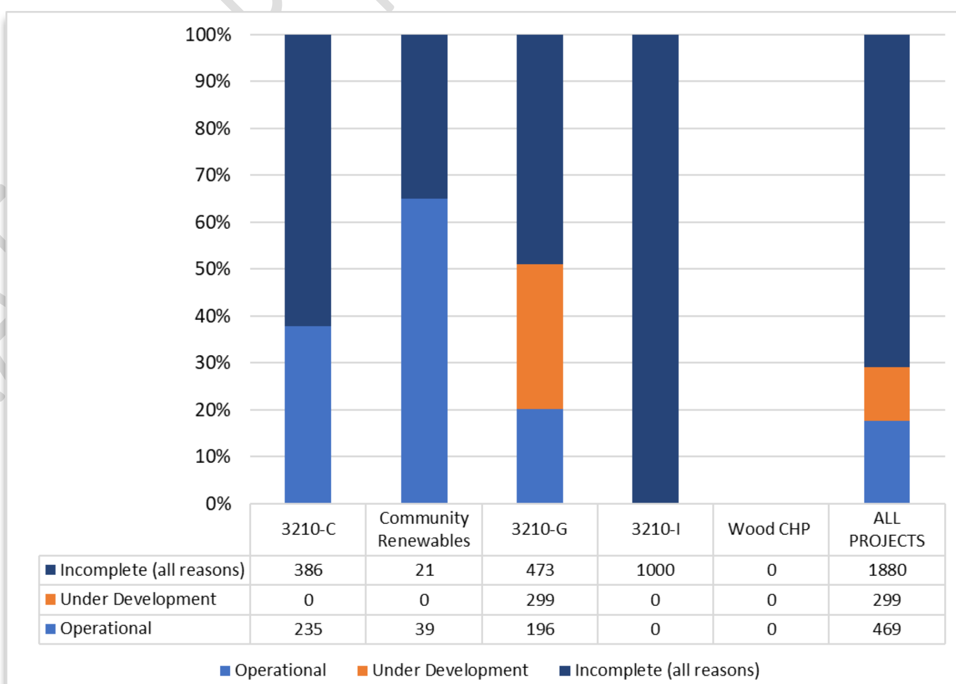
The products procured under past selections are summarized in Figure ES-9. As discussed further in report Section 6.2.1.2, the vast majority of Maine's contracting to date - which occurred under different statutory requirements than in place today and under different circumstances of renewable industry maturity and recent macroeconomic disruptions impacting the renewable energy sector attributable largely to COVID-19 and the Ukraine war - has been dominated by energy-only contracting, with a small number of awards to procure RECs or capacity. As discussed further in report Section 6.2.1.2, Maine stands alone in its past preference for and practice of not procuring RECs, due in large part to intersection of the approval conditions reflected in procurement statute and the Commission's analyses of proposed project costs and benefits. With respect to capacity, Maine's peer states have mixed experience with some procuring or hedging capacity and others not doing so.

Figure ES-9: Products Procured Across All Past Maine PUC Long-Term Contract Awards, by % of MW



Maine's experience in the progress of selected (not yet operating) large-scale renewables projects to reach commercial operation has, like other states with similar policies, been subject to material attrition for a range of reasons and at different stages between selection and contract termination. Maine's past experience with selected new large-scale renewable energy generation project reaching commercial operation, failing to do so, and still under development with outcome yet to be determined, is summarized by percentage of MW in total and across each program.

Figure ES-10: Attrition of New Generation by Program & Across All Programs (Percent of MW Selected)



	3210-C	Community Renewables	3210-G	3210-I	Wood CHP	ALL PROJECTS
Incomplete (all reasons)	386	21	473	1000	0	1880
Under Development	0	0	299	0	0	299
Operational	235	39	196	0	0	469

It is informative to compare Maine's experience with progress of selected new generation through large-scale renewables procurement to that of other similarly-situated states (summarized in Section 6.2.3). Because of the dramatic disruption caused by the back-to-back impact of the COVID-19 pandemic and the Ukraine War end their respective impacts in supply chains, inflation and interest rates, this data is most effectively compared in two temporal groupings: those projects unaffected by the COVID/Ukraine war circumstances (Maine's Section 3210-C and CBRE programs) and those affected by the COVID/Ukraine war circumstances (Section 3210-G and 3210-I). When comparing the earlier procurements, Maine's attrition was materially higher than its peers for Section 3210-C, and of comparable magnitudes for the CBRE program. In the COVID/Ukraine era, other states have suffered between 90% to 100% attrition of their contracted new generation portfolios; as shown in Figure ES-10, if the 'under development' Section 3210-G projects come to fruition, Maine may fare moderately better with less attrition than its peers (although still significantly more attrition than the pre-COVID/Ukraine period; if Maine's selected project suffers further attrition, however, Maine's experience may line up with its peers.

Going forward, Maine's policy requirements have evolved. Specifically, as detailed in Section 6.3.1, Maine has adopted some of the "*most ambitious decarbonization policies in the country, aimed at mitigating the worst impacts of climate change on the state and catalyzing the development of Maine's clean energy economy"*.[3] These include (as detailed further in Section 6.3.1) :

- ✓ LD 1679/P.L. Chapter 476: GHG targets 80% below 1990 by 2050
- ✓ Executive Order: economy-wide carbon neutrality by 2045
- ✓ LD 1494/P.L. Chapter 477: 80% renewable energy by 2030, with a goal of 100% by 2050
- ✓ Gov. Mills setting a 100 % clean energy by 2040 goal, subsequently enacted in statute a year later, also in 38 MRS 576-A
- ✓ L.D. 1682/P.L. 2021 Ch. 279) amending the 35-A MRSA §101, adding greenhouse gas emission reduction to the Statement of Purpose of the Commission.

Several near-future procurement events are established by statute, as discussed further in Section 6.3.2. These include:

- **Section 3210-J**: Solicitations of land-based supply representing 5% of Maine load, plus replacement of attrition from a portion of previously contracted supply under Section 3210-G, with a preference for development on contaminated land.
- **Chapter 481**: Offshore wind generation (and possibly, transmission) procurement.
- **Northern Maine Generation and Transmission:** Replacement of the terminated Section 3210-I procurement, plus fulfillment of an additional statutory mandate to solicit for unused space on the transmission line.

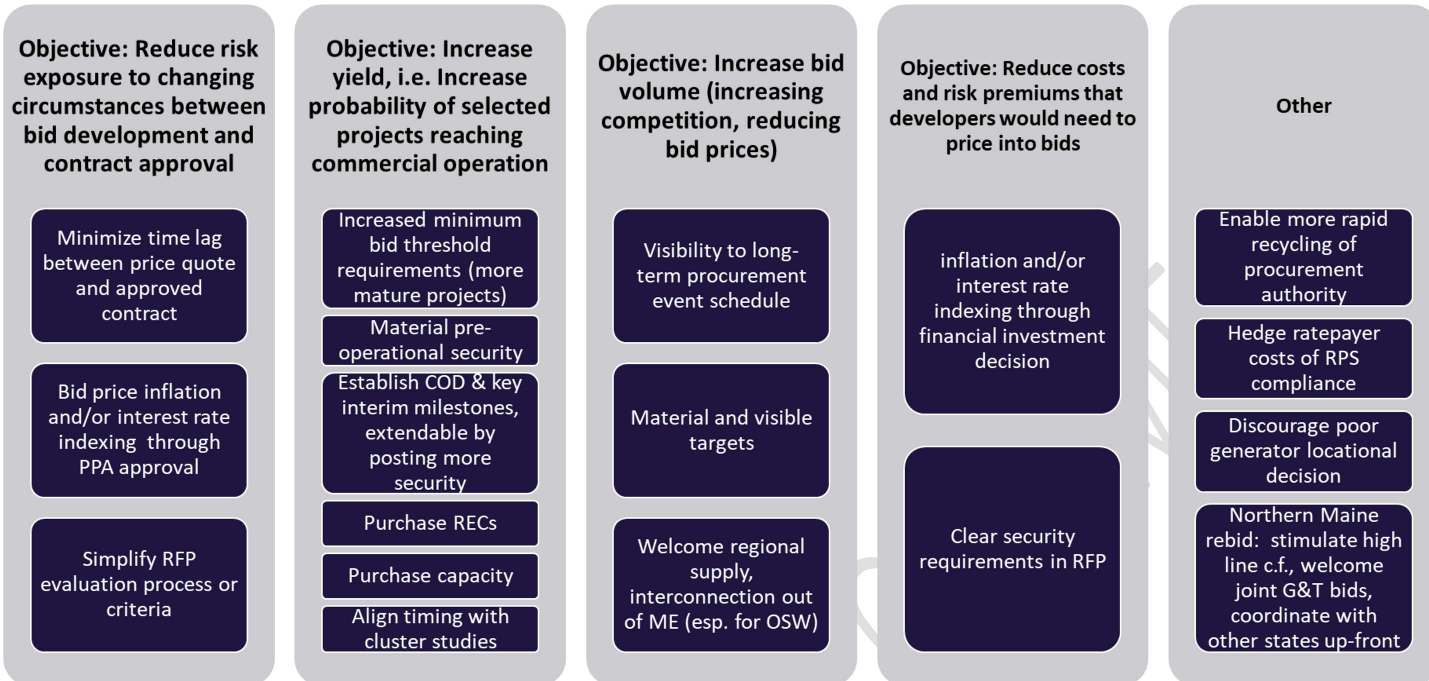
The Governors Energy Office also has been allocated authority under the *Beneficial Electrification Policy Act* (2023)[4] to petition the Commission to initiate renewable energy procurements to meet state goals.

Based in a consideration of Maine's past experience, evolving policy objectives and maturity of the renewable energy industry, and recent macroeconomic disruptions impacting renewable energy and other infrastructure development, Section 6.4 offers a range of considerations for future large-scale renewable energy procurement in Maine. The categories of identified considerations are summarized here in Figure ES-11, with details on identified considerations, their drivers, their rationale or examples of practices elsewhere, their potential impacts and trade-offs, summarized in a series of tables in Section 6.4.1. Some additional considerations for supporting and maintaining existing supply are summarized in Section 6.4.2.

[3] Maine GEO, State of Maine Renewable Energy Goals Market Assessment (March 2021), https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/renewable-energy-market-assessment

[4] 35-A M.S.R.A. §3803 (2023), https://legislature.maine.gov/legis/bills/getPDF.asp?paper=SP0688&item=3&snum=131

Figure ES-11: Considerations for Future Large-Scale Renewable Energy Procurement Policy



Finally, as detailed in Section 6.4.3, historically Maine's legislature has been both fairly prescriptive and narrow in directing renewable energy procurement obligations and/or authority to the Commission and (more recently with offshore wind) the GEO; in addition, procurement statutes have recently been adopted with little lead time for the Commission to act, limiting the opportunity for the Commission to evolve from 'off the shelf' procedures, RFPs and standard contracts.

Given the evolving circumstances and statutory requirements, and the procurement lessons learned, best practices and considerations raised earlier in this section, there are opportunities to consider where reducing developer risk may benefit ratepayers. While the legislature could consider implementing prescriptive changes directly, an alternative may be for the legislature to consider granting some combination of the GEO and the Commission with broader procurement authority, along with the time to study and consider potential procurement suggestions and perhaps other opportunities for procurement and contract design where reducing developer risk can benefit ratepayers, and the latitude and to adopt and incorporate changes it determines are in the public interest. Several of Maine's peer states with similar ambitious renewable energy and climate goals, have elected to establish statutory goals (objectives, eligibility, quantity, key criteria) while granting authority and latitude to their expert agencies to run processes to study and identify optimum approaches, and work out the details with such latitude.

Acronyms

ACP	Alternative compliance payments
AESC	Avoided energy supply component/ cost
BOT	Build-Operate-Transfer
CBRE	Community-based renewable energy
CEPs	Competitive electricity providers
CES	Clean energy standard
COD	Commercial operation date
DEEP	Connecticut Department of Energy & Environment Protection
DOER	Massachusetts Department of Energy Resources
ESG	Environmental and social governance
EUT	Joint Standing Committee on Energy, Utilities, and Technology
FCEM	Forward clean energy market
FTE	Full-time equivalent
GDP	Gross domestic product
GEO	Governor's Energy Office
GHG	Greenhouse gas emissions
GW	Gigawatt
ISD	In-service date
ISO	Independent system operator
kV	Kilovolt
LBNL	Lawrence Berkeley National Laboratory
LSE	Load-serving entity
MSW	Municipal solid waste
MW / MWh	Megawatt / Megawatt-hour
NEPOOL GIS	New England Power Pool Generation Information System
NE-REMO	New England Renewable Energy Market Outlook (Service by SEA)
NMISA	Northern Maine Independent System Administrator
NYSERDA	New York State Energy Research and Development Authority
OREC	Offshore renewable energy certificate
OSW	Offshore wind
PPA	Power purchase agreement
PUC	Public Utilities Commission
PURPA	Public Utility Regulatory Policy Act
REC	Renewable energy certificate
RFP	Request for proposals
RPS	Renewable portfolio standard
SEA	Sustainable Energy Advantage, LLC
T&D	Transmission and distribution
TREC	Thermal renewable energy certificate
TSA	Transmission service agreement

1 Introduction

During the 2023 session, the Maine legislature passed LD 1591 – codified as Public Law 2023, Chapter 321[5] – requiring that by March 31, 2024, and every three years thereafter, the Governor's Energy Office (GEO) submit to the joint Standing Committee on Energy, Utilities, and Technology (EUT) of the Maine Legislature a report describing the status and impacts of Maine's Renewable Portfolio Standard (RPS). The legislature requires this review to be conducted in consultation with the Public Utilities Commission (PUC), completed through a public process, and include:

- A review of the status and impacts of the RPS to date—including observations on Class I, Class IA, Class II, and Thermal REC compliance,
- Consideration of the impacts of the RPS on energy prices, and
- An assessment of selected benefits of the RPS, including but not limited to greenhouse gas (GHG) emissions and the economy of the state.
- In addition, the GEO has requested a review of Maine's large-scale renewable procurement policies and programs—to help evaluate the role of procurements in supporting Maine's renewable energy policy objectives.

This report includes quantitative analyses of the sources of RPS compliance and associated costs. Available data are parsed by year, class, technology, and location. Maine's Competitive Electricity Providers (CEPs) – which are obligated to meet the RPS for all retail load served – are asked to self-report the cost of Renewable Energy Certificates (REC), which are the verification mechanism for substantiating compliance with RPS policies throughout New England. REC costs are reported in aggregate, as are Alternative Compliance Payments (ACPs) made when CEPs are unable to secure RECs of applicable type and quantity sufficient to meet their obligations.

In addition, this analysis includes a qualitative discussion of Maine's RPS and large-scale procurement policies and programs. These policies are discussed in detail and then contextualized within – and benchmarked to – the regional marketplace. Each New England state has an RPS and some form of procurement authority, and they all compete on the margin for new renewable energy supply – meaning that all new renewable energy facilities built hereafter can be used for compliance in any New England RPS market, and that the eligibility differences between the states no longer dictate REC prices (i.e., their quantities are "submarginal" in the comparison of supply and demand). This assessment offers observations on potential policy and programmatic adjustments intended to help Maine achieve its renewable and clean energy policy objectives. While the policy recommendations are forward-looking, the quantitative RPS data analyses in this report are retrospective—covering RPS market dynamics from 2002 to 2022.

By reading this report, policymakers and market participants will gain an understanding of how Maine has met its RPS to date, the impacts on Maine ratepayers and economy, the role of large-scale renewable energy procurements, and options for adjusting Maine's RPS and procurement policies to maintain alignment with Maine's policy objectives and desired outcomes.

What is a Renewable Portfolio Standard?

An RPS, also known as a Renewable Energy Standard (RES), is a policy designed to increase the use of renewable energy sources for electricity generation. RPS policies (which are currently active in 29 states and the District of Columbia) – and

[5] L.D. 1591, §1 (131st Legis. 2023), https://legislature.maine.gov/ros/LawsOfMaine/breeze/Law/getDocById/?docId=103138

increasingly, Clean Energy Standards (CES) – also establish parameters or requirements for the continued use of renewable energy and/or non-emitting generators to meet retail energy needs. These policies require load-serving entities (LSEs) – including competitive electricity providers and the provider of Standard Offer Service – to serve their retail customers with a stated minimum percentage of electricity from eligible renewable resources each year. It is common for RPS policies to include multiple requirements, differentiating the obligation by resource type, vintage, size, or other characteristics. RPS policies vary by state in stringency, structure, resource eligibility, and enforcement/flexibility mechanisms. A more detailed introduction to RPS policies, as well as an assessment of Maine's RPS in the regional and national context is provided in Section 2.

Analytical Team

The Maine PUC and GEO selected Sustainable Energy Advantage, LLC (SEA) to conduct this report. Since 1998, SEA has specialized in analysis at the intersection of renewable energy policy design and quantitative market modeling. SEA has been conducting detailed analysis of the New England RPS landscape on a continuous basis since 2005. The macroeconomic benefits portion of this analysis was conducted in partnership with EBP, Inc., which focuses on evaluating economic performance and impacts in the fields of energy, infrastructure, and economic development. SEA and EBP (together, the SEA team) roles are discussed further in the Process Overview below.

Approach and Report Organization

This report covers two related topics: the status and impacts of Maine's RPS, and an assessment of the role of large-scale renewable procurements in achieving Maine's renewable energy goals.

- Section 2 provides a more detailed explanation of the structure, approaches, and common objectives of RPS policies and gives an overview RPS policies and trends across the country. It then introduces the parameters of Maine's RPS in detail and compares RPS policy design choices across the six New England states—demonstrating how design choices are influenced by policy objectives.
- Section 3 assesses the status and impacts of Maine's RPS to date. This is accomplished through detailed analysis of CEP compliance filing data (which includes accounting of RPS demands, supplies, and costs), Maine PUC RPS compliance reports, and detailed data from the NEPOOL GIS summarizing certificates settled specifically to demonstrate compliance with Maine's RPS. When assessed together, these data tell the story of how Maine and regional supply were used to meet Maine's RPS compliance obligations each year.
- Section 4 summarizes RPS impacts on Maine's economy by evaluating costs, employment, and supplier purchases associated with the different energy generation technologies used for RPS compliance. This report discusses how renewable generation facilities used for RPS compliance create jobs for Maine residents, how operation of those facilities also generates purchases of parts, materials, supplies, and services that are provided by other Maine businesses, and how cost effects of the RPS policy impact ratepayers and their spending power, as well as various sectors of the Maine economy and their productivity.
- Section 5 looks into the future—making observations on the potential future sources of RPS supply and how outcomes will be impacted by regional RPS market dynamics, Maine's forward-looking procurement policies, and large-scale procurement initiatives in other New England states. Through this lens, Section 5 makes observations on potential adjustments to Maine's RPS to maintain alignment with policy objectives.
- Section 6 describes Maine's large-scale renewable energy procurement programs and policies to date and summarizes results—extracting insights from both successes (operating projects) and failures (terminated contracts). Section 6 also assesses the cost to ratepayers of energy procurements to date and the benefits of contracting for energy from in-state generation. Next, Section 6 takes an overarching look at what Maine is trying to accomplish with large-scale renewable energy procurements and provides examples of best practices and

outcomes from other states' experiences. Section 6 concludes with observations on how Maine decisionmakers may consider adjusting procurement policies and programs to best align with desired outcomes.

Stakeholder Engagement

The legislature requires this report "be completed through a public process." As part of this process, the SEA Team, GEO, and PUC conducted a public webinar on January 24, 2024, for the purpose of reviewing the scope, methodology, and schedule with – and receiving questions and feedback from – all interested stakeholders. The GEO published and maintained information about the study process on its website and promoted opportunities for engagement through its communication channels. Approximately 46 individuals representing nearly three dozen entities participated in the call, which included both a presentation and Q&A over a 90-minute period. Feedback provided during the Q&A period was incorporated into the study team's approach for this analysis. Stakeholders were also provided the opportunity to review a draft report in March 2024.

2 Summary of Renewable Portfolio Standard Policies: Maine and the Regional Context

2.1 What is a Renewable Portfolio Standard?

RPS policies place an obligation on each retail electricity supplier to serve a minimum percentage of its retail load with eligible renewable energy resources. Eligible resources are specified by either legislation or regulation and vary by state based on fuel type, technology, vintage (i.e., the date the facility entered service), size, and other facility-specific criteria such as actual emissions or certain physical characteristics (e.g., the presence of fish passage at small hydroelectric facilities). RPS policies often include multiple categories (referred to as Classes or Tiers) to incent, for example, both the development of new resources and the continued use of existing ones. Where a state has more than one RPS category, eligibility varies within a state by 'Class.' RPS targets, which are typically set by legislation, also vary widely by state and class. The parameters specific to Maine's RPS are both described in detail and compared to the rest of New England in Section 2.3.

Calculating and Assigning RPS Obligations

Sometimes 100% of state load is obligated under the RPS. In most cases, however, one or more exemptions exist. The most common exemption is for retail contracts entered before the RPS obligation was passed. This exemption applies in Maine and elsewhere in New England and is intended to expire when the pricing terms of the existing contract expire (i.e., it is not intended to be evergreen). Maine's use of a geographic exemption (for the Pine Tree Development Zone) is unique among the New England states, but some other states have elected to exempt their municipal and/or cooperative utilities.

Each retail LSE is obligated under the RPS. This includes both competitive electricity providers and the energy supplier for the Standard Offer Service. To calculate a Maine retail LSE's RPS obligation, subtract exempted load from total load (including the line losses required to serve retail load[6]) and then multiply by the applicable percentage target for each Class.

Verifying RPS Compliance

Policy mandates necessitate mechanisms to verify compliance, and thus progress towards policy objectives. Substantiating RPS policy compliance requires reliably describing, allocating, and counting the energy and attributes associated with every megawatt-hour (MWh) generated within (or delivered into) the regional transmission system. In New England, this is achieved through the New England Power Pool Generation Information System (NEPOOL GIS)—which tracks the production and descriptive characteristics of every MWh (renewable and non-renewable) on the system using certificates. A certificate is a tradable instrument that conveys the descriptive characteristics of one MWh from a specific electricity generator. When purchased and settled by an RPS-obligated entity, that entity owns the unique claim to that MWh for the purpose of demonstrating RPS compliance. While certificates from renewable energy generators (i.e., RECs) tend to garner the most attention, a NEPOOL GIS certificate is created for every MWh regardless of facility type. At the end of each compliance year, MWhs of energy and MWhs of certificates are paired one-to-one, ensuring that no attribute goes uncounted, and no attribute is counted more than once. Until energy and RECs are paired, the energy must not be described as having any characteristics; the description of the energy is derived from the settled certificate (including for 'residual mix' certificates settled at the end of each year).

Flexibility Mechanisms

Under some market conditions, it is not possible to secure RECs with the required characteristics and/or in the necessary quantities to fulfill the entirety of one's annual RPS obligation. For this reason, most RPS policies include one or more flexibility mechanisms, which are intended to leverage the prior or upcoming year and smooth the matching of RPS supplies to RPS demands. These mechanisms are casually referred to as banking and borrowing. In fact, the actual mechanism – which is deployed by the state regulatory authority (e.g., the PUC in Maine) and not the NEPOOL GIS – is to allow over-compliance (in the case of banking) in the current year to count towards compliance in either of the following two compliance years. When an RPS-obligated entity 'borrows' from the following compliance year, the applicable regulatory authority allows it to buy RECs of following year vintage and apply them to the current vintage year. Maine allows CEPs (which have satisfied at least 66% of their obligation with current year RECs) to meet the remainder of their current year RPS requirement with RECs generated in the first quarter of the following compliance year – which is referred to as the "cure period." Again, for all New England states, these types of mechanisms are authorized and tracked by the state regulatory authority and not by NEPOOL GIS.

If these mechanisms are not available or are insufficient to balance RPS supplies and demands each year, or if an RPS-obligated entity has simply failed to meet its obligation, it may make ACPs to fulfill the shortfall. The ACP owed is the product of the obligated entity's REC shortage and the ACP rate, which often differs by Class (ACP rates for New England are summarized in Section 2.3).

Other RPS Characteristics

RPS policies are also shaped by broader state-specific characteristics and objectives. For example, natural gas fuel cells are eligible Class I resources in Connecticut – which has an active fuel cell manufacturing industry. Black liquor is an RPS-

[6] If the calculation of RPS-obligated load does not include line losses, then a state with a 100% RPS or CES will never achieve its objective. Maine correctly includes line losses in the calculation of RPS-obligated load.

eligible fuel (per PUC Order, rather than legislation, as described in Section 2.3) in Maine – which relates to the important historic and ongoing role of the pulp and paper industry.

Other policy mechanisms for supporting specific resource categories include but are not limited to:

- Carveouts: in which specific types of resources have their own 'class' and associated annual target. For example, this approach has been used to accelerate solar adoption in MA via the SREC program, and could potentially be deployed in Maine to support offshore wind adoption.
- REC multipliers: in which one MWh of production (and thus one NEPOOL GIS Certificate) is counted as more than one MWh of RPS compliance. This makes certificates from eligible generators more financially attractive – e.g., a 2X multiplier enables compliance at half the cost of a certificate without a multiplier. These mechanisms are not common. Maine allows a 3X multiplier for municipal solid waste (MSW), but no other New England state currently has a multiplier. Maine's MSW multiplier policy will eventually need to sunset for the state to achieve a 100% RPS or CES.
- Thermal RECs: in which a state promotes fuel switching in the heating sector by creating a REC equivalent and associated obligation.

2.2 National Status and Trends

As of March 2024, 29 states and the District of Columbia have RPS policies.[7] An additional seven states have renewable portfolio goals, which are intended to influence purchasing choices but are not ultimately mandatory or enforceable. As previously described, RPS policies differ widely in program structure, resource eligibility, targets, and flexibility or enforcement mechanisms. The variation in RPS policy designs reflects the range of state policy objectives, which may include but are not limited to:

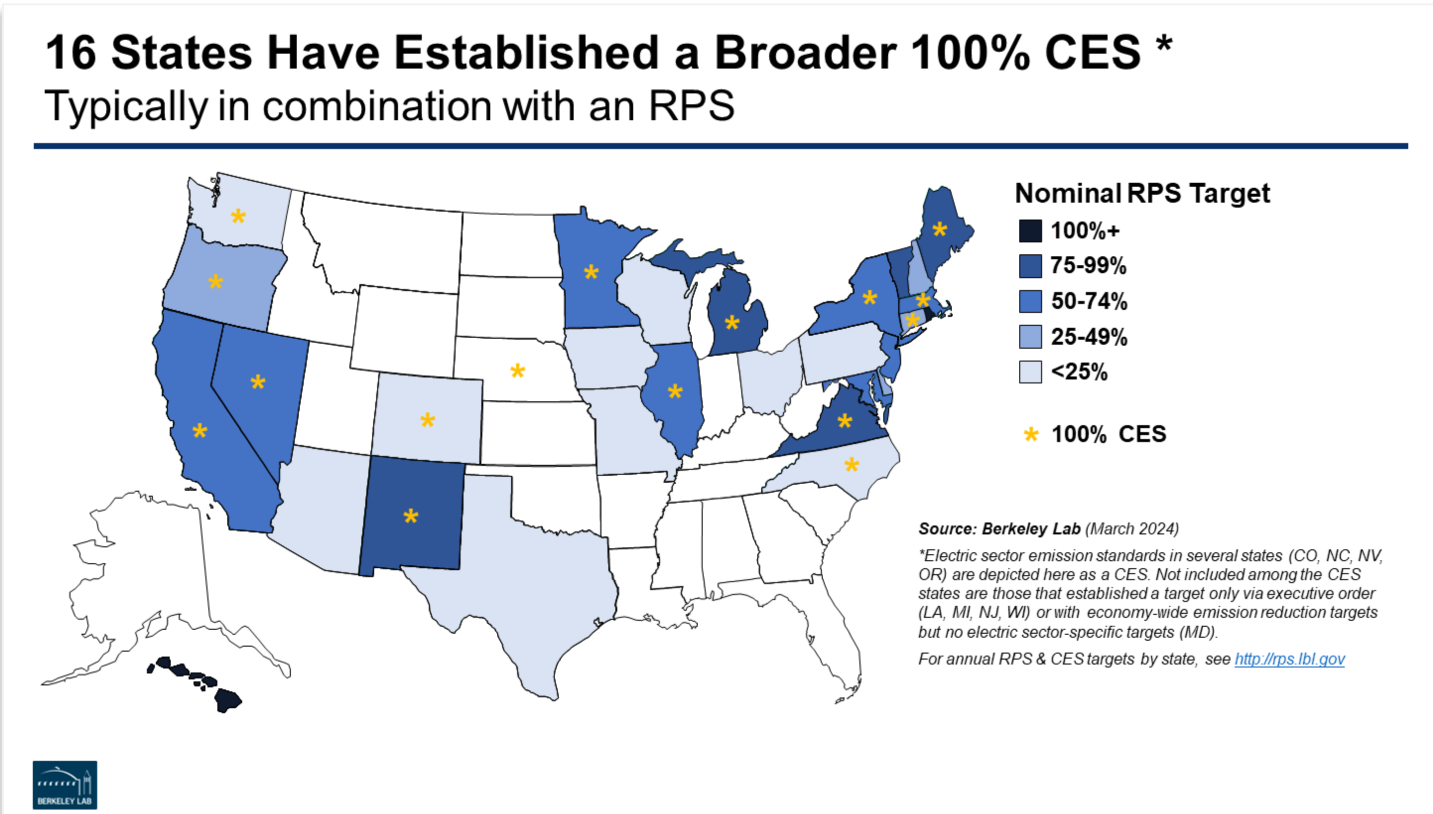
- Spurring the development, financing, and construction of new renewable energy resources,
- Maintaining the existing fleet of renewable energy resources,
- Diversifying the state (and regional) fuel mix,
- Driving local job creation and local economic development benefits,
- Maintaining the economic benefits of existing facilities,
- Increasing energy independence, and
- Achieving other environmental and climate objectives.

Figure 1[8] was developed by the Lawrence Berkeley National Laboratory (LBNL) and summarizes nominal RPS targets by state. These percentages represent the endpoint of the current RPS policies and sum all classes within each state, as applicable. For example, Maine's shading in the 75% to 99% category represents the state's 80% by 2030 mandate (which is comprised of a 10% Class I target, a 40% Class IA target, and a 30% Class II target). At present only Hawaii and Rhode Island have 100% RPS targets. However, an additional 16 states have 100% CES. A CES is like an RPS but encompasses a broader set of eligible technologies. Specifically, CES typically add all non-emitting resources to the list of RPS eligible technologies[9]. As a practical matter, most of the difference between an RPS and a CES policy can typically be explained by the addition of nuclear and large hydroelectric to the list of eligible technologies. LBNL treats Maine's climate action plan

[7] Galen L Barbose, "U.S. State Renewables Portfolio & Clean Electricity Standards," Lawrence Berkeley National Laboratory, Map updated by author March 2023, https://emp.lbl.gov/publications/us-state-renewables-portfolio-clean
[8] Ibid.
[9] Renewable and clean fuels, when and where available, are typically included directly into RPS (rather than CES) policies.

for 100% by 2050 (codified through LD 1679/Chapter 476) or by 2040 (via the Governor's Pathway to 2040 initiative) as a CES.

Figure 1: RPS and CES Targets, by State



The onset of CES policies – which are often implemented as a 'wrap-around' to existing RPS policies – represents a significant trend in state energy policy and is a result of states' increasingly ambitious targets. State mandates to reach 80%, 90%, or 100% have reinvigorated conversations about the long-term role of large hydroelectric and nuclear supply. Where RPS policies focus largely on encouraging new supply, CES policies broaden the emphasis to include greenhouse gas reduction policy objectives.

Other current trends or discussion points in national RPS markets include:

- Exploring seasonal, quarterly, or hourly (rather than annual) energy and REC matching and settlement
- Exploring the potential phase-down or phase-out of emitting resources
- Evaluating the impact of behind-the-meter supply on both RPS obligation calculations and REC supply

2.3 Maine's RPS in the Regional Context

History and Evolution of Maine's RPS Policy

Maine's RPS has undergone several changes since its initial launch in 2000, reflecting the state's evolving commitment to renewable energy. When the statute governing Maine's RPS, 35-A M.R.S. § 3210[10], was first enacted in 1999, it created a single Class of eligible resources (that did not differentiate between new and existing) required to meet 30% of Maine

[10] 35-A M.R.S. §3210 (2023), https://www.mainelegislature.org/legis/statutes/35-a/title35-Asec3210.html

retail load. Maine has historically had a large fleet of existing hydroelectric and biomass power facilities and, when combined with the PUC's decision[11] to allow black liquor (a byproduct of the pulp and paper manufacturing process) to qualify as an eligible biomass fuel, the existing fleet provided more than enough supply to fulfill RPS demand under then-current market conditions. From 2000 (the first year of Maine RPS compliance) through 2007, therefore, Maine's RPS did not spur the development of incremental renewable energy capacity. Subsequent legislation[12] – passed in 2007 – created a Class I requirement of 10% by 2017 – and renamed Maine's original 30% target to Class II.

For a resource to be eligible as 'new' for Maine Class I, it must have an in-service date after September 1, 2005, or have been refurbished after that date. In this context, 'refurbished' "means an investment has been made in equipment or facilities, other than for routine maintenance and repair, to renovate, reequip or restore the renewable capacity resource"[13] which are deemed – by the PUC – to enable the facility to operate beyond its original useful life. In conjunction with the black liquor fuel eligibility, the refurbishment provision resulted in a material amount of supply for ME Class I that is not eligible for any other Class I market RPS, and in many cases not eligible for regional Class II markets either (due to fuel type, emissions, or both). This is discussed further in Section 3. As a result, Maine's RPS market experienced surplus conditions and low compliance prices for most of the study period. As regional Class I targets (and Class IA targets in Maine) increased over the last several years, this dynamic has evolved. Maine Class I and IA REC costs have largely converged with regional Class I costs – indicating that these markets now compete for the marginal supply required to fulfill their growing RPS obligations. Compliance costs are discussed in more detail in Section 3.2.1.

In 2019, Governor Janet Mills signed LD 1494 (*An Act to Reform Maine's Renewable Portfolio Standard*)[14] into law, which increased Maine's total RPS target to 80% by 2030 and set a (non-binding) goal of 100% by 2050. LD 1494 tightened the previous refurbishment provision for Class I renewable resources by adding a requirement effective on and after September 1, 2019, that a resource operating beyond its previous use life must have received certification from the PUC:

a. "Before September 1, 2019 that it is operating beyond its previous useful life or is employing an alternate technology that significantly increases the efficiency of the generation process; or
b. On or after September 1, 2019 that it is operating beyond its previous useful life as evidenced by a finding that the facility would be reasonably likely to cease operation if not for substantial capital investment made after September 1, 2018, except for capital investment required to meet state and federal fish passage standards."

LD 1494 also created a new category of 'Qualified Hydroelectric Output,' which is defined as the output from FERC-licensed hydroelectric generators with a commercial operation date (COD) prior to January 1, 2019 that are at least 25 MW, interconnected to an electric distribution system located in the state, and not located in a critical habitat for Atlantic salmon. Qualified Hydroelectric Output is eligible for Class I. LD 1494 also added two new classes, Class IA and Class I Thermal. Class IA is comparable to regional Class I requirements and was created to incent incremental new renewables. The eligibility criteria are the same as Class I resources except that refurbished facilities are excluded, and Qualified Hydroelectric Output is quantity limited. Class IA resources can be used to meet either Class I or IA compliance. The

[11] *Public Utilities Commission*, Order Adopting Rule and Statement of Factual and Policy Basis, No. 2007-391, Order (Me. P.U.C. Oct. 22, 2007): the Commission concluded that, "without further legislative direction and in light of the unqualified statutory term "biomass," the Commission would adopt a relatively broad definition that includes all fuel derived from wood and wood byproducts (along with other organic sources)." This statute has been cited by the PUC in multiple resource certifications where the PUC found black liquor to be eligible given that the heat generating portion of black liquor is a combustible and organic byproduct of the wood pulping process.
[12] L.D. 1920 (123rd Legis. 2007), https://legislature.maine.gov/legis/bills/bills_123rd/chappdfs/PUBLIC403.pdf; codified as P.L. 2007, Chapter 403
[13] 65-407 C.M.R. Ch. 311 §2 (2023), https://www.maine.gov/mpuc/sites/maine.gov.mpuc/files/inline-files/Chapter%20311.pdf
[14] L.D. 1494 (129th Legis. 2019), https://www.mainelegislature.org/legis/bills/display_ps.asp?paper=SP0457&PID=1456&snum=129; codified as P.L. 2019, Chapter 477

requirement for thermal renewable energy credits (TRECs) was established primarily to incentivize efficient heating and cooling installations. As such, the Thermal requirement does not impact the portfolio serving retail electricity load, but for consistency is nonetheless expressed as a percentage of retail electricity load and the certificates are denominated in MWh-equivalents.

Regional Context

All six New England states have a form of RPS in place, and as alluded to above, these programs are not homogenous. This is driven by individual states' focus on their own industries, economic development, and policy goals. As a result, some certificates are only eligible in one state. The NEPOOL GIS market and cost of compliance is driven by the interplay of these differing regulatory mandates, and their impact on overall supply of and demand for qualified renewable energy sources. Maine's unique and flexible eligibility criteria resulted in ample supply and lower compliance costs than the rest of the Class I market for much of the study period. Load and RPS target increases over time mean that Class I markets now compete on the margin for supply. In other words, the unique eligibility differences have become submarginal and – barring legislative changes to eligibility criteria – no longer impact short-term REC prices.

Regional RPS Classes

Figure 2 provides an overview description of the current classes within each New England state's RPS program.

Figure 2: Summary of New England RPS Classes by State

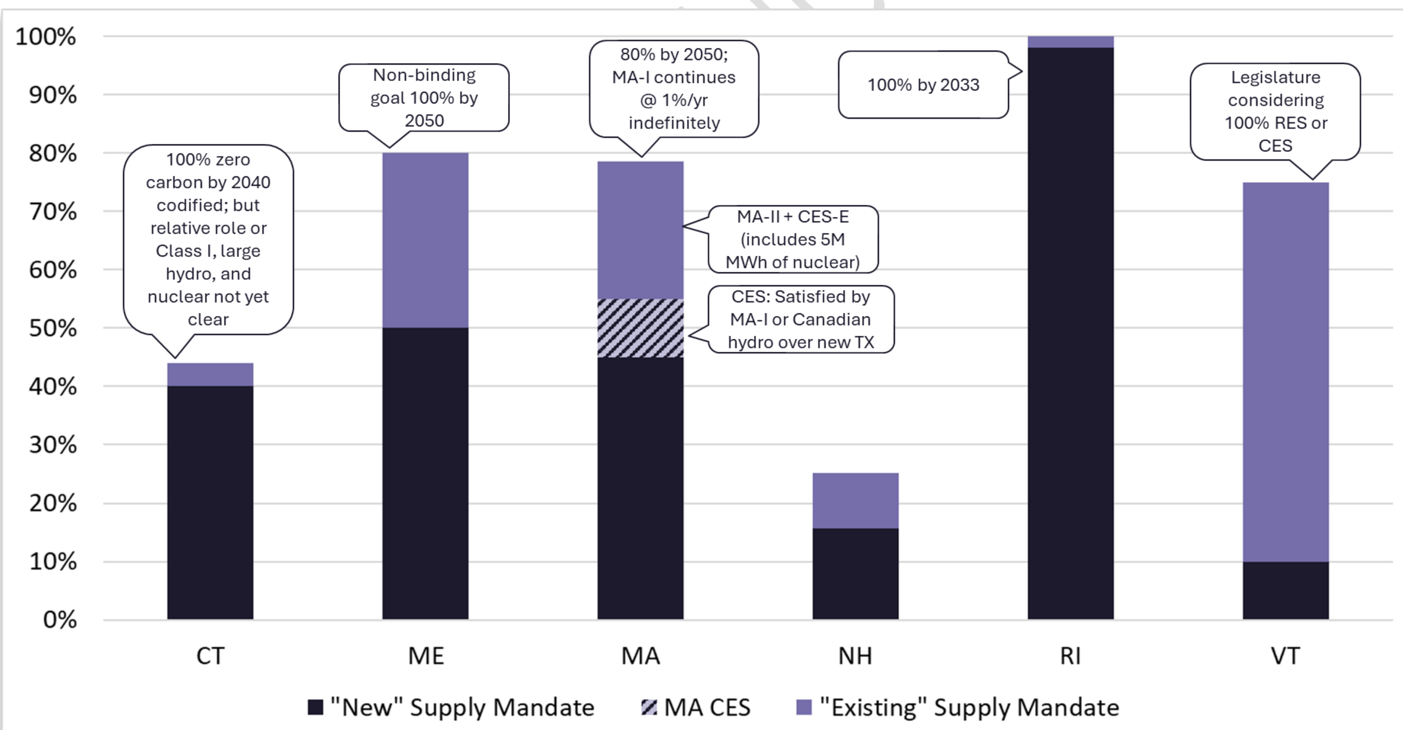
Connecticut	Class I	New Renewables
	Class II	Existing Renewables
	Class III	Conservation and Load Management
Maine	Class I	New Renewables
	Class IA	New Renewables, No Refurbishments
	Class I Thermal	Converts Heating from Fossil to Renewable
	Class II	Existing Renewables
Massachusetts	Class I	New Renewables
	SREC I/II	Solar Obligation Carveouts
	Class II	Existing Renewables
	Class II Waste-to-Energy	Existing Municipal Solid Waste
New Hampshire	Class I	New Renewables
	Class I Thermal	Converts Heating from Fossil to Renewable
	Class II	Solar Only
	Class III	Pre-2006 Biomass & Landfill Gas ≤ 25 MW
	Class IV	Pre-2006 Hydro ≤ 5 MW
Rhode Island	New	New Renewables
	New or Existing	Existing Renewables (New also eligible)
Vermont	Tier I	Existing Renewables
	Tier II	In-State Distributed Generation < 5 MW
	Tier III	Energy Transformation Projects

Key Maine RPS Features: Maine created Class IA in 2019 to incent incremental new renewable resources. Maine also created a Thermal requirement in 2019, to incentivize renewable heating and cooling installations, to reduce reliance on heating oil.

Regional RPS Targets

A common feature of many RPS policies is the existence of a 'new' renewable resource class, with "placed in service" dates (referred to as vintage dates) specified by legislation or regulation, and an 'existing' renewable resource eligibility class (with vintage dates prior to the "new" designation). When comparing two states' RPS policies, the sizes of these 'new' and 'existing' class targets may differ depending on the balance of a state's focus between increasing new resources or preventing attrition of its existing fleet. Massachusetts and Rhode Island passed New England's first RPS policies in 1997. As a result, their vintage requirement for "new" is anything with a placed in-service data after December 31, 1997. By comparison, Maine Class I eligibility requires an in-service date after September 1, 2005.[15] Class II in Maine is the "maintenance" tier that targets existing renewable resources that were in operation before the implementation of Maine's RPS. Maine, which has a large legacy resource pool, has a 30% Class II target, demonstrating the policy importance of maintaining the existing fleet. The recent addition of Class IA connotes an objective of balancing support for new and existing sources of supply. Figure 3 summarizes regional RPS targets by the year 2035, compares requirements for new versus existing resources, calls out several unique eligibility features, and flags policies currently under review.

Figure 3: Summary of New England RPS Mandates, 2035



[15] With exceptions for facilities that have made significant capital improvements to extend their useful lives. This 'refurbishment' provision is addressed later in the report.

Regional RPS Vintage Requirements & Eligibilities

COD (also called in-service date) plays a critical role in RPS eligibility. Table 1 summarizes vintage requirements across New England's RPS markets.

Table 1: Summary of Vintage Requirements, by Class

State	ME	CT	MA	NH	RI	VT
Class I ('New')[16]	Post-8/31/04	None, except for hydro (Post-7/1/03) and nuclear (post-10/1/23)	Post-12/31/97	Post-12/31/05	Post-12/31/97	Post-6/30/15
Class II ('Existing')	Pre-9/1/05	None	Pre-1/1/98	Pre-1/1/06	Pre-1/1/98	Pre-7/1/15

As outlined in Table 1, Maine Class I and comparable RPS classes targeting 'new' facilities have vintage requirements setting a date after which a facility must have begun operating to qualify as 'new'. These dates vary widely due to several factors, including when a given state's RPS and particular class became active. Facilities with earlier CODs than these vintage requirements generally fall into 'existing' classes within the RPS programs—with a few exceptions for refurbished facilities or incremental capacity.

Key Maine RPS Features: Maine's RPS has a several unique eligibility features.

- **Black liquor** is an eligible biomass fuel—only in Maine. Black liquor is a primarily liquid byproduct of the pulp and paper manufacturing process, generated when wood is converted into pulp to make paper.
- **Refurbished** renewable resources are eligible under Class I requirements, so long as the resource was refurbished after 9/1/05 and received certification from the PUC "before September 1, 2019 that it is operating beyond its previous useful life or is employing an alternate technology that significantly increases the efficiency of the generation process; or on or after September 1, 2019 that it is operating beyond its previous useful life as evidenced by a finding that the facility would be reasonably likely to cease operation if not for substantial capital investment made after September 1, 2018, except for capital investment required to meet state and federal fish passage standards."
- **Qualified Hydroelectric Output** may be a Class I/IA resource in Maine and is defined as the output from FERC-licensed hydroelectric generators with a COD prior to January 1, 2019 that are greater than 25 MW, interconnected to an electric distribution system located in the state, and not located in a critical habitat for Atlantic salmon.

Alternative Compliance Payments

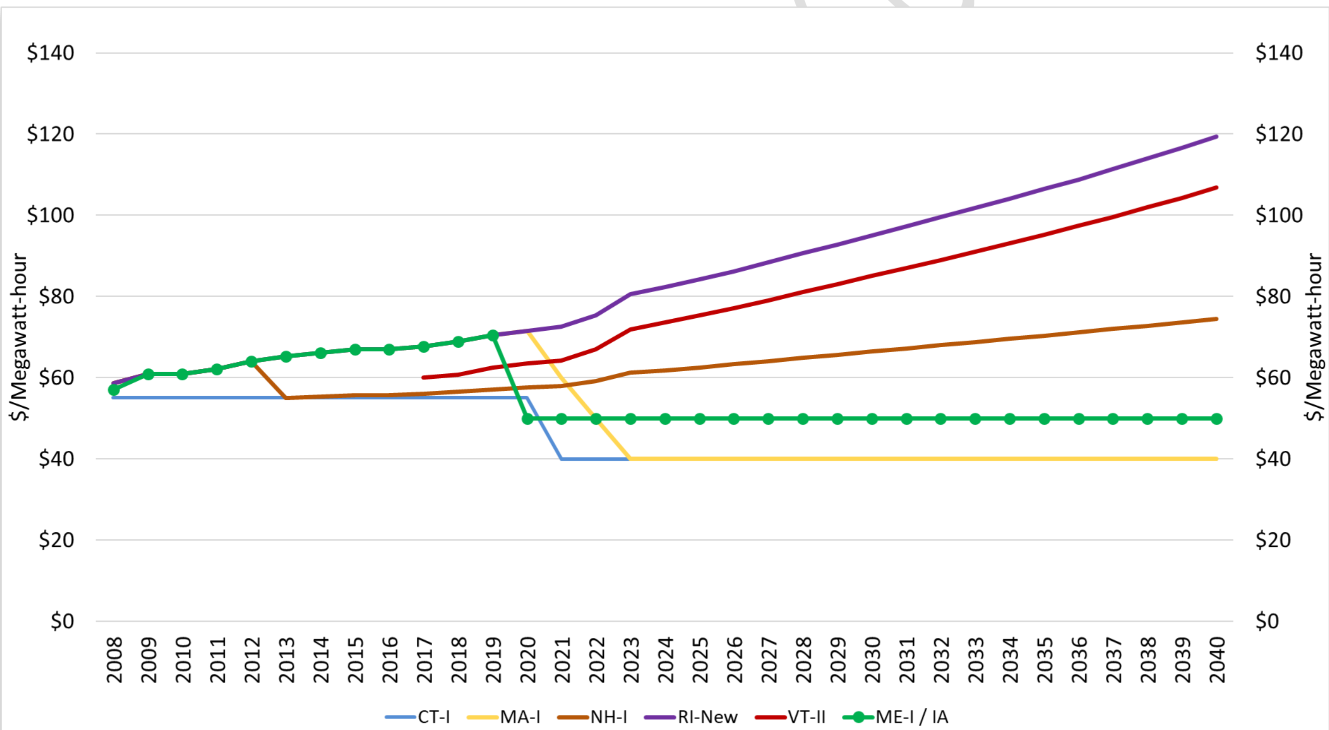
As discussed in Section 2.1, obligated entities can make ACPs in lieu of acquiring RECs to satisfy the RPS requirements. If the ACP rate is less than the premium for new market entry, the ACP effectively serves as a price cap. ACP rates differ by state, and by class (see Figure 4 and Figure 5). As a result, available eligible REC supply will (barring contractual commitments to the contrary) go to the highest-valued market (with the highest ACP) first. In a supply shortage, this may leave markets with lower ACPs short and mean that the obligated entities need to use the alternative compliance mechanism to fulfill their RPS obligations.

[16] And Vermont Tier II (which, despite the numbering convention, is for new resources)

Key Maine RPS Features: Like MA and CT, ME revised its Class I ACP more than a decade into Class I implementation. The 2007 passage of *An Act to Stimulate Demand for Renewable Energy* established a base Class I ACP of $57.12 per MWh that would increase annually based on the Consumer Price Index; however, in 2019 the Class I ACP was reduced and fixed at $50 per MWh for compliance years 2020 and thereafter.

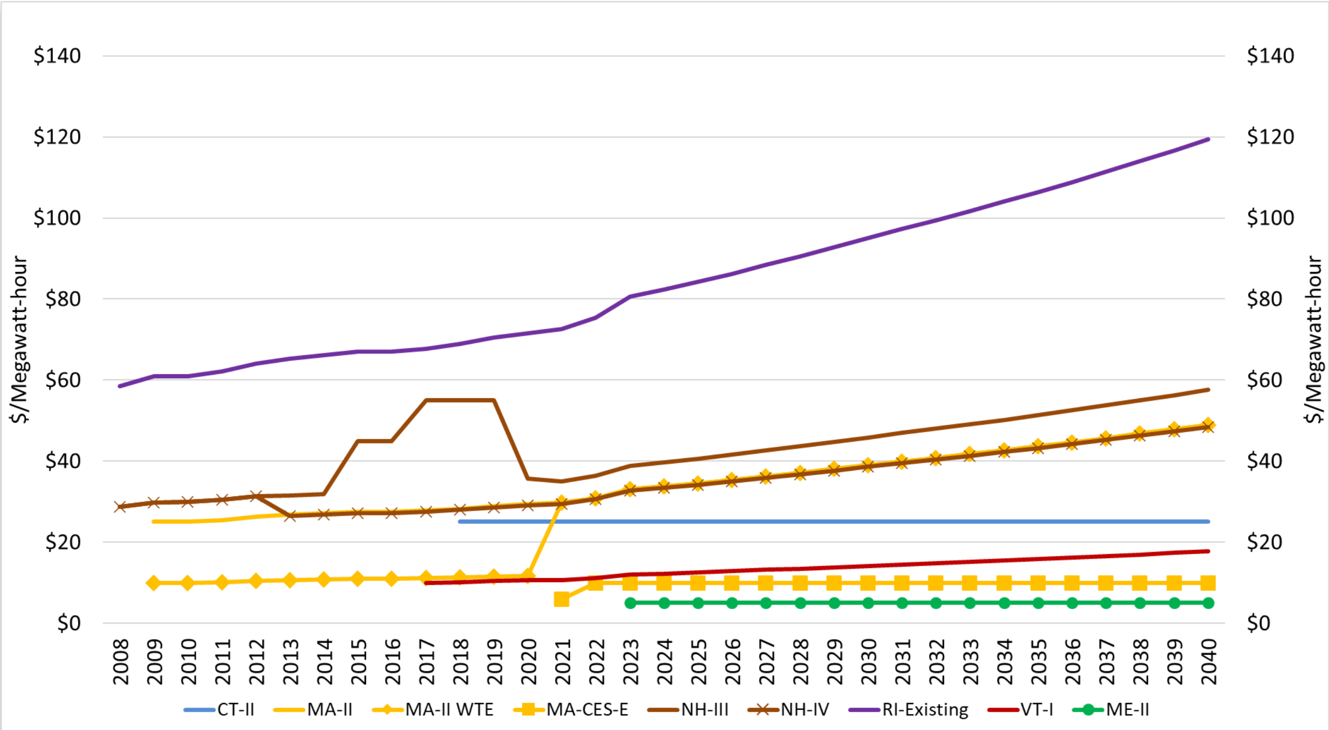
Unlike other markets, while the first compliance year for Maine Class II was 2000, Maine did not formally establish a Class II ACP until 2023. The ME Class II market was characterized by systemically surplus for most of this period, so the absence of a formal ACP rate was not a binding market factor. In 2023, the legislature directed the PUC to establish a Class II ACP of $10/MWh or less. Through a docketed process,[17] the PUC took public comment and established a Class II ACP fixed and flat at $5/MWh. Figure 4 and Figure 5 show how Maine's ACP rates compare to the rest of the region and provide insight into the market conditions that may cause Maine CEPs to make alternative compliance payments. For example, MA and CT have lower Class I ACP rates than Maine and will therefore trigger ACPs first – freeing up supply for Maine Class I/IA compliance. Among Class II markets, however, Maine has the lowest ACP rate and will be the first to see ACPs if demand for regional Class II eligible resources ever exceeds supply (e.g., either due to load grow or an increase in activity in voluntary REC purchases from corporate an institutional buyers.)

Figure 4: Summary of 'New' RPS Category Alternative Compliance Payment Rates, by State, by Year



[17] *Commission Initiated Rulemaking for Alternative Compliance Payment for Class II Resources Pertaining to Chapter 311,* Docket No. 2023-00225, Order Adopting Rule and Statement of Factual and Policy Basis (Me. P.U.C. Nov. 1, 2023)

Figure 5: Summary of ‘Existing’ RPS Category Alternative Compliance Payment Rates, by State, by Year



Role of Adjacent Control Areas, including the Northern Maine Independent System Administrator

The New England Power Pool has physical ties to three adjacent control areas: New York, Quebec, and New Brunswick. Whereas the NEPOOL GIS automatically creates certificates for each MWh of production from facilities located within ISO-NE, unit-specific certificates representing production originating from adjacent control areas are only created when both the energy and attributes are imported into ISO-NE and settled with a specific counterparty.[18] This mechanism allows renewable energy imports to contribute to New England states’ RPS compliance and ensures that the attributes are not counted towards any policies or claims in the jurisdiction of origin. Through these rules, wind, hydroelectric, biomass, landfill gas, and other generators in neighboring jurisdictions have been participating in New England RPS markets for approximately 20 years. These same rules allow New England generators to export energy and RECs to neighboring control areas. As a practical matter, however, this has only been economically attractive in limited circumstances. As renewable energy policies and targets evolve in New York and Canada, however, it is possible that the frequency and quantity of renewable energy imports from these regions will evolve with them.

There is one important exception to the rules governing energy and certificate imports. The state of Maine is unique in that while most of its territory lies within ISO-NE, a portion of the electric system (in the northeast) is physically part of Canada—specifically, part of the New Brunswick Power system. This portion of Maine is (electrically) managed by the Northern Maine Independent System Administrator (NMISA). Per Maine Public Utilities Commission Rules Chapter 311[19], generating facilities located within the NMISA territory do not need to physically import both energy and RECs into ISO-NE for their RECs to be eligible to be settled by Maine CEPs in satisfaction of Maine RPS compliance (even if the load that such RECs are satisfying is not located in the NMISA territory).[20] In short, RECs created by facilities located anywhere

[18] Rule 2.7, “New England Power Pool (NEPOOL) Generation Information System (GIS) Operating Rules” (NEPOOL, 2024), https://nepoolgis.com/wp-content/uploads/sites/3/2020/07/GIS-Operating-Rules-Effective-7-1-21.doc
[19] 65-407 C.M.R. Ch. 311 (2023), https://www.maine.gov/mpuc/sites/maine.gov.mpuc/files/inline-files/Chapter%20311.pdf
[20] Certificates originating from renewable energy generators in NMISA are tracked through the North American Registry (NAR).

within the Maine state boundary are fully fungible within Maine for RPS compliance. If, however, a generator located in NMISA wishes to sell its RECs for compliance toward the RPS in any other New England state, the import of both energy and RECs into ISO-NE is required.

3 Status and Impacts of Maine's RPS to date

This section reports on Maine RPS compliance to date. RPS obligations and exemptions are provided by class, followed by a summary of the supply purchased and retired by CEPs to fulfill the RPS requirement. The data utilized in this section are derived from CEP compliance filings, ME PUC RPS compliance reports, the NEPOOL GIS, ISO-NE, the US DOE Energy Information Administration (EIA), and research conducted by SEA.

3.1 RPS Demands and Supplies

3.1.1 RPS Demand: Obligations and Obligated Entities

Obligated Load and Exemptions

The RPS is a state-wide obligation applicable to retail electricity sales. However, Maine retail load is exempt from the Class I, Class IA, Thermal, and/or Class II RPS policy if (1) it is attributable to a qualified Pine Tree Development Zone business established under Title 30-A I or (2) it is served under a retail supply contract or standard-offer service arrangement that was executed on or before the effective date of the Class-specific requirement. Separately, customers receiving service at a transmission or subtransmission voltage level were offered a one-time option (through 12/31/2019) to opt-out of Class IA. Where such option was exercised the exempt customer may not sell Class IA RECs produced by the customer's or affiliate's generation facility to any other entity for Class IA compliance. This exemption expires after 12/31/2027.

RPS-obligated load is calculated by subtracting exempted load from total retail sales (including line losses) for each LSE. Figure 6 summarizes RPS obligated load and exemptions, by class, from 2008 – 2022. While Maine's original RPS (now called Class II) commenced in 2000, LSE compliance filings reporting RPS-obligated load and exemptions were not required until the 2008 compliance year. All available data are reported below. From 2000 to 2007, it is assumed that the RPS obligation was always equal to 30% of Maine load minus Pine Tree Development Zone load. For this period, supply data is sourced from the NEPOOL GIS.

Since Class I commenced in 2008, Class IA in 2020, and Thermal in 2021, the complete history of RPS obligations is included below for these three classes.

Figure 6: Summary ME RPS Obligated Load and Exemptions, by Class, by Year

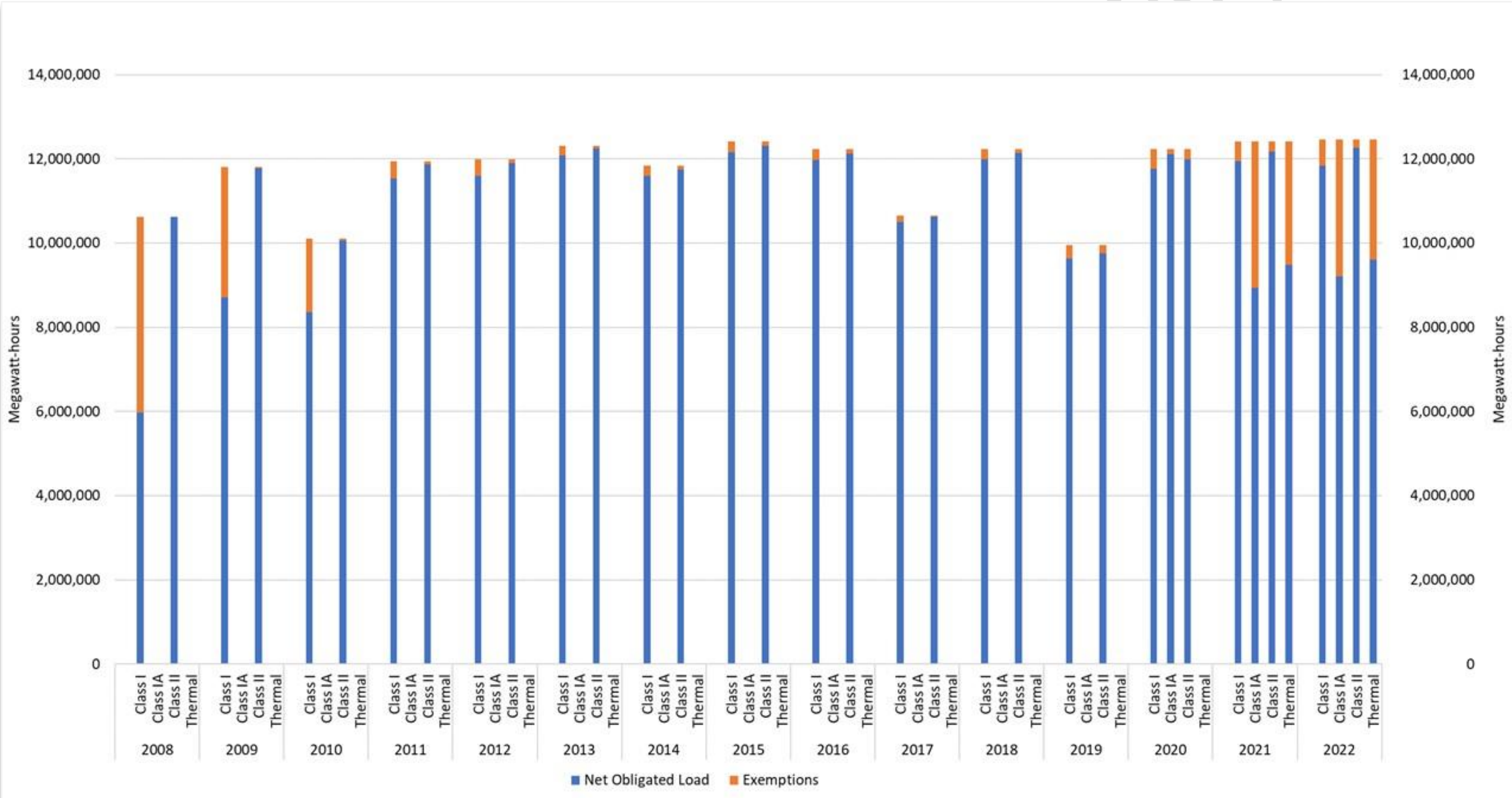


Figure 6 provides data on RPS obligated load and exemptions, from which several insights can be drawn. Due to its geographic (rather than contractual) nature, Pine Tree Development Zone exemptions are consistent over time – at approximately 1% to 2% of load. By comparison, due to the short-term nature of most retail contracts (which typically span 12 to 36 months), one would expect contract-related exemptions to be significant during the first year or two of the implementation of a new Class (i.e., following Class I implementation in 2008, Class IA in 2020, and Thermal in 2021) and then drop off sharply thereafter. The data do not support this hypothesis as definitely as expected. While Class I exemptions seem to follow this trend from 2008 to 2009, exemptions data were not available for 2010 and therefore visibility on the rest of the trend is limited (for graphing purposes, 2010 exemptions were estimated by averaging 2009 and 2011 data).

For Class IA, exemptions were expected to be highest in the first year, but reported Class IA exemptions were small in 2020 (1% of load), grew significantly in 2021 (28% of load), and remained high in 2022 (26% of load). If existing retail contracts were the source of the exemption, then one would have expected a larger decrease between 2021 and 2022. The data available to the SEA team do not explain *why* an exemption was granted (except for the small volume of Pine Tree Development Zone exemptions), so it is possible that RPS-obligated entities have petitioned for, and received, exemptions that are not itemized in the Commission's RPS reports. It is plausible that CEPs entered multi-year contracts in 2019 that remained in effect through 2022, but unlikely that the pricing terms of these contracts extended into 2023. Therefore, a significant reduction in Class IA exemptions is expected to be visible once 2023 compliance filings are completed (in Q3 2024)[21].

Figure 6 also suggests that while RPS-obligated load varies with exemptions and the addition of new classes, Maine load has been relatively stable since 2008. The load reductions implied by the 2010, 2017, and 2019 data are not expected and are difficult to explain. Data for 2010 is based on NEPOOL GIS reports. Data for 2017 and 2019 are based on the aggregate of individual CEP compliance reports and represent the sum of all load and exemption data available to SEA from the PUC.

[21] If this expectation is not realized, then it may be appropriate to investigate whether exemptions are being granted to selected wholesale providers without ensuring that all RPS requirements are being fulfilled by the retail entities those wholesale suppliers are serving.

RPS Demand: Past and Future

RPS demand is the product of RPS-obligated load (described and quantified above) and the class-specific target, by year. Figure 7 summarizes RPS targets, by class for 2000 – 2030. Figure 8 summarizes RPS demand, by class, for the study period (2000 – 2022).

Figure 7: Maine RPS Targets, by Class, by Year

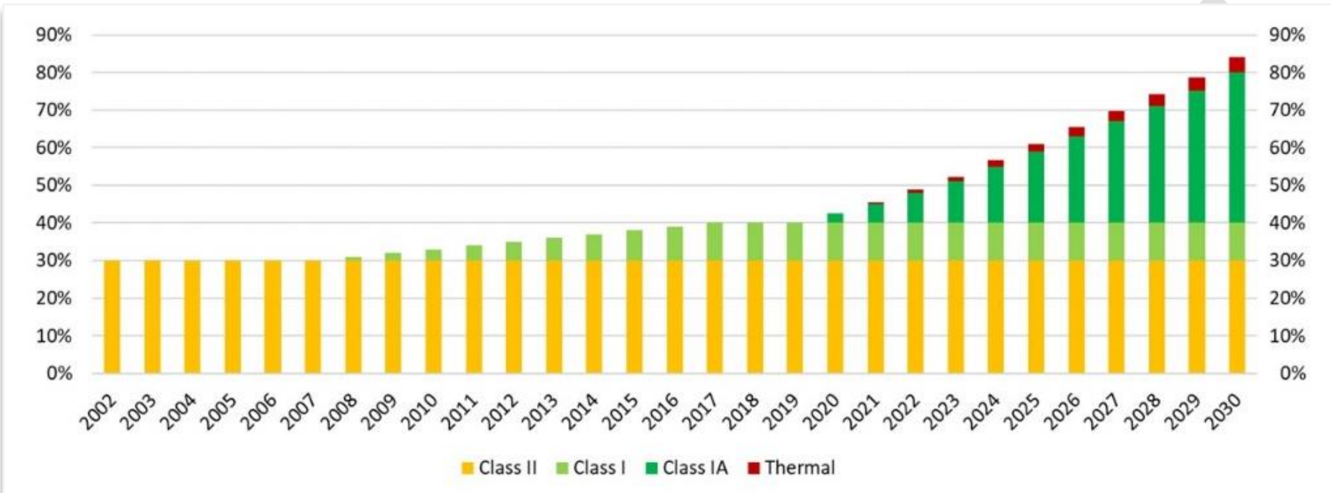
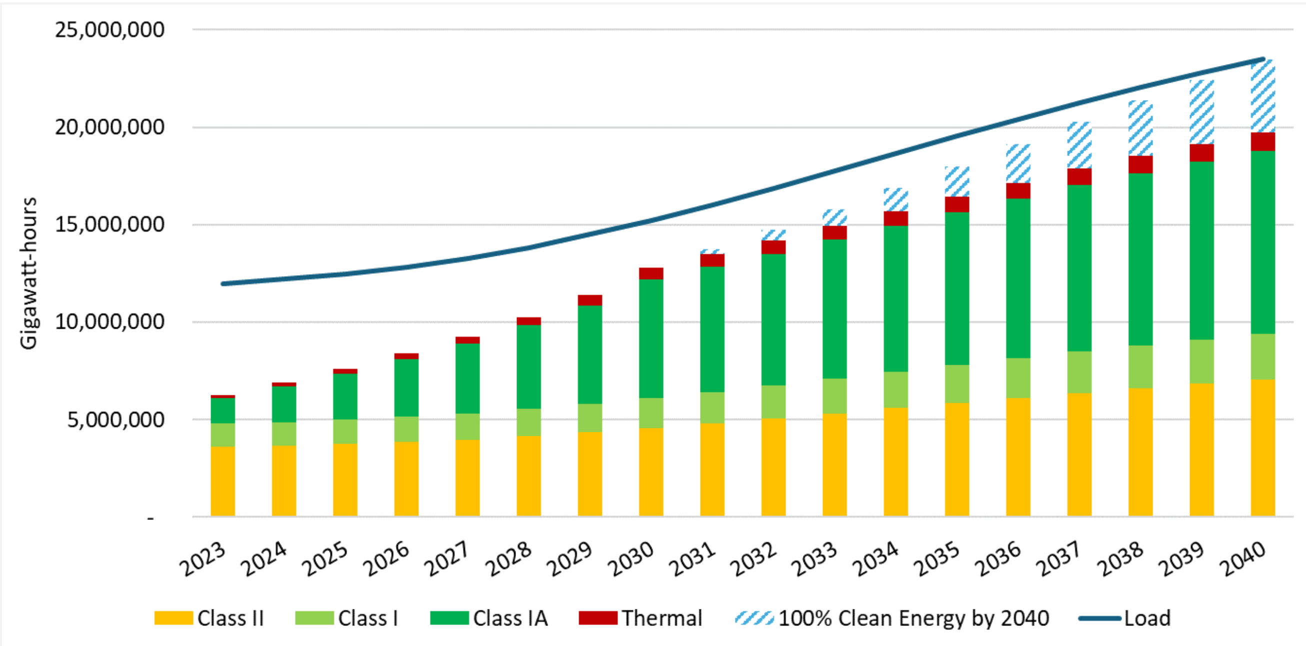


Figure 8: Maine RPS Demand, by Class, by Year

While the focus of this report is retrospective, it is important to note that electrification initiatives, changes in the New England and Maine economy, and evolutions in consumer behavior may cause load to increase—thus making the future quite different than the past. Figure 9 provides an estimate of Maine load for 2023 to 2040 (the line graph) as provided by GEO. Since data are not available to forecast RPS exemptions, the load forecast serves as a proxy for an RPS-obligated load forecast and is not differentiated by class. The stack bars provide a rough estimate of RPS obligation, by Class, for 2023 – 2040. The purpose of this figure is simply to provide a highest-level estimation of potential implications of load growth for RPS compliance. How those targets may be fulfilled is not within the scope of this report but is nonetheless discussed qualitatively in Section 5.

Figure 9: Forecast of Maine RPS Demand, by Class, by Year



3.1.2 RPS Supply: Definitions and Verification

Renewable energy supplies eligible to contribute to Maine's RPS are defined, by class, in Maine Public Utilities Commission Rules Chapter 311[22] and summarized below in Table 2.

Table 2: Maine RPS Eligibility Criteria, by Class

RPS Class	Eligible Technologies	Commercial Operation Threshold	Eligibility Notes
Class I	• Fuel cells* • Tidal • Solar • Wind • Geothermal • Hydroelectric • Biomass	Constructed after 9/1/2005	• Except for solar and wind, resource may not have a nameplate capacity greater than 100 MW • Allows refurbished facilities ("has been refurbished after September 1, 2005 and is operating beyond its useful life or employing an alternate technology that significantly increases the efficiency of the generation process")
Class IA	• Fuel cells* • Tidal • Solar • Wind • Geothermal • Hydroelectric • Biomass	Constructed after 9/1/2005	• Except for solar and wind, resource may not have a nameplate capacity greater than 100 MW • Does not allow refurbished facilities
Thermal	• Biomass thermal • Waste heat or pressure • Useful renewable thermal	Constructed after 6/30/19	• Produced directly by a facility using sunlight, biomass, biogas or liquid biofuel or produced as a byproduct of electricity generated by a Class I or Class IA resource
Class II	Renewable resources: • Fuel cells* • Tidal • Solar • Wind • Geothermal • Hydroelectric • Biomass • Municipal solid waste Efficient resources: • Cogeneration facilities	Efficient resources must have been constructed before 1997; no threshold for renewable resources	• Renewable resources may not exceed 100 MW
***If run on renewable fuels**			

Class I, IA, and Thermal resources must apply to, and be certified by, the PUC before selling NEPOOL GIS certificates to LSEs for RPS compliance. The PUC maintains a list of all Class I, IA, and Thermal certification applications on its RPS website.[23] Class II resources are permitted by the Maine PUC to self-certify – that is, they inform the NEPOOL GIS administrator that their certificates should be marked "Yes" for Maine Class II RPS eligibility (see Appendix B: NEPOOL GIS Generators List – Maine Class II Certified for current list).

[22] 65-407 C.M.R. Ch. 311 (2023), https://www.maine.gov/mpuc/sites/maine.gov.mpuc/files/inline-files/Chapter%20311.pdf
[23] "Maine Renewable Portfolio Standard," MPUC, https://www.maine.gov/mpuc/regulated-utilities/electricity/renewable-programs/rps

Please note, however, that being certified as a Maine RPS-eligible facility does not mean that certificates from each of these generators was used for RPS compliance in each year. It is common for renewable energy facilities to be certified in multiple states and to sell certificates to LSEs in numerous states and in varying quantities each year. For this reason, the data analysis in this report focuses on the NEPOOL GIS certificates that were purchased by Maine LSEs and retired specifically for Maine RPS compliance. These data are sourced from individual LSE compliance filings and from NEPOOL GIS reports to the Maine PUC. To preserve LSE confidentiality, all data are reported in aggregate.

As introduced in Section 2, NEPOOL GIS Certificates are the verification mechanism for substantiating compliance with RPS policies throughout New England. GIS Certificates (commonly referred to as RECs when derived from renewable energy facilities) are paired one-to-one with energy for every MWh produced within or delivered into ISO-NE each year. For this reason, there is no functional, environmental, or policy difference between energy and RECs purchased together versus separately. At the end of each compliance period, the right to claim the descriptive characteristics of each MWh resides with the entity that has retired the certificate. If an LSE purchases energy only (or energy and RECs but then resells the REC) it must purchase certificates in equal MWh quantities or be assigned residual mix certificates[24] at the end of the compliance year. The assignment of residual mix certificates each year ensures that all energy supply is paired with attributes and that each MWh attribute is counted only once. Energy-only contracts do not enable claims to descriptive characteristics and cannot be used to demonstrate RPS compliance.

3.1.3 Results: Fulfillment of Maine's RPS to date

This section provides a detailed description of the quantities, technologies, and locations of NEPOOL GIS certificates used for Maine RPS compliance to date. Class II certificate data are available from NEPOOL GIS beginning 2002 (the Class II policy commenced in 2000). Class I, IA, and Thermal data are all available from the inception of each policy and were reported by LSEs through the RPS compliance filing process beginning with compliance year 2008.

Class I and IA

Figure 10 summarizes actual historical Class I RPS compliance by technology, by year. While the eligibility criteria for regional Class I markets are generally designed to encourage the development and construction of new (in Maine's case post-September 2005) generating facilities, Maine's unique treatment of biomass results in a slightly different outcome for Maine's Class I RPS. Maine allows for supply from existing facilities that have become Class I eligible through the refurbishment provision and have been deemed to be either operating beyond their original useful life or employing an alternate technology that significantly increases the efficiency of the generation process. Most biomass supply is from existing and/or refurbished facilities. Only four biomass projects, totaling approximately 84 MW, have been constructed since the inception of the Class I RPS.

In addition, the ME PUC determined – through facility-specific docketed proceedings[25] – that black liquor is an eligible biomass fuel because the heat generating portion of black liquor is a combustible and organic byproduct of the wood pulping process. The Commission concluded that, "without further legislative direction and in light of the unqualified statutory term "biomass," the Commission would adopt a relatively broad definition that includes all fuel derived from

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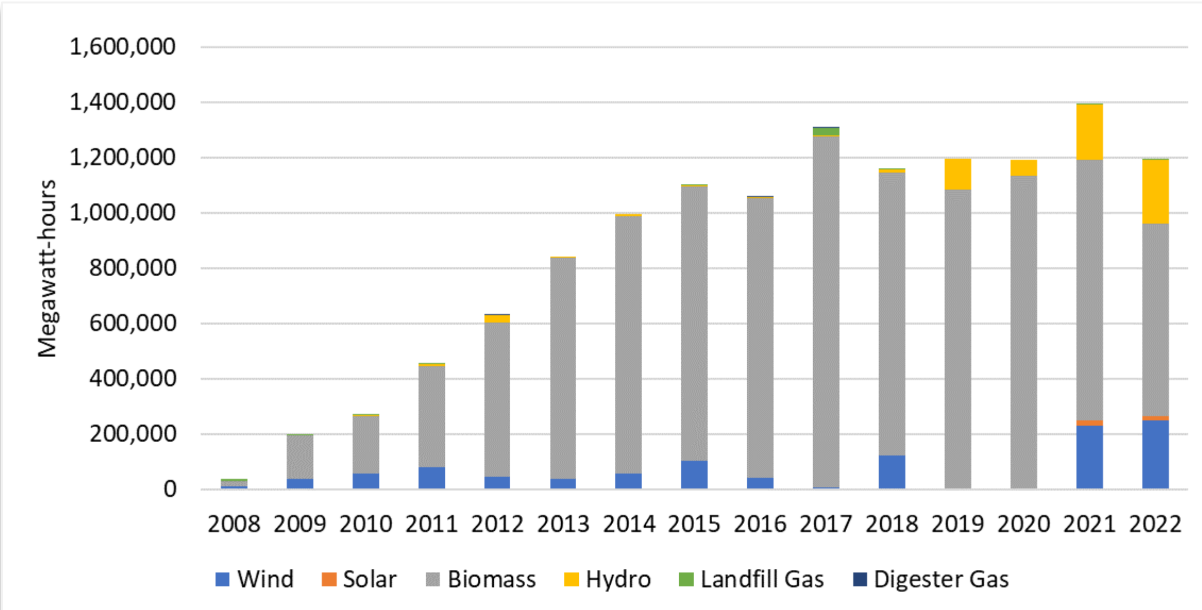
[24] Residual Mix Certificates represent the characteristics of all certificates left unsold at the end of each compliance year.

[25] *Verso Androscoggin, LLC Request for Certification for RPS Eligibility*, Docket No. 2015-00325, Order Granting New Renewable Resource Certification (Me. P.U.C. Apr. 1, 2016); and *Lincoln Paper and Tissue, LLC Request for Certification for RPS Eligibility*, Docket No. 2008-00173, Order Granting New Renewable Resource Certification (Jan. 27, 2009).

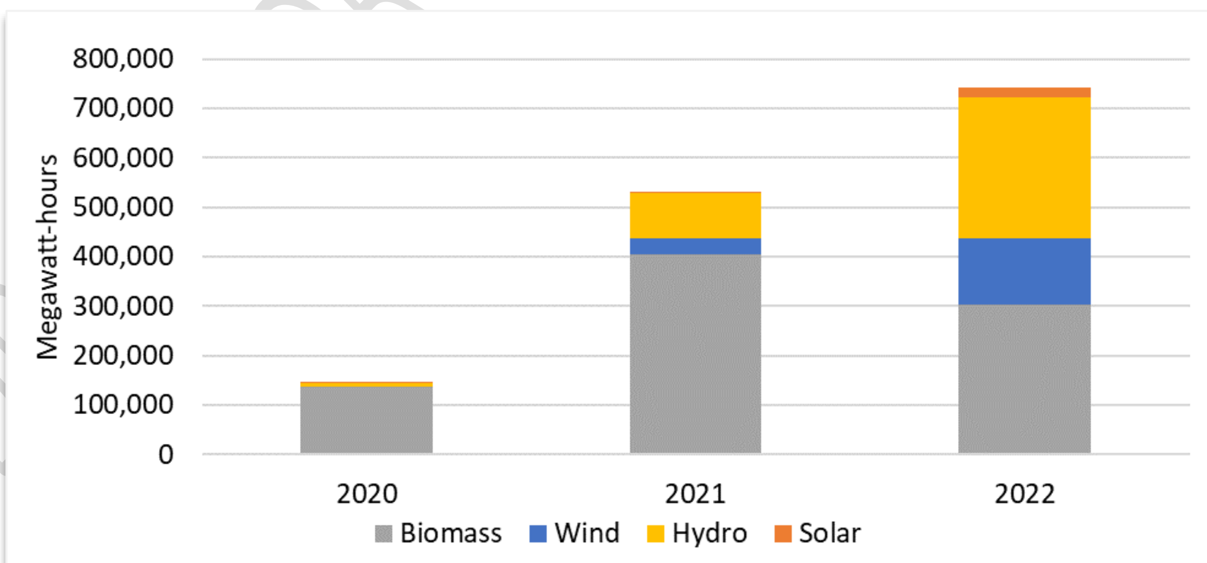
wood and wood byproducts (along with other organic sources)."[26] This further increases eligible production from certified biomass facilities. This production is only eligible for the Maine RPS.

Figure 10: Class I RPS Compliance, by Technology, by Year



Maine's Class IA obligation has been in effect since 2020. The supply composition results to date are summarized in Figure 11. The objective of Class IA – which reaches 40% of Maine retail load by 2030 – is more closely aligned with regional Class I markets and does not allow refurbished facilities. As a result, Class IA is more likely to both encourage the development of new supply and compete on the margin with Class I RPS requirements throughout New England.

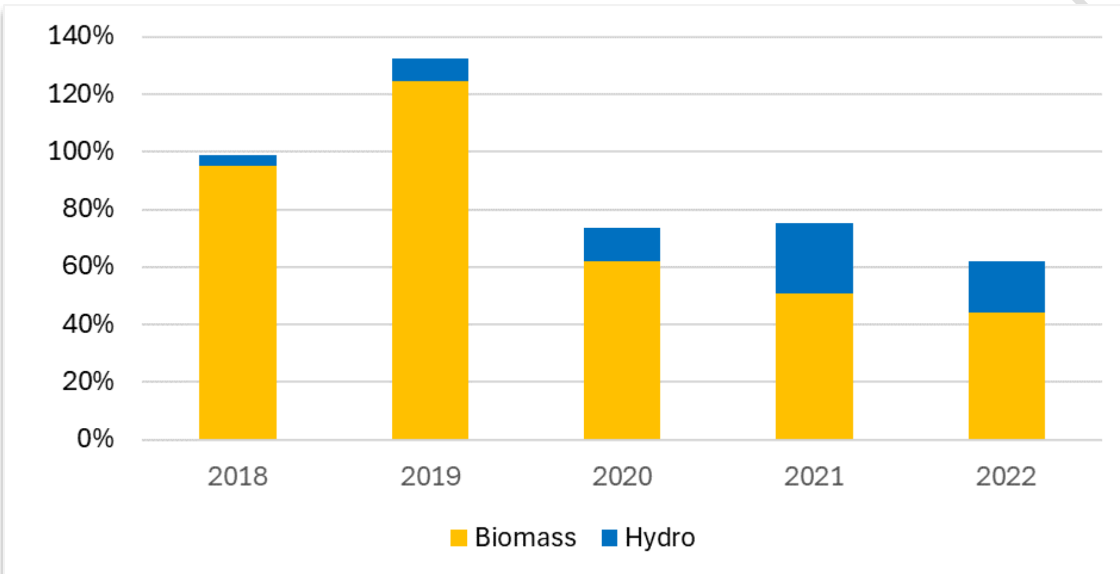
Figure 11: Class IA RPS Compliance, by Technology, by Year



[26] *Public Utilities Commission*, Order Adopting Rule and Statement of Factual and Policy Basis, No. 2023-00225, Order (Me. P.U.C. Nov. 1, 2023)

Based on the unique eligibility criteria described above, Figure 12 summarizes the supply that is eligible for Maine Class I or IA (and not eligible for any other New England RPS) as a percentage of Maine Class I + IA demand for the most recent five years (2018 – 2022). This supply comes from thirteen biomass facilities and ten hydro facilities whose eligibility (either in whole or in part) meets these criteria.

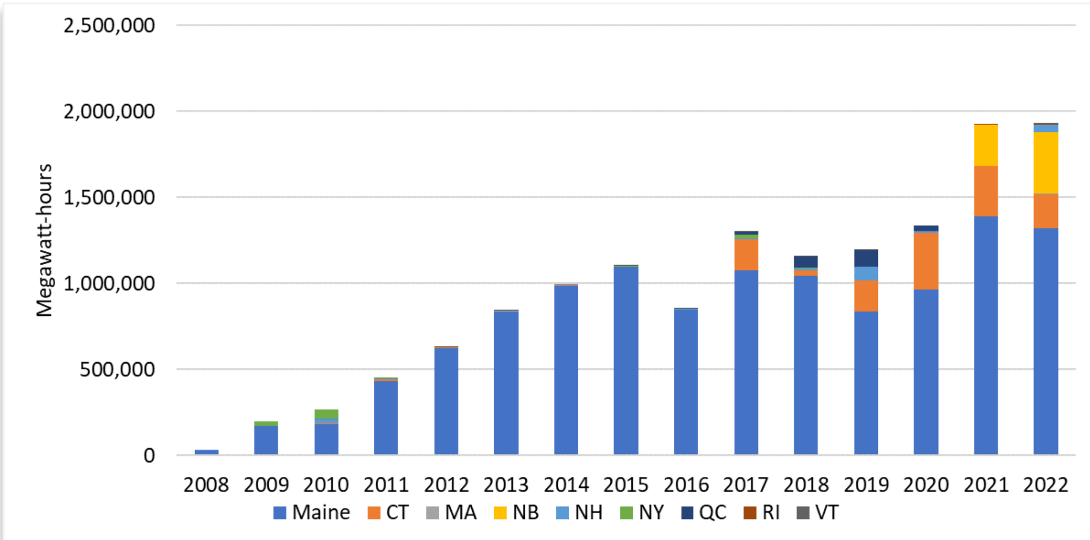
Figure 12: ME I/IA-Only Supply as % of ME I/IA Demand



Prior to the creation of Class IA, supply uniquely eligible in Maine was able to satisfy (or nearly satisfy) Class I RPS demand – resulting in low compliance costs. As RPS targets began to increase again (via Class IA) beginning in 2020, supply uniquely eligible in Maine fulfilled a smaller (but still substantial) portion of Class I/IA compliance. Maine now competes on the margin with other New England states for RECs to fulfill the RPS obligation. This corresponds to the higher cost of compliance experienced in 2021 and 2022, as shown in Section 3.2.1

As discussed in Section 2, while NEPOOL GIS certificates are only created for production within, or delivered to, ISO-NE, eligibility criteria for regional RPS markets is not based on the generator's physical location. Instead, RPS eligibility criteria are established by policymakers taking into account technology, size, emissions, and other characteristics. As a result, GIS Certificates for RPS compliance in Maine are sourced from generators from around the region. Figure 13 summarizes Class I and IA supply by location.

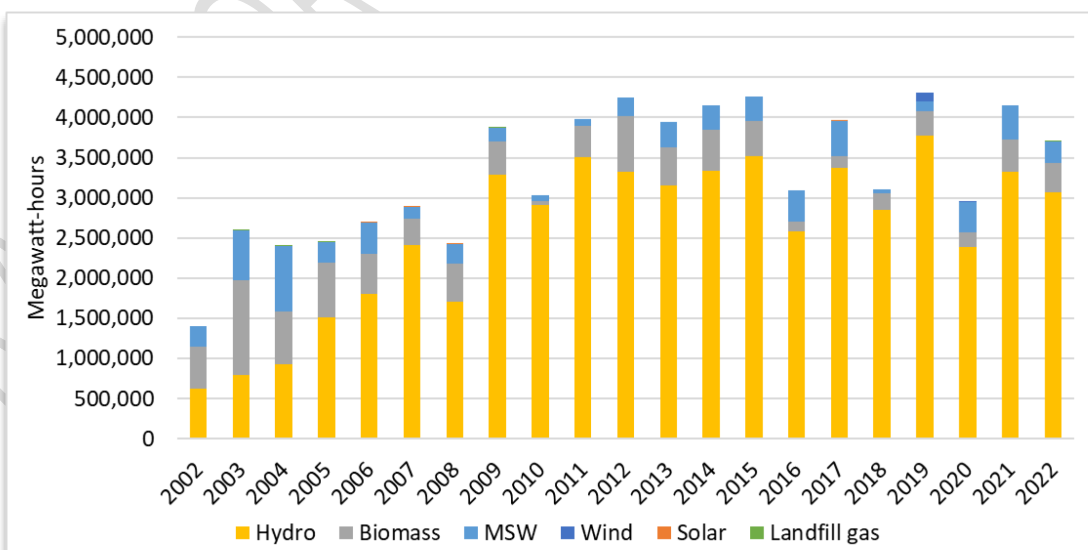
Figure 13: Class I and IA Supply by Location, by Year



Class II

As introduced in Section 2.3, Maine's Class II is focused on maintaining the existing fleet. As a result, the obligation is largely fulfilled by existing hydro. Biomass not eligible for Class I – including "efficient resources" which are cogeneration facilities with a combined (power and thermal) efficiency output of 60% or more[27] – sell into the Class II market. Cogeneration facilities are resources that simultaneously produce (co-generate) electricity and useful heat from the same energy source and can be fueled by a variety of energy sources including – but not limited to – biogas, biomass, coal, industrial waste heat, MSW, natural gas, and oil. MSW, which has a dedicated class in the MA and CT RPS, is part of Class II in Maine. MSW's contribution is weighted by a 3X multiplier wherein the PUC counts one certificate as 3 MWhs of Class II RPS compliance. Figure 14 summarizes Class II supply by technology and year.

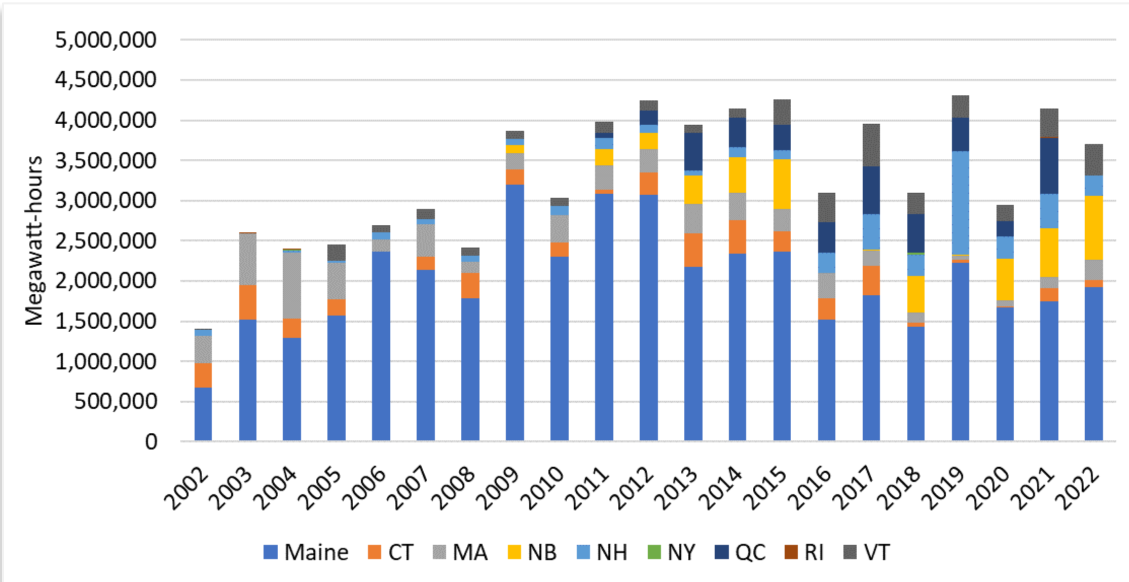
Figure 14: Class II Supply by Technology, by Year



[27] The Maine RPS definition of "efficient resource" specifies that the resource qualifies as a "qualifying cogeneration facility" under the Federal Energy Regulatory Commission rules, 18 Code of Federal Regulations, Part 292, Subpart B, as in effect on January 1, 1997

Figure 15 summarizes Class II supply by location.

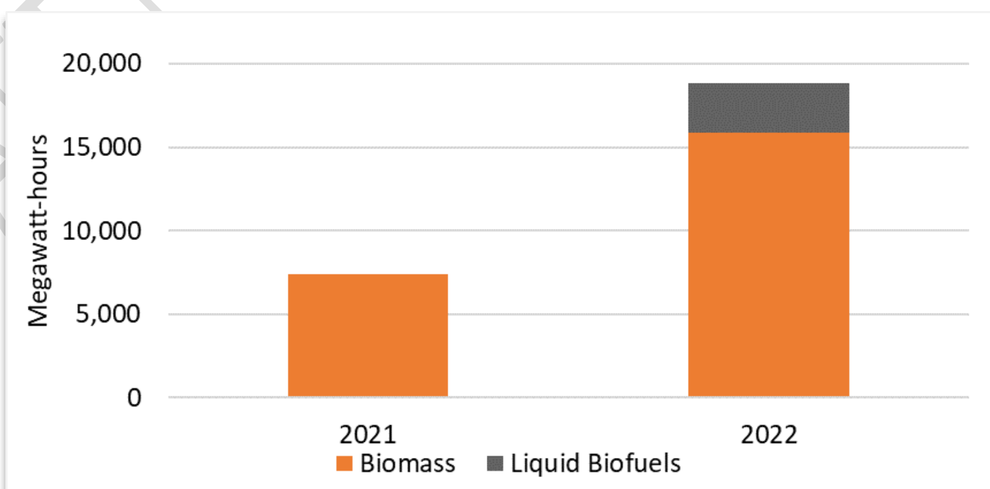
Figure 15: Class II Supply by Location, by Year



Thermal RECs

Maine's Thermal REC requirement is new – with only two years of compliance experience to date. So far, fourteen facilities have applied for TREC certification. Ten have been approved, one application was dismissed, and three applications are still under review at the PUC as of January 2024.Twelve of the fourteen facilities are characterized as biomass, one as biofuel, and one as solar hot water (still pending PUC review). Figure 16 summarizes Thermal REC supply by technology to date. This nascent market is designed to encourage heating with renewable fuels and reduce Maine's dependency on fossil fuels. As such, it is a localized market relying on bespoke applications of heating and cooling systems. The market is in its infancy and supply is not yet keeping pace with demand. The resulting alternative compliance payments are summarized in the subsection below.

Figure 16: Thermal REC Supply by Technology



Compliance Flexibility Mechanisms

As described in Section 2.1, all regional RPS programs deploy one or more flexibility mechanisms to maximize compliance, smooth compliance costs from year to year, and otherwise enable the growing renewable energy industry to meet increasing RPS demand. The figures below summarize how CEPs have deployed these flexibility mechanisms, by class. Each shows the quantity of compliance satisfied by RECs (which includes the use of excess compliance banked from either of the two prior compliance years), and the quantity of RECs purchased during the following year cure period. Based on these data and the estimate of Class-specific RPS demand, the SEA team has estimated the quantity of compliance for which no RECs were purchased and one or more LSEs was required to make ACPs. Maine's RPS compliance reports do not quantify demand and ACPs in the same way each year, so it is not possible to compare and confirm estimated payments to actual ACPs received.

When reviewing the chart below it is also important to consider that RECs – and excess compliance (i.e., banking) – are not evenly distributed. It is not only possible but common that some CEPs will have a surplus of RECs (which they will carry forward) while others are short and required to make ACPs. This explains why, in the charts below, a single year can include both excess compliance ("Banked for Future)" and ACPs.

Figure 17: Class I Compliance – RECs and Flexibility Mechanisms

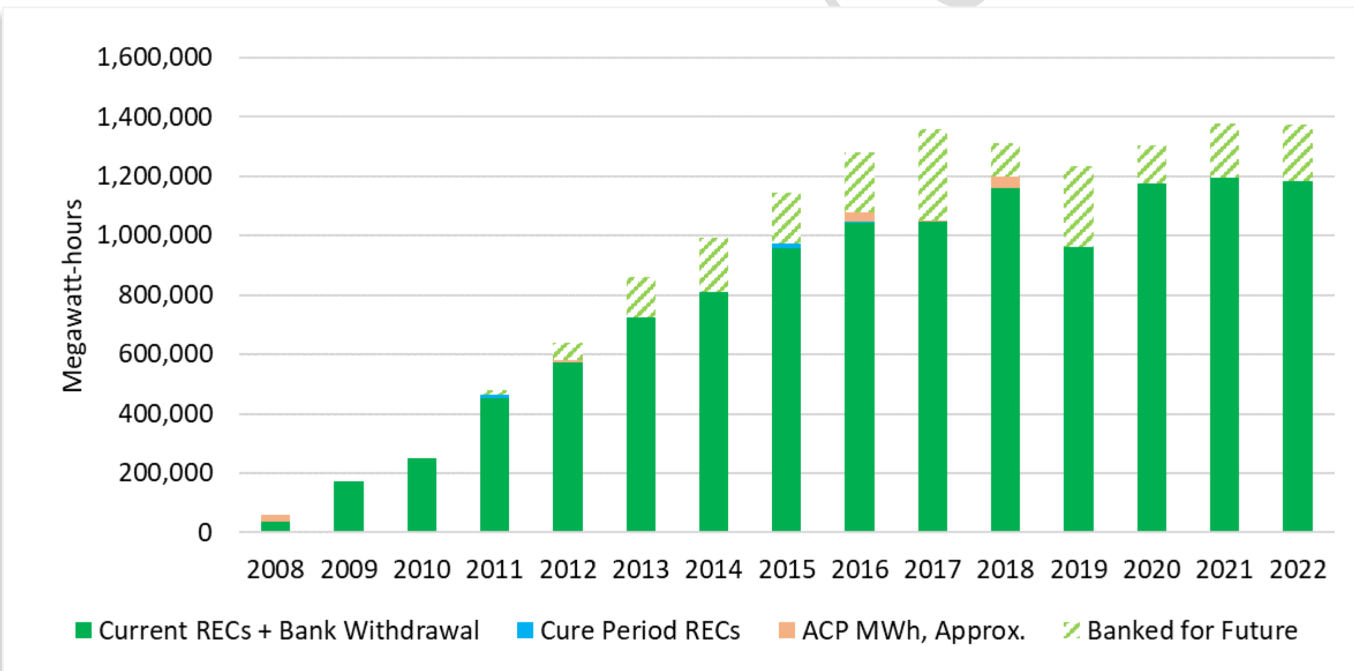


Figure 18: Class IA Compliance – RECs and Flexibility Mechanisms

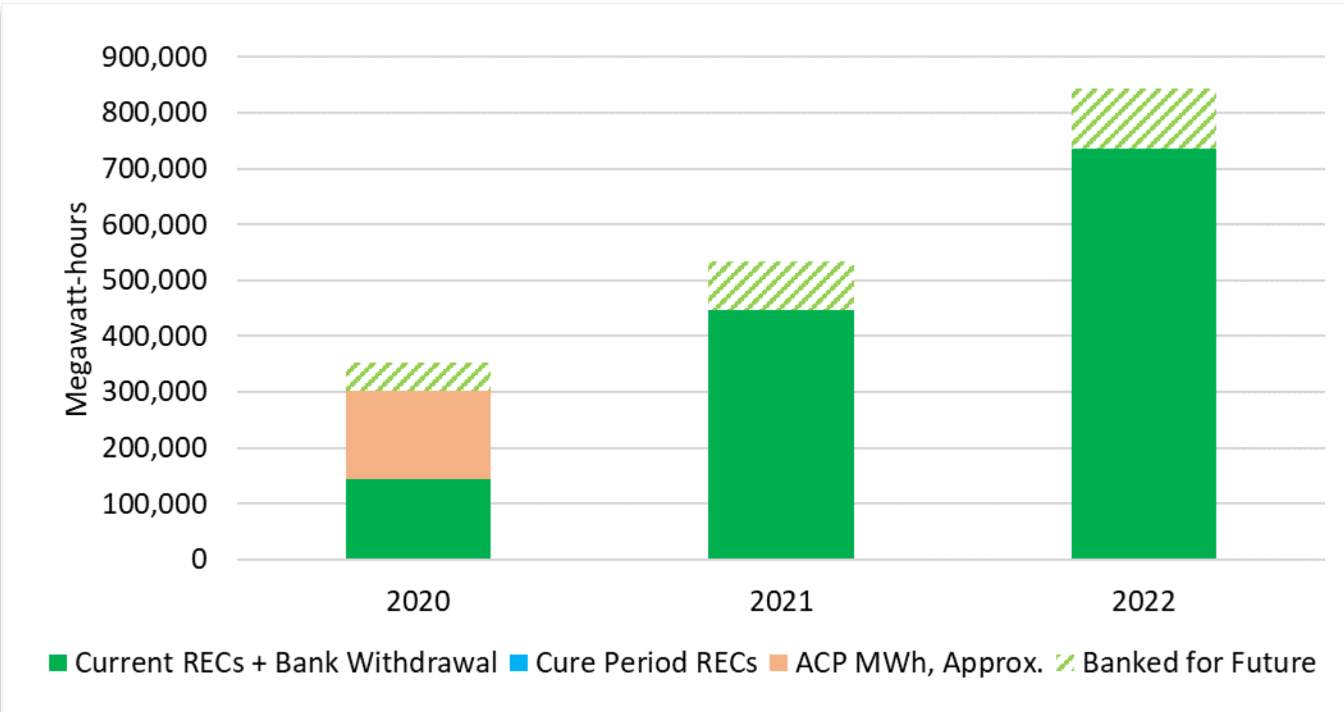
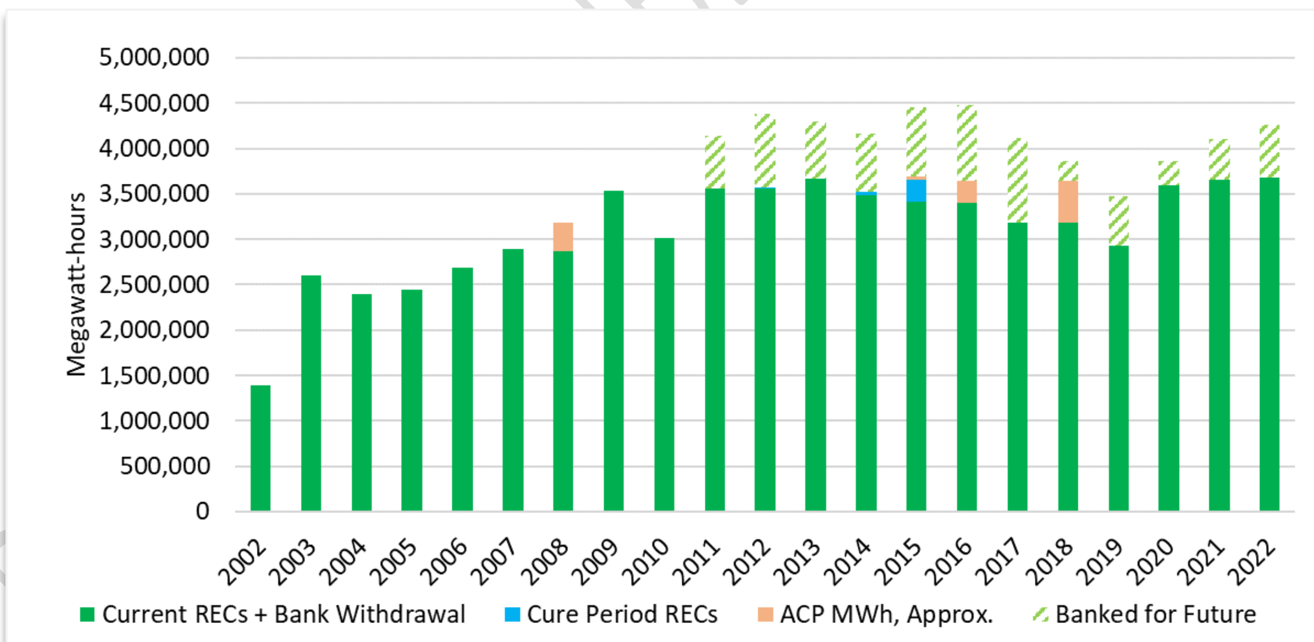


Figure 19: Class II Compliance – RECs and Flexibility Mechanisms

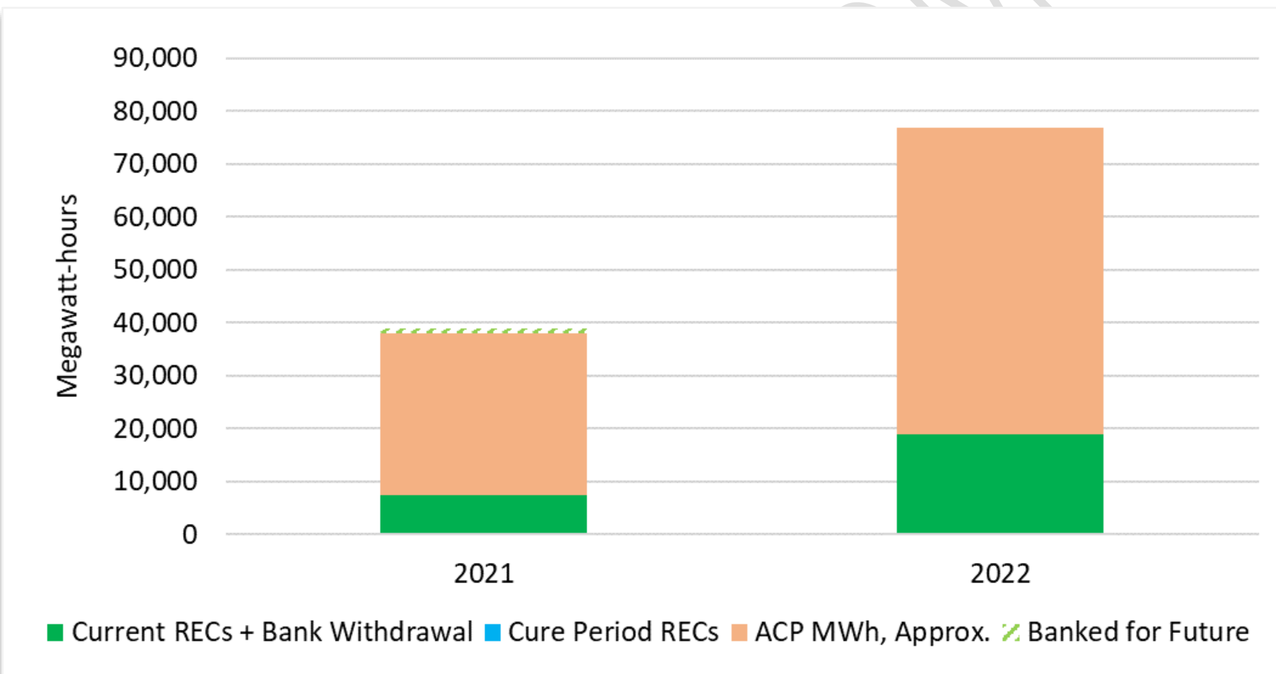


Note that until 2023, Class II did not have an explicit alternative compliance payment rate, potentially due to the persistent surplus present for Class II from 2000 through. The data available for this analysis imply, however, that some CEPs may have fallen short of their Class II obligations and that ACPs may have been required in several years. It is possible that this finding is due to data gaps or errors.

Beginning in 2021, as demand for 'existing' resources increased – through the passage of Clean Energy Standards, increases in existing RPS requirements, and robust voluntary renewable and clean energy purchasing by corporate and institutional buyers – availability of Class II supply became more limited, and the cost of compliance increased from <$1/MWh to as high as $14/MWh. This led the legislature to mandate a Class II alternate compliance mechanism and the PUC to conduct a docketed process resulting in a Class II ACP rate of $5/MWh – which is fixed and flat.

As introduced above, the first compliance year for TRECs was 2021. As such, the profile of compliance for the first two years – some RECs available but paired with significant alternative compliance payments – is similar to other young markets, past and present. This is to be expected. Maine's policy to reduce its reliance on fossil fuels is well-conceived and the TREC program is expected to play a meaningful role towards accomplishing that objective as it matures. Figure 20 summarizes Class I Thermal compliance for 2021 and 2022.

Figure 20: Thermal Compliance – RECs and Flexibility Mechanisms



3.2 Cost of RPS Compliance; Impacts on prices & emissions

This section summarizes the historical cost of RPS compliance and the impacts of Maine's RPS on regional energy prices and emissions. While costs and selected economic impacts are discussed, this report is not intended to represent a comprehensive benefit cost analysis. In fact, since Maine policymakers have already determined that 80% renewable energy by 2030 (and, likely, 100% clean energy by 2040) is the state's objective, a traditional benefit cost analysis would not be the preferred framework for RPS policy evaluation. The purpose of this report is to summarize RPS compliance to date and discuss its impacts on ratepayers and the state's economy. This section and Section 4 quantify key metrics for evaluating cost and economic impacts.

3.2.1 Cost of RPS Compliance

As introduced immediately above, RPS compliance can be – depending on the year – a function of the cost of RECs purchased at different time periods and the quantity of ACPs required (if any). The Maine PUC asks CEPs to report the average price paid for RECs used for ME RPS compliance, by class. This report calculates the weighted average price of all RECs used for RPS compliance – i.e., taking into account CEP volume as well as price paid. Subsequently, the weighted average total cost of compliance is calculated by blending in the quantity of ACP and associated rate (which changed each year with inflation between 2008 and 2019 before being fixed at $50/MWh beginning with the 2020 compliance year).

As a means of alternate compliance, the ACP rate sets a cap on the price at which class-specific RECs will transact. That is, while a REC seller could request a price above the ACP rate, there is no logical economic reason why a REC buyer would elect this option over making an ACP to demonstrate compliance. If the REC premium associated with new market entry is greater than the ACP, obligated entities will pay the ACP rather than support the development of new resources. The presence of ACPs in a CEP's compliance filing typically denotes market shortage. ACP rates vary by state, and states with the lowest ACP rates should expect to see the most ACPs – because RECs will flow to the highest value markets.

Figure 21, Figure 22, Figure 23, and Figure 24 summarize the weighted average REC cost and total cost of RPS compliance by class. Compliance cost data was not available for 2010.

Figure 21: Cost of RPS Compliance, Class I, $/MWh

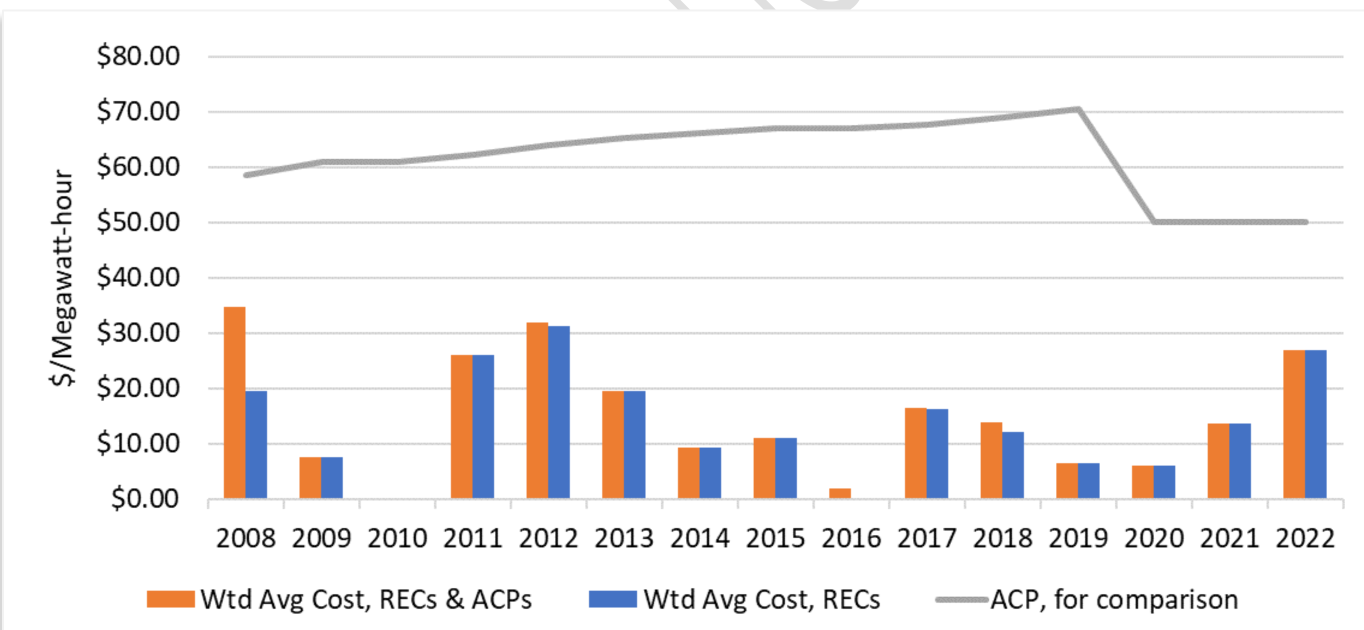


Figure 22: Cost of RPS Compliance, Class IA, $/MWh

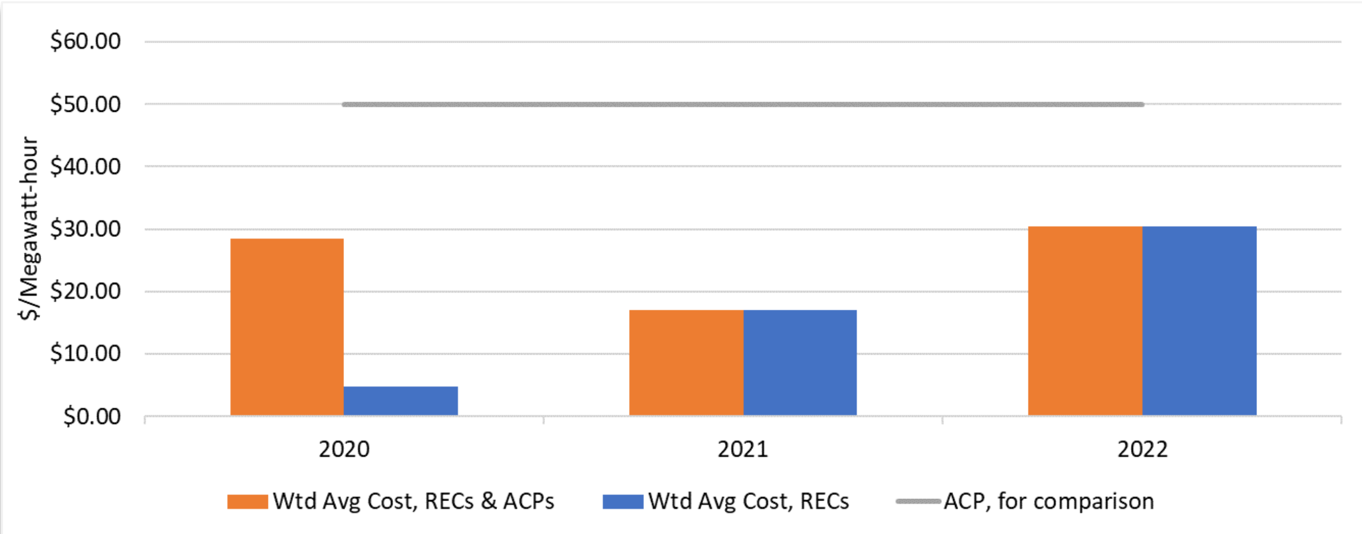


Figure 23: Cost of RPS Compliance, Class II, $/MWh

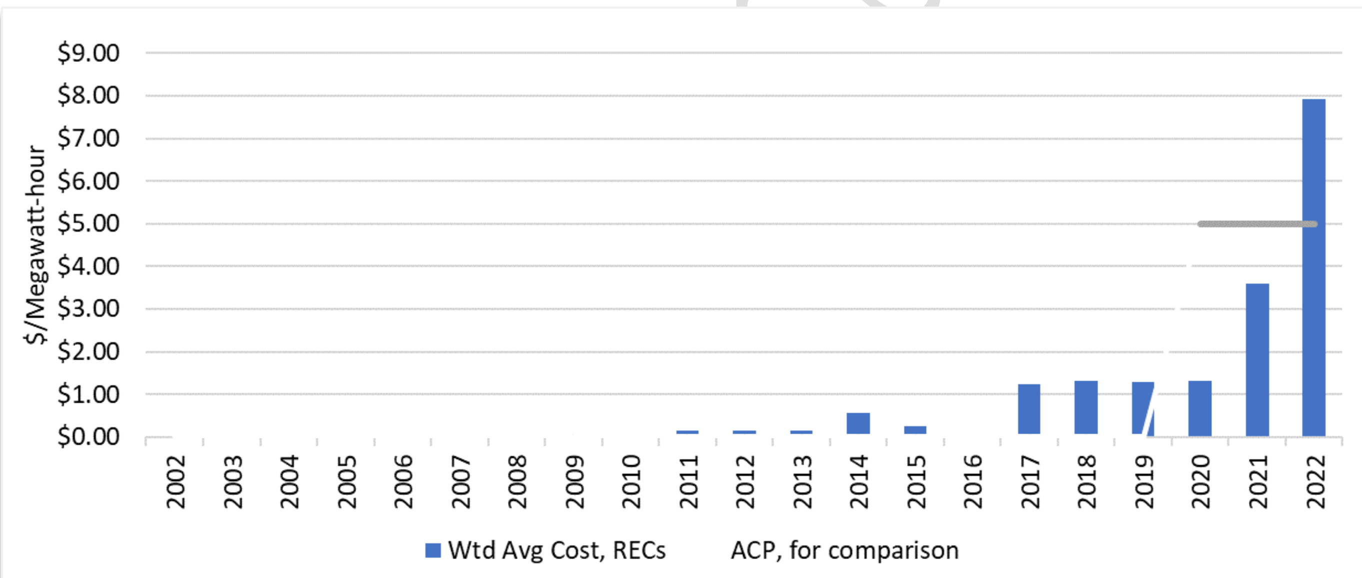
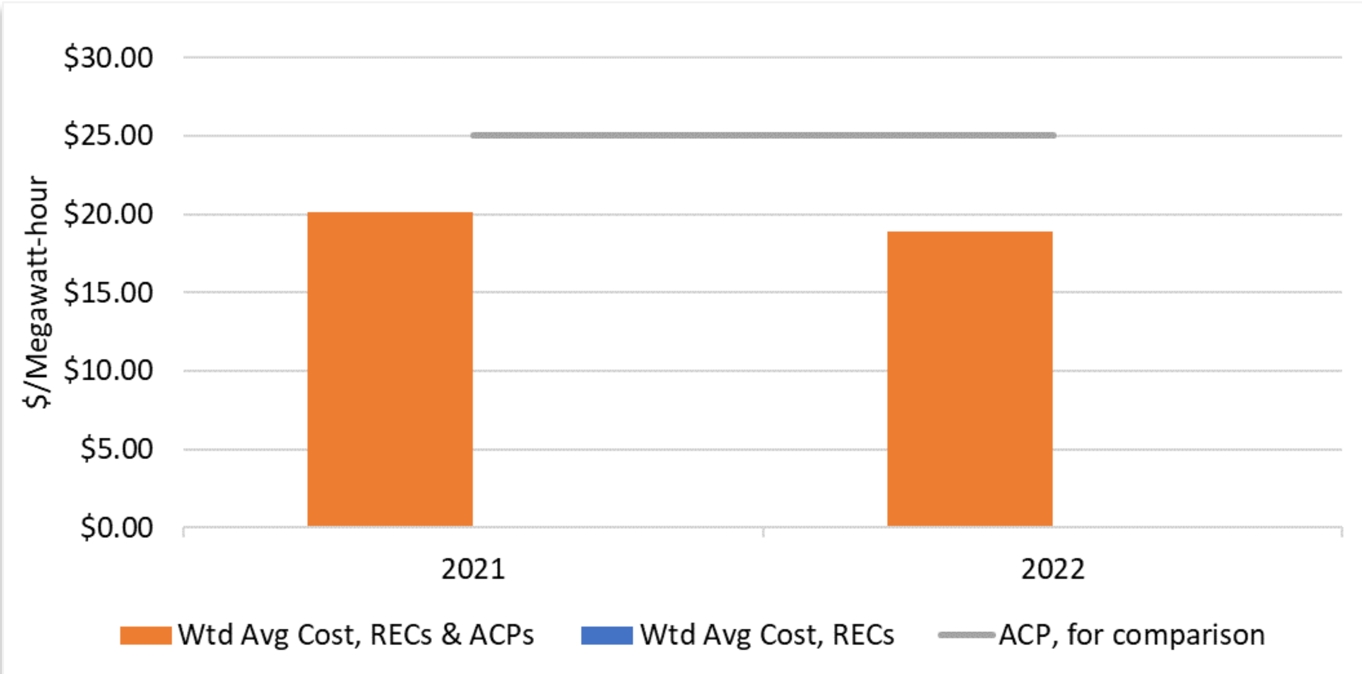


Figure 24: Cost of RPS Compliance, Thermal, $/MWh



3.2.2 Impacts on energy prices and marginal emissions

Resources associated with Class I and IA certificates settled for compliance in Maine have impacts on wholesale market prices, carbon dioxide (CO_2) emissions and nitrogen oxides (NO_X) emissions, which this analysis estimated. Specifically, for wholesale impacts, the SEA team estimated price suppression impacts on capacity and energy prices.[28] These price suppression impacts are an estimate of how wholesale clearing prices change as new resources are added to a supply curve. The SEA team derived these estimates from the 2021 Avoided Energy Supply Cost Component (AESC) study.[29] For estimating CO_2 and NO_x emissions impacts, the analysis used marginal emissions rates included in the 2021 AESC and for years for which the AESC did not provide marginal emissions rates, the analysis used ISO-NE system-level marginal emissions rates.[30] The CO_2 benefit is based on the 2021 AESC Social Cost of Carbon, applying a 2% discount rate, which, for emissions in the year 2022 was $114.74 per short ton. The NO_x value was also derived from the AESC. The figure below assumes that biogenic resources (primarily biomass) yield net zero GHG emissions.

Figure 25 summarizes the price suppression and emissions benefits of Maine's RPS by year. Price suppression benefits include both value that accrues to Maine ratepayers and value that accrues to other New Englanders. The SEA team views value captured by other New Englanders to be a positive externality that should be considered in this analysis, as Maine ratepayers similarly benefit from price suppression impacts attributable to the RPS policies in other New England states. If

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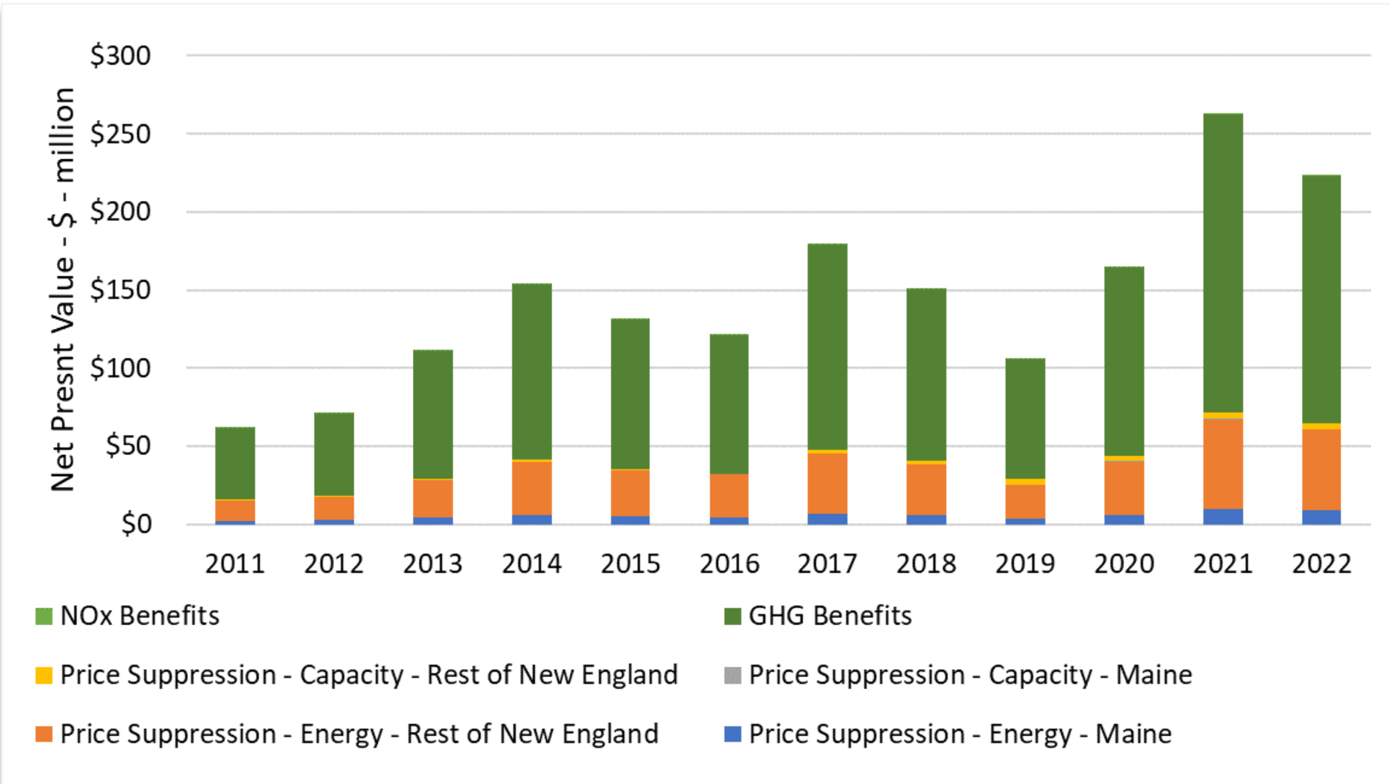
[28] Energy price suppression impacts also include suppression of natural gas prices, as a result of reduced use of natural gas for electricity production reducing natural gas prices.

[29] Synapse Energy Economics et al, *Avoided Energy Supply Components in New England: 2021 Report*, March 2021

[30] "Environmental and Emissions Reports", ISO-New England, https://www.iso-ne.com/system-planning/system-plans-studies/emissions

each state elected to not consider values that accrue out of state, the region would systematically undervalue real, financial benefits of RPS and other energy policies.

Figure 25: Emissions and Price Suppression Value of RPS, by Year



Also note that – applicable both here and to Section 4 – a significant amount of the renewable generation built in Maine since 2000 was driven by RPS policies in other New England states. The benefits derived from these new generating sources are in addition to the benefits quantified throughout this analysis.

4 Impacts of RPS on Maine's Economy

4.1 Background

This section analyses and summarizes the impact of Maine's RPS program on the statewide economy, measured in terms of jobs, income, business output, and GDP (Gross Domestic Product). While Maine hosts renewable generation used to satisfy RPS mandates in other states, the impacts of production from those facilities are not included in this analysis because they do not contribute to Maine RPS compliance. Each of these impact measures reflects a different perspective for viewing overall statewide economic activity, so while they are all of interest, their effects cannot be added together. In addition, it is important to remember that this is not intended to be a comprehensive benefit-cost analysis.

The box below shows the interpretation of these measures and how they are calculated for this study.

Measures of Dollar Impacts on the Maine Economy

- **Output (Sales Revenue)**: Revenue received from sales of goods + services by Maine businesses.
- **GDP**: the portion of output that is "value added" (i.e., money left after subtracting cost of inputs to production); this includes worker wages, owner profits, and taxes paid.
- **Worker Income:** portion of GDP paid to workers in the form of wages.

Economic impacts occur from Maine's RPS through four mechanisms:

- RPS encourages investment in Maine through its incentive to develop renewable power generators in the state. Spending on these facilities creates *direct* effects associated with on-site construction, operations, and maintenance of additional generation facilities.
- RPS supports broader spending and revenue generation flowing to other Maine industries. This occurs as Maine renewable generation also supports: (a) *indirect* effects -- purchases of parts, materials, and supporting services from Maine suppliers, (b) *induced* effects of additional workers' income spending going for consumer purchases in Maine, and (c) added state tax revenues.
- RPS affects energy prices and costs for Maine ratepayers in several countervailing ways, including the added cost of RECs and an offsetting effect on suppressing wholesale energy prices. The latter occurs insofar renewable generation tends to have lower marginal costs than fossil fuel plants (especially as wind and solar have no fuel cost).
- RPS supports "import substitution"—by increasing electric sales by Maine energy suppliers, the net effect is to keep more money *flowing to* Maine-based businesses that might otherwise *flow* to out-of-state suppliers. By supporting the growth of renewable power, it also reduces imports of fossil fuels that nearly all involve money flowing to out of state sources.

For completeness and context, the SEA team presents the findings on Maine RPS impact relative to the broader context of Maine's overall renewable energy supply and demand. This is important for two reasons:

(1) Maine's renewable energy industry is also supported by sources of demand beyond Maine RPS, and
(2) Maine RPS also supports development of out-of-state renewable resources.

4.2 Methodology

Data Assembly. First, the research team assembled government records to track the dollar value of renewable and non-renewable electric production, consumption, and sales in Maine, by year and type of generation technology. State records were also assembled to track sales patterns and historical trends for sales and purchases of Maine RECs, and the associated quantities of renewable power (by year and type). From this information, the research team derived a profile of the mix and quantity of renewable generation developed in Maine and the portion attributable to RPS over the period of RPS operation from 2008 onward.

Modeling Economic Demand and Output. Second, the research team applied the JEDI (Jobs and Economic Development Impact) model from the National Renewable Energy Lab (NREL) to calculate the broader economic effect of constructing and operating additional renewable energy facilities due to Maine's RPS program, in terms of jobs, income, GDP, and output. JEDI profiles the types of jobs, purchases and industries involved in direct construction and operation of alternative types of renewable power generating facilities. It also leverages the IMPLAN input-output economic model to calculate the broader indirect and induced effects on the Maine economy. For this study, the project team updated JEDI economic model factors to current levels and utilized a current Maine statewide IMPLAN model to portray effects on flows on income into, out of, and within the state of Maine.

Modeling Cost Savings. Third, the SEA team calculated the effect of RPS on wholesale energy price suppression. This calculation is described in Section 3. This leveraged data profiling energy consumption by economic sectors (specific industries, and classes of households, and governments) within Maine, to establish the distribution of cost savings effects for those sectors. Further analysis identified effects on disposable income and consumer re-spending. Those effects were validated by benchmarking with energy price impact studies elsewhere.

Context Interpretation. Finally, the research team assembled information to place the Maine RPS impact findings in a broader context that recognizes how it works alongside supporting programs in other states to enhance the renewable energy economy across New England.

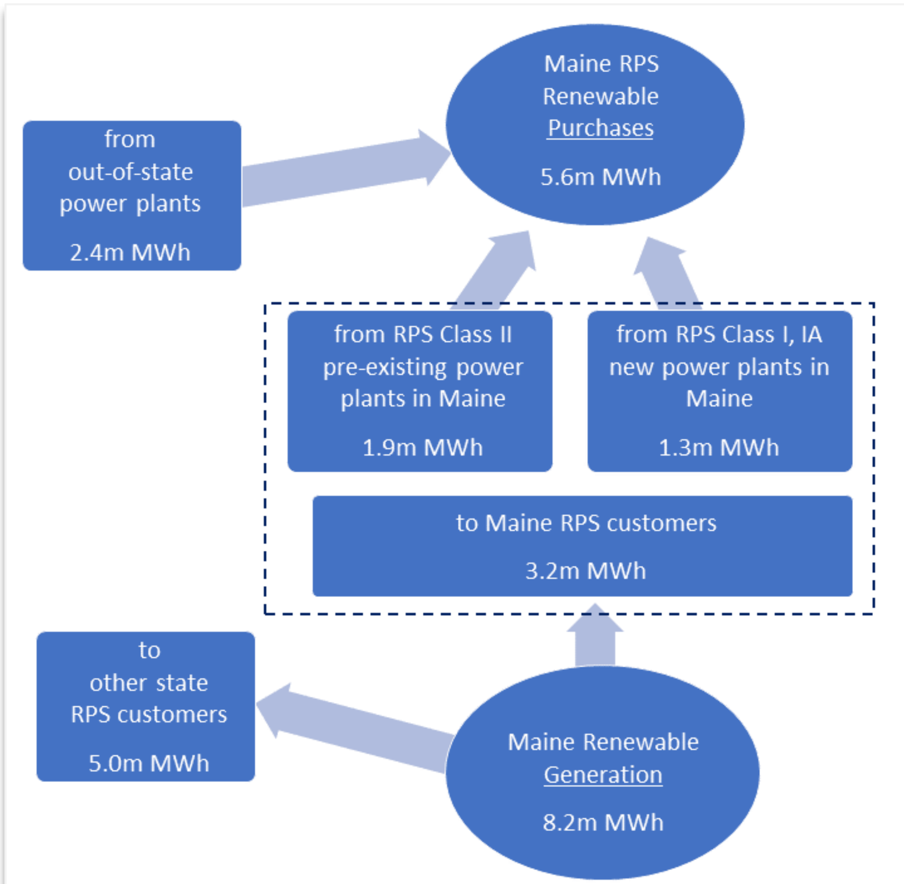
4.3 Interpretation of Economic Analysis

Role of State Boundaries

The economic impact analysis reported here focuses specifically on jobs, income, and business output occurring within the boundaries of the State of Maine. This is critical to note since RPS is an energy *purchasing policy*, all of the New England states have RPS policies that work in tandem, and electricity flows freely across state boundaries within the New England power grid. That means there are flows of renewable energy both into and out of Maine, as illustrated in Figure 26. The figure shows that 57% of the RECs used to satisfy Maine's RPS are supplied by generators located in Maine, while the remainder are purchased from generators located out of state. At the same time, 60% of the renewable energy generation occurring within Maine goes to buyers in other states to satisfy those other states' RPS requirements[31].

[31] While these purchases support Maine-based generation, the associated benefits are not included in this report because they are not attributable to Maine's RPS.

Figure 26: Illustration of RPS Role in Maine's Energy Production and Consumption Economy[32]



Amounts shown are millions of MWh purchased or produced, annually

Maine RPS Impact as a Portion of Total Renewable Impacts

This report focuses specifically on measuring how Maine's RPS supports jobs, income and business output taking place specifically within Maine's boundaries—the element of the energy economy that is within the dotted line area Figure 26. While this approach is factually correct, it is important to acknowledge two effects that are outside of that dotted line area—Maine's RPS also supports jobs associated with out-of-state generators (box A), while the RPS of other states also support jobs associated with Maine-based generators (box B). In fact, the chart shows that "B" is larger than "A", meaning that beyond the Maine RPS effect, Maine is also a net exporter of renewable energy to other states. At current wholesale prices, this net export (around 2.6MW/yr.) represents an economic inflow of roughly $140 million/year flowing into Maine's economy.

In Figure 26's dotted line area, a distinction is also made between "new" renewable electricity generation built in Maine after initiation of Maine's RPS (i.e., Class I and IA facilities) and "pre-existing" renewable generation built before Maine's RPS was initiated (i.e., Class II facilities). For this analysis, the SEA team attributes the benefits associated with the construction and continued operation of new facilities to the RPS even if they were also supported by procurement policies or other state programs. However, for facilities entering commercial operation before the RPS was enacted, this

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[32] Maine RPS Compliance Filings and Annual Reports; U.S. Energy Information Administration (EIA) Maine State Profile and Energy Estimates

analysis does not attribute construction benefits to the RPS. The benefits of continuing operation are, however, attributed to the RPS policy.

4.4 Economic Analysis of RPS Impact on Maine's Economy

4.4.1 RPS Impact of Added Power Plant Investment

Maine RPS encourages a flow of investment dollars into Maine to develop renewable power generators in the state. For this report, the SEA team counts only the portion of newly constructed renewable capacity that is supporting Maine RECs. The valuation of the associated money investment is then based on the number and size of associated new renewable capacity, and costs of construction and equipment acquisition over time. Table 3 shows:

- Column 1: the capacity of renewable power plants added in Maine since the start of RPS.
- Column 2: the part of that new capacity directly serving Maine RPS. The difference between columns 1 and 2 is additional power plant capacity in Maine that is driven by out-of-state demand (i.e., the RPS of other states).
- Column 3: the estimated level of direct investment $ involved in construction of the additional power generation shown in column 2, based on the average power plant size built in Maine and renewable generation cost profiles. For this report, the value of investment is presented in constant 2023 dollars even though the actual investments were made in earlier years.
- Column 4: the portion of direct investment flowing to the Maine economy. It is smaller than column 3 because it excludes cost of equipment purchased from out-of-state suppliers.

The capital investment levels shown here reflect dollars spent on construction of generation facilities including development, on-site construction labor, and cost of installed materials and equipment. Overall, wind and solar are the dominant categories of new renewable generation added in Maine, though biomass accounts for a larger share of Maine RECs. Since a large share of installed equipment for these technologies (e.g., turbines, photovoltaic panels, boilers, controls) is manufactured outside of Maine, the SEA team also showed the estimated portion going to Maine workers and businesses.

Table 3: Estimate of Cumulative Direct Investment in Maine Due to Maine's RPS

(includes Class I, IA New Facilities Attributable to Maine REC Certificates, sum of 2008-2022)

Resource Type, Total for All Years	Added Maine MW Capacity[33]		Estimate of Direct Investment Due to RPS[34]	
	Total	Maine RPS Share	Capital Expenditure	Portion in Maine economy
	(1)	(2)	(3)	(4)
Wind	1,032	41	$64 million	$14.1 million
Solar	224	20	$21 million	$7.4 million
Biomass	84	84	$143 million	$43.4 million
Hydro	30	5	$21.1 million	$13.3 million
Digester Gas	9	1	$0.5 million	$0.5 million
Total	**1,379**	**233**	**$114.1 million**	**$78.7 million**

[33] Data and analysis from SEA's proprietary project database for NE-REMO
[34] Data from NREL Jobs and Economic Development Impact (JEDI) Model, using factors from the Maine IMPLAN model

These capital investment numbers do not account for purchase of land, which economists generally treat as a transfer of money between parties. They also do not account for additional investment required for transmission infrastructure to connect those generators. Note that all of these costs are one-time investments that have been made over the RPS period.

To derive the broader indirect and induced impact of RPS-driven investment on the Maine economy, the SEA team used the JEDI model to determine the profile of inputs (jobs, equipment, materials, and services) required to build each type of power plant, along with the IMPLAN economic model for Maine that calculates the portion of each required input that comes from successive rounds of in-state suppliers, and further effects of added worker spending on consumer purchases. These results are shown in Table 4. While project construction is a one-time event, these events are spread over 15 years. Hence the total GDP impact of $86.8 million translates to an average of around $5.8 million per year.

Note that the direct investment numbers shown earlier in Table 3, column 4 are reflected in Table 4 as the impact of construction labor (row 1 output) plus a portion of supply chain purchases (row 2 output) that constitutes direct purchases of generator and installation equipment. Table 4 provides a more inclusive accounting of capital investment effects because it also includes subsequent rounds of supply chain purchases (i.e., suppliers of materials and services needed by first round equipment providers) plus the effect of workers re-spending their added income on purchases of more goods and services in Maine. Figure 27 illustrates the components of Maine job impact associated with new power plant investment.

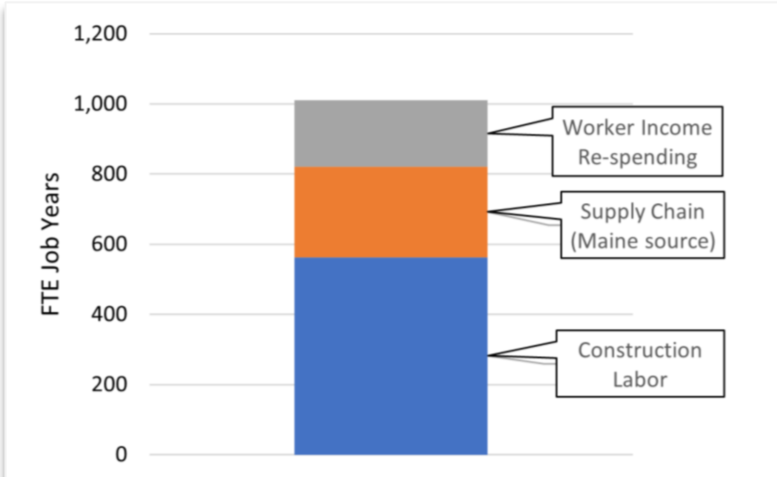
Table 4: Broader Economic Impact of Maine RPS Due to Power Plant Capital Investment, 2008-2022[35]

Cumulative Impact, All Years	Jobs (FTE,[36] job-years)	Worker Income ($m)	GDP ($m)	Output ($m)
On-site Labor	563	$46.3	$50.0	$60.0
Supply Chain	258	$12.9	$20.2	$39.7
Worker Income Re-spending	190	$ 9.6	$16.6	$28.8
Total Impact (2008-2022)	**1,001**	**$68.8**	**$86.8**	**$128.5**
Average Year (full period of investment)	*67*	*$5.7*	*$7.2*	*$10.7*

Values represent cumulative total over 2011-2022 period, full-time equivalent jobs, and millions of 2023$

[35] Data from NREL JEDI model
[36] Full-Time Equivalent

Figure 27: Maine Jobs Supported by RPS-Driven Capital Investment, 2008-2022



Values measured as Job-Years, FTE

4.4.2 RPS Impact of Added Operations and Revenue Generation

Maine RPS also supports the continued operation and maintenance (O&M) for renewable power resources in the state. While it takes fewer jobs and dollars to operate a renewable power plant than to build it, these O&M impacts recur annually.

The SEA team determined the RPS portion of power plant O&M impact in a very different way than was done for the investment impact. Here the SEA team considers that RPS supports a mix of renewable resources located in Maine that varies widely from year to year. For that reason, Maine RPS gets credit for supporting jobs and income to the extent that REC certificates support each particular type of generation in each specific year. This does not count the economic impact of Maine power plants that are supported by RECs from other states in some years. But it does recognize that Maine RPS supports the ongoing operation of power plants regardless of whether they were built before or after the start of Maine RPS. For that reason, the O&M impacts shown in Table 5a and b below reflect a wider base of power plants (and associated larger capacity) than the capital investment impacts that was shown earlier in Table 3.

Table 5 shows the base of renewable power activity within Maine that is counted as being attributable to Maine's RPS. It shows:

- The amount of renewable power (annual MWh) provided by Maine sources to Maine purchasers via Maine RECs (including Class I, IA, and II facilities).
- The share of power plant operations and maintenance $ spending in Maine that corresponds to Maine's RPS. This is calculated by applying average spending factors ($/MWh) for each type of generator facility, based on NREL's JEDI model. Further adjustment is made for the fact that costs of operations change over time. Results are shown in 2023 dollars.

Table 5a shows cumulative totals for the entire 2008-2022 period. While production in each category varied from year to year, the first five years had consistently lower levels as RPS energy production was ramping up. Accordingly, Table 5b presents annual averages for the most recent available ten years (2013-2022), which better reflects annual levels following the ramp up period. Note that since our accounting of O&M impacts includes RPS Class II (not built due to RPS but selling RPS certificates and hence operating with RPS support), the mix is dominated by biomass and hydro plants.

Table 5: Power Plant Operation + Maintenance Activity Directly Due to Maine's RPS[37]

Includes Class I, IA, and II, New and Pre-Existing Facilities Supporting Maine REC Certificates

(a) Cumulative Total, All Years (2008-2013)

Sum, All Years	**Energy Production** due to Maine RPS (MWh '000s)	**Operations + Maintenance Spending in Maine** ($ millions)
Wind	658.4	$7.9
Solar	56.8	$0.6
Biomass	15,524.5	$448.7
Hydro	25,540.0	$636.5
Digester Gas	5.6	$5.3
Municipal Waste	2,736.8	$77.3
Total – All Types	**44,522.2**	**$903.4**

(b) Average Year, Most Recent Decade (2013-2022)

Average Year, Last Decade	**Energy Production due to Maine RPS (MWh '000s)**	**Operations + Maintenance Spending in Maine** ($ millions)
Wind	52.0	$0.66
Solar	5.7	$0.07
Biomass	1,220.7	$36.81
Hydro	1,485.1	$21.18
Digester Gas	0.2	$2.87
Municipal Waste	200.0	$5.65
Total – All Types	**2,963.8**	**$67.24**

To view broader impacts on the Maine statewide economy from renewable power plant operation linked to Maine RPS, the SEA team again used NREL's JEDI model to determine the profile of inputs (labor, materials, parts, and services) required to operate and maintain each type of power plant, along with the Maine economic model that calculates the portion of each input that comes from in-state suppliers as well as impacts of worker income re-spending on purchases of consumer goods and services in Maine. The economic model results are shown in Table 6, in terms of cumulative total impacts on the Maine economy and the annual average for the most recent ten years.

[37] Energy production data from Maine RPS Compliance Annual Reports; O&M data from NREL JEDI model

Table 6: Broader Economic Impact of Maine RPS Due to Power Plant Operation + Maintenance (2023$)[38]

O&M Impact	Job-Years	Worker Income ($m)	GDP ($m)	Output ($m)
Cumulative Impact, 2008-2022	10,627	$1,020.9	$1,520.1	$2,390.8
Average Year, Most Recent Decade (2013-2022)				
On-site Labor	230	$46.6	$46.6	$46.6
Supply Chain	414	$30.9	$61.6	$115.1
Worker Income Re-spending	135	$12.5	$22.4	$39.9
Total Impact (Average Year)	779	$90.0	**$130.6**	**$201.7**

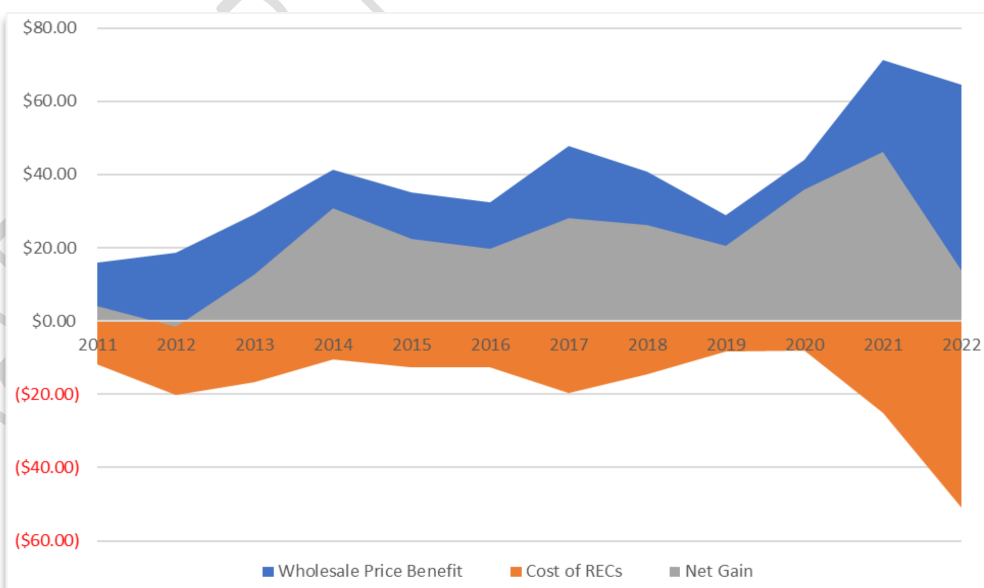
4.4.3 RPS Costs and Offsetting Price Effects

RPS injects both positive and negative effects on the cost of electricity in Maine:

- Cost of REC. The price of purchasing Maine RECs is a "market premium" adder to cost that is passed on to Maine energy users (ratepayers). It applies to all Maine RECs regardless of whether the energy supplier is within or out of state. This cost has grown over time as renewable supply has increased.
- Price Suppression Benefit. However, RPS also helps to suppress wholesale energy prices, which can save costs for Maine energy users. This effect occurs since most renewable resources have little or no fuel cost, so they can offer a lower marginal cost than fossil-fuel based generators, particularly at peak times. The expected end result is a retail price savings for Maine ratepayers.

Figure 28 illustrates the interaction of these two offsetting effects and shows how the net impact has been a net savings for Maine ratepayers.

Figure 28: Price Suppression Benefit, REC Cost and Net Gain



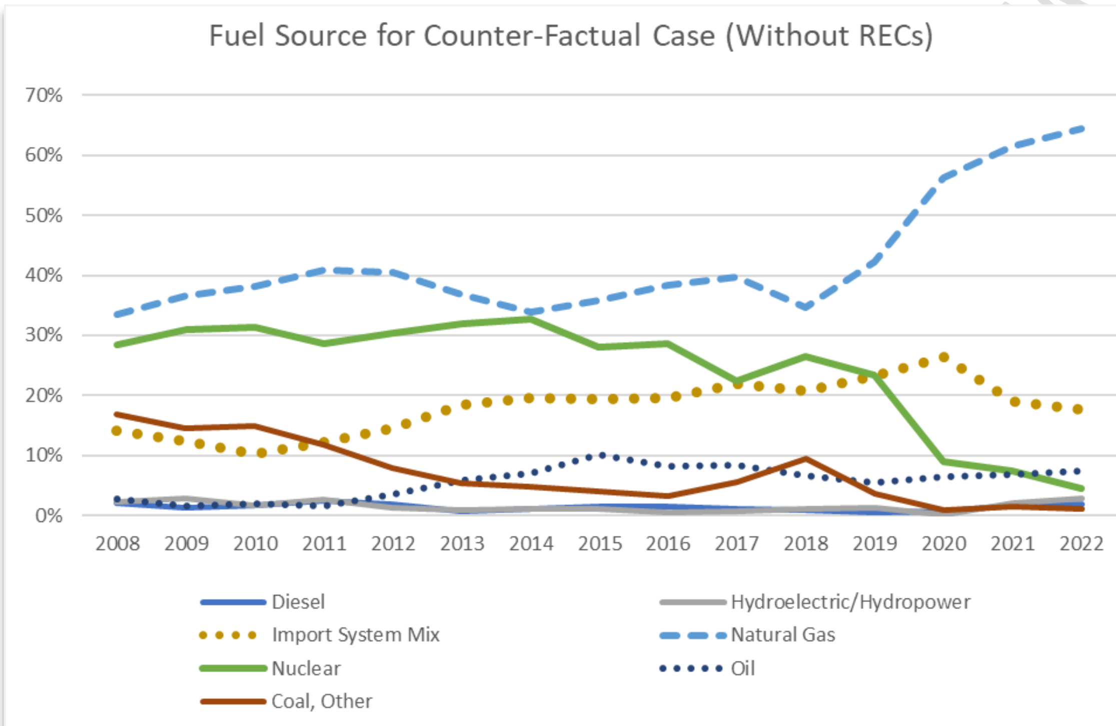
Note: data available only for period of 2011 forward

[38] Data from NREL JEDI model

4.4.4 RPS Impact from Import Substitution

To show how Maine RPS has facilitated the development of renewable energy resources in Maine, the project team developed a "counter-factual" scenario representing what would likely have been the mix of fuel sources if neither Maine nor surrounding states had implemented RPSs. The result is a reliance largely on natural gas, supplemented by some use of nuclear, oil, and a more general "import system mix." This alternative scenario is illustrated in Figure 29.

Figure 29: Scenario for Non-Renewable Fuel Source Mix Without RPS[39]



The interpretation is that, in lieu of the RPS renewable mix that has been satisfying Maine RPS demand, there would instead be a corresponding MWh level of additional electric generation in Maine that depends on purchases of natural gas, oil, diesel, and nuclear sources. Since none of those fuels originate from Maine sources, there would have been an outflow of money going out of the Maine economy to purchase those fuels. In contrast, neither wind, solar, biomass, nor hydropower require purchases of fuel from out of state. Economists refer to this outcome as "import substitution," which means that a reliance on in-state renewable resources has substituted for an outflow of money that would otherwise occur to pay for fossil fuels "imported" to Maine from out of state.

While the price of conventional fossil fuels has gone up and down over the past 12 years, average values can be applied to derive rough estimates of the "import substitution" benefit to the Maine economy resulting from reducing (avoiding) flows of money out of Maine to pay for fossil fuels. The results are shown in Table 7. The first column is based on the total MWh of Maine RECs supplied by generators located in Maine, including both new and pre-existing resources. The second column reflects the portion attributable just to new resources attributed to RPS. The second column numbers serve as a conservative estimate of the incremental impact of Maine RPS on the state's economy. It is evident from the table that, as

[39] NEPOOL GIS Public Reports, Residual Mix. https://nepoolgis.com/public-reports/

Maine's RPS has increased renewable energy purchases over time, the import substitution savings (from avoiding paying for imports of fossil fuels to the state) have also grown. Focusing on the most recent ten years, the import substitution effect has brought an annual average of $30 million of additional money into the state, which enables more purchases from in-state suppliers and spending by their workers. The direct effect of this import substitution is equivalent to an additional 178 ongoing jobs in Maine.

Table 7: Estimated Savings from Import Substitution (Reduction in Outflows to Purchase Fossil Fuels)[40]

Year	Avoided Fossil Fuel Purchases ($ millions, 2023$)	
	All REC Power Generation in Maine	New Maine REC Generators only
2008	44.7	0.7
2009	81.5	4.1
2010	60.0	4.5
2011	86.8	10.7
2012	93.5	15.9
2013	75.6	21.0
2014	81.7	24.2
2015	88.5	28.0
2016	61.7	22.2
2017	80.0	29.7
2018	65.2	27.5
2019	84.3	23.0
2020	85.8	31.5
2021	102.5	45.5
2022	108.5	44.1
Total All Years (2008-2022)	1,200.2	**332.6**
Average, Last Decade Only (2013-2022)	*83.4*	*30.0*

4.4.5 Overall Impact of RPS on Maine Economy

There are four categories of Maine RPS impacts on the Maine economy. They are explained below and detailed in Table 8.

1) Investment in constructing new renewable power plants, attributable to Maine RPS. This is the contribution to Maine's economy from construction of new power plants that would probably not have occurred without Maine RPS. The numbers are from Table 4, shown earlier. Note: since Maine RPS accounts for roughly 17% of all new renewable capacity built over 2011-2022 (per Table 3), the full economic impact of constructing all new renewable generation capacity in Maine is about 5.9 times greater than the numbers shown in this row.

2) Operations + maintenance spending for renewable power plants that is supported by Maine RPS. This covers costs for operating all new construction renewable plants (Class I, IA) as well as pre-existing power plants (Class II) located in Maine, to the extent that they also account for Maine RECs (ensuring use by Maine-based users). Thus, these effects cover a significantly wider base of power plants than was covered in row 1, and Maine RPS is given credit for "supporting" these plant's O&M activities. The numbers are from Table 6, shown earlier. Since Maine RPS accounts

[40] Analysis included substituting conventional fuel mix (from Table 7) with unit fuel costs from EIA Average Power Plant Operating Expenses for Major U.S. Investor-Owned Electric Utilities, 2012 through 2022

for roughly 39% of all Maine renewable generation, (per Figure 26), the full economic impact of operating all renewable generation capacity in Maine is about 2.5 times greater than the numbers shown here.

3) Net electricity price reduction, attributable to Maine RPS. This is the value of wholesale energy price suppression minus the cost of RECs. In terms of economic impact, this can be viewed as a reduction in both revenue and cost for Maine's RPS-obligated entities (which cancel each other out), but more importantly as a net addition to spendable income for Maine's energy consumers. For that reason, it can be viewed as a potential increase in the income component of GDP, so the analysis can also estimate the number of jobs likely to be created because of additional in-state spending of that money.

4) Import substitution gain, attributable to Maine RPS. This is the savings attributable to RPS by avoiding the need to purchase fossil fuels for conventional power plants. The numbers are based on Table 7, which is calculated by comparing the current situation to a "counter-factual" (non-RPS) scenario where Maine relies on conventional power generation instead of that required under Maine RPS. In the non-RPS scenario, there is an outflow of money from Maine to purchase fossil fuels from outside sources. The use of renewables under RPS eliminates (avoids) that outflow from the Maine economy.

There are two ways to view the Table 8 results.

- Maine Economic Activity Attributable to RECs. To identify the level of economic activity occurring in Maine that is a direct or indirect consequence of Maine RECs, add items 1,2 and 3.

- RPS vs. Non-RPS Scenarios. To identify the incremental benefit of RPS on growth of the state economy, compared to a counter-factual case of conventional electric generation, add item 4 (reduction in spending outflow) but omit item 2 (since conventional generators have O&M spending likely to be of the same general magnitude as the O&M spending of renewable generators).

Table 8: Summary of Maine RPS Impacts on the Maine Economy (2023$)

Impact of Maine RPS on the Maine Economy	GDP Impact ($ millions)		Job Impact (FTE job-years)	
	10-yr. Average*	Cumulative 2008-2022	10-yr Average*	Cumulative 2008-2022
(1) Capital Investment (Renewable Gen.)	$6	$87	67	1,001
(2) Operations + Maintenance Spending	$131	$1,520	779	10,627
(3) Net Electricity Price Reduction	$26	$254	153	1,511
(4) Import Substitution Gain	$30	$333	178	1,982
Total Maine Economic Activity Attributable RECs (1+2+3)	**$163**	**$1,861**	**999**	**13139**
Maine benefit from RPS, compared to Non-RPS Scenario (1+3+4)	**$62**	**$674**	**398**	**4,494**

**These numbers represent annual average during most recent decade (2013-2022), to show the larger annual impact that has applied following the initial five years of activity ramping up (2008-2012). Full data is not yet available for year 2023.*

5 Looking Ahead: Considering the Future of Maine's RPS

Renewable Portfolio Standards are an important renewable energy policy tool. They clearly convey policy objectives and establish a mechanism for accurate accounting. RPS policies also create incentives around investment and purchasing decisions, as well as a means to allocate the cost of renewable energy attributes to generation service customers. RPS policies have proven effective in sending price signals to market participants, and in providing revenue to support development of new, and continued operation of existing, RPS-eligible resources.

However, RPS policies alone have not been sufficient to enable financing and drive investment in new renewable generation. As observed in a recent report issued by the Connecticut Department of Energy & Environment Protection (DEEP), "*price volatility in the REC market means the RPS does not provide the revenue certainty needed for new renewable energy projects to obtain financing and come online. As a result, bringing new clean resources online has required separate long-term contracts between project developers and the EDCs—on top of the RPS—in order to provide the revenue certainty these resources require*."

Maine's RPS and procurement policies must be considered within the regional context. All six New England states have RPS and procurement policies. Regional RPS policies vary by percentage target, generator eligibility, and compliance flexibility mechanisms – including Alternative Compliance Payments (ACPs). For most of the study period, Maine's eligibility criteria allowed for a modest surplus in Class I and a major surplus in Class II, leading to lower REC (and thus RPS compliance) costs than other New England RPS markets. By the end of the study period (i.e., 2021 – 2022), however, the combined effect of higher regional RPS targets, the advent of Maine Class IA, and increasing challenges (and delays) associated with developing, financing, and constructing new resources, resulted in market equilibrium or modest shortages. For Maine Class I and IA, supply uniquely eligible in Maine was no longer able to fulfill the entire obligation. As a result, Maine's RPS-obligated entities began buying from the same pool of multi-state RPS-eligible resources as RPS-obligated entities in other states and REC prices for Maine Class I and IA eventually converged with other regional Class I markets. The SEA team refers to the last increment of RECs purchased from this multi-state-eligible pool as being "on the margin."

There is one more critically important dynamic related to regional REC pricing and the cost of RPS compliance – the ACP rate. If an RPS-obligated entity has not secured RECs sufficient to meet its requirement, it may make Alternative Compliance Payments equal to its MWh shortage. Each state sets its own ACP rate, by class. If the regional (marginal) REC price exceeds the ACP rate in any state, rational economics dictate that the RPS-obligated entities in that state will make ACPs (for that class) rather than purchase RECs. While technically a form of compliance, ACPs do not represent renewable energy settled on behalf of retail load, and thus the affected state will not have achieved its renewable energy target in any year for which ACPs are used for compliance. ACP rate-setting therefore represents a trade-off between ratepayer protection and achievement of policy targets when states are competing for supply. If regional supply is insufficient, states with the highest ACP rates will see RPS compliance via renewable energy (i.e., RECs). States with the lowest ACP rates will see compliance via ACPs.

Maine Class II provides a pertinent example. The Class II market experienced surplus conditions from 2000 to 2020. By 2021, however, greater regional emphasis on existing sources of supply (e.g., MA CES-E) and increases in voluntary renewable energy purchases by corporate and institutional entities seeking to satisfy environmental and social governance (ESG) objectives began to create demand tension for existing renewables. As a result, Maine Class II REC prices increased from $1/MWh to as high as $14/MWh before settling into the $8 - $10 range. Shortly thereafter the PUC established a Class II ACP rate of $5/MWh, which now serves as a price cap. Therefore, if the regional price for Class II RECs exceeds $5/MWh, Maine's RPS-obligated entities will begin making ACPs for Class II rather than comply with renewable energy certificates.

Analysis of Maine RPS compliance (whether retrospective or prospective) must always be conducted in the regional context. Supply adequacy should never be evaluated solely on capacity installed (or expected to be installed) in Maine. Targets, eligibility criteria, flexibility mechanisms, and regional supplies (including imports of energy and RECs from adjacent control areas) must be overlayed to produce actionable insights. Maine policymakers should take these dynamics into account when considering potential adjustments to RPS and procurement policies.

While the mandate for this report was to review the status and impacts of the RPS *to date*, it is also appropriate to look ahead and think about (a) the sources of supply likely to fulfill Maine's RPS in the future and (b) what policy options the legislature and PUC may wish to consider to promote RPS compliance as timely and cost-effective as possible.

5.1 Potential Sources of Supply for Future RPS Compliance

RPS compliance choices reside with CEPs but are influenced by market conditions and underlying state-sponsored renewable energy (i.e., inclusive of RECs) procurement policies. Market conditions impact sources of RPS compliance at the intersection of regional class-specific targets and eligibility criteria. As this report demonstrated in Section 3.1.3, Maine's Class I eligibility criteria resulted in a significant amount of supply that was only eligible for Maine Class I (i.e., it could not be used for RPS compliance in any other market). This resulted in surplus or equilibrium conditions and low to moderate REC price for most of the period between 2008 to 2020 (with variations in Maine Class I REC prices traceable to the timing of certification of refurbished facilities). The introduction of Class IA targets in 2020 (which increase through 2030) put Maine on a path of REC price convergence with the rest of the region. Looking ahead, supply uniquely eligible in Maine should <u>not</u> be expected to fulfill Maine RPS demand. Therefore, Maine CEPs will need to source RECs for RPS compliance from the regional pool of new resources that are eligible for all Class I markets and pricing for these RECs is expected to equilibrate across markets.

Maine can, of course, hedge its Class I / IA RPS compliance position through long-term procurements that include RECs. This is discussed in detail in Section 6. The resource types (e.g., offshore wind, onshore wind, solar, biomass, hydroelectric, etc.) selected through these procurements will influence Maine's RPS blend if the RECs are retained and retired on behalf of ratepayers. Actual REC quantities available for compliance are dependent on whether future procurements are authorized and conducted on their expected schedule, for anticipated quantities, from generation assets that ultimately achieve commercial operation, and result in the retirement of RECs. Other programs contribute to the development of new smaller scale, distributed renewable energy supply but are not the subject of this report.

Table 9: Potential Sources of Supply for Future RPS Compliance

Class I / IA	Class II	Thermal
Operating supply eligible only in Maine	Operating supply eligible only in Maine	
Operating supply eligible for multiple markets	Operating supply eligible for multiple markets	
Competitive procurement of new, large-scale renewables (w/ RECs)		
Net Energy Billing (RECs retained)		

5.2 Policy Considerations

Renewable Portfolio Standards have been active in New England for over 20 years, and the renewable energy sector has matured substantially during that time – from technology, development, financing, community, and policy perspectives. As a result, state policy makers have periodically modified RPS policies by accumulating and implementing lessons learned from their own – and others – experience. This section summarizes RPS policy topics where Maine may wish to consider enhancements or evolutions to support the continued successful implementation of its RPS.

Obligated Load and Exemptions

RPS demand is calculated, by class, as: (RPS Obligated Load – Exemptions) * Target. To achieve a 100% RPS or CES, all load must eventually be RPS-obligated and all exemptions eventually phased-out. Exemptions should be thought of as a transitional mechanism – they make RPS policy adoption easier in the early years and promote cost-effective compliance while RPS policies ramp up. As states transition to 100% targets, however, exemptions must eventually sunset.

In addition, policymakers must reconcile the role of behind-the-meter (BTM) generators. Today, these facilities reduce retail load (and thus the RPS obligation) while also generating RECs that can be used for RPS compliance in other jurisdictions. Addressing this issue appropriately and comprehensively requires regional coordination. Policymakers should consider adding BTM production quantities to RPS-obligated load. If this is done, all corresponding RECs created can be transacted across markets (as they are today) without impairing any individual state's ability to meet its targets.

Targets

Figure **3** summarized RPS targets across the New England states for 2035, but in most cases these are not the targets – or even classes – that were originally enacted. Since their respective inceptions, New England RPS statues and regulations have been updated as follows:

- Connecticut: Revised Class I and II eligibility; currently considering revision to Class I targets.
- Massachusetts: Revised Class I targets and eligibility; revised Class II target; created an Alternative Portfolio Standard (APS), Clean Peak Energy Standard (CPES), CES, CES-Existing (CES-E), and GHG Emissions Standard (GGES) (for municipal utilities).
- Rhode Island: Revised "New" (equivalent to Class I) target.
- Vermont: The legislature is currently (Spring 2024) discussing possible revisions to the RES, which may include adding a new regional Class I requirement and revising existing class targets and eligibility.

The table below summarizes topics that Maine policymakers may wish to consider relative to RPS targets:

Table 10: RPS Target Considerations, by Class

Class I / IA	Class II	Thermal
Option: Consider combining Class I and IA once all exemptions have sunset. **Drivers/Implications:** Supply uniquely eligible in Maine no longer fills the obligation. As Class IA targets continue to increase, Maine will always need to compete for "multi-state supply" and Class I / IA REC prices will remain converged with the rest of the region.	**Option**: Consider adjusting the Class II percentage requirement to keep targets neutral on a MWH-basis. **Drivers/Implications**: If load increases dramatically w/ electrification, a 30% Class II target could outpace available supply because, by definition, the 'existing' fleet cannot be expanded. This would result in a prescribed shortage and, if the ME Class II ACP was lower than other regional Class II ACPs (as it is now), ME would experience compliance via ACPs rather than RECs.	The Thermal market is young, and it is appropriate to allow additional time to determine whether the targets and ACPs are sufficient to incent market entry and new construction. To date, supply has not kept pace with demand, but this is typical in the early stages of this type of market.

Finally, the SEA team recommends that the cost of achieving long-term RPS targets (particularly where mandates reach 100%) should be considered in the context parallel advances in other sectors. While it cannot be answered in this report, the question to ask is whether the incremental cost of achieving higher RPS penetration is greater than or less than the cost of decarbonizing the next increment in the heating or transportation sectors.

Eligibility

The key consideration here is whether Maine's 100% target will be an RPS or a CES? Will production from hydroelectric facilities >100 MW and/or nuclear become eligible? If yes, will their maximum contribution be limited to the increment above the current RPS (i.e., 20%)?

These questions cannot be answered in a vacuum. Any recommendations must be tied to what the subject state is trying to accomplish. Ultimately, state policymakers must decide how to balance support for specific resources types, greenhouse gas objectives, and deployment of new construction versus existing installations.

Massachusetts provides a helpful example. MA has adopted a CES and contracted for 9.45 TWh of large hydroelectric supply from Eastern Canada. MA has also adopted a CES-E (Existing) which allows all existing hydroelectric >30 MW and up to 5 million MWh of nuclear certificates per year (specifically, 2.5 million from each of Seabrook and Millstone). Through the CES and CES-E, MA has elected to create a role for resources outside of its RPS to help accomplish greenhouse gas objectives.

Additional eligibility-related considerations are included Table 11.

Table 11: Eligibility Considerations, by Class

Class I / IA	Class II	Thermal
Is refurbishment part of the long-term solution? If yes, should portion of percentage target shift from Class II to I? How align w/ GHG objectives? How right-size compensation to existing generators?	Review for alignment with GHG objectives. Require PUC certification, as consumer protection mechanism as compliance costs increase?	
Are dispatchable non-emitting resources considered sufficiently in eligibility definition?		

Alternative Compliance Mechanisms and Payment Rates

The alternative compliance mechanism is well conceived as a flexibility and ratepayer protection measure. This report focuses on considerations related to the ACP rate. Now that regional Class I (and IA) markets are seeing REC price convergence – because they are all drawing from the same pool of supply to meet ever-increasing targets – it is reasonable to recommend Class I ACP alignment across all New England states. This would prevent interstate arbitrage, which is currently resulting in ACPs in states with lower ACP rates and redirecting RECs toward states with higher ACP rates. This undermines the progress towards policy objectives for the states with lower ACP rates.

For Class I / IA markets, the ACP rate itself should consider the expected cost of producing energy and RECs from new renewable energy facilities. If market-based energy and REC prices do not sum to a new facility's revenue requirement, it will be unable to secure financing and complete construction. An ACP rate set well beyond the cost of new entry could increase ratepayer cost, although market competition is likely to mitigate that risk – especially where competitive procurements are deployed in a consistent and predictable manner.

For regional Class II markets, the key questions are: how much cost should ratepayers bear to maintain the existing fleet, and how much REC revenue to existing facilities need to continue operation? These questions should be considered in the context of alternatives – that is, if existing facilities either cease operation or sell RECs towards other states RPS compliance, how would this impact Maine's RPS compliance cost. If Class II resources were not available to fulfill the 30% target, then the gap would need to be filled with Class I and IA resources – presumably at higher cost. So, while it is difficult to determine exactly how much each existing facility needs in REC revenue to continue operation, there is a reasonable argument that replacing Class II resources with Class I or IA resources is likely to add cost (at least in the near-term). For these reasons, alignment with regional Class II markets may be required to achieve policy objectives at least cost – even if that cost is higher than Maine has experienced in the past. States' focus on 100% CES policies has increased the demand for existing resources. Voluntary REC purchases by corporate and institutional buyers with Environmental and Social Governance (ESG) mandates is also increasing demand. As a result, the market dynamics that led to the $1 REC prices that Maine (and other states) experienced for many years have definitively shifted, and the past is no longer a reasonable benchmark for setting future expectations. States that do not adapt their ACP rates to changing market conditions are likely to see an increase in compliance via payments rather than renewable energy supply – thereby falling short of their renewable energy and greenhouse gas objectives.

6 Role of Large-Scale Renewable Energy Procurements in Achieving Maine's Renewable Energy Policy Objectives

RPS policies are an important renewable energy policy tool. They establish a mechanism for accurate accounting that generally forecloses the risk of double claim or double counting inherent in an electric system that transacts fungible electrons that move where they will according to the laws of physics, through financial transactions. RPS policies also provide incentives for action, and a means to allocate the costs of renewable energy attributes to generation service customers. RPS policies have proven effective in sending price signals to market participants, and in providing revenue to support development of, investment in, and/or continued operation of eligible resources. However, RPS policies alone have not proven effective at driving investment in capital-intensive new generation. As observed in a recent report[41] issued by the Connecticut Department of Energy & Environment Protection (DEEP), "price volatility in the REC market means the RPS does not provide the revenue certainty needed for new renewable energy projects to obtain financing and come online. As a result, bringing new clean resources online has required separate long-term contracts between project developers and the EDCs—on top of the RPS—in order to provide the revenue certainty these resources require." The same Connecticut DEEP report notes that RPS policies match supply and demand on an annual basis. Further, RPS (when multipliers are not used to differentiate allocation of RECs in different proportion than to energy production) are generally technology neutral and (within the bounds of their geographical and delivery requirements) location- neutral. As a result of these limitations, legislators and policymakers in competitive market states have frequently elected to complement RPS policies with procurement co-policies designed to accomplish what RPS alone cannot: support financing of incremental investment, steer location or technology decisions, and consider desirable production characteristics.

Since the outset of state electric utility restructuring, many competitive market states in the U.S. have established both RPS policies and long-term procurement and contracting policies, in order to expand and/or maintain resource diversity in a market environment. Several competitive market states, particularly those in the Northeast, have extensive experience with such renewable energy long-term contract procurements. In addition, many other states with vertically integrated monopoly structures have extensive experience with renewable energy solicitations, and countries around the globe have accumulated an extensive body of experience with renewable energy contract procurement via solicitations, tenders or auctions.

In competitive electricity markets, long-term renewable energy contracting policies often serves as co-policies accompanying RPS policies, for a variety of purposes that may include some or all of:

- Creating revenue certainty and attracting investment in renewable energy generation projects that might not otherwise come to fruition as a result of RPS alone;
- Reducing ratepayer costs by reducing financing costs, securing production below forecasted cost of marginal alternative resource, or driving scale economies;
- Securing the right to claim renewable energy by securing generation attributes, typically represented by purchase of RECs among other generation products;
- Hedging generation service wholesale energy costs and RPS compliance costs to reduce retail electricity rate volatility;
- Encouraging developers to locate projects or select specific technologies or otherwise provide characteristics deemed to provide sought-after benefits to the soliciting state's ratepayers or broader economy.

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[41] Connecticut Department of Energy & Environment Protection, Draft Report on Select Connecticut Energy Supply Issues (Feb. 20, 2024), https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:c9f1d5ea-77a8-4f4d-b378-13105078a886

Maine has accumulated experience across several statutory large-scale renewable energy programs since 2008. With the establishment of ambitious renewable energy and greenhouse gas emission reduction requirements, more such procurement events are on the horizon.

This Section first presents a summary of Maine's past post-restructuring large-scale renewables programs (Section 6.1), followed by a summary and analysis of results of procurements to date (Section 6.2). Section 6.3 includes a summary of the forward-looking large-scale renewables procurement objectives and the future procurement events currently in the works. Finally, Section 6.4 presents a set of considerations for future Maine procurements to best achieve policy objectives and discuss the potential need to consider additional procurements to support continued operation of existing legacy renewable energy supply.

6.1 Summary of Past Procurement Programs and Policies

The Commission has over 15 years of experience with soliciting proposals for (and selecting for contracting by Maine's investor-owned utilities long-term contracts from) large-scale renewable energy generation plants. For purposes of this report, the analysis focuses on large-scale commercial renewable energy procurements, and does not discuss legacy supply purchased pursuant to Public Utility Regulatory Policy Act (PURPA) purchase obligations predating the competitive era.[42]

The focus of this report is therefore on five procurement programs for which Request for Proposals (RFPs) have been issued and bids have been submitted. A review of these procurement events and their results provide a basis for assessing Maine's experience, what has worked and what could be improved on in future procurement exercises. These programs include:

- Section 3210-C Procurements
- Community-Based Renewable Energy Pilot Program (CBRE)
- Section 3210-G Procurements
- Section 3210-I Northern Maine Generation & Transmission RFP
- Wood-fired Combined Heat and Power Program

Each of these programs has differences in timing, focus, eligible supply, quantity targets, objectives and priorities, evaluation criteria, and contractual terms and conditions. One commonality is that they are all focused on stimulating generation located in the state of Maine either through eligibility criteria or evaluation weighting of in-state benefits. However, some focus on different *products* (energy, capacity, RECs), vintages (new versus existing generation); technologies; or locations within the state of Maine. Successive procurements evolved as a result of statutory directive, evolving priorities, and implementing lessons learned. Below, the SEA team summarizes key features of each program and their procurement cycles.

[42] In 2019, Governor Mills signed http://legislature.maine.gov/LawMakerWeb/summary.asp?paper=SP0565&SessionID=13 into law as Chapter 478 of 2019, which required the PUC to procure 125 MW of commercial and industrial distributed generation and 250 MW of "large-scale shared distributed generation" by July 1, 2024. The first procurement round was conducted through Docket 2020-00014, and in an August 28, 2020 Order, the PUC determined that the procurement did not meet competitiveness standards, resulting in no contracts awarded. In 2021, LD 936 - An Act to Amend State Laws relating to Net Energy Billing and the Procurement of Distributed Generation was enacted into law (without the Governor's signature) as Chapter 390, which prohibited the PUC from conducting any more distributed generation procurements.

6.1.1 Section 3210-C Procurements

Program Overview:

This program was authorized by the Legislature in 2006[43] (Act to Enhance Maine's Energy Independence and Security, P.L. 2005, ch. 677 (Act). Part C of the Act (codified at 35-A M.R.S. § 3210-C) to allow the PUC to direct transmission and distribution utilities to enter into long-term contracts for the ***capacity and/or associated energy*** from *capacity resources*. The Commission adopted rules to implement it as Chapter 316. The primary goal of the program is to lower and stabilize electricity rates for customers by securing contracts that are below expected market value or that reduce price volatility[44]. Other key features include:

- Evaluation objectives: A primary goal of the statutory authority was to seek contracts that would result in lower and more stable electricity rates, hence the Commission sought the lowest price offers, subject to choosing capacity resource proposals according to a stated priority list[45] (35-A M.R.S. § 3210-C(4) described further below. In addition, the Commission could authorize a contract for capacity if deemed a least-cost means to address a local grid reliability need; is necessary for the resource to be developed; will significantly lower regional capacity costs; and the contract prices are significantly below expected market value.
- Evaluation criteria focused on leveraging purchases at significant discounts off of expected market prices.
- Targets This program had no specific quantity targets. Rather, the awards were intended to be opportunistic.
- Procurement Frequency: The procurement schedule was subject to Commission discretion, subject to a statutory requirement[46] that the Commission solicit no less often than every 3 years if it determined that the likely benefits to ratepayers from any contracts exceed the likely costs. 35-A M.R.S. § 3210-C (6).
- **Allowed Contract Duration:** Section 3210-C also specified that the long-term contracts should be no more than ten years, *unless* the Commission finds a longer term to be prudent.
- **Contract structure:** The default contract structure was for physical delivery; however, Section 3210-C also allows the Commission to approve "contracts for differences", provided that it may not do so to buffer ratepayers from negative impacts from transmission development.

The program changed somewhat over time, resulting in evolving objectives, eligibility criteria, evaluation methods, products sought, and contractual terms and conditions for different procurement cycles. Of note, in 2010 the Legislature enacted an Act to Enhance Maine's Clean Energy Opportunities[47] (Clean Energy Opportunity Act). P.L. 2010, Ch. 518. Section 3 of the Clean Energy Opportunity Act (codified at 35-A M.R.S.A. § 3210-C(3)(C)) authorized the Commission to also direct transmission and distribution (T&D) utilities to enter long-term contracts for available RECs associated with capacity resources[48], if the cost of the RECs is below market value or the purchase of the RECs adds value to the transaction.

Procurements Overview:

This set of 6 procurement events spanning 2008, 2010, 2012, 2014, 2015, 2018 were executed under Section 3210-C. The solicitations did not occur on a pre-determined schedule; but rather when circumstances indicated that cost-beneficial

[43] 35-A M.R.S. § 3210-C (2023), https://www.mainelegislature.org/legis/bills/bills_123rd/billpdfs/HP078601.pdf
[44] *Maine T&D's*, Inquiry Findings and Conclusions – Inquiry into the Goals and Objectives for Long-Term Contracting Pursuant to 35-A M.R.S. Section 3210-C, No. 2015-00058 Order (Me. P.U.C. Feb. 1, 2018), https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId={358B92E9-4AED-4A51-B779-A37E1F3C2EC3}&DocExt=pdf&DocName={358B92E9-4AED-4A51-B779-A37E1F3C2EC3}.pdf
[45] 35-A M.R.S. § 3210-C (4) (2023), https://www.mainelegislature.org/legis/statutes/35-a/title35-Asec3210-C.html
[46] 35-A M.R.S. § 3210-C (6) (2005), https://www.mainelegislature.org/legis/statutes/35-a/title35-Asec3210-C.html
[47] 35-A M.R.S.A. § 3210-C(3)(C) (2019), https://www.mainelegislature.org/legis/statutes/35-a/title35-Asec3210-C.html
[48] *Public Utilities Commission*, Order Directing Utility to Enter into Long-Term Contract, No. 2010-66 Order (Me. P.U.C. Jan. 3, 2011), https://www.maine.gov/mpuc/electricity/rfps/longterm1012/docs/Verso%20order.doc

proposals may be available. As noted above, evolving statutory directives and Commission practices between RFP cycles led to somewhat different objectives between some of these procurement events. Key features of the procurements included:

- **Eligibility / Technologies Sought**: All but one RFP sought proposals from new and existing resources, both renewable and non-renewable supply side resources and demand-side resources. The RFP in 2014 sought proposals only from renewable energy resources, defined as fuel cells; tidal; solar; wind; geothermal; biomass (including landfill gas, but not including municipal solid waste); or hydroelectric.
- **Vintages sought**: The 2014 RFP allowed only resources with In-Service Date (ISD) after January 1, 2014. All other procurements sought both existing and new resources, with new defined as capacity with an ISD after 9/1/2005.
- **Products sought**: In 2008, the Commission sought only energy and capacity proposals. From 2010 and thereafter, a statutory change allowed the Commission to authorize long-term contracts that included RECs, provided that the cost of the RECs is below market value or the purchase of the RECs adds value to the transaction.
- **Quantitative targets**: No minimum, target or maximum quantitative targets were specified in any RFP.
- **Contract term**: The Commission had automatic authority to approve contracts up to ten years in duration and could approve longer contracts if determined that such a contract is prudent and in the best interest of Maine consumers.
- **Preferences**: No preferences among eligible resources were expressed. The 2018 RFP[49] expressed a preference for proposals with terms of ten years or less, due to the Commission's desire to avoid the risk to ratepayers of increased costs from contracts, which it concluded "inherently increases with the length of the contract term". The 2018 was stimulated by a petition to the Commission to issue an RFP under Section 3210-C for a 5-year contract tailored to address issues associated with Northern Maine; however, the Commission declined to pursue a targeted solicitation solely to promote generation development in specific areas of the State to reduce locational marginal prices, capacity costs or to avoid transmission and distribution costs, instead relying on its basic approach of seeking proposals with little or no restrictions on the type of qualifying project[50].
- **Stated procurement objectives**: The main objective of all solicitations was to acquire capacity and energy to reduce electricity costs for Maine consumers and/or to obtain a beneficial hedge against price volatility.
- **Key evaluation criteria**: The following attributes were weighed in proposal evaluation with the following statutory Resource Priority Order:
    1. new interruptible, demand response or energy efficiency capacity resources located in Maine;
    2. new renewable capacity resources located in Maine;
    3. new capacity resources with no net emission of greenhouse gases;
    4. new nonrenewable capacity resources located in Maine, with preference given to resources with no net emission of greenhouse gases;
    5. capacity resources that enhance the reliability of the Maine's electric grid, with preference given to resources with no net emission of greenhouse gases;
    6. other capacity resources.
- **Key terms and conditions**:
    - **Proposal Security Deposit**: In general, Proposal Security Deposits will (1) be refunded if a proposal is not selected or (2) be replaced with the Project and Performance Security if a proposal is selected.
        - .2008 Proposal Security:
            - Generation projects <= 5.0 MW --- $ 5/kW; $25,000 Maximum
            - Generation projects > 5.0 MW --- $ 5/kW; $100,000 Maximum
            - Demand response projects --- $ 5/kW; $100,000 Maximum
            - Other demand-side resources and efficiency --- $ 5/kW; $100,000 Maximum
        - 2010, 2012, 2014, 2015 Proposal Security: The Proposal Security Deposit required is $5 per kW of capacity proposed, with a cap of $100,000.

[49] *Versant Power & Central Maine Power Company*, Order Approving Requests for Proposals, No. 2018-00137 Order (Me. P.U.C. July 24, 2018), https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId={683C5EDE-C6D3-43E6-B3EA-FCC5081B3904}&DocExt=pdf&DocName={683C5EDE-C6D3-43E6-B3EA-FCC5081B3904}.pdf

[50] Ibid.

    - 2018 Proposal Security: None
  - **Project and Performance Security:**
    - 2008: $5 per kW of capacity per year and $10 per MWh of energy per year
    - 2010, 2012, 2014, 2015, and 2018: Determined on a project-by-project basis by the Commission following submission.
  - **Development Milestones and Milestone Flexibility**: No developmental milestone requirements were included in the RFP or standard contract, and hence no flexibility mechanisms to extend such milestones were present. Of note, in the 2018 awarded contracts, different terms for each were negotiated with awardees.[51]
  - **Congestion-related terms and conditions**: None
  - Other provisions of note: The last three RFPs sought hourly generation profiles from bidders, indicating potentially detailed consideration of production profiles in the evaluation process.
- **Other provisions of note**: The 2014, 2015 and 2018 RFPs sought hourly generation profiles from bidders, indicating detailed consideration of production profiles in the evaluation process.

6.1.2 Community-Based Renewable Energy Pilot Program

Program Overview: In 2009, the Legislature enacted An Act To Establish the Community-based Renewable Energy Pilot Program (Act)[52], which established a pilot program, administered by the Commission, to provide incentives for the development of CBRE projects, defined as projects that were “locally owned electricity generating facilities” (51% or more of the facility must be owned by “qualifying local owners”) and not exceeding 10 MW. The Act offered two options for qualifying CBRE projects, either seek a long-term contract for the output of the facility, or alternatively, receive the equivalent of a 150% REC multiplier[53]). Only the long-term contract procurement option and its results are described here. The Act required the Commission to conduct competitive RFPs to select certified CBRE projects that sought to enter into a long-term power purchase agreement (PPA). In contrast to Section 3210-C, the CBRE program envisioned and allowed approval of projects with “above-market costs”, which were to be recovered through the utilities’ stranded cost proceedings[54].

In 2015, the Legislature amended the Act[55], most notably requiring the Commission to conduct a viability assessment to determine if previously certified projects were likely to reach commercial operations by December 31, 2018. If the Commission deemed contracted projects not viable, the Commission would revoke the PPAs (although projects could remain CBRE-certified, thus eligible for the REC multiplier if they were to advance.

Procurements: The Program consisted of three separate procurements, issuing RFPs in 2011, 2013, and 2015. The RFPs issued in 2011 and 2013 were largely similar, with some differences appearing in the 2015 RFP, as detailed below.

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[51] In the contract with Weaver Wind, a “Commercial Operation Obligation Date” was established; failure to meet this date would be an event of default, unless the Seller elected to extend this date by 6 months by posting an Additional Security Amount of $30/kW. In addition, a number of specific interim development milestone dates were included (relating to receipt of permits, execution of interconnection agreement, closing of project financing, and notice to proceed with construction) which could be extended by up to 6 months through posting Milestone Security of $15/kW. In the contract with Three Rivers Solar, slightly different developmental milestones were included (relating to permit application submission and receipt, interconnection application submission and agreement execution). Rather than establishing explicit flexibility mechanisms, the Seller was allowed to make a showing that the delay was caused by an ‘Excusable Delay’, which if approved by the Commission would trigger a 90-day milestone extension.

[52] P.L. 2009, ch. 329, An Act To Establish the Community-based Renewable Energy Pilot Program, https://mainelegislature.org/legis/bills/bills_124th/chapters/PUBLIC329.asp

[53] e.g., 1.5 RECs per MWh generated

[54] Maine Public Utilities Commission, Report on the Community-Based Renewable Energy Pilot Program, January 15, 2021

[55] P.L. 2015, ch. 232, An Act To Amend the Community-based Renewable Energy Program, https://legislature.maine.gov/legis/bills/bills_127th/chapters/PUBLIC232.asp

- **Eligibility**: Generation facilities had to be Commission-certified as CBREs with an installed generating capacity between 1 and 10 MW. Eligible technologies were renewable resources, including includes fuel cells; tidal power; solar, wind and geothermal installations; hydroelectric generators; generators fueled by landfill gas; and biomass generators whose fuel includes anaerobic digestion of agricultural products, byproducts or wastes. There was no stated preference among these technologies.
- **Vintages sought**: Projects had to be new, with an ISD after September 1, 2009.
- **Products sought**: The 2011 and 2013 solicitations sought energy, capacity or RECs, while the 2015 solicitation sought energy only.
- **Quantity targets**: A maximum of 50 MW of PPAs were available under CBRE. Under each RFP, the Commission could select one, multiple, or no projects. The 2015 procurement occurred after the Commission conducted a viability assessment on certified projects, and determined there 21 MW of capacity was available for the 2015 solicitation
- **Term**: up to 20 years
- **Location**: in Maine
- **Stated procurement objectives and key evaluation criteria**: The procurements' objectives were to support the State's policy to encourage the sustainable development of CBRE projects in Maine through the award of long-term power PPAs. Proposals were required to provide proposed pricing terms for indicative prices not to exceed 10¢/kWh; full project cost disclosure; expected revenue sources in addition to the long-term PPA, and a Commission order certifying it as a CBRE project or petition for certification. The Commission was authorized to negotiate contracts that were 'commercially reasonable and that commit all parties to commercially reasonable behavior'. Commission selection criteria authorized selection program participants that are competitive and the lowest priced when compared to other available bids of the same or similar contract duration or terms.
- **Key terms and conditions**:
  - **Milestones**: The PPAs under the CBRE program required that the Agreement terminate in the event that the In-Service Date has not occurred on or before three (3) years from the date of the PPA. However, the PPAs contained no interim development milestones, leaving no means for the Commission to terminate a non-performing project and replace it until the ISD milestone was not met. As noted above, the Legislature amended the Act in 2015 to require a viability assessment and authorize the Commission to terminate and seek replacements for projects not deemed to be viable.
  - **Bid or contract security**: None
  - **Congestion-related terms and conditions**: None

6.1.3 Section 3210-G Procurement (Tranches 1 and 2)

Program Overview: In 2019, the Legislature passed an *Act To Reform Maine's Renewable Portfolio Standard*[56], which directed the Commission to seek proposals from qualifying Class IA renewable generation resources for the sale of energy or RECs through two competitive procurements to meet a target of 14% of 2018 retail electricity sales in the State, or 1.715 Million MWh.

Procurements Overview: The Commission issued two RFPs seeking energy or RECs from RPS Class IA resources through two rounds, the first resulting from a 'Tranche 1' RFP[57] issued in 2020, and the second through a 'Tranche 2' RFP[58] issued in 2021. Key details of the procurements included:

- Eligibility: Generation facilities must be a Maine RPS Class IA resource. Energy storage facilities were also allowed if the energy provided by a storage facility was generated by an RPS Class IA facility, and the storage system is

[56] P.L. 2019, ch. 477, An Act To Reform Maine's Renewable Portfolio Standard, https://legislature.maine.gov/legis/bills/bills_129th/chapters/PUBLIC477.asp

[57] "2020 Request for Proposals for the Sale of Energy or Renewable Energy Credits from Qualifying Renewable Resources," Maine.gov, September 22, 2020, https://www.maine.gov/mpuc/electricity/rfps/class1a2020/

[58] "2021 Request for Proposals for the Sale of Energy or Renewable Energy Credits from Qualifying Renewable Resources," Maine.gov, June 29, 2021, https://www.maine.gov/mpuc/electricity/rfps/class1a2021/

collocated with a qualifying resource, or if not, would reduce greenhouse gas emissions. A bid including an energy storage system had to include separate proposals with and without energy storage. There was no limit on project size.

- Location: Neither the enabling statute nor the RFP specifically required that proposing projects be located in Maine. However, an evaluation weight of 30% was given to benefits to the Maine economy, and In-State Benefits categories suggest that an out-of-state project would fare poorly in evaluation.
- Vintages sought: New Resources that began commercial operations after June 30, 2019 had to meet 75% of quantity targets, while (to the extent available) 25% of the targets had to be generated from Class IA resources with earlier In-Service Dates.
- Products sought: Both RFPs sought energy and RECs, and while not specifically seeking capacity, bidders were also allowed to include capacity in their proposals. RFPs expressed a preference for energy-only bids.
- Quantity targets: Of the 14% of sales overall target, the Tranche 1 procurement by statute sought between 7% and 10% of load, while the Commission was required to seek the remainder not acquired in Tranche 1 through the Tranche 2 procurement.
- Term: The RFPs requested a contract term of 20 years, but allowed bidder to request a longer term which the Commission was authorized to approve if it found a longer term prudent.
- Stated procurement objectives and key evaluation criteria: The enabling state established State goals for increasing consumption of electricity in the State that comes from renewable resources to reach 80% of retail electricity sales by January 1, 2030 and 100% of retail electricity sales from renewable resources by January 1, 2050. In furtherance of meeting those goals, the Act established the 3210-G procurement program to stimulate investment in Class IA resources or achieve ratepayer benefits from Class IA resources, and required reporting to the Legislature on resultant “benefits and costs of the contracts to the State's economy, environmental quality or electricity consumers”. Procurement evaluation criteria were weighted 70% on benefits to Maine ratepayers, and 30% on benefits to the Maine economy including capital investments by the Class IA resource to improve long-term viability of an existing facility; payments by the Class IA resource for the harvest of wood fuel; employment resulting from the Class IA resource; payments by the Class IA resource to a host community, whether or not required by law or rule; excise, income, property and sales taxes paid by the Class IA resource; purchases of goods and services by the Class IA resource; and avoided emissions resulting from the operation of the Class IA resource.
- Other provisions of note: The RFP sought hourly generation profiles from bidders, indicating potentially detailed consideration of production profiles in the evaluation process.

- Key terms and conditions
  - **Milestones**: No interim development milestones were included in the standard contract; A COD was specified in the standard contract without clear terms or conditions providing for what would happen in the event such a date was missed. *Note that several projects have requested and been granted extensions on COD milestones.*
  - **Bid Security**: The RFPs contained no bid security requirement.
  - **Performance Security**: In the Tranche 1 RFP, the amount of performance security to be posted by an awardee would be determined on Aa project-specific basis based on the Commission’s assessment of the contract prices and payments, the expected benefits to the Maine economy and other risks and benefits of the contract. In the Tranche 2, the amount of Performance Security was set at $40/kW of nameplate capacity. This amount would be reduced over time in the absence of Events of Default, to $30/kW on the 5th anniversary of COD, $20/kW on the 10th anniversary of the COD and to $10/kW on the 15th anniversary of the COD. Performance security was designed to secure (in addition to other conventional damages) a Contract Payment Adjustment. This adjustment could be applied by the Commission to reduce contract payments in the event of cumulative shortfalls versus claimed benefits used in the evaluation.[59]
  - **Congestion-related terms and conditions**: None

[59] “The actual performance of the resource against the claimed benefits will be calculated on a cumulative basis following each year of the contract term. If, in its annual review of benefits provided, the Commission finds the claimed benefits are not being achieved on a cumulative basis, the Commission may reduce the contract price in the next subsequent year by a percentage up to the percentage difference between the actual and claimed benefits, but not to exceed an overall 30% reduction. The reduction to the contract payment will be re-evaluated annually by the Commission.” Tranche 1 RFP,February 14, 2020. Commission Staff recently initiated further reviews of annual reports submitted by Brookfield White Pine and Silver Maple Wind under these provisions.

6.1.4 Section 3210-I Northern Maine Generation & Transmission RFP

Program Overview: In November of 2021, pursuant to the June 2021 *An Act To Require Prompt and Effective Use of the Renewable Energy Resources of Northern Maine*[60] *(*P.L. 2021, Chapter 380) the Commission issued a single RFP[61] seeking distinct and time-staged proposals for renewable energy generation (or energy storage) located in Northern Maine and a transmission line or lines to connect such generation to the ISO-NE transmission system. Transmission project proposals were due in March 2021, two months before the May 2021 generation project proposal due date, so generator developers could structure their proposals around possible proposed transmission projects.

Procurements Overview: This procurement, conducted in Docket No. 2021-00369, consisted of a single RFP, seeking proposals for:

- A 345 kilovolt (kV) double circuit "generation connection line" or a transmission line or lines of greater capacity that would transmit power from Northern Maine to the ISO-NE system (Transmission Project).
- Qualified renewable energy generation projects designed and constructed to transmit their power from Northern Maine to the ISO-NE system using this transmission line or lines (Generation Project(s)).

Key procurement details are summarized below.

- Eligibility and Location: Generation facilities were required to be a Class I or Class IA resource (except by statute biomass generators fueled by landfill gas or by anaerobic digestion, and waste-to-energy generators do not qualify), or energy storage; Transmission facilities were required to be a 345 kV double circuit "generation connection line" or a transmission line or lines of greater capacity. Generation facilities were required to be located in Northern Maine, defined as Aroostook County and other areas in Maine where the market is administered by the NMISA. The transmission lines had to be capable of connecting and delivering power from renewable energy resources located in Northern Maine to the ISO-NE system.
- Vintages sought: New generation and transmission line(s)
- Products sought: Capacity, energy, RECs, or any combination thereof
- Quantitative targets: At least 18% of the state's 2019 annual retail electric load
- Contract term or duration: For transmission, a preferred term of 30 years, but bidders could propose different term length. For generation, a preferred term of 20 years, but bidders could propose different term length.
- Preferences:
    - There is a preference for Transmission Projects that will be developed as one of the applicable types of transmission allowed by the jurisdictional authority, processes, and tariffs administered by the ISO-NE.
    - For generation facilities, the RFP expressed a preference for energy-only proposals.
- Stated procurement objectives: The procurement was expressly targeted to "promote the development of renewable energy resources in Northern Maine and the delivery of power from those resources" to the ISO-NE market. Additionally, it sought to:
    - Encourage the rapid development or renewable resources in northern Maine;
    - Develop the necessary transmission infrastructure to meet these policies and goals;
    - Transition the State's mandated renewable energy purchasing to account for electricity usage associated with beneficial electrification;
    - Promote energy equity; and
    - Recognize the public interest of near-term development of infrastructure to reduce greenhouse gas emissions.

[60] P.L. 2021, ch. 380, An Act To Require Prompt and Effective Use of the Renewable Energy Resources of Northern Maine, https://www.maine.gov/mpuc/sites/maine.gov.mpuc/files/inline-files/LD%201710%20Maine%20130%20-%20SP%20563.pdf

[61] *Versant Power & Central Maine Power Company*, Request for Proposals for Renewable Energy Generation and Transmission Projects, No. 2021-00369, Order (Me. P.U.C. Nov. 29, 2021), https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2021-00369

- **Key evaluation criteria**: Costs to Maine ratepayers, total project cost, value to Maine ratepayers from transmission and generation-related products, economic benefits to Northern Maine, inclusion of at least one contract that supports the construction and development in Northern Maine of a biomass generator fueled by wood or wood waste, project viability and likelihood of timely development, technical and financial qualifications of the bidder and related project development entities, and land use issues, including use of existing corridors and rights-of-way.
- **Key terms and conditions**: Due to many issues related to the cross-contingencies (project-on-project risk) associated with independent generation and transmission bids, terms and conditions were customized to reflect the nature of these risks.
    - **Generation Milestones**: The RFP references establishing the generation project(s') COD. Because of the need to coordinate the timing of transmission and generation, the generation Standard Form PPA provided that delivery would start at the later of the COD or the date when the Facility has all applicable approvals and authorizations required to inject supply to the grid. However, in the event of a Transmission Availability Delay, the PPA term would start once the Designated Transmission Facilities become. While further milestones were not included in the RFP or Standard Form PPA, the selected project in its proposed TS offered Milestones for PPA execution, permits and COD (the latter two milestones at Transmission Notice to Proceed plus 18 months).
    - **Transmission Milestones**: While specific milestones were not part of the RFP, the Commission's Order on transmission service agreement (TSA) essential terms[62] indicated that the TSA would include a specified COD and critical milestones (for site control and land rights; permit and siting approvals; federal, regional, state and local regulatory approvals) consistent with the Act's stated intent that projects be developed and placed into operation promptly.
    - **Milestone Flexibility**: Neither the RFP nor the Standard Form PPA/TSA provided for any specified milestone flexibility. While the projects did not advance to PPA/TSA, the selected generation project's Term Sheet noted that key Milestone Dates may be extended for good cause with the approval of the Commission.
    - **Proposal Security**: Transmission projects were required to provide security of $100,000, and generation projects to provide security of $100,000 or $5/kW of nameplate capacity (whichever is lesser). The Proposal Security Deposit would (1) be refunded if a proposal is not selected or (2) be replaced with the Project and Performance Security if a proposal is selected.
    - **Project and Performance Security**:
        - For generation, the Standard Form PPA indicated that Seller Credit Support would be determined by the Commission on a project-specific basis based on the Commission's assessment of the risks and benefits of this contract. The amount of credit support would be based on the Commission based on the Commission's assessment of the risks and benefits related to "the Transmission Project, including amounts sufficient to secure the Project's obligations under the TSA and may also include amounts intended to secure against risks associated with or to which Generation Project(s) may be exposed in the event the Transmission Project is delayed or canceled and/or the TSA is terminated for any reason."
    - **Congestion-related terms and conditions**: None were explicit, although the RFP sought information describing the transmission facility 'degree of firmness'.

6.1.5 Wood-fired Combined Heat and Power Program

<u>Program Overview</u>: In 2022, the Legislature passed *An Act To Establish a Wood-fired Combined Heat and Power Program*[63], which directed the Commission to seek proposals from qualifying combined heat and power projects using

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[62] *Versant Power & Central Maine Power Company*, Transmission Service Agreement Essential Terms, No. 2021-00369, Order (Me. P.U.C. Feb. 1, 2022), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=113634&CaseNumber=2021-00369

[63] P.L. 2021, ch. 604, An Act To Establish a Wood-fired Combined Heat and Power Program, https://legislature.maine.gov/legis/bills/getPDF.asp?paper=HP0880&item=3&snum=130

waste wood fuel for the sale of energy, capacity or RECs. In 2023, the Legislature amended the original Act by passing *An Act To Reduce Maine's Dependence on Fossil Fuels and Carbon Footprint for Energy Production Using Waste Wood Fuel*[64], which prompted the Commission to initiate another solicitation.

Procurements Overview: There were two procurement rounds for the Wood-fired Combined Heat and Power Program, one in late 2022[65] and a second in late 2023[66]; the proposals for the latter were due February 16, 2024 so selections have not yet been made at the time of this report. Key details of the procurements included:

- **Eligibility**: Generation must be a combined heat and power project, defined as a facility that uses wood fuel to generate electric heat and power used for industrial or space heating purposes. Wood fuel is defined as biomass derived from: (1) forest products manufacturing residuals, including, but not limited to, mill chips, sawdust, bark, shavings and fines; (2) harvest residues, including trees or portions of harvested trees that are too small or of too poor quality to be used for wood products; or (3) downed trees from weather events and natural disasters, nonhazardous landscape or right-of-way trimmings, and plant material removed for purposes of invasive species control. Under the 2022 RFP, projects were required to be no less than 3 MW and no more than 10 MW, and in the 2023 RFP, no less than 3 MW and no more than 15 MW.
- **Location**: Must be connected to the Maine electric grid.
- **Vintages sought**: Must have an in-service date after November 1, 2022.
- **Products sought**: The 2022 RFP sough energy, capacity, or RECs, while the 2023 RFP sought Energy-only proposals,
- **Quantitative targets**: The 2022 RFP caps the total net generating capacity of all projects to no more than 20 MW, while pursuant to statutory change, the 2023 changed the total cap to 30 MW.
- **Contract term**: Any length, up to 20 years maximum.
- **Price cap**: The contract price was capped at 10¢/kwh.
- **Preferences**: For the 2022 RFP, preference was expressed for energy-only proposals (while in 2023, energy-only was the only option)
- **Stated procurement objectives and key evaluation criteria**: The program was established to "encourage the development in the State of combined heat and power projects that will promote the climate action plan developed in accordance with Title 38, section 577, subsection 1."
  - A weight of 30% was given to the combined efficiency of the electricity generation and heat utilization of the project.
  - A weight of 40% was given to the total cost of the project.
  - A weight of 30% was given to the proximity of the projects to wood fuel derived from forest products manufacturing residuals; the location of the project and whether electricity generated will meet a demand for that electricity; the net greenhouse gas emissions from the project, the economic impact to the State from the project; whether the generation of electricity most effectively accounts for the changing seasonal time of day and other electricity characteristics associated with beneficial electrification; and the effect on other Class I and Class IA resources[67].
- **Key terms and conditions**:
  - **Security**: The RFP's Standard Contract set performance security (referred to as Seller Credit Support) at $40/kW, reduced to $35/kW, $30/kW, $20/kW and $10/kW on the COD, 5th, 10th, and 15th anniversaries, respectively.

[64] P.L. 2023, ch. 353, An Act to Reduce Maine's Dependence on Fossil Fuels and Carbon Footprint for Energy Production Using Waste Wood Fuel, https://www.mainelegislature.org/legis/bills/getPDF.asp?paper=HP0904&item=5&snum=131

[65] *Public Utilities Commission*, Request for Proposals for Combined Heat and Power Projects, No. 2022-00342, Order (Me. P.U.C. Dec. 1, 2022), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=117364&CaseNumber=2022-00342

[66] *Public Utilities Commission*, Request for Proposals for Combined Heat and Power Projects, No. 2023-00296, Order (Me. P.U.C. Nov. 17, 2023), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=121376&CaseNumber=2023-00296

[67] Ibid.

- **Contract Price Reduction:** In the event that the actual performance of the project against the claimed attributes falls short, the Commission may reduce the contract price in the next subsequent year in proportion to the claimed benefit shortfall, not to exceed an overall 30% reduction in any year.
- **Milestones**: Commercial Operation Date.
- **COD milestone Flexibility:** The Seller is allowed to extend the COD until an unspecified "Extended Commercial Operation Date" by providing the Additional Security of $10/kW of Net Generating Capacity.
- **Congestion-related terms and conditions**: None

6.2 Results of Procurement Programs to Date

6.2.1 Summary of Procurement Selections

3210-C: Under Section 3210-C, in 2008 a single new 60 MW wind project, Rollins Wind, was selected for an energy and capacity contract, rejecting all other bids. In the 2010 RFP, the Commission selected a 5 year capacity and REC contract with Verso Bucksport LLC's 35 MW existing biomass project. In 2012, the Commission approved the 90 MW Downeast Wind project for a capacity (partial hedge) and energy term sheet. In the 2014 RPF, the Commission approved SunEdison's 99 MW Weaver Wind project for energy and capacity (later withdrawn), and NextEra's Highland Wind project, initially at 44 MW but modified to 96.6 MW, for contracting, for energy and a partial capacity hedge. In the 2015 RFP, the Commission ultimately approved a portfolio of up to 75 MW of Dirigo Solar, LLC to-be-determined new solar projects for energy and capacity (partial), under a 'master agreement' structure. Finally, through the 2018 RFP, the Commission approved term sheets for the 100 MW Three Rivers Solar project for energy-only, and a new proposal from Longroad for a 72.6 MW version of the previously withdrawn Weaver Wind project (energy and capacity). As discussed further in Section 6.2.2, while some projects reached commercial operation, some of the selected projects failed to reach completion pursuant to their selection under this program.

Community-based Renewable Energy Pilot Program: The CBRE program resulted in long-term contract award selection for the 8.5 MW Athens biomass plant, the Exeter anaerobic digester project (in 2 phases totaling 3 MW), the 8,5 MW Georges River biomass plant, the 9 MW Pisgah Wind plant, as well as a 1 MW and 10 MW version of Shamrock Wind, a 96. MW Jonesport Wind project, and the 0.395 MW Mayo Mill hydroelectric plant. All of these selections were for energy-only. As discussed further in Section 6.2.2, while some projects reached commercial operation, some of the selected projects failed to reach completion pursuant to their selection under this program.

Section 3210-G Procurements: The Tranche 1 and Tranche 2 procurement selections are summarized in the tables below.

Table 12: Tranche 1 Award Summary[68]

Category	Bidder	Project	Resource Type	Nameplate Capacity (MW)
New	BNRG/BD Solar Church Hill LLC	Church Hill	Solar	20
New	BNRG/BD Solar Eddington LLC	Eddington	Solar	20
Existing	Brookfield White Pine Hydro LLC	Androscoggin 3	Hydro	4.5
New	Freepoint Solar LLC	Alfred Solar	Solar	50
New	Glenvale/Emery Meadow Solar Station LLC	Emery Meadow Solar Station	Solar	26.3
New	Glenvale/Topsham Meadow Solar Station LLC	Tospham Meadow Solar Station	Solar	18
New	Glenvale/West Baldwin Solar Station LLC	West Baldwin Solar Station	Solar	16.2
New	Granite Apollo/Canton Solar Energy Center, LLC	Canton Solar	Solar	65
New	Granite Apollo/Roxbury Solar, LLC	Roxbury Solar	Solar	55
Existing	ReEnergy Livermore Falls LLC	Livermore Falls	Biomass	39
New	SWEB Silver Maple Wind, LLC	Silver Maple	Wind	20
New	Swift Current/Three Rivers Solar Power LLC	Three Rivers Solar	Solar	100
New	Walden Renewables/Fairly Solar, LLC	Fairly Solar	Solar	17
New	Walden Renewables/Mousam River Solar, LLC	Mousam River Solar	Solar	20
New	Walden Renewables/Walden Solar Maine III, LLC	Sweden Solar	Solar	35
New	Walden Renewables/Walden Solar Maine V, LLC	Leeds Solar	Solar	20
New	Walden Renewables/Walden Solar Maine VII, LLC	Madison Solar	Solar	20

Table 13: Tranche 2 Award Summary[69]

Category	Bidder	Project	Resource Type	Nameplate Capacity (MW)
New	C2 Energy Capital LLC	Parkman	Solar	14
New	Glenvale - Turner Meadow Solar Station, LLC	Turner Meadow Solar Station	Solar	10
New	Glenvale - Warren Meadow Solar Station, LLC	Warren Meadow Solar Station	Solar	75
New	Greene Apple Solar Power LLC	Greene Apple	Solar	120
Existing	Helix Maine Wind Development LLC	Kibby Mountain Wind	Wind	132
New	Walden Renewables - Goose Cove Solar, LLC	Goose Cove	Solar	40
New	Walden Renewables - Oyster River Solar, LLC	Oyster River	Solar	31

All project awards were for energy-only with the exception of Brookfield White Pine Hydro which also included RECs. As discussed further in Section 6.2.2, while one of the selected new projects is operating and many are still under development, some of the selected projects or their contracts have been terminated, and others could yet fail to proceed pursuant to their selection under this program.

Section 3210-I Northern Maine Generation & Transmission RFP: Following submissions to the procurement described in Section 6.1.4, in November 2022 the Commission selected the 1000 MW King Pine Wind project for an energy-only contract[70] and the 1200 MW LS Power Aroostook Renewable Gateway transmission project, but initially did so conditionally. While the Commission found the terms sheets acceptable, it found that it could not determine whether the

[68] "2020 Request for Proposals for the Sale of Energy or Renewable Energy Credits from Qualifying Renewable Resources," Maine.gov, September 22, 2022, https://www.maine.gov/mpuc/electricity/rfps/class1a2020/

[69] "2021 Request for Proposals for the Sale of Energy or Renewable Energy Credits from Qualifying Renewable Resources," Maine.gov, June 21, 2021, https://www.maine.gov/mpuc/electricity/rfps/class1a2021/

[70] *King Pine Wind*, Proposed Term Sheet for Power Purchase Agreement under 35-A § 3210-I, No. 2021-00369, https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId=%7b29AA26D5-1BD5-4E01-B9AD-83C35B68C42D%7d&DocExt=pdf&DocName=%7b29AA26D5-1BD5-4E01-B9AD-83C35B68C42D%7d.pdf

contracts would be in the public interest without further resolution of whether another state, most likely Massachusetts, would contract for a portion of the projects. In August of 2022 the Massachusetts legislature had passed *An Act Driving Clean Energy and Offshore Wind* (C. 179 of the Acts of 2022) (the Act); Section 82 thereof authorizing the Massachusetts Department of Energy Resources (DOER) to, by the end of 2022, consider and make a beneficial determination of whether "to coordinate with other New England states undertaking solicitations for clean energy generation, transmission, or capacity", if it determined that doing so would meet the beneficial standards in Section 82. On December 30, DOER issues a beneficial determination and instructed the state's electric distribution companies to contract fort up to 40% of the King Pine electricity and RECs, and 40% of the Aroostook Gateway project's payments, for up to 20 years, would be in the state's interest. Following the Beneficial Determination[71], in February 2023 the Commission approved the PPA and TSA for 60% of the selected projects, respectively. Meanwhile, in Massachusetts, the Beneficial Determination commenced negotiations with multiple parties in parallel with the Maine Commission's proceeding. The SEA team notes that the different contract durations for transmission and different products to be purchased than those reflected in the Maine PPA/TSA (Massachusetts valued contracting for the RECs to capture "increased supply of RECs available for Massachusetts to use for the Commonwealth's RPS program" and proposed contracting for 20 years of transmission compared to Maine's 30 years), presumably added complexity to the contracting negotiations as indicated by LS Power.[72]

In November 2023 LS Power filed its proposed TSA with the Commission. During the negotiation and drafting process of TSA and PPA between the bid winners, CMP and Versant, LS Power and the Commission were unable to settle on a TSA term sheet that LS Power would proceed under and that Commission would accept. LS Power requested to change the fixed price that was included in their bid, and the Commission concluded that it would be unfair to other bidders if they accepted the price adjustment and terminated the procurement process. On December 22, 2023, the PUC announced its decision to terminate the procurement[73] which had awarded the 1200 MW Aroostook Renewable Gateway transmission facility to LS Power Grid Maine (LS Power) and a 1000 King Pine Wind PPA to Longroad Development Company (Longroad).

In January 2024, LS Power filed a letter[74] to the Commission in Docket 2021-00369, adding context to its stated inability to proceed with the initial term sheet. Specifically, LS Power cited the introduction of Massachusetts as a participant in the contracting as creating a number of new risks and delays that were "beyond LS Power's control, not within [its] fixed price, and not accounted for in the Term Sheet" LS Power asserted that inclusion of Massachusetts after the submittal of its proposal would have added an additional year of uncertainty. Among other recommendations, LS Power recommended to the Commission that going forward, the inclusion of and collaboration with other states in the procurement should be addressed upfront in the procurement itself, not after project selection. In addition, LS Power requested inclusion in the next RFP including transmission of a "commercially reasonable, financeable" pro forma transmission agreement.

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[71] *Massachusetts Public Utilities Commission*, DOER Determination on Section 82 Of An Act Driving Clean Energy And Offshore Wind, No. 2021-00369 (Ma. D.O.E.R. Dec. 30, 2022), https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId=%7bCD92FB4A-D35C-4446-A562-BDCAFAE3B6DD%7d&DocExt=pdf&DocName=%7bCD92FB4A-D35C-4446-A562-BDCAFAE3B6DD%7d.pdf

[72] *LS Power*, Request for Proposals for Renewable Energy Generation and Transmission Projects Pursuant to the Northern Maine Renewable Energy Development Program, No. 2021-00369 (Jan. 11, 2024), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=122054&CaseNumber=2021-00369

[73] *Versant Power and Central Maine Power Company*, Order Terminating Procurement, No. 2021-00369, Order (Me. P.U.C. Dec. 22, 2023), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=121809&CaseNumber=2021-00369

[74] *LS Power*, Request for Proposals for Renewable Energy Generation and Transmission Projects Pursuant to the Northern Maine Renewable Energy Development Program, No. 2021-00369 (Jan. 11, 2024), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=122054&CaseNumber=2021-00369

Wood-fired Combined Heat and Power Program: Following the 2022 procurement under this program as described in Section 6.1.5, the Commission rejected all bids[75], based on findings on issues relating to proposed projects exceeding the Program's limits on net generating capacity; not being highly efficient; not having an in-service date after November 1, 2022; and not being located in the service territory of an investor-owned T&D utility. The December 2023 procurement had a bid due date of February 16, 2024, so evaluation is still underway as of the date of this report.

The SEA team summarizes the characteristics of projects selected for award under each of these procurements and across all programs. The analysis includes all projects selected for award, even though a subset never made it to or past term sheet to PPA, or were withdrawn, for a variety of reasons, as considerations of all the projects which the Commission sought to contract with is most instructive for purposes of this analysis.

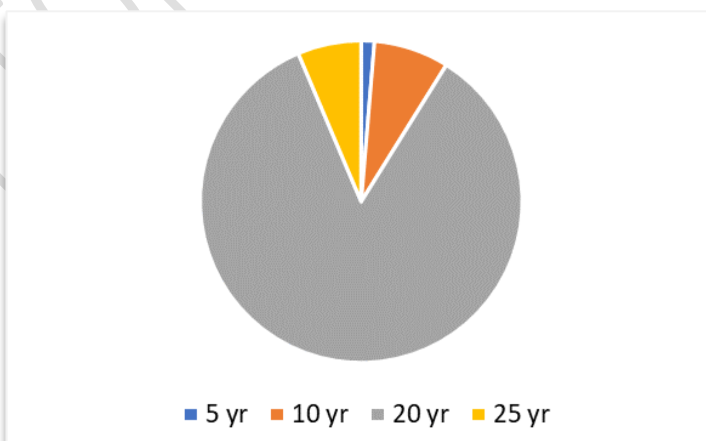
6.2.1.1 Contract Term

As shown in Table 14, the vast majority of solicitation awards by the Commission have fallen into the range of 5 to 25 years, with about 85% being 20 years in duration. The 5-year term was for an existing biomass plant. As noted in Section 6.1.1, the Section 3210 C statute encourages contracts of 10-years or less unless a longer duration is determined to be prudent.

Table 14: Contract Term Distribution Across All Past Maine PUC Long-Term Contract Awards

PPA Term	# of Projects	MW	% of Total MW
5	1	35	1.3%
10	2	200	7.6%
20	46	2,244	84.7%
25	2	169	6.4%
All Terms	51	2,648	100%

Figure 30: MW by Contract Term Across All Past Maine PUC Long-Term Contract Awards



[75] *Public Utilities Commission*, Request for Proposals for Combined Heat and Power Projects, No. 2022-00342, Order (Me. P.U.C. May 16, 2023), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=117364&CaseNumber=2022-00342

For comparison, most long-term renewable energy contracts in the Northeastern US competitive markets are in the range of 15 to 25 years.

Table 15: Examples of Long-Term Renewable Energy Contract Terms In Northeast US

Contract Term (Years)	Examples
15	2013 Connecticut PA 13-303 Section 6 Procurement[76]
20	Massachusetts Section 83C Offshore Wind Procurements; Connecticut Zero-Carbon Procurement; New York Tier 1 Large-Scale Renewable REC Procurement
25	New York Offshore Wind REC Procurement

6.2.1.2 Products

As shown in Table 16, Figure 31, Figure 32 and Figure 33, the vast majority of solicitation awards by the Commission have been for energy, with just over 9% of MW offered a full financial capacity hedge, and just over 2% of MW offered a partial capacity hedge. Only 3 projects out of 51 selected for award, representing 3.4% of total capacity, have been selected for the purchase of RECs. Of those procuring capacity – typically through a financial transaction structure in which the seller received a hedge on capacity costs while participating directly in the FCM, in those term sheets and PPAs including capacity, some of the hedges were partial, e.g. representing 25% or 50% of the capacity revenue, as indicated below. As described throughout Section 6.1, these historical Commission decisions are rooted in an era predating the adoption of ambitious climate and renewable energy goals, when the statutory mandate focused primarily on a conservative contracting perspective, seeking cost savings and avoiding the risk of additional stranded cost, in an environment when the renewable energy industry was far less mature. Notably, until recently Maine Class I/IA REC prices were substantially below those in other states, making REC procurements less attractive as a financial hedge.

[76] L.D. 1138, Section 9 (303rd Legis. 2013), https://www.cga.ct.gov/2013/act/pa/pdf/2013pa-00303-r00sb-01138-pa.pdf or Conn. Gen. Stat. §16a-3a

Table 16: Products Across All Past Maine PUC Long-Term Contract Awards

	Contract Products	Projects	MW	% of Total MW
All Programs	Energy	49	2608	98.2%
	RECs	3	90	3.4%
	Capacity	5	244	9.2%
	Partial Capacity Hedge	9	58	2.2%
3210-C	Energy	15	586	93.2%
	RECs	1	35	5.6%
	Capacity	4	194	30.9%
	Partial Capacity Hedge	9	58	9.2%
Community Renewables	Energy	10	60	100.0%
	RECs	0	0	0.0%
	Capacity	0	0	0.0%
	Partial Capacity Hedge	0	0	0.0%
3210-G	Energy	23[77]	963	99.5%
	RECs	2	55	5.6%
	Capacity	1	50	5.2%
	Partial Capacity Hedge	0	0	0.0%
3210-I	Energy	1	1000	100.0%
	RECs	0	0	0.0%
	Capacity	0	0	0.0%
	Partial Capacity Hedge	0	0	0.0%

[77] One project procured under 3210-G Tranche 2, was only contracted for 50% of their energy output (see Helix Kibby Wind Term Sheet)

Figure 31: Products Procured Across All Past Maine PUC Long-Term Contract Awards, by # of Projects

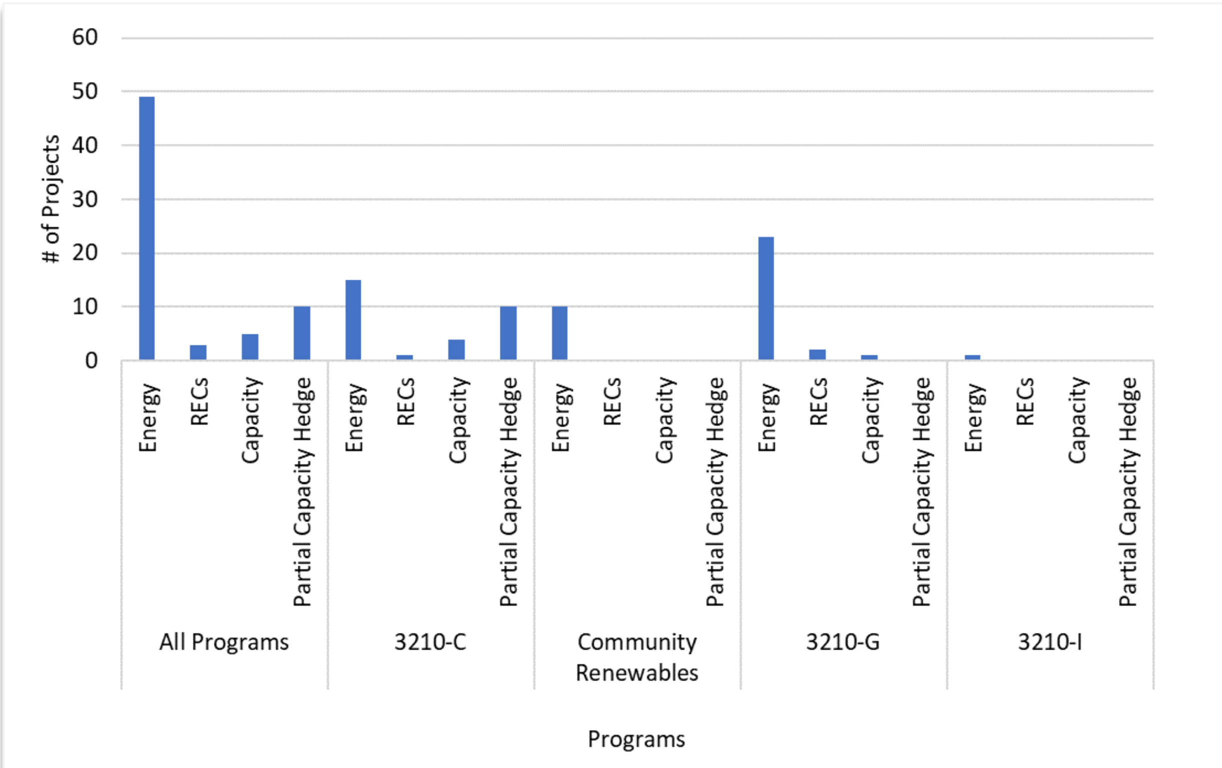


Figure 32: Products Procured Across All Past Maine PUC Long-Term Contract Awards, by MW

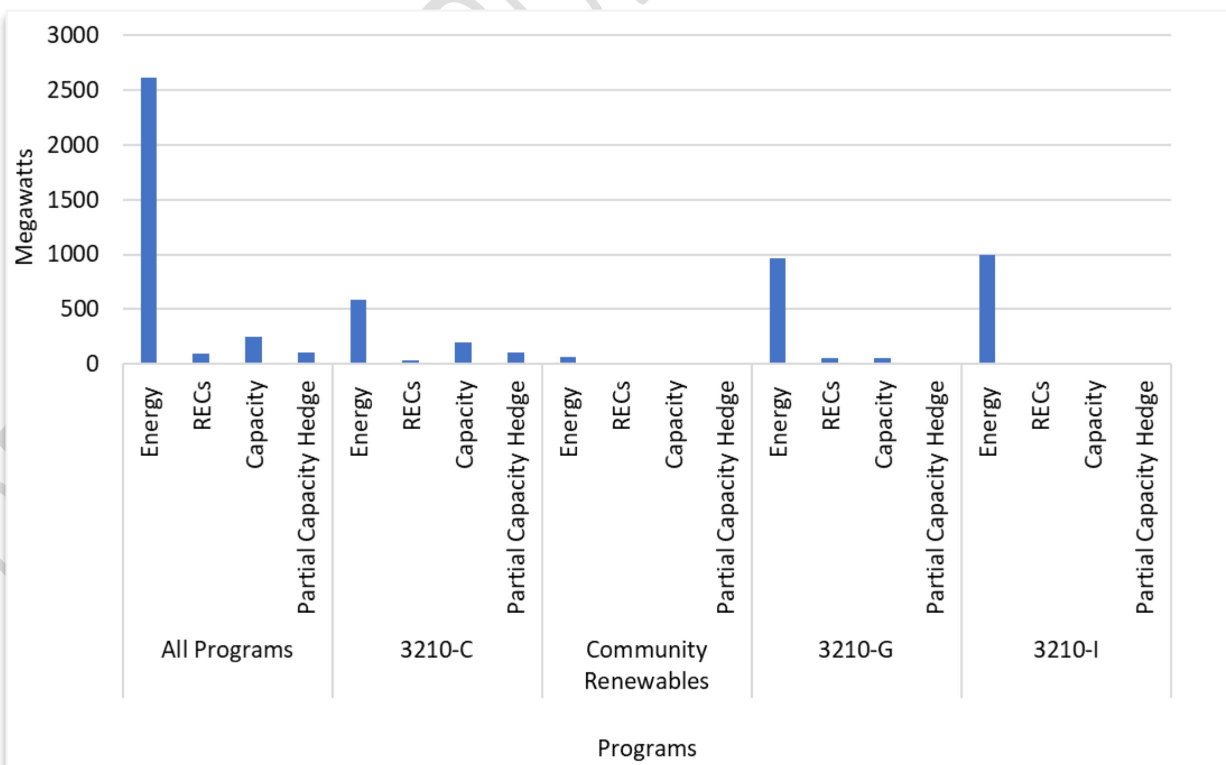
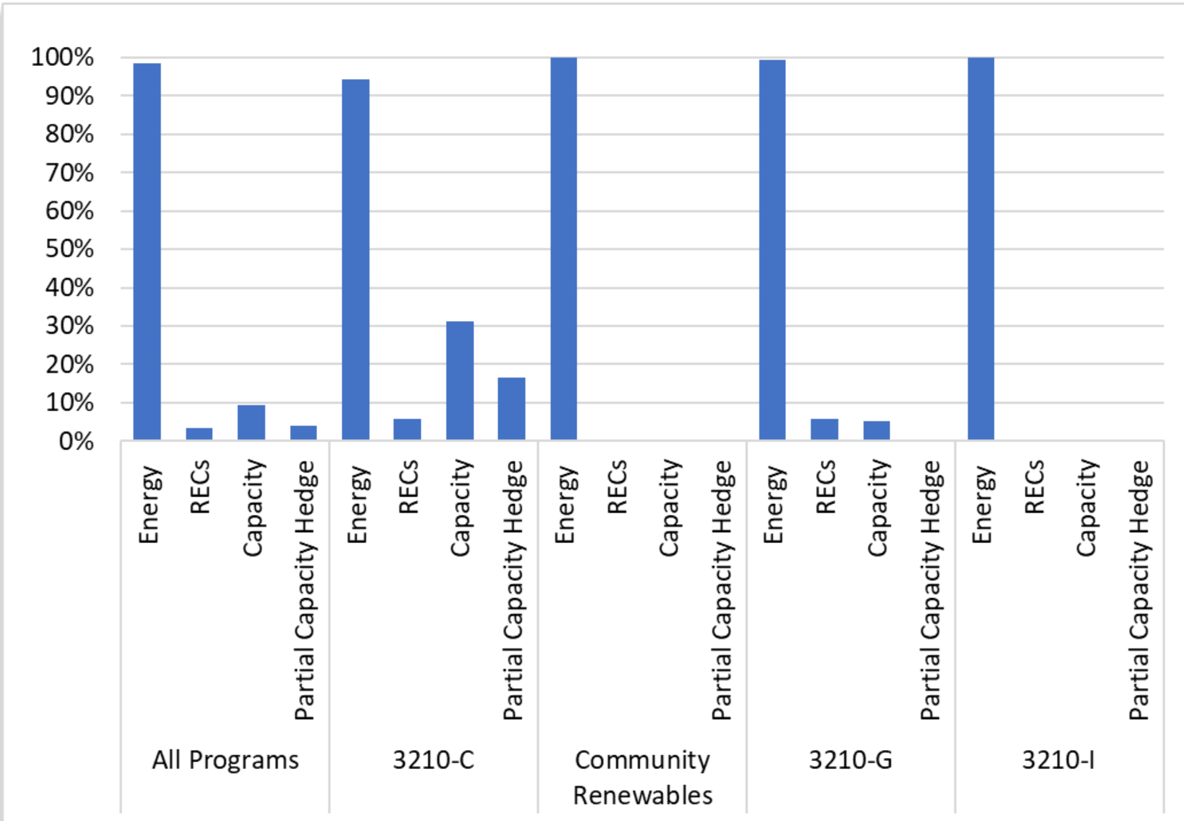


Figure 33: Products Procured Across All Past Maine PUC Long-Term Contract Awards, by % of MW



For comparison, all long-term renewable energy contracts (over 22 GW in New York, Massachusetts, Connecticut, and Rhode Island alone) in the Northeastern U.S. competitive markets provide for hedging either (i) energy and RECs or (ii) energy, capacity and RECs. Table 17 summarizes the approaches used in most major long-term contract programs in the region.

Table 17: Examples of Long-Term Renewable Energy Contract Products In Northeast US

Contract Products	Examples
Energy and RECs	Massachusetts Section 83 and 83A Procurements (land-based large-scale renewables), Massachusetts Section 83C Offshore Wind Procurements; Connecticut Zero-Carbon Procurement; New England Clean Energy RFP (MA,CT, RI)
Energy, Capacity, and RECs	New Jersey and Maryland Offshore Wind REC Procurements (REC-only, but REC payment settlement structure provides perfect hedge for energy, capacity, and RECs); New York Tier 1 Large Scale Renewable REC Procurement and Offshore Wind REC Procurement (REC-only, but REC payment settlement structure provides *imperfect* hedge for energy, capacity, and RECs). 2013 Connecticut PA 13-303 Section 6 Procurement

6.2.1.3 Technology and Vintage

Figure 34 and Figure 35 provide a breakdown of the selected project technology within each program, as well as a summary of technologies selected through all programs. Solar and wind comprise the majority of selected project total capacity, coming in at roughly 36% for solar and 60% for wind, with biomass, hydroelectric, and anaerobic digestion making up the remaining 4%. Only 4 biomass, 2 hydroelectric, and 2 anaerobic digestor projects were selected over the four programs. Additionally, 47 out of the 51 selected projects were proposed as 'new', making up 92% of the 'new' capacity while the 4 existing projects made up the remaining 8% of capacity. Three of the existing projects were selected under the 3210-G program and one under the 3210-C program.

Figure 34: Distribution of Technology by MW, Past Maine PUC Procurements

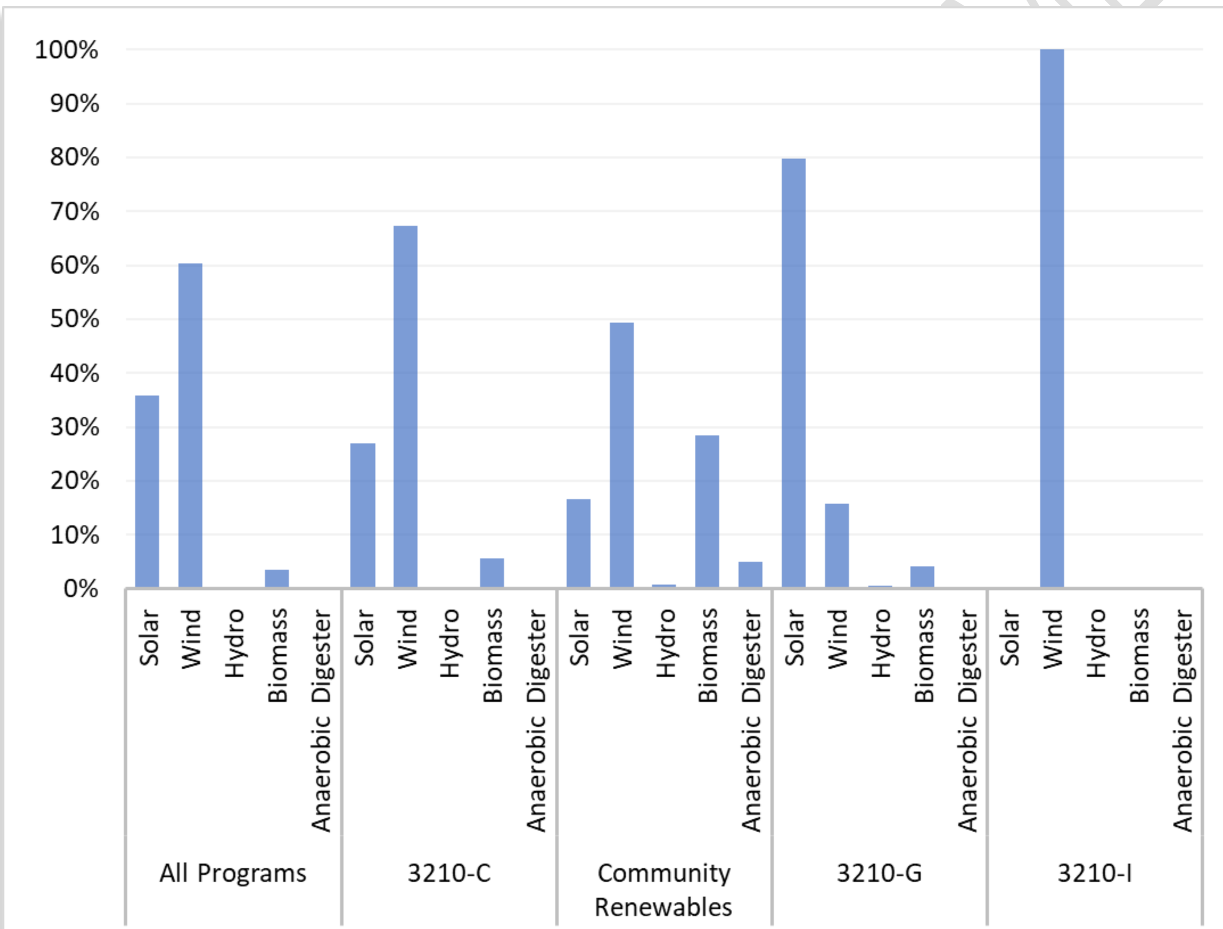


Figure 35: Distribution of Technology Across All Past Maine PUC Procurements

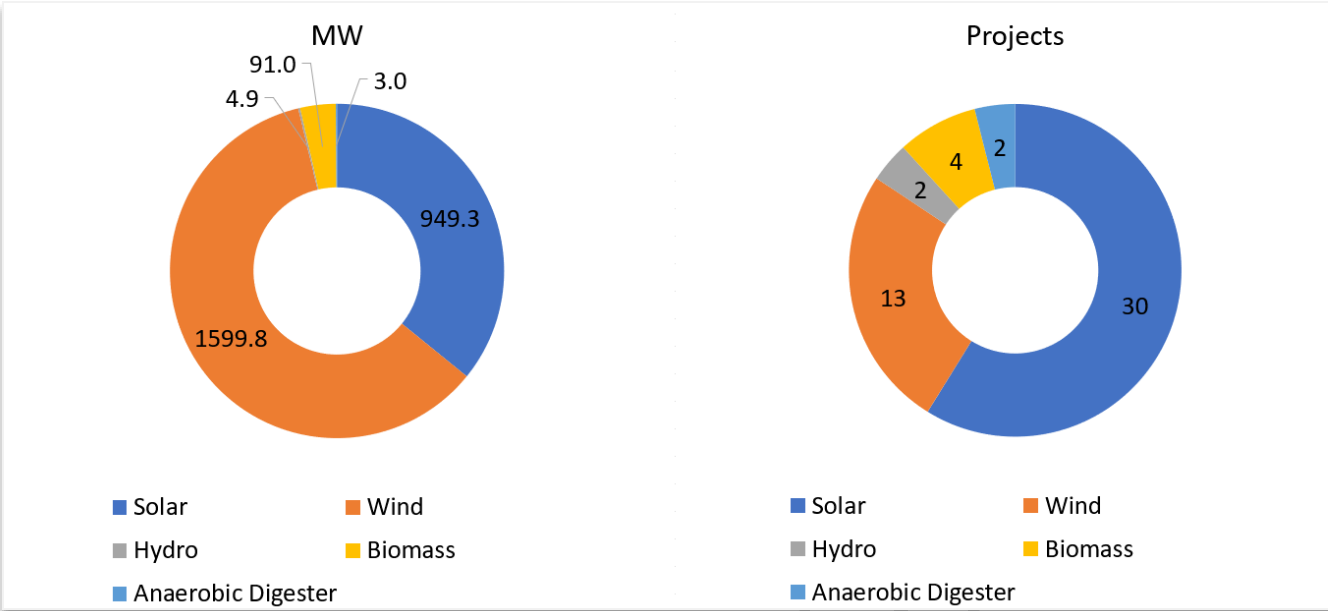


Table 18: Summary of Vintage Across All Past Maine PUC Long-Term Contract Awards

Vintage	Projects	MW	% of MW
New	47	2,437	92%
Existing	4	211	8%

6.2.2 Attrition

As discussed further below, it is typical industry-wide that not all renewable energy projects selected for award of a long-term contract as a result of competitive procurements reach fruition. Common reasons for contract failure (referred to here as attrition) include siting, permitting or public acceptance factors; interconnection related factors; and financial factors, such as inability to attract investment, or costs exceeding estimates used at the time of bid development. Renewable generation developers and their investors typically require revenue certainty (e.g., via the PPA) prior making the financial commitment to locking in all their costs, and justifying the substantial investment of time, money and resources to remove all permitting, interconnection and other risk and uncertainty from a project. As discussed further in Section 6.4, the tradeoff of project maturity requirements versus barriers to entry is a balance to strike in procurement program design: the more maturity is required, the higher at-risk investment required of the bidder, which can limit the attractiveness of the procurement and reduce competition.

Table 19 provides a breakdown of the current status of projects, with 30 either operational or under development, with an attrition of 21 contracts[78], resulting in an overall attrition rate so far of about 41% of selected projects. Table 20 shows the same breakdown but by capacity, with roughly 29% of total capacity across all projects either operational or under

[78] Attrition to date is labeled 'incomplete' due to one of the following reasons: never moving beyond selection to contract, contract being terminated (or termination expected by the Commission), or withdrawal of a proposal post-selection.

development, and a MW attrition rate to date of 71%. The SEA team notes that the attrition rate could rise but not shrink, of project under development falter, and further that at least some projects whose contracts (or selection for the offer to enter into contracts) that have terminated or been terminated could still someday move to completion. The SEA team observes that more than half of the capacity deemed incomplete can be attributed to the termination of the Northern Maine solicitation (and with it, the 1000 MW King Pine Wind project) under the 3210-I program, while over half of the projects deemed incomplete were originally selected under the 3210-G program.

Table 19: Summary of Maine PUC Selected Projects (#) by Program and Current Status

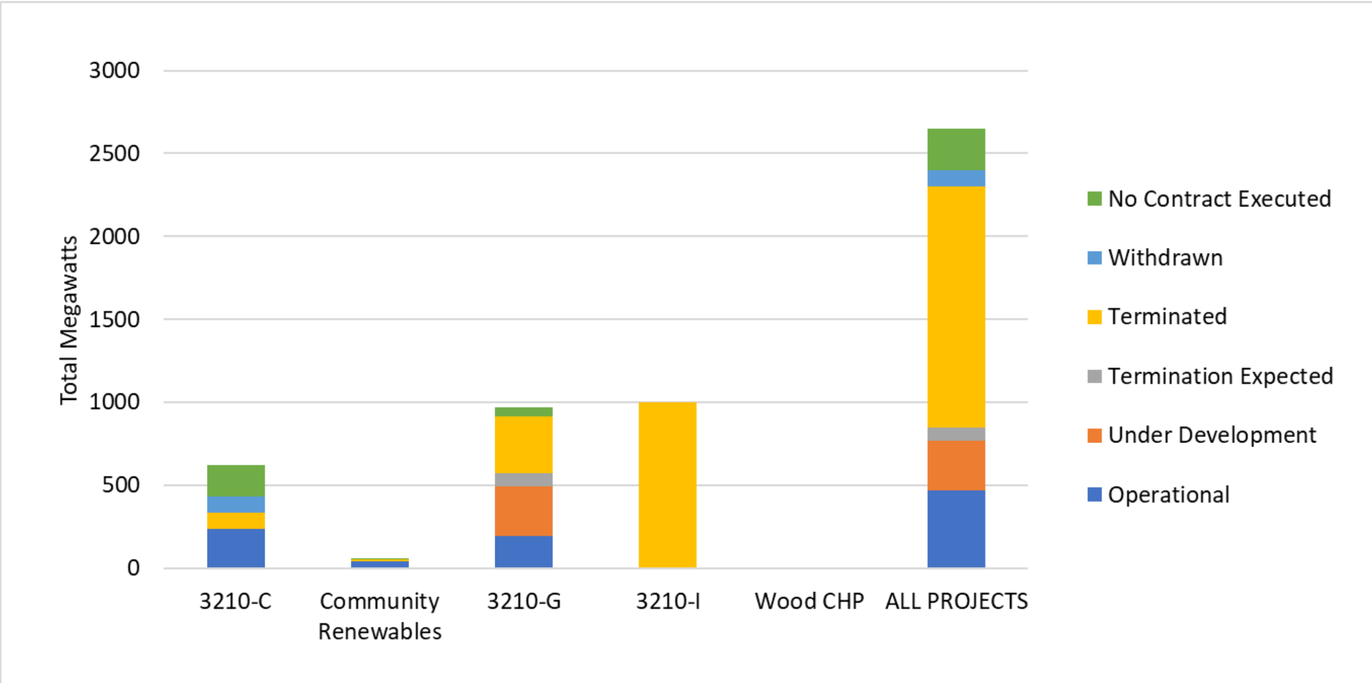
	3210-C	Community Renewables	3210-G	3210-I	Wood CHP	ALL PROJECTS
Operational	12	6	4	0	0	22
Under Development	0	0	8	0	0	8
Termination Expected[79]	0	0	3	0	0	3
Terminated	1	3	8	1	0	13
Withdrawn	1	0	0	0	0	1
No Contract Executed	2	1	1	0	0	4
Incomplete (all reasons)	4	4	12	1	0	21
Total # of Projects	16	10	24	1	0	51

Table 20: Summary of Maine PUC Selected Projects (MW) by Program and Current Status

	3210-C	Community Renewables	3210-G	3210-I	Wood CHP	ALL PROJECTS
Operational	234.95	38.88	195.5	0	0	469.3
Under Development	0	0	299	0	0	299
Termination Expected	0	0	80	0	0	80
Terminated	100	11.395	343	1000	0	1454.4
Withdrawn	99	0	0	0	0	99
No Contract Executed	186.6	9.6	50	0	0	246.2
Incomplete (all reasons)	385.6	20.995	473	1000	0	1879.6
Total MWs	620.55	59.875	967.5	1000	0	2647.9

[79] As reported to SEA by PUC staff.

Figure 36: Attrition by Program and Across Maine PUC All Programs, by MW



6.2.3 Observations

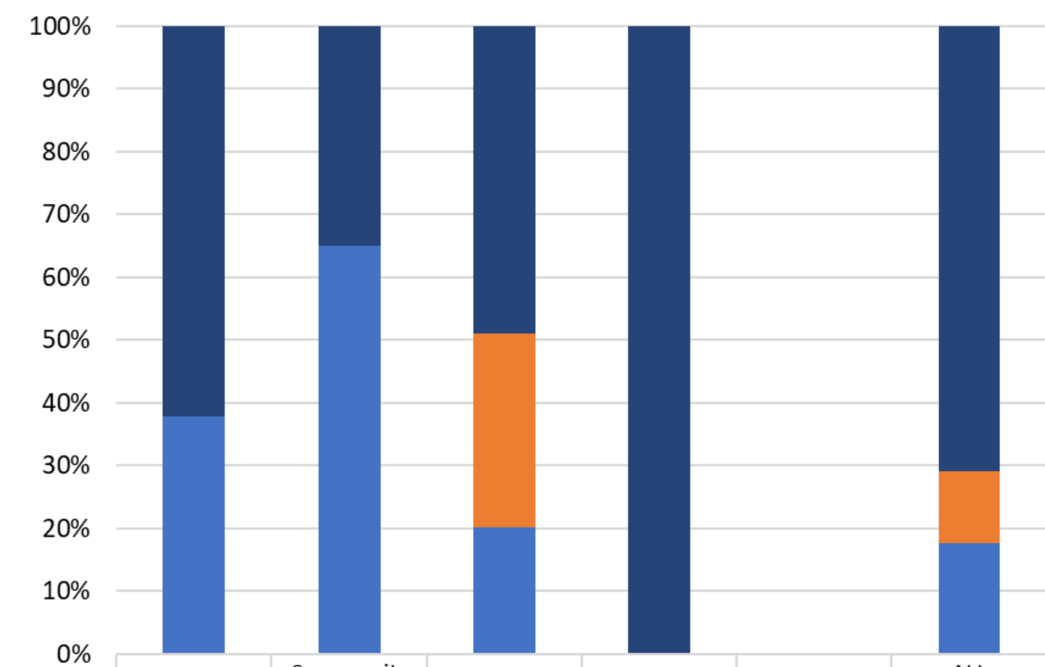
Observations regarding Maine's procurement choices summarized above, compared to experience elsewhere, foreshadows some potential opportunities for decisions on procurement approach going forward that may yield improved yield on (success of) projects selected for award. With respect to experience elsewhere, there is a deep reservoir of large-scale renewables procurement lessons learned and best practices throughout the United States and globally. However, circumstances such as market structure and developable resource potential differ, and what works in some circumstances may be less suited in other situations. Competitive market may differ materially from vertically-integrated markets (especially those with substantial resource potential) where, procurements are frequently the means for RPS compliance. As a result, the SEA team will provide greatest emphasis on peer competitive states in northeast with similarly ambitious renewable energy and climate policy objectives to those of Maine and that have pursued large-scale renewables under competitive procurements, including in particular New York, Massachusetts, Connecticut and Rhode Island.

Attrition: As can be seen from Figure 37, overall Maine has experienced attrition of to date of selected new generation of over 75% to date, a figure which could grow if any projects currently under development fail to reach commercial operation. For comparison to peer state experience, see Table 21. Attrition data to date (more could still happen) has been parsed into the pre-COVID/Ukraine war period, during which projects faces typical developmental challenges and any challenges related to the procurements or contracts themselves, versus a period in which renewable energy projects (in particular, along with most other generation facilities and other parts of the economy impacted by inflation and global supply chain) were exposed to the additional upward cost and supply chain challenges of the COVID/Ukraine war period.[80]

[80] U.S. Department of Energy Land-Based Wind Market Report: 2022 Edition and Offshore Wind Market Report: 2022 Edition, Issued August 16, 2022

For comparison, Maine's Section 3210-C and CBRE programs fall into the first time period, while the Section 3210-G and 3210-I experience falls into the second. The earliest program, Section 3210-C, suffered materially higher attrition (about 60% of MW) than contemporaneous peer state procurements which experienced attrition in the approximately 1% to 43% range. The CBRE program experience fell into the range of its peers, with attrition of approximately 35%, likely in part because the program offered more robust incentives. The most recent Maine procurements intersected the COVID-19 and Ukraine war driven inflation, interest rate and supply chain disruptions that similarly disrupted contemporaneous peer state programs. These programs have suffered exceptionally high attrition. For comparison, excluding previously operating generation from the summary shown in Figure 36, new generation Section 3210-G has (so far) fared moderately better than peer states, whose procurement have faced 90% to 100% attrition. However, as several Section 3210-G projects are neither operational nor terminated to date, it is possible that the attrition figures could increase to be comparable to peer states before the book is closed on that program.

Figure 37: Attrition of New Generation, by Program & Across All Maine PUC Programs (Percent of MW Selected)



	3210-C	Community Renewables	3210-G	3210-I	Wood CHP	ALL PROJECTS
Incomplete (all reasons)	386	21	473	1000	0	1880
Under Development	0	0	299	0	0	299
Operational	235	39	196	0	0	469

Operational   Under Development   Incomplete (all reasons)

Table 21: Procurement Attrition Experience to Date in Other Northeast Markets, by MW[81]
(Source: Sustainable Energy Advantage, LLC analysis)

MW			
Summary - Not Affected by COVID/Ukraine			
	Contracted	Terminated, to Date	Attrition to Date
CT	1,274	547	43.0%
MA	1,722	272	15.8%
RI	595	4	0.6%
NY	3,879	1,095	28.2%
Summary - Affected by COVID/Ukraine[82]			
	Contracted	Terminated, to Date	Attrition to Date
CT	1,052	948	90.1%
MA	2,432	2,432	100.0%
RI	50	50	100.0%
NY	11,688	11,169	95.6%
Summary – Total			
	Contracted	Terminated, to Date	Attrition to Date
CT	2,326	1,496	64.3%
MA	4,154	2,704	65.1%
RI	645	54	8.3%
NY	15,567	12,263	78.8%

Maine's large-scale renewables procurement and contracting experience to date has involved considerable effort on the part of the Commission and its consultants to solicit, evaluate and negotiate Term Sheets and PPAs, and has produced results that may be considered disappointing in absolute terms. Renewable energy development is challenging and faces many barriers (as discussed further in Section 6.4 below).

Recent and comprehensive analysis of pertinent LSR procurement program attrition is not available, and while a comprehensive and detailed analysis of industrywide attrition experience is beyond the scope of this report, relevant data from peer states as summarized in Table 21 provides some perspective. While it is difficult to draw absolute comparisons between state and programmatic experiences due to differing circumstances and misaligned timeframes, Maine has not outperformed its peer states' procurement performance when measured by attainment of successful commercial operation, and has likely lagged its peer states to some degree. In the remainder of Section 6, the SEA team identifies some of the practices employed in peer states to suggest evolution of Maine's procurement and contracting approach in furtherance of Maine's policy objectives.

[81] The analysis results shown in this table were compiled by SEA from a range of public resources and SEA's own databases. The analysis was crafted to offer the best benchmarks possible for Maine's experience, but did require some subjective judgements. Specifically, SEA deemed projects who bid and were selected for contracting during a timeframe in which they were exposed to the unique upward cost pressures and supply chain disruptions as 'Affected by COVID/Ukraine' before reaching sufficient development maturity to lock in their prices. SEA excluded from the analysis (i) existing nuclear procurement by Connecticut, (ii) existing and new large-scale hydro and new transmission procurement by Massachusetts (due to unique circumstances), and (iii) bids in New York State Energy & Development Authority's most recent 2022/2023 procurement rounds, because of both the large volume as well as it being too early to assess attrition experience.

[82] Sources include NY Large-scale Renewable Projects Database, CT Clean and Renewable Energy Program Data, and SEA's proprietary project database for NE-REMO. Notably, following promptly on the heels of this attrition experience, New York has quickly gone back to market and procured replacement projects under its Tier 1 RES REC procurement program and its Offshore Wind REC (OREC) procurement programs. Massachusetts, Connecticut, and Rhode Island at the time of this report are seeking replacements for their canceled offshore wind projects, while Connecticut is in the process of seeking proposals to replace past large-scale solar attrition.

Products Procured and/or Hedged: The Commission, as noted in Section 6.2, selected projects for primarily energy-only contracts which it found would provide benefits in excess of costs for Maine ratepayers. As noted above, Maine has very rarely procured RECs from large-scale renewables, even when the Commission has had the statutory authority to do so. Even in the recent Section 3210-G and Section 3210-I procurement rounds, the Commission has stated[83] a preference for energy-only PPAs, despite state policy evolving towards 100% renewable energy and ambitious greenhouse gas reduction goals. Maine is an outlier in this practice, as all state policy-driven large-scale renewable energy procurement in the peer states noted above, as well as other US and international markets with REC tracking systems that the SEA team is aware of, have included generation attribute (REC) procurement. The primary reasoning for procuring RECs includes (i) capturing the claim (if RECs are not procured, they can and often are sold to load-serving entities in Maine or other states – often where REC prices are highest - for use towards meeting their renewable energy obligations, and (ii) to provide a hedge on the REC revenue stream that allows for lower *expected* cost of financing and this lower price bids, in the face of material perceived political and regulatory risk.[84] As with all hedges, a transaction that looks reasonable based on forecasted prices at the time they are entered may in hindsight turn out to be more or less costly than the alternative. However, in the balance of sometimes competing objectives and with the addition of ambitious renewable energy targets and mandates, avoiding the risk of potential future avoided costs by imposing risks on a generator that it cannot anticipate or manage may run counter to cost-effectiveness and successful renewable energy procurement.

In addition, Maine has rarely procured (or financially hedged) capacity revenue. As detailed in Section 6.2.1.2**,** other New England States have rarely elected to hedge capacity, particularly in their recent procurements. However, New York (since the advent of the Clean Energy Standard and its Renewable Energy Standard and Offshore Renewable Energy Credit (OREC) procurements) has offered an *imperfect* hedge[85] for capacity, while the New York and Maryland OREC procurements offer a full and perfected capacity hedge. The SEA team notes that developers are largely indifferent to a physical capacity same and a financial capacity hedge, and the Commission's past choice of offering financial capacity hedges (when offered) may be more straightforward to implement.

Contract Term: With respect to contract term, while the Commission has often expressed preference for shorter terms of 10 years for new generation, as shown in Figure 30, the Commission's decisions have usually been 20 years in duration, with two wind awards of 25 years (in the Section 3210-C program) and one project selected with a 10 year term under two different programs, Section 3210-C and Section 3210-G. The single 5-year term selection was for an operating project. This data suggests that new capital-intensive large-scale renewable projects seek the longest term option available to them, and/or longer-term offers are (predictably) more attractive on a price basis because upfront capital costs can be spread over more production. Maine's results align with general industry experience but also suggest that there is little value on seeking or expressing preference in shorter contract terms. The SEA team observes that with industry experience with their deployment, operation and maintenance, wind and solar expected renewable energy

83 Under the 3210-G Tranche 1 RFP and Tranche 2 RFP, the PUC stated "Preference will be given to proposals for the sale of energy". Under the 3210-I RFP, the PUC stated "Proposals for energy-only are preferred."

84 Unlike energy, compliance RECs serve a policy function and their value is highly sensitive to policy and political decisions. As Connecticut Department of Energy and Environmental Protection concluded, industry experience underscores the impact of not hedging REC revenue: "price volatility in the REC market means the RPS does not provide the revenue certainty needed for new renewable energy projects to obtain financing". Connecticut Department of Energy & Environmental Protection, Draft Report on Select Connecticut Energy Supply Issues (Feb. 20, 2024), https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:c9f1d5ea-77a8-4f4d-b378-13105078a886

85 New York's Index REC and Index OREC approach utilize a production independent monthly average zonal energy and capacity reference prices which leaves generators with locational and temporal basis risk. *State of New York Public Service Commission,* Order Modifying Tier 1 Renewable Procurements, Case 15-E-0302, (Jan. 16, 2020), https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Clean-Energy-Standard/2020-01-16-Order-Modifying-Tier1-Renewable-Procurements.pdf

technology economic lives have been getting longer[86], and industry-wide we've observed expectations for longer lives and a modest trend towards longer contract terms, reflecting growing demand for renewable energy sources and the desire for price stability and predictability in energy costs, both in policy-driven as well as private PPAs.[87] With recent upward pressure on upfront costs (due to COVID-19/Ukraine induced inflation and supply chain issues), the Commission may wish to consider longer terms to spread fixed costs over time thereby lowering unit costs.

6.2.4 Benefits of contracting for energy from in-state generation

The prior section focuses on the netting of generator payments and market revenues. While the hope is that market revenues are equal to or greater than contract payments, there are additional benefits to Maine's economy when the underlying contract contributed to the financing and construction of an in-state generator. While the entities purchasing and settling the RECs from these facilities own the claim to the facilities' descriptive characteristics, the energy-only contracts held by Maine are nonetheless partially responsible for creating economic impacts in Maine – including investment, job, and tax benefits. It is not possible, however, to definitively attribute benefit to the energy and REC contracts, respectively. Were Maine to structure future procurements to purchase both energy and RECs, however, the state would retain the right to claim the energy as renewable and the right to claim 100% of the benefits to the state's economy.

6.3 Large-Scale Renewables Procurement Going Forward

6.3.1 LSR Procurement Objectives

Today, Maine has established, and the Commission is operating within the context of, "some of the most ambitious decarbonization policies in the country, aimed at mitigating the worst impacts of climate change on the state and catalyzing the development of Maine's clean energy economy."[88] The following legislation and Executive Orders frame Maine's broader large-scale renewables procurement context:

- *An Act To Promote Clean Energy Jobs and To Establish the Maine Climate Council* (LD 1679, enshrined as P.L. Chapter 476) established the Maine Climate Council, which is tasked with advising on strategies for Maine to meet economy-wide emission reductions of at least 45% below 1990 levels by 2030 and 80% below by 2050. These targets are based on 38 M.R.S.A. § 576[89].
- Subsequently, Governor Mills issued an Executive Order aimed at achieving economy-wide carbon neutrality by 2045, which was subsequently enacted in statute a year later, also in 38 MRS 576-A[90].
- *An Act To Reform Maine's Renewable Portfolio Standard* (LD 1494, enshrined as P.L. Chapter 477) increased the share of the state's electricity coming from renewable resources to a total of 80% by 2030 and a goal of 100% by 2050. This law also required the PUC to procure long-term clean energy generation contracts totaling 14% of

[86] Wiser, Ryan H., Mark Bolinger, "Benchmarking Anticipated Wind Project Lifetimes: Results from a Survey of U.S. Wind Industry Professionals",LBNL, September 2019 and Wiser, Ryan H., Mark Bolinger, Joachim Seel, "Benchmarking Utility-Scale PV Operational Expenses and Project Lifetimes: Results from a Survey of U.S. Solar Industry Professionals", LBNL, June 2020

[87] Lance T. Brasher and Nike O. Opadiran, "Increased Demand for Renewable Energy PPAs Expected to Create Seller-Friendly Market," Insights | Skadden, Arps, Slate, Meagher & Flom LLP, January 19, 2022, https://www.skadden.com/insights/publications/2022/01/2022-insights/corporate/increased-demand-for-renewable-energy

[88] Maine GEO, State of Maine Renewable Energy Goals Market Assessment (March 2021), https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/renewable-energy-market-assessment

[89] Ibid.

[90] Ibid.

Maine's 2018 retail sales in two rounds of procurement in 2020 and 2021 and to undertake a renewable energy assessment[91].

- *An Act To Require Consideration of Climate Impacts by the Public Utilities Commission and To Incorporate Equity Considerations in Decision Making by State Agencies*[92] (L.D. 1682, enshrined as P.L. 2021 Ch. 279) amended the 35-A MRSA §101, adding greenhouse gas emission reduction to the Statement of Purpose of the Commission.
- Most recently, in 2023, Governor Mills announced an accelerated goal for Maine to reach 100% clean energy by 2040.[93] GEO has launched a planning process to inform that effort, which is detailed on the Maine Energy Plan: Pathway to 2040 page. The Pathways to 2040 work is exploring, among other issues, alternative supply resources to meet 100% clean electricity.

Maine's current energy goals and strategies, when added to the Commission's traditional ratepayer cost mandates, represent a paradigm shift which must be reflected in future Commission procurement large-scale renewables long-term solicitation and contracting actions, considerations and decisions. This context necessitates a shift from selecting and approving proposals solely if they reduce expected ratepayer costs and provide economic benefits, to also prioritizing procuring renewable energy at the lowest possible cost for ratepayers, while ensuring or improving grid reliability.

This evolution requires:

- Shifting evaluation from a purely benefit-cost analysis to one prioritizing cost-effectiveness;
- Shifting the 'compared to what' question to alternative means of achieving Maine's policy requirements (rather than 'no action');
- Placing a premium on facilitating renewable energy supply, through attracting a development pipeline of viable projects and approving the best project bids, should they meet other requirements;
- Driving successful projects, by creating the conditions for viability and low cost. This can include refining procurement details and contract terms and conditions that facilitate low-cost financing and balance risk apportionment between developers/investors and ratepayers accordingly; and
- Securing the ability to apply procured supply towards the states objectives (procuring RECs, as RECs not procured could be used for RPS compliance in other states).

Furthermore, additional future procurements will need to increasingly give greater weight to aligning production and consumption of electricity, integrating large volumes of variable renewable energy generation, and maintaining reliability while fulfilling Maine's renewable energy and climate objectives. This is a focus of the 2040 Pathways study underway.

Two additional issues merit consideration in crafting large-scale renewables procurements and contracts going forward:

1. Maine as a whole, and in particular many portions of Maine that are rich in renewable energy potential, are export-constrained, meaning that in many hours the total of production within a portion of the transmission system exceeds the sum of load within that portion and transmission capacity to export that supply to serve load in other parts of the system, as discussed in the 2020 Maine Stakeholder Study on transmission solutions to enable renewable energy investment in the State.[94] On May 1, 2023, in Docket 2023-00054, the Commission

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[91] Ibid.
[92] P.L. 2021, ch. 279, §1, https://lldc.mainelegislature.org/Open/Laws/2021/2021_PL_c279.pdf.
[93] "Renewable Portfolio Standard," Governor's Energy Office, accessed March 12, 2024, https://www.maine.gov/energy/initiatives/renewable-energy/renewable-portfolio-standard
[94] Maine GEO, Resolve, To Study Transmission Solutions to Enable Renewable Energy Investment in the State – Stakeholder Study Pursuant to Public Law 2019, Chapter 57: Final Report (Jan. 3, 2020), https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/LD1401_Transmission_Renewable_Energy%20Study_Stakeholder%20Report.pdf

issued a Procedural Order[95] requesting comments on a March 3 Petition[96] filed by the Maine Office of the Public Advocate (OPA), the Union of Concerned Scientists (UCS), Brookfield Renewable (Brookfield), and Onward Energy (Onward)(collectively, the Petitioners). The Petitioners sought to modify the PPA format that the PUC uses in its large-scale renewable energy procurements by removing the purchase of energy during hours when wholesale energy prices are negative. Currently, when spot energy prices are negative, CMP and/or Versant are paying both the negative prices and the energy price in the PPA, adding costs for ratepayers. Furthermore (and of great interest to the petitioners), newly selected projects cause increased curtailment for previously operating projects.

In its comments, Onward Energy explained that because projects still receive their contracted rate when delivering energy, they will not curtail their projects during negative pricing hours, thereby contributing toward grid congestion. While shifting negative pricing risk to project owners could cause some projects to use a higher risk premium, raising their bid prices, Onward asserted that higher PPA prices will be less than the costs that ratepayers pay from projects delivering when energy prices are negative. Onward further argued that if the Commission approved the PPA changes, projects in more grid-constrained areas would face higher risk premiums, making them less competitive in solicitations, and therefore less likely to be selected, built, and to exacerbate those grid constraints.

The Petitioners are seeking to shift negative energy pricing risk from ratepayers to project owners. The SEA team notes that this would be similar to the PPA structure for renewable projects in Massachusetts. The issues highlighted in this petition (on which the Commission has yet to rule) necessitates an increased focus on considering such issues in forthcoming procurements, as well as considering transmission solutions (the latter of which is a focus of the ongoing Pathways to 2040 activity).

2. The Commission has observed that the long-term contracting process has often been extremely resource-intensive for both the Commission and bidders, with few proposals ultimately selected by the Commission. In addition, even when term sheets were approved, often times projects have not moved forward.[97] This experience suggests a focus on adopting tweaks to procurement and contracting approaches that streamline the evaluation process, and that reduce the attrition rate experienced in past procurements.

As noted in the following subsection, aspects of this paradigm shift are visible in the most recent legislation requiring additional large-scale renewable energy procurement.

6.3.2 Future Procurement Events

Going forward, there are three categories of anticipated large-scale renewables procurement activities defined by statute, each a material component of moving Maine towards meeting its goals. These include:

- Section 3210-J: Solicitations of land-based supply representing 5% of Maine load, plus replacement of attrition from a portion of previously contracted supply under Section 3210-G, with a preference for development on contaminated land.
- Chapter 481: Offshore wind generation (and possibly, transmission) procurement.

[95] *Office of the Public Advocate*, Procedural Order Requesting Comments, No. 2023-00054, Order (Me. P.U.C. May 1, 2023), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=118963&CaseNumber=2023-00054

[96] *Public Utilities Commission*, Petition to Modify Standard Form Power Purchase Agreements, No. 2023-00054 (Office of the Public Advocate, March 3, 2023), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=118252&CaseNumber=2023-00054

[97] *Public Utilities Commission*, Inquiry Findings and Conclusions, No. 2015-00058, Order (Me. P.U.C. Feb. 1, 2018), https://mpuc-cms.maine.gov/CQM.Public.WebUI/MatterManagement/MatterFilingItem.aspx?FilingSeq=96682&CaseNumber=2015-00058

- **Northern Maine Generation and Transmission:** Replacement of the terminated Section 3210-I procurement, plus fulfillment of an additional statutory mandate to solicit for unused space on the transmission line.
- The Governors Energy Office also has been allocated authority under the *Beneficial Electrification Policy Act* (2023)[98] to petition the Commission to initiate renewable energy procurements to meet state goals.

6.3.2.1 Section 3210-J

Program and Procurement Overview: On June 26, 2023, Governor Mills signed LD 1591 – *An Act to Promote Economic Reuse of Contaminated Land through Clean Energy Development*[99] into PL 2023 Chapter 321 that ordered PUC to solicitate RECs from eligible Class IA resources or combined projects that pair a Class IA resource with an energy storage project with preference to develop on agricultural land contaminated by perfluoroalkyl and poly fluoroalkyl substances. Chapter 321 required a launch of the procurement by January 1, 2024; however this timeline was infeasible due to the requirement that Commission PUC promulgate governing rules for the procurement. On February 13, 2024, the Commission published the proposed Chapter 397[100] rule, pursuant of PL 2023 Chapter 321, for procurement of renewable energy and RECs.

Subject to any changes resulting from the current rulemaking, pursuant to the proposed Chapter 397 rule the procurement target energy and RECs will be the sum of 1) 5% of retail electricity sales in the State from January 1, 2021 to December 31, 2021, which is 579,000 MWh, and 2) the amount of energy and RECs that have not been fulfilled in the procurement pursuant to the Section 3210-G, as determined by the Commission prior to issuance of the RFP. PUC must initiate the procurement process by issuing a first RFP within three months of the adoption of Chapter 397 and would continue to commence solicitation until the target amount of energy and RECs is fulfilled.

If the bidder submits a "combined project" (eligible generation paired and co-located with an energy storage system) to the RFP, there must be two proposals: one with and one without the energy storage system. The proposals would also include economic benefits value regardless of the project type, which addresses the requirement in PL 2023 Chapter 321 that bidders must present community and economic benefits including new job opportunities, increasing tax income, and increasing transaction activities. The Commission also set forth the selection criteria for evaluating proposals, including four factors: 1) benefit to ratepayers, 2) congestion and curtailment, 3) preferences for projects located on contaminated land (primary) and that minimize use of non-contaminated farmland and forest land (secondary), 4) economic benefits. The criteria address the requirements in PL 2023 Chapter 321 that PUC must consider the expected effect of congestion and curtailment of interconnecting new projects to the grid, impacts to the ratepayers, and preference for reusing contaminated lands. The value of economic benefits would only be considered as a tie-breaker. The procured RECs would be assigned to an investor-owned transmission or distribution utilities that provide standard service and are subject to the RPS.

Procurement Details: As proposed in the current rulemaking, key details are as follows:

- **Eligibility (technology and vintage)**:
  - Class IA resources; if fuel cells, they must use renewable fuels;
  - The project must begin commercial operation on or after September 19, 2023;

[98] 35-A M.S.R.A. §3803 (2023), https://legislature.maine.gov/legis/bills/getPDF.asp?paper=SP0688&item=3&snum=131
[99] 35-A M.R.S.A. §3210 (2023), https://www.mainelegislature.org/legis/bills/getPDF.asp?paper=SP0622&item=3&snum=131
[100] *Public Utilities Commission*, Procurement of Renewable Resources with a Preference for Projects Located on Contaminated Land, No. 2024-00028, Order (Me. P.U.C. Feb. 13, 2024), https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId={D0D9A38D-0000-C836-9EFA-78496ACBD35A}&DocExt=pdf&DocName={D0D9A38D-0000-C836-9EFA-78496ACBD35A}.pdf

  - An ISO-NE interconnection system impact study must have been filed;
  - For combined projects: an energy storage project co-located with Class IA resource and connected to the grid, could be metered either jointly or separately from the Class IA resource.
- **Location**: Not specified (or limited); however, the evaluation criteria appear to favor projects located in Maine, and qualification as contaminated land would be subject to a determination process that would appear to limit such qualification for this preference to Maine locations.
- **Products sought**: Energy and RECs.
- **Contract term**: No more than 20 years, unless the Commission determines that a contract for a longer term is in the public interest.
- **Procurement objectives**: Procure (and support the development and financing of) renewable energy; replace cancelled projects from prior procurements, reuse contaminated land, and boost local economics by renewable energy development.
- **Key evaluation criteria**:
  - Benefit to ratepayers: PUC will assess the impacts on ratepayers by comparing the cost of contract to the market value of the contracted products. Only projects whose projected market value exceeds the contract cost will be considered.
  - Congestion and curtailment: The Commission will consider the congestion and curtailment effects of the proposed project on other renewable resources. Bidders must therefore provide an assessment of the proposed project's effects on other renewable resources. Additionally, PUC could request bidders to provide pricing that eliminates the potential effects or conduct its own assessment.
  - Preferences:
    - Primary preference to eligible projects located on contaminated land. PUC would seek guidance from the Maine Department of Agriculture, Conservation and Forestry (DACF) for confirming the qualifications provided by the proposals.
    - Secondary preference to eligible projects that would minimize use of farmland and forested lands.
  - Economic benefits: The economic benefits will only be evaluated when choosing between two identical projects. PUC reserves the right to include in the RFP an ongoing reporting requirement to verify fulfillment of the economic benefits. The proposals must present economic benefits including:
    - Number of potential new job opportunities;
    - Excise, income, property and sales taxes that will be paid; and
    - Goods and services that will be purchased.

6.3.2.2 Offshore Wind Procurement

Program Overview: On July 27, 2023, Governor Mills signed LD 1895 – *An Act Regarding the Procurement of Energy from Offshore Wind Resources* and enacted it into PL 2023 Chapter 481.0[101] This statue set the State's wind energy generation goal, ordered the GEO to schedule offshore wind energy procurements, established an Offshore Wind Research Consortium and Maine Offshore Wind Renewable Energy and Economic Development Program, and ordered the Office of Tax Policy to develop a Fishing Community Protection Tax Incentive Program. This makes Maine the 8th state to mandate a commercial-scale offshore wind target (see Table 22 below).

[101] 35-A M.R.S.A. §3408, https://legislature.maine.gov/bills/getPDF.asp?paper=SP0766&item=5&snum=131.

Table 22: Offshore Wind Procurement Goals, by State[102]

State	Offshore Wind Target (MW)
MA	5,600 by 2035
RI	1,430 by 2030
CT	2,000 by 2030
NY	9,000 by 2035
NJ	11,000 by 2040
MD	8,500 by 2031
VA	5,200 by 2034
NC*	8,000 by 2040
CA*	25,000 by 2045
LA*	5,000 by 2035
OR*	3,000 by 2030

*Starred states have planning targets, but have not mandated state procurements for offshore wind

<u>Procurements Overview:</u> Chapter 481 sets the State's wind energy generation goal of deploying 3,000 MW by the end of 2040. The GEO may re-evaluate the generation goal every two years starting in 2025 and increase the statutory goal if it sees fit. As a result, the GEO must determine the schedule for offshore wind energy procurement. Chapter 481 required that each RFP must solicitate not less than approximately 600 MW, or with sufficient size that enable cost-competitive commercial-scale development.

The Commission will review the solicitation before issuing the final RFPs in coordination with the GEO. Chapter 481 requires that the GEO file the first solicitation with the Commission by July 1, 2025, unless the GEO and Commission otherwise agree. It required the Commission to give preference to proposed projects located outside the Lobster Management Area 1 and those that provide employment opportunities for disadvantaged communities, and consider impacts to ratepayers and economic development in the State during selection process. Additionally, it ordered the proposed projects to minimize the effects to scenic views.

Chapter 481[103] also required the Commission, in coordination with the GEO, to "seek to advance regional transmission solutions to interconnect offshore wind power with transmission and distribution utilities, other New England states or entities" and region's bulk power system. It gave the Commission the authority to (but did not require it to) carry out one or more procurements for offshore wind energy transmission infrastructure projects. It requested the PUC to consider the proposed projects' impacts to environment and ratepayers and whether they utilize the existing grid and transmission lines for interconnection during selection process. Key provisions are summarized below:

- **Eligibility**: Offshore wind projects larger than 600 MW or sufficient size that enable cost-competitive commercial-scale development.
- **Location**: The statute implies that eligible generation must have a BOEM lease in the Gulf of Maine. It is unclear whether a procurement would require a project to interconnect onshore within Maine.
- **Products**: energy, capacity, <u>or</u> RECs

[102] U.S. Department of Energy Offshore Wind Market Report: 2023 Edition, Issued May 31, 2023
[103] 35-A M.R.S.A. §3409 Sec. 7, https://legislature.maine.gov/bills/getPDF.asp?paper=SP0766&item=5&snum=131.

- **Quantitative targets**: deploy 3,000 MW capacity of offshore wind energy projects by the end of 2040. E. If the Commission determines that a contract for a greater amount is in the public interest, it may select resources and approve contracts in a greater quantity.
- **Solicitation Approval Timing**: The Commission shall review and make a determination on each solicitation submitted by the GEO within 6 months of submission.
- **Procurement Timing**: The Commission must issue the first RFP by the later of (i) January 15, 2026 or (ii) 3 months after the first BOEM Gulf of Maine auction for offshore wind power leases. Thereafter, the statute provides no visibility as to the frequency or timing of future procurements under this statute. However, if within any 3-year period between January 15, 2026 and January 1, 2039, the Commission has not found a solicitation submitted by the GEO to be reasonably likely to further the objectives of this program it shall expeditiously develop and issue its own RFP consistent with the requirements of this §3407 statute.
- **Procurement objectives**: To further the development and use of offshore wind power projects in the Gulf of Maine, to advance Maine's greenhouse gas emissions reduction obligations and climate policies of this State (under Title 38, section 576-A and Title 38, section 577), renewable energy goals (under section 3210, subsection 1-A) and workforce development efforts.
- **Selection Criteria and Preferences**: Cost-effectiveness for electric ratepayers over the term of the contract, "taking into consideration potential quantitative and qualitative economic, environmental and other benefits to ratepayers." Priority shall be given to project proposals that:
  - Are located outside the Lobster Management Area 1;
  - Project developers that comply with the U.S. Code Title 29 Chapter 158(f) – Agreement covering employees in the building and construction industry;[104]
  - Provide job opportunities for federally recognized Indian tribes in the State, and workers from disadvantaged communities;
  - Contribute to research on offshore wind power projects' environmental impacts;
  - Maximize economic, employment and contracting opportunities for residents of this State and all businesses in this State, and provide economic benefits to the State, including using an offshore wind port; and
  - Provide ratepayer benefits.
- Bidding criteria: The Commission must ensure that contracts are cost-effective for electric ratepayers over the term of the contract, taking into consideration potential quantitative and qualitative economic, environmental and other benefits to ratepayers. Additional specific criteria include:
  - How the proposed projects align with the Maine Offshore Wind Roadmap including stakeholder engagement, capacity building and energy and economic equity of coastal and socially vulnerable communities; achieving economic and community benefits and diversity, equity and inclusion in employment and contracting; and contributing to research on fisheries, wildlife and conservation.
  - A fishing communities investment plan;
  - Entering an agreement to contribute $5,000 per MW of the proposed project to the Offshore Wind Research Consortium Fund; and
  - Fulfilling Community and Workforce Enhancement Standards requirements.

[104] 29 U.S.C. §7-2, https://www.govinfo.gov/content/pkg/USCODE-2010-title29/html/USCODE-2010-title29-chap7-subchapII.htm

6.3.2.3 Northern Maine Generation and Transmission

As described in Section 6.2, the Commission in 2022 issued an RFP seeking renewable generation in Northern Maine and a transmission facility to transmit power from Northern Maine to ISO-NE system.

On June 30, 2023, Governor Mills signed LD 1943 – *An Act Regarding Future Energy Procurements for Renewable Energy Development in Northern Maine* and enacted the bill into PL 2023 Chapter 371.[105] Chapter 371 ordered the PUC to issue RFPs for the development and construction of renewable energy generation projects in northern Maine, in addition to those previously procured in the 2022 Northern Maine solicitation, in order to maximize utilization of the transmission line capacity selected via the 2022 Northern Maine solicitation. This statute required the Commission to approve a contract if selected in accordance with the original Section 3210-I criteria, if determined in the public interest. The commission shall consider prior bids by allowing those bidders an opportunity to submit updated proposals accounting for any previous contract awards (allowing expeditious and cost-effective proposals "in consideration of those previous awards". Preference would be given to any proposal that: (a) demonstrates the greatest likelihood of programmatic success by making sure the transmission line and other generation projects get done; (b) s from a bidder who demonstrates significant experience; and (c) complements thee projects already chosen, but lowers the overall chance of failure by diversifying bidders and economic development opportunities in Northern Maine. If a selected proposal under this subsection is unable to proceed after selection and before commercial operation, the Commission may consider other proposals previously received under in the current or prior Section 3210-I solicitations, and upon finding that such a proposal would support the overall successful implementation of the program, "the Commission shall approve and order a contract or contracts accordingly". Furthermore, the Commission shall conduct the RFP – if practicable – on a schedule to enable selected projects to seek inclusion in the ISO-NE's Third Maine Resource Integration Study and the subsequent cluster system impact study.

As noted in Section 6.2.1, on December 22, 2023, the PUC announced its decision[106] to terminate the procurement which had awarded the 1200 MW Aroostook Renewable Gateway transmission facility to LS Power LS Power and a 1000 King Pine Wind PPA to Longroad.

Ch 371 did not envision termination of the prior Section 3210-I procurement. Following termination as described above, the Commission has announced its intent to issue a new RFP under some combination of authorities directed by either subsection 3 or 3A (the latter pursuant to Chapter 371 in the future, with timing to be determined. At this juncture, it is unclear whether Massachusetts would participate in contracting for a selected project as discussed in Section 6.2.1, although legislation proposed in early 2024 would extend the timeline for Massachusetts to consider coordinated procurement for transmission and generation.[107]

[105] 35-A M.R.S.A. §3210-I (3-A), https://legislature.maine.gov/legis/bills/getPDF.asp?paper=SP0792&item=5&snum=131

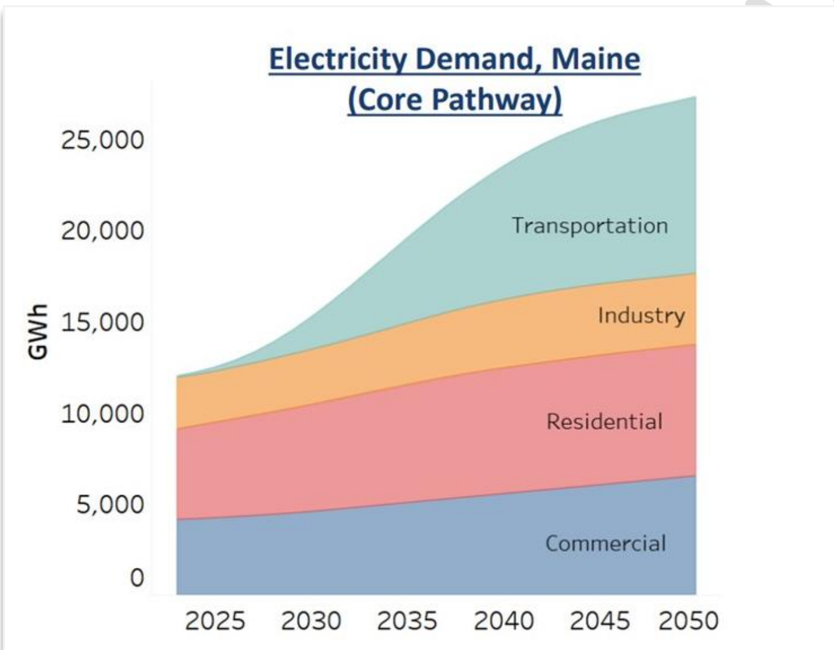
[106] *Versant Power and Central Maine Power Company*, Request for Proposals for Renewable Energy Generation and Transmission Projects Pursuant to the Northern Maine Renewable Energy Development Program, No. 2021-00369, Order (Me. P.U.C. Dec. 22, 2023), https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId=%7b1047928C-0000-C915-85C1-DE73B07A9304%7d&DocExt=pdf&DocName=%7b1047928C-0000-C915-85C1-DE73B07A9304%7d.pdf

[107] H.3216 (193rd Legis. 2024), "Clean Power Anchor Bill", https://malegislature.gov/Bills/193/H3216/BillHistory

6.3.2.4 Future Procurement Needs

In addition, as electrification drives increased load (see Figure 38), additional large-scale renewable energy procurement will need to be considered to meet Maine's objectives. The GEO is currently overseeing a *Pathways to 2040* study[108] which in large part focuses on the policy and procurement needs to achieve Maine's 2040 policy goals and continue to meet them thereafter. Any additional future procurements will need to be deployed to meet potentially shifting objectives and priorities needed to align production and consumption of electricity, integrate large volumes of variable renewable energy generation, and maintain reliability while fulfilling Maine's renewable energy and climate objectives. The specifics will be influenced by 2040 Pathways study underway.

Figure 38: Maine Electricity Demand Outlook[109]



6.4 Options Considerations for Future LSR Procurement Policy in Maine

Like any infrastructure development, renewable energy generation development faces a range of challenges between project proposal commercial operation. Because of the capital-intensivity of fuel-free renewables, attracting capital investment and minimizing the cost of capital have an elevated importance for fuel-free renewables relative to fuel-using resources, placing a premium on revenue certainty. While developers can influence aspects of development risk to a degree by the sites they select, efficacy of local stakeholder engagement and the studies they undertake, there are many drivers of completion risk over which developer has limited or no control with respect to unforeseeable issues, outcomes, or timing, including (but not limited to):

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108 "Maine Energy Plan: Pathway to 2040," Maine Energy Plan: Pathway to 2040 | Governor's Energy Office, accessed February 29, 2024, https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/energyplan2040

109 "Pathway to 2040 Webinar on November 16, 2023" (Portland, ME: Governor's Energy Office, 2023), https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/ME%20GEO%20Pathways%20-%20Stakeholder%20Meeting%203%20-%2016Nov2023.pdf

- Unforeseen issues or impacts arising during studies conducted throughout the development process (wetlands, avian, aviation, historical or cultural resources, to name a few);
- Public acceptance and permitting outcomes beyond technical compliance with regulations and practices at the time of bid submission;
- Availability of hardware component and labor supply chain at timing and cost assumed at the time of a bid (which can rarely be fully locked in before a financial investment decision, and which can be disrupted by regional or international competition or global disruption);
- Unanticipated interconnection costs, including distant network upgrades that may become apparent only after extensive study; and
- Overlapping impacts due to other projects being pursued independently.

In light of the evolving statutory and policy imperatives, the Commission may wish to revisit the allocation of risk components among ratepayers and developers, particularly in light of changing circumstances including the maturation of renewable energy technology, establishment of binding renewable energy and climate goals, and the recent macroeconomic disruptions impacting the renewable energy sector (supply chain, inflation, interest rate increases due largely to COVID-19 and the Ukraine war). A core premise of contracting is to allocate risks to parties best able to manage and mitigate them efficiently. Due to its mandate prior to adoption of the legislative and policy drivers noted in Section 6.3.1, the Commission has historically prioritized protecting ratepayers from risks of exposure to over-market costs or creation of stranded cost, while giving little or no weight to mitigating developer/investor risks. Going forward, the Commission should look for opportunities to mitigate some of the risks developers face where doing so could benefit ratepayers through both lower bid prices and more development success.

As noted in the introduction to Section 6, RPS alone has supported very little renewable energy development without being accompanied by a material hedge for a material proportion of total revenues over a material portion of a generator's economic life. Many of the challenges faced by renewable energy developers - such as those relating to permitting and local acceptance and the time lags and cost allocations associated with the interconnection process - are largely outside of the Commission's scope and beyond the scope of this report, there are many modifications which the Commission can consider to derisking procurement and contracting which can improve project success and reduce cost.

6.4.1 New Supply Procurement

This section identifies a series of options for consideration for deploying large-scale renewables procurements towards effectively achieve the state's policy objectives, based on consideration of Maine's past large-scale renewable energy procurement and contracting experience, upcoming procurement events required by the legislature, the state's renewable energy and climate laws, policies and goals, and industry procurement practices, experience and best practices in other competitive market states and beyond. The potential changes detailed below hold the promise of more successful procurement and contracting outcomes, including reduced bid prices and increased successful deployment of projects selected for award. Suggestions to achieve other objectives are also provided. The SEA team notes that many suggestions come with explicit or implied tradeoffs, and these are noted as well.

Objective: Reduce risk exposure to changing circumstances between bid development and contract approval				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Minimize time lag between price quote and approved contract	Volatility in cost drivers	Best practice[110]	Reduce Risk and probability that costs will change between bid development and contract approval	Requires streamlining of Commission review process
Bid price inflation indexing and/or interest rate indexing through contract approval (or later, e.g., financial investment decision or receipt of permits)	Volatility in cost drivers	Recent New York and New England offshore wind procurements and New York Large-Scale (land-based) REC procurement	Insulate bidder versus exogenous risks	While competitively neutral, ratepayers share a risk previously borne exclusively by bidders
Simplify RFP evaluation process or criteria, substituting higher financial repercussions for required due diligence	Number of criteria, nature of requires analysis or number of cases (testing multiple futures to assure robust benefits), subjective criteria all require material effort and time[111]	Supports minimized lag best practices	Reduced PUC staff and consultant effort required, shortens decision timelines	Effort required to streamline.

Objective: Increase yield, i.e. Increase probability of selected projects reaching commercial operation				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Increased minimum bid threshold requirements and evaluation requirements, particularly with respect to project maturity, e.g., land control, permitting progress or completion, interconnection status, minimum bidder experience thresholds	Immature projects or inexperienced developers, evolving permitting and interconnection standards	Best practice[112]	Projects evaluated will have cleared some viability hurdles	Higher thresholds comes at the expense of (potentially illusory) aggressive price competition, as increased maturity will reduce applicants, all else equal

[110] Based on SEA's 2017-2018 study on International Best Practices in Renewable Energy Procurement

[111] The Commission found that "the long-term contracting process has been extremely resource intensive for both the Commission and bidders". *Public Utilities Commission*, Inquiry Findings and Conclusions, No. 2015-00058, Order (Me. P.U.C. Feb. 1, 2018), https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/ViewDoc.aspx?DocRefId=%7b358B92E9-4AED-4A51-B779-A37E1F3C2EC3%7d&DocExt=pdf&DocName=%7b358B92E9-4AED-4A51-B779-A37E1F3C2EC3%7d.pdf. In the Commission's Order under Docket 2015-00058 Inquiry into the goals and objective for long-term contracting under the authority contained in 35-A M.R.S. § 3210-C (p. 6)

[112] Based on SEA's 2017-2018 study on International Best Practices in Renewable Energy Procurement

Objective: Increase yield, i.e. Increase probability of selected projects reaching commercial operation				
Require material pre-operational security (refundable only if reach COD) in addition to operation-phase security[113]	Low bar to participation by poorly funded, inexperienced or speculative developers	Best practice[114]	Reduce speculative bidding buy underpriced projects Attract real projects and bidders with financial wherewithal who may have been discouraged by low barriers to speculative bidders	will reduce applicants (but many of the applicants may not have been viable)
Establish contractual milestones for COD and key interim milestones, which may be extended in increments (e.g., 6 months), through posting of additional security	Give projects a better chance to achieve COD, within reason, acknowledging the challenges of development; Onerous on the Commission / staff to consider extension applications case by case vs. automatic rights to extend.	Best practice adopted by most other states in Northeast	Project making progress will post additional security those not will drop out. Reduces exposure to exogenous risks	none
Purchase RECs	Insufficient revenue certainty to secure financing, limited market opportunities to secure long-term market REC offtake	Universal practice adopted in similar contexts	Materially increased probability of securing viable bids relative to PPAs not procuring RECs; reduced effective energy bid prices due to reduced risk premium.	Some possibility that REC transaction could someday be above market[115]
Purchase or hedge capacity (financially, via a netting of capacity revenue received against contract payments)	Insufficient revenue certainty to secure financing, limited market opportunities to secure long-term market capacity offtake; increased uncertainty created by	Increases probability of financing. Adopted by NYSERDA for REC and OREC contracting, as well as NJ and MD ORECs.	Modestly increased probability of securing viable bids relative to PPAs not procuring RECs; reduced effective energy bid prices	Some possibility that capacity transaction could someday be above market.

[113] Review experience in other states to identify a level that balances a high enough bar to reduce speculative bidding but not so high as to materially increase bid prices.

[114] Based on SEA's 2017-2018 study on International Best Practices in Renewable Energy Procurement

[115] Note that the practice of procuring RECs and thereby enabling projects to get financed and built will reduce spot market prices *relative to what they would have been*. In this context, the appropriate benchmark for whether a past REC purchase is over market is what REC prices would have been absent the purchase (and others like it), not the current spot REC price. However, the former can only be estimated by modeling, while the latter is calculable. It is for this reason that retrospective analysis of overmarket costs of contracting RECs may have an inherent bias towards overstating the costs.

Objective: Increase yield, i.e. Increase probability of selected projects reaching commercial operation				
	adoption of capacity accreditation reform.	Pursued in some past cases in Maine.	due to reduced risk premium.	
Align timing of procurements to align/synchronize with ISO-NE transmission cluster studies	Uncertain interconnection constraints and costs	Reducing uncertainty	Reduce risk premium, and/or reduce likelihood of bids whose interconnection costs turn out to be well above what assumed at time of RFP	Lack of Commission control over ISO-NE study timeframes.

Objective: Increase bid volume (increasing competition, reducing bid prices)				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Create visibility to long-term schedule of future series of procurement events	Lack of signals for long-term investment in multi-year development efforts; Lack of information on next available procurement opportunity encouraging bids from immature projects.	New York has established a regular schedule of annual (for land-based renewables) procurements	Attract long lead-time investment in a robust development pipeline, by providing better-understood opportunity for return on at-risk development investments. Encourage bidders to focus on bid events for which they have sufficient maturity to bid with low risk and reduced contingencies. Less Commission & consultant time in reviewing and evaluating projects that are viability-impaired. Fewer projects that are underpriced (would have failed anyway).	Lack of long-term procurement authority.
Make procurement volumetric targets material and visible (or at least, a range)	Procurements without targets or minimums are often viewed by developers as 'fishing expeditions, not meriting significant investment in bid preparation because of unclear commitment to buy.	The firmer the commitment, the more a multi-state develop will find the Maine market attractive relative to other opportunities to invest their development resources.	Attract interest from experienced developers, increasing competition.	Lack of statutory authority (at times; recent and upcoming procurements have been clearer than prior procurement policies)

Objective: Increase bid volume (increasing competition, reducing bid prices)				
Consider regional (e.g., delivered to ISO-NE or NMISA, rather than located in-state) eligibility.[116]	Most cost-effective interconnection points (e.g., for Gulf of Maine offshore wind) may be in NH or MA	Other NE states procure from region. Commerce Clause compliance concerns.	Support Maine's participation in regional solutions that can tap optimal scale economies, interconnection point. Increased price competition.	Possible loss of some in-state economic benefits.

Objective: Reduce costs and risk premiums that developers would need to price into bids				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Establish clear security requirements in RFP	Past procurements practice of establishing security on a 'case-by-case' basis. Different security requirements may create unlevel competitive plaing field.	Posting security has a cost. Not knowing required security before price bid introduces uncertainty which may impact proposed pricing or other T&Cs. Best practices pre-specify required security per-unit.	Removal of an uncertainty from bidder may reduce bid price or risk of failure.	
Bid price inflation indexing and/or interest rate indexing through date of financial investment decision (when all costs are actually locked in by developer)	Volatility in cost drivers, which continues to be an exposure following contract approval until the financial investment decision	Recent New York and New England offshore wind procurements	Insulate bidder versus exogenous cost change risks between bid and resolution of cost uncertainties	While competitively neutral, ratepayers share a risk previously borne exclusively by bidders
Align timing of procurement with timing of any planned transmission and/or interconnection solutions	Uncertainty adds cost, effort	Reduces uncertainty	Reducing cost of bid development, submission for multiple hypothetical interconnection injection points, and cost of evaluation of extra bid proposals	Lack of control over timing of transmission and/or interconnection solutions

[116] While many RFPs to date have not explicitly forbidden generation not located in Maine, the way RFPs have been drafted, along with evaluation criteria, have strongly discouraged bids from regional resources located outside of Maine. Practically, because of the location of the region's developable resource potential, most land-based would come from Maine, if energy must be delivered to ISO-NE.

Objective: Enable more rapid recycling of procurement authority				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Inclusion of and enforcement of milestones including interim milestones (such as land control, filing of interconnection application, receipt of permits, interconnection agreement executed, financial closing)	Lack of interim milestones results in non-viable projects taking up space in procurement queue until they miss COD milestone, that could be cleared earlier and replaced.	Best practice, frequently deployed.	Allow the Commission to timely clear the 'deadwood' shortly after non-viability becomes apparent, allow for termination and replacement of non-performing projects in a timely manner	none

Objective: Hedge ratepayer costs of RPS compliance and provider of last resort service				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Buy RECs to Hedge ratepayer REC cost, capacity to hedge ratepayer capacity costs; require retirement or in-state resale.	Energy-only purchases providing hedge only on energy. RECs not procured can go to other states; or to ME load-serving entities at or near ACP if supply is short.	RECs may be sold into other states who claim them towards their own goals.	Capture RECs associated with procurement towards state goals, in a way that hedges ratepayer costs.[117]	Hedges reduce volatility of outcomes, do not always reduce cost.

[117] Connecticut DEEP noted that it supports efforts by the Public Utilities Regulatory Authority to "also investigate changes to the existing contracting model, such as exploring whether resources contracted by the EDCs to achieve state policy goals should be directly used to serve state load as opposed to being used as a financial hedge as they are now, and whether some or all of the environmental attributes of contracted resources should be used directly to meet the EDCs' RPS or similar zero carbon energy accounting requirements, rather than the buy-sell-rebuy approach to RECs from contracted resources that is in place today". Connecticut Department of Energy & Environment Protection (DEEP), Draft Report on Select Connecticut Energy Supply Issues 46 (Feb. 20, 2024), https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:c9f1d5ea-77a8-4f4d-b378-13105078a886

Objective: Discourage poor generator locational decision				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Adopting negative LMP / congestion provisions in standard contracts that limit compensation to projects during some (e.g., bound # of hours) or all times during which energy prices are negative. [118]	Bidders may face few signals discouraging location in congested areas, exacerbating congestion and curtailment	Variants deployed in most recent large-scale renewables RFPs in the region. Section 3210-J program rulemaking in Docket 2024-00028 to consider congestion and curtailment effects of the proposed project on other renewable resources.	Guide better locational decision or otherwise mitigate potential curtailment of operating renewable energy supply	Increases revenue risk to bidders, particularly if unbounded, increasing bid prices. Bidders face basis risk and price suppression risk due to subsequent project development.

Objective: Specific recommendations relating to the new Northern Maine Generation and Transmission procurement				
Recommendation	Driver	Rationale, Example	Impact	Tradeoffs
Allow bids overloading the line and/or bundling non-coincident supply and/or storage	High fixed-cost transmission regardless of capacity factor over the line, means low capacity factor leads to high per unit costs	NYSERDA Tier 4 procurement example.[119]	Maximizing capacity factor of generation over transmission line to reduce per-unit cost	Note that generation+storage in excess of line capacity may be limited by ISO-NE Loss-of-Source Limit of 1,200 MW; ISO-NE is considering changes to this limit during 2024
Consider allowing joint transmission and generation bids	Lack of ability to package non-coincident resources and negotiate prioritization rues at constrained times when Transmission and Generation procured seprately	NYSERDA Tier 4 procurement example.[120]	Seeking bundled generation and transmission for a single delivered price allowed for the bidders to negotiate and offer bundles that took greatest advantage of opportunities for a generation package to increase capacity factor	ISO-NE loss of line limit; Anti-competitive concerns to navigate in RFP construction.

[118] As noted in Section 6.3.1, in Docket 2023-00054 which was opened in response to a Petition to Modify the Standard Form Power Purchase Agreements jointly filed by the Office of the Public Advocate, the Union of Concerned Scientists, Brookfield Renewables, and Onward Energy on March 3, 2023, the petitioners are seeking such changes. The Commission has taken comment on this approach but has yet to make any ruling.

[119] Bob Grace and Po-Yu Yuen, "Reflections on the Northern Maine Transmission Line Redux" (Framingham, MA: Sustainable Energy Advantage, LLC, February 28, 2024), https://e2tech.org/EmailTracker/LinkTracker.ashx?linkAndRecipientCode=wcatOs7qvTDZPff%2faV4C%2bkyXlsfWKyF%2feMuluZNYfirHGNIz2QinO%2fO7LMZhNT3RBzHApeFJaWzSqO2K7EGuwLrg8gpFTCH9lVjIdMpYo3Q%3d

[120] Ibid.

Objective: Specific recommendations relating to the new Northern Maine Generation and Transmission procurement				
Coordinate up front with other states with whom selected generation and transmission offtake may be shared	Challenges exposed in first round of Section 3210-I procurement,	Not doing so introduces significant risk, as highlighted by LS Power in January letter	avoid adding complexity post-bid	Coordination presents its own challenges. Examine the MA/CT/RI offshore wind MOU[121] as a model for multi-state coordination and collaboration

[121] *Offshore Wind Multi-State Coordination Memorandum of Understanding (MOU)* (Massachusetts Department of Energy Resources, Connecticut Department of Energy and Environmental Resources, Rhode Island Office of Energy Resources, October 3, 2023), https://www.mass.gov/doc/ma-ri-ct-offshore-wind-procurement-collaboration-memorandum-of-understanding/download

In addition to the specific adjustments to the procurement and contracting policies deployed by the Commission in the recent past, there are other alternatives being considered in other Northeast states that represent entirely different approaches to procurement. These approaches would be much bigger lifts requiring further research and extensive work involving other parties, and hence may be many years away. They are included here for completeness.

Build-Operate-Transfer (BOT) contract or model

Maine could consider adopting an approach in which a utility or a public agency/ state authority with ability to finance/own competitively procured generation, would competitively procure resources to be built for them, and which they would own. The benefits of such an approach could include lower cost of capital, and capturing the residual (post-contract) value of generation products. However, this approach would face many obstacles, including resistance from many impacted entities, costs and risks associated with the transition, conflict with the current competitive market model, etc. New York's investor-owned utilities have been arguing for years that allowing them to own generation would reduce cost[122] (due in large part to cost of capital and residual value arguments). New York's legislature recently authorized the New York Power Authority to develop, purchase or own generation.[123]

Forward Clean Energy Market (FCEM)

A regional FCEM is a concept conceptualized to bring long-term contracting for clean energy resources into the wholesale markets. The concept would eliminate the concept of 'out-of-market' costs or conflict with competitive markets, by allowing states and other entities to submit demand bids to an entity running regional procurements under contract to the participating entities or other institutional home, with payments, settlement and collections cleared through the ISO-NE settlement system. This concept has been discussed in NEPOOL/ISO-NE for the last six or more years, and the Massachusetts DOER sponsored a draft conceptual design document released in early 2023 for a New England FCEM market.[124] New Jersey is actively pursuing such an approach with PJM.[125] There are many potential variants to the FCEM model, and a litany of design and implementation complexities. The concepts put forward to date present an alternative means (versus buying RECs) to hedge generation attributes by embedding them as a load-serving entity requirement, and enabling a regionally shared structure. The approach leaves much risk (unhedged energy ad capacity revenue) on bidders, but in combination with Maine procurement of energy (and possibly capacity), might provide an alternative approach to providing generators a more complete revenue hedge 'in market' that would increase project viability and reduce ratepayer cost.

6.4.2 Supporting /Maintaining Existing Supply

Supporting continued generation from operating legacy (pre-restructuring) renewable energy generation, and eventually, older generation from generation brought into operation post-restructuring, makes sense from a land-use perspective and an economic perspective so long as the all-in cost per MWh of new generation exceeds to costs required to maintain production from operating facilities (when adjusted for the difference in value due to different production profiles or location). Owners of operating facilities experiencing equipment failures or degradation due to aging beyond their useful

[122] *Joint Utilities*, Petition of The Joint Utilities Concerning the Trade of Value Of Distributed Energy Resources Tier 1 Renewable Energy Credits, No. 15-E-0302 (N.Y. P.S.C. Nov. 14, 2023), https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=15-E-0302&submit=Search

[123] New York P.L. 2023 Ch. 56, https://www.nysenate.gov/node/12008687

[124] Massachusetts Department of Energy Resources, The Brattle Group & Sustainable Energy Advantage, Proposed Market Rules for New England Forward Clean Energy Market (Jan. 2023), https://www.mass.gov/doc/ma-doer-fcem-design-proposal/download

[125] New Jersey Board of Public Utilities, 2022 Progress Report on New Jersey's Resource Adequacy Alternatives (Updated March 2023), https://www.nj.gov/bpu/pdf/publicnotice/Staff's%202022%20Resource%20Adequacy%20Investigation%20Report_2023%20Revisions.pdf

lives will need to justify investments in maintenance, overhauls, replacements, refurbishments and/or repowering. The less costly of these options may be supportable under expected market revenues, or through achieving eligibility under a Class I RPS (as with Maine's 'refurbishment/operating beyond previous useful life' provisions.[126] However, larger investments in equipment replacement, refurbishment or repowering with a multi-year payback period maybe challenging to justify in the presence of sufficient revenue certainty or political/regulatory certainty is a barrier to larger investments. These observations support consideration by Maine's legislators, policymakers and regulators of creating procurement and contracting opportunities for legacy renewable energy generation as leveling the playing field by enabling retention of legacy supply at cost below that of replacement with new generation. As the per-unit scale of investment may be lower than that of new generation, investment in extending the life of (or reusing the site of) a legacy generator may not require the same degree of support – in terms of duration or products hedged – as required for attracting investment to new renewable generation projects.

Maine has some experience with soliciting and contracting to support existing, operating generation projects, as discussed in Section 6.2.1.3, including recently under Section 3210-G procurements. While a comprehensive global study of experience with contracting for existing renewable energy generation is beyond the scope of this report, there is very little experience in retail competitive markets with state-sponsored procurement targeting existing clean energy.[127]

- Connecticut has procured nuclear energy and associated generation attributes under its Zero Carbon RFP,[128] contracting for both Millstone and Seabrook supply, in a procurement that also sought new largest-scale renewables. The SEA team observes that the procurement process was extended and complex, and for those reasons may not serve as a good model for Maine.
- The New York State Energy Research and Development Authority (NYSERDA) conducted three 'Tier 2' solicitations offering 3-year contracts for legacy supply ineligible for its Tier 1 Renewable Energy Standard.[129] Ultimately NYSERDA elected to procure very little supply: three small hydroelectric projects totaling about 14 MW were selected under the first round of procurement, while under the second and third procurements, no awards were offered as "all bids exceeded the Maximum Bid Price set by NYSERDA and the Department of Public Service". Ultimately, since most eligible supply was eligible for Class I RPS compliance markets in neighboring states, NYSERDA elected to set a Maximum Bid Price that could not compete with other revenue sources available to eligible projects.

Because Maine has a material fleet of legacy renewable generation, going forward, Maine's policymakers may wish to study the prospects, needs and investments required for continuation of the legacy renewable energy supply, and consider whether, as the fleet grows and ages, alternative of supplemental means to support continued operation and/or repowering of such generation would be merited, beyond Chapter 311 refurbishment/operating beyond useful life eligibility provisions. If such study supports a procurement policy, Maine may wish to consider pilot programs structured as either head-to-head with new supply, or existing-only procurements.

[126] 65-407 C.M.R. ch. 311, § 2(T)(4), https://www.maine.gov/sos/cec/rules/65/407/407c311.docx
[127] In contrast, municipal light plants and Vermont utilities not subject to retail competition have actively sought legacy renewables supply under medium to longer term contracts as part of building their clean energy portfolios.
[128] Connecticut Department of Energy and Environmental Protection, 2020 Integrated Resources Plan – Appendix A6 (Oct. 2021), https://portal.ct.gov/-/media/DEEP/energy/IRP/2020-IRP/Appendix-A6--Procurement-Selections-and-Pricing.pdf
[129] "Competitive Tier 2 Program," NYSERDA, accessed March 12, 2024, https://www.nyserda.ny.gov/All-Programs/Large-Scale-Renewables/Tier-Two-Competitive-Program

6.4.3 Process and Authority

Historically, Maine's legislature has been both fairly prescriptive and narrow in directing renewable energy procurement obligations and/or authority to the Commission and (more recently with offshore wind) the GEO; in addition, procurement statutes have recently been adopted with little lead time for the Commission to act, limiting the opportunity for the Commission to evolve from 'off the shelf' procedures, RFPs and standard contracts.

In the peer states discussed earlier in Section 6.2.3, the state commissions and/or energy offices often are granted a degree of latitude in conducting procurements. In New York (New York State Energy Research and Development Authority, NYSERDA), Massachusetts (Department of Energy Resources, DOER), Connecticut (Department of Energy and Environmental Protection, DEEP), and Rhode Island, (Office of Energy Resources, OER), the agency has the direction role of conducting procurements subject to procurement statute that is higher level, leaving various degrees of latitude to expert agencies, or of working with the state's utilities in developing and conducting the procurement. The New York Public Service Commission has given NYSERDA material authority to design and execute solicitations subject to Orders approving programs and 'Implementation Plans' and does not need to approve individual or aggregate selections under specific procurement events. Connecticut DEEP has been granted by the legislature several tranches of broad authority (eligibility and quantity) pursuant to several distinct statutes, which it may utilize when it determined necessary through its biennial Integrated Resource Plan process. Massachusetts DOER has been granted authority by the legislature for several tranches of procurement authority, some through prescriptive statute and some with considerable latitude regarding whether and when to seek supply. Rhode Island's electric distribution company has been granted very open-ended authority by the legislature to (in consultation with OER) procure and bring forward for consideration selected projects for Public Utilities Commission consideration. The New Jersey Board of Public Utilities has been granted prescriptive authority to conduct multiple offshore wind renewable energy (OREC) procurements to meet state goals.

Given the evolving circumstances and statutory requirements, and the procurement lessons learned, best practices and considerations raised earlier in this section, there are opportunities to consider whereby reducing developer risk may benefit ratepayers. While the legislature could consider implementing prescriptive changes directly, and alternative may be for the legislature to consider granting some combination of the GEO and the Commission with broader procurement authority, along with the time to study and consider potential procurement suggestions and perhaps other opportunities for procurement and contract design where reducing developer risk can benefit ratepayers, and the latitude and to adopt and incorporate changes it determines are in the public interest. Several of Maine's peer states with similar ambitious renewable energy and climate goals, have elected to establish statutory goals (objectives, eligibility, quantity, key criteria) while granting authority and latitude to their expert agencies to run processes to study and identify optimum approaches, and work out the details with such latitude.

Appendix A: Facilities Currently Certified for Maine Class I, IA, and Thermal RECs

List derived from approved RPS Class I, IA, and TREC Renewable Resources Applications, last updated March 8, 2024[130]

Unit Name	State	Fuel Type	Eligibility		
			Class I	Class IA	TRECs
Loring Bioenergy	ME	BioFuel	Yes	No	NA
Village Green Brunswick Landing ADS - ADS #1	ME	Biogas	Yes	Yes	NA
Greenville Steam Company	ME	Biomass	Yes	Yes	NA
Lincoln Paper and Tissue - TG-3	ME	Biomass	Yes	Yes	NA
Expera - Biomass Boiler - Turbine #6	ME	Biomass	Yes	Yes	NA
SAPPI NORTH AMERICA, INC	ME	Biomass	Yes	Yes	NA
Expera -- Biomass Boiler - Turbine #4	ME	Biomass	Yes	Yes	NA
BUCKSPORT - G2 and G3	ME	Biomass	Yes	Yes	NA
Moose River Lumber - Moose River Unit #1	ME	Biomass	Yes	Yes	NA
Irving Forest Products - Unit #1	ME	Biomass	Yes	Yes	NA
Androscoggin - Androscoggin G-1,2,3	ME	Biomass	Yes	Yes	NA
The Jackson Laboratory - JAX Biomass	ME	Biomass	Yes	Yes	NA
COVANTA JONESBORO	ME	Biomass	Yes	Yes	NA
SAPPI SOMERSET/HINCKLEY	ME	Biomass	Yes	Yes	NA
Rumford Paper Company - No4	ME	Biomass	Yes	Yes	NA
ATHENS ENERGY LLC	ME	Biomass	Yes	Yes	NA
COVANTA WEST ENFIELD	ME	Biomass	Yes	Yes	NA
REENERGY STRATTON	ME	Biomass	Yes	Yes	NA
REENERGY LIVERMORE FALLS	ME	Biomass	Yes	Yes	NA
GEORGES RIVER ENERGY	ME	Biomass	Yes	Yes	NA
SAPPI SOMERSET/HINCKLEY 2	ME	Biomass	Yes	Yes	NA
SAPPI - Somerset Hill Hogged Fuel Boiler #2	ME	Biomass	Yes	Yes	NA
Old Town Mill	ME	Biomass	Yes	NA	NA
EXETER AGRI ENERGY	ME	Digester gas	Yes	Yes	NA
ORONO A	ME	Hydroelectric	Yes	No	NA
UNION GAS STATION	ME	Hydroelectric	Yes	No	NA
KEZAR MIDDLE FALLS	ME	Hydroelectric	Yes	No	NA
YORK HYDRO	ME	Hydroelectric	Yes	Yes	NA
GOOSE RIVER HYDRO, INC.	ME	Hydroelectric	Yes	No	NA
CORRIVEAU HYDROELECTRIC LLC	ME	Hydroelectric	Yes	No	NA
Livermore Falls - Livermore No. 1-8	ME	Hydroelectric	Yes	Yes	NA
Otis - Otis No. 2	ME	Hydroelectric	Yes	Yes	NA
WORUMBO HYDRO	ME	Hydroelectric	Yes	Yes	NA
ORONO B HYDRO	ME	Hydroelectric	Yes	Yes	NA
Dolby Facility	ME	Hydroelectric	Yes	Yes	NA
Millinocket Facility	ME	Hydroelectric	Yes	Yes	NA
MADISON COMPOSITE	ME	Hydroelectric	Yes	Yes	NA
RUMFORD FALLS	ME	Hydroelectric (Qualified)	Yes	Yes	NA

[130] "Maine Renewable Portfolio Standard," MPUC, https://www.maine.gov/mpuc/regulated-utilities/electricity/renewable-programs/rps

Unit Name	State	Fuel Type	Eligibility Class I	Class IA	TRECs
HARRIS 1, 2, 3,4	ME	Hydroelectric (Qualified)	Yes	Yes	NA
Millinocket Facility	ME	Hydroelectric	Yes	Yes	NA
Dolby Facility	ME	Hydroelectric	Yes	Yes	NA
Norway Hydro_KEI	ME	Hydroelectric	Yes	Yes	NA
Deer Rips Facility - Unit 1	ME	Hydropower	Yes	Yes	NA
PINE TREE LFGTE	ME	Landfill gas	Yes	Yes	NA
CROSSROADS LANDFILL	ME	Landfill gas	Yes	Yes	NA
Cobscook Bay Tidal Energy Project	ME	Ocean Tidal	Yes	Yes	NA
SunGen StepGuys	ME	Solar Photovoltaic	Yes	Yes	NA
Labrie Farms - System #1	ME	Solar Photovoltaic	Yes	Yes	NA
Fog Hill - Fog Hill	ME	Solar Photovoltaic	Yes	Yes	NA
Caribou F-M system # C - Neal Griffeth System C	ME	Solar Photovoltaic	Yes	Yes	NA
Caribou F-M system #A - Neal Griffeth System A	ME	Solar Photovoltaic	Yes	Yes	NA
Caribou F-M system #B - Neal Griffeth System B	ME	Solar Photovoltaic	Yes	Yes	NA
SP Real Estate - SP Real Estate	ME	Solar Photovoltaic	Yes	Yes	NA
Birch Haven - Birch Haven	ME	Solar Photovoltaic	Yes	Yes	NA
Ward, Ryan - Ward, Ryan	ME	Solar Photovoltaic	Yes	Yes	NA
Mancinelli, Isabel - Mancinelli, Isabel	ME	Solar Photovoltaic	Yes	Yes	NA
PITTSFIELD SOLAR	ME	Solar Photovoltaic	Yes	Yes	NA
Colby College Solar Field	ME	Solar Photovoltaic	Yes	Yes	NA
Sundog Solar LLC - Sundog Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Waldoboro - Waldoboro	ME	Solar Photovoltaic	Yes	Yes	NA
Stockton Springs Solar - Stockton Springs	ME	Solar Photovoltaic	Yes	Yes	NA
Pratt Chevrolet - Pratt Chevrolet	ME	Solar Photovoltaic	Yes	Yes	NA
SFSFG - SFSFG - 336 Fowler	ME	Solar Photovoltaic	Yes	Yes	NA
Bridgeo, John	ME	Solar Photovoltaic	Yes	Yes	NA
Bendheim, Catherine - SE 3800	ME	Solar Photovoltaic	Yes	Yes	NA
Chatfield, Chris - Chatfield, Chris	ME	Solar Photovoltaic	Yes	Yes	NA
Roux Center Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Town of Bristol - Town of Bristol	ME	Solar Photovoltaic	Yes	Yes	NA
Boothbay Facility -	ME	Solar Photovoltaic	Yes	Yes	NA
Mt Desert Facility - Mancinelli	ME	Solar Photovoltaic	Yes	Yes	NA
Chris Noyes - Chris Noyes	ME	Solar Photovoltaic	Yes	Yes	NA
Town of Tremont - Town of Tremont	ME	Solar Photovoltaic	Yes	Yes	NA
Cranberry Isle Fishermans Co-op	ME	Solar Photovoltaic	Yes	Yes	NA
Fogtown Brewery - Fogtown Brewery	ME	Solar Photovoltaic	Yes	Yes	NA
Wiscassett Water District	ME	Solar Photovoltaic	Yes	Yes	NA
Bricknell, Ian - Bricknell, Ian	ME	Solar Photovoltaic	Yes	Yes	NA
North Branch Farm - North Branch Farm	ME	Solar Photovoltaic	Yes	Yes	NA
David Berry - David Berry	ME	Solar Photovoltaic	Yes	Yes	NA
Brian & Luana Smith - Brian & Luana Smith	ME	Solar Photovoltaic	Yes	Yes	NA
Camacho - Camacho	ME	Solar Photovoltaic	Yes	Yes	NA
Decourcey - Decourcey	ME	Solar Photovoltaic	Yes	Yes	NA
Limestone Water and Sewer District	ME	Solar Photovoltaic	Yes	Yes	NA
Dale Roy - Dale Roy #1	ME	Solar Photovoltaic	Yes	Yes	NA

Unit Name	State	Fuel Type	Eligibility Class I	Class IA	TRECs
Labrie Farms #2 - Labrie Farms #2	ME	Solar Photovoltaic	Yes	Yes	NA
Yarmouth Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Bar Harbor Facility-Skylines	ME	Solar Photovoltaic	Yes	Yes	NA
Ellsworth Facility - Happytown	ME	Solar Photovoltaic	Yes	Yes	NA
Tremont Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Tremont Facility - Southeast Creek	ME	Solar Photovoltaic	Yes	Yes	NA
Dedham - Deer Path	ME	Solar Photovoltaic	Yes	Yes	NA
Freeport Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Topsham Facility	ME	Solar Photovoltaic	Yes	Yes	NA
GWH Moody School	ME	Solar Photovoltaic	Yes	Yes	NA
South Portland Landfill	ME	Solar Photovoltaic	Yes	Yes	NA
233 North - 233 North	ME	Solar Photovoltaic	Yes	Yes	NA
David Clark - David Clark	ME	Solar Photovoltaic	Yes	Yes	NA
Withee - Withee	ME	Solar Photovoltaic	Yes	Yes	NA
Power Gripps - Power Gripps	ME	Solar Photovoltaic	Yes	Yes	NA
Killian - Killian	ME	Solar Photovoltaic	Yes	Yes	NA
Garner - Garner	ME	Solar Photovoltaic	Yes	Yes	NA
Manza - Manza	ME	Solar Photovoltaic	Yes	Yes	NA
Stockton Springs Solar Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Bar Harbor Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Caribou Solar Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Sanford Airport Solar Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Sheepscot Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Falmouth Library	ME	Solar Photovoltaic	Yes	Yes	NA
Freeport Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Cumberland Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Good Shepherd	ME	Solar Photovoltaic	Yes	Yes	NA
New Dimensions Federal Credit Union	ME	Solar Photovoltaic	Yes	Yes	NA
MSAD 75	ME	Solar Photovoltaic	Yes	Yes	NA
Town of Windham	ME	Solar Photovoltaic	Yes	Yes	NA
Dirt Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Gray Landfill	ME	Solar Photovoltaic	Yes	Yes	NA
Shaw Brothers	ME	Solar Photovoltaic	Yes	Yes	NA
Euphoria 415 LLC	ME	Solar Photovoltaic	Yes	Yes	NA
CLC YMCA	ME	Solar Photovoltaic	Yes	Yes	NA
Town of Oakland	ME	Solar Photovoltaic	Yes	Yes	NA
Downeast Concepts	ME	Solar Photovoltaic	Yes	Yes	NA
Hospice of Southern Maine	ME	Solar Photovoltaic	Yes	Yes	NA
Farmington Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Acton H Road Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
Naples Casco Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
Perkins Road Belfast Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Pequawket Trail Baldwin Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Enterprise Ave Gardiner Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Route 32 China Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Avesta Livermore Terrace	ME	Solar Photovoltaic	Yes	Yes	NA

Unit Name	State	Fuel Type	Eligibility Class I	Class IA	TRECs
Nonni Corp	ME	Solar Photovoltaic	Yes	Yes	NA
Rowells Garage	ME	Solar Photovoltaic	Yes	Yes	NA
North Nobleboro Solar	ME	Solar Photovoltaic	Yes	Yes	NA
BWC Maces Pond	ME	Solar Photovoltaic	Yes	Yes	NA
New Gen Venture_S_Portland	ME	Solar Photovoltaic	Yes	Yes	NA
Morningstar Marble and Granite	ME	Solar Photovoltaic	Yes	Yes	NA
Solar Mgt Int_Waterboro	ME	Solar Photovoltaic	Yes	Yes	NA
Bissel Brothers Brewing Co	ME	Solar Photovoltaic	Yes	Yes	NA
ECA Maine BET	ME	Solar Photovoltaic	Yes	Yes	NA
Camden Solar LF	ME	Solar Photovoltaic	Yes	Yes	NA
Naples Casco Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
Acton H Road Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
Revision-110 Main Street	ME	Solar Photovoltaic	Yes	Yes	NA
Thomaston Pollution Control	ME	Solar Photovoltaic	Yes	Yes	NA
HEP USA SPV5 Unity LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Calibrant South Portland	ME	Solar Photovoltaic	Yes	Yes	NA
Paradise Park	ME	Solar Photovoltaic	Yes	Yes	NA
Port Property Mgt	ME	Solar Photovoltaic	Yes	Yes	NA
HEP USA SPV 6 Hartland	ME	Solar Photovoltaic	Yes	Yes	NA
Midcoast Recreation Center	ME	Solar Photovoltaic	Yes	Yes	NA
JB Brown & Son Portland	ME	Solar Photovoltaic	Yes	Yes	NA
HO Bouchard Inc.	ME	Solar Photovoltaic	Yes	Yes	NA
Good Shepherd Food Bank	ME	Solar Photovoltaic	Yes	Yes	NA
Nyle Systems LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Caribou Solar Power LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Milo CSG, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
1 IDEXX Drive PV	ME	Solar Photovoltaic	Yes	Yes	NA
Alabama RD Loring Development Authority	ME	Solar Photovoltaic	Yes	Yes	NA
Augusta Road Bowdoin Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Gorham Savings	ME	Solar Photovoltaic	Yes	Yes	NA
Norridgewock River Road	ME	Solar Photovoltaic	Yes	Yes	NA
Maine DG Holding - Monmouth	ME	Solar Photovoltaic	Yes	Yes	NA
Maine DG Holding - W Baldwin	ME	Solar Photovoltaic	Yes	Yes	NA
Maine DG Holding - Augusta	ME	Solar Photovoltaic	Yes	Yes	NA
Town of Searsport	ME	Solar Photovoltaic	Yes	Yes	NA
Re Sidney Rd Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Searsmont Rd Lincolnville	ME	Solar Photovoltaic	Yes	Yes	NA
NextGrid Mangrove	ME	Solar Photovoltaic	Yes	Yes	NA
NextGrid Peppertree	ME	Solar Photovoltaic	Yes	Yes	NA
NextGrid Cliffrose	ME	Solar Photovoltaic	Yes	Yes	NA
New Gen Ventures_Yarmouth	ME	Solar Photovoltaic	Yes	Yes	NA
City of S Portland Rec	ME	Solar Photovoltaic	Yes	Yes	NA
Church Hill_Augusta	ME	Solar Photovoltaic	Yes	Yes	NA
Biddeford Morin St Solar	ME	Solar Photovoltaic	Yes	Yes	NA
FSS Inc.	ME	Solar Photovoltaic	Yes	Yes	NA
City of S Portland Transfer	ME	Solar Photovoltaic	Yes	Yes	NA

Unit Name	State	Fuel Type	Eligibility Class I	Class IA	TRECs
Market Street Gardiner Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Church Hill Road Augusta Solar Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Searsmont Road Lincolnville Solar Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Monson Community Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Livermore Falls CSG, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Littlefield Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
New Gen Ventures_Freeport	ME	Solar Photovoltaic	Yes	Yes	NA
Industrial Road Ellsworth Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Mariaville Road Ellsworth Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Wells Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Sturgeon Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Webb Road Solar Facility	ME	Solar Photovoltaic	Yes	Yes	NA
Madison Solar One LLC	ME	Solar Photovoltaic	Yes	Yes	NA
City of South Portland	ME	Solar Photovoltaic	Yes	Yes	NA
Maine DG Holdings - Harmony	ME	Solar Photovoltaic	Yes	Yes	NA
Nexamp Solar_Rumford	ME	Solar Photovoltaic	Yes	Yes	NA
100 Coffins Neck Rd	ME	Solar Photovoltaic	Yes	Yes	NA
DeWitt Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
West Paris CSG, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Randolph Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
A&A Market	ME	Solar Photovoltaic	Yes	Yes	NA
Middlesex Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
Norway Road Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
Kennebunk Savings Bank	ME	Solar Photovoltaic	Yes	Yes	NA
Gorham Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Boothbay Regional YMCA	ME	Solar Photovoltaic	Yes	Yes	NA
Salt Pump Climbing Center	ME	Solar Photovoltaic	Yes	Yes	NA
Sturgeon Quarry Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Sturgeon Town House Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Brewer Long Term Holdings	ME	Solar Photovoltaic	Yes	Yes	NA
Gray Farm Project, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Port Property Mgmt_Biddeford	ME	Solar Photovoltaic	Yes	Yes	NA
HEP Barefoot	ME	Solar Photovoltaic	Yes	Yes	NA
HEP Broadhead	ME	Solar Photovoltaic	Yes	Yes	NA
Front Street	ME	Solar Photovoltaic	Yes	Yes	NA
Huggard Ave	ME	Solar Photovoltaic	Yes	Yes	NA
TES Presumpscot Solar 23 LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Gorham ME 1 LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Maine Pines Racquet Club	ME	Solar Photovoltaic	Yes	Yes	NA
RE Gardiner Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Philips Way Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Loring Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
BWC Beech Ridge Brook LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Albion Road Benton Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Damariscotta Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Pope Memorial Humane Society	ME	Solar Photovoltaic	Yes	Yes	NA

Unit Name	State	Fuel Type	Eligibility		
			Class I	Class IA	TRECs
Wolfe's Neck Farm Foundation	ME	Solar Photovoltaic	Yes	Yes	NA
Winthrop Center Solar 1	ME	Solar Photovoltaic	Yes	Yes	NA
Searsport Solar 1, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
MSD Guimond, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Jay Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Longfellow's Greenhouses	ME	Solar Photovoltaic	Yes	Yes	NA
Casco Standish Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
MEVS Waterville	ME	Solar Photovoltaic	Yes	Yes	NA
Tremont Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Samoset Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Madison CSG, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
MSD Wiscasset	ME	Solar Photovoltaic	Yes	Yes	NA
MEVS DOT LLC Exit 109	ME	Solar Photovoltaic	Yes	Yes	NA
MEVS Whitten Road	ME	Solar Photovoltaic	Yes	Yes	NA
Gardiner A LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Royal Rivers Natural Foods	ME	Solar Photovoltaic	Yes	Yes	NA
Aaron Sleeper	ME	Solar Photovoltaic	Yes	Yes	NA
MEV DOT Civic Center Drive	ME	Solar Photovoltaic	Yes	Yes	NA
Maine DG Solar Pittsfield	ME	Solar Photovoltaic	Yes	Yes	NA
RE Skowhegan Solar	ME	Solar Photovoltaic	Yes	Yes	NA
AES - Pelletier Solar	ME	Solar Photovoltaic	Yes	Yes	NA
AES - Daigle Solar	ME	Solar Photovoltaic	Yes	Yes	NA
SynerGen Solar/Caribout Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Treasure Lane Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Green Mile Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Green Valle Farm	ME	Solar Photovoltaic	Yes	Yes	NA
Loring Solar I	ME	Solar Photovoltaic	Yes	Yes	NA
Loring Solar II	ME	Solar Photovoltaic	Yes	Yes	NA
Surry Solar 1, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
MEVS Hanson, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Mariner Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Hermon Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Bluebird Scarborough LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Waterfall Arts	ME	Solar Photovoltaic	Yes	Yes	NA
Norton Solar 1 LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Somerset Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Maxcys Mill Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Waldoboro Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
NRS Bethel Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Knights Pond Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Bodwell CPD Inc	ME	Solar Photovoltaic	Yes	Yes	NA
South Thomaston Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
American Steel & Aluminum LLC	ME	Solar Photovoltaic	Yes	Yes	NA
MEVS Clark	ME	Solar Photovoltaic	Yes	Yes	NA
NextGrid Bitterbush	ME	Solar Photovoltaic	Yes	Yes	NA
Davis Road Senior Housing	ME	Solar Photovoltaic	Yes	Yes	NA

Unit Name	State	Fuel Type	Eligibility Class I	Class IA	TRECs
Crowley Solar LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Footbridge Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
MEVS Richards LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Town of Trenton	ME	Solar Photovoltaic	Yes	Yes	NA
Front Ridge Road Solar 1, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Dixfield Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Nutting Ridge Solar, LLC	ME	Solar Photovoltaic	Yes	Yes	NA
SOL Alliance Development LLC	ME	Solar Photovoltaic	Yes	Yes	NA
ME CDG 003 Norway	ME	Solar Photovoltaic	Yes	Yes	NA
Fort Fairfield	ME	Solar Photovoltaic	Yes	Yes	NA
Arctaris Saddleback Solar	ME	Solar Photovoltaic	Yes	Yes	NA
Nonesuch River Brewing	ME	Solar Photovoltaic	Yes	Yes	NA
ER Pleasant Street Solar	ME	Solar Photovoltaic	Yes	Yes	NA
ME Richmond Lincoln Street LLC	ME	Solar Photovoltaic	Yes	Yes	NA
Town of Kittery - Town of Kittery	ME	Wind	Yes	Yes	NA
Evergreen Wind Power - Mars Hill Wind	ME	Wind	Yes	Yes	NA
STETSON WIND FARM	ME	Wind	Yes	Yes	NA
BEAVER RIDGE WIND	ME	Wind	Yes	Yes	NA
UNDER5MW - FOX ISLAND WIND2	ME	Wind	Yes	Yes	NA
STETSON II WIND FARM	ME	Wind	Yes	Yes	NA
ROLLINS WIND PLANT	ME	Wind	Yes	Yes	NA
RECORD HILL WIND	ME	Wind	Yes	Yes	NA
PISGAH MOUNTAIN WIND	ME	Wind	Yes	Yes	NA
BINGHAM WIND	ME	Wind	Yes	Yes	NA
OAKFIELD WIND	ME	Wind	Yes	Yes	NA
KIBBY WIND POWER	ME	Wind	Yes	Yes	NA
Roxbury Wind	ME	Wind	Yes	Yes	NA
ReEnergy Fort Fairfield - Fort Fairfield	ME	Wood	Yes	Yes	NA
Rumford Paper Company - No4	ME	Wood	Yes	Yes	NA
ReEnergy Ashland - Ashland	ME	Wood	Yes	Yes	NA
PLAINFIELD RENEWABLE ENERGY	CT	Biomass	Yes	Yes	NA
Colchester Fuel Cell Facility	CT	Fuel Cell	Yes	Yes	NA
WYRE WYND HYDRO	CT	Hydroelectric	Yes	Yes	NA
Stevenson Station	CT	Hydropower	Yes	Yes	NA
90 WOODS HILL RD. POMFRET CT	CT	Solar Photovoltaic	Yes	Yes	NA
DWW SOLAR	CT	Solar Photovoltaic	Yes	Yes	NA
Nutmeg Solar	CT	Solar Photovoltaic	Yes	Yes	NA
Quinebaug Solar	CT	Solar Photovoltaic	Yes	Yes	NA
Wallingford 1 Solar Facility	CT	Solar Photovoltaic	Yes	Yes	NA
Wallingford 2 Solar Facility	CT	Solar Photovoltaic	Yes	Yes	NA
Wallingford 3 Solar Facility	CT	Solar Photovoltaic	Yes	Yes	NA
East Hartford 2	CT	Solar Photovoltaic	Yes	Yes	NA
CF Waterford LLC	CT	Solar Photovoltaic	Yes	Yes	NA
CF North Haven LLC	CT	Solar Photovoltaic	Yes	Yes	NA
ORANGE HYDRO 2	MA	Hydroelectric	Yes	Yes	NA
ICE HOUSE PARTNERS INC.	MA	Hydroelectric	Yes	Yes	NA

Unit Name	State	Fuel Type	Eligibility		
			Class I	Class IA	TRECs
DWIGHT	MA	Hydroelectric	Yes	Yes	NA
GARDNER FALLS	MA	Hydroelectric	Yes	Yes	NA
FITCHBURG LANDFILL	MA	Landfill gas	Yes	Yes	NA
SEAMAN ENERGY LLC	MA	Landfill gas	Yes	Yes	NA
GRTR NEW BEDFORD LFG UTIL PROJ	MA	Landfill gas	Yes	Yes	NA
MM LOWELL LANDFILL - QF	MA	Landfill gas	Yes	Yes	NA
SOUTHBRIDGE LANDFILL	MA	Landfill gas	Yes	Yes	NA
CAMELOT_WIND_ID1240	MA	Wind	Yes	Yes	NA
FUTURE GEN WIND	MA	Wind	Yes	Yes	NA
Mark Richey Woodworking Wind Farm	MA	Wind	Yes	Yes	NA
Holiday Hill Facility	MA	Wind	Yes	Yes	NA
INDECK ALEXANDRIA	NH	Biomass	Yes	No	NA
BURGESS BIOPOWER	NH	Biomass	Yes	Yes	NA
Avery	NH	Hydroelectric	Yes	Yes	NA
HOPKINTON HYDRO	NH	Hydroelectric	Yes	Yes	NA
SMITH	NH	Hydroelectric	Yes	Yes	NA
Dodge Falls Hydroelectric Project	NH	Hydroelectric	Yes	Yes	NA
Rolfe Canal Hydroelectric	NH	Hydroelectric	Yes	Yes	NA
PPL Colebrook LFGTE - PPL Colebrook LFGTE	NH	Landfill gas	Yes	Yes	NA
UNH POWER PLANT	NH	Landfill gas	Yes	Yes	NA
UNH CHP Plant	NH	Landfill gas	Yes	Yes	NA
LEMPSTER WIND	NH	Wind	Yes	Yes	NA
GRANITE RELIABLE POWER, LLC	NH	Wind	Yes	Yes	NA
JERICHO WIND	NH	Wind	Yes	Yes	NA
THUNDERMIST HYDRO QF	RI	Hydroelectric	Yes	No	NA
JOHNSTON LFG TURBINE PLANT	RI	Landfill gas	Yes	Yes	NA
Hope - Hope Farm Solar	RI	Solar Photovoltaic	Yes	Yes	NA
BLOCK ISLAND WIND FARM	RI	Wind	Yes	Yes	NA
Lyndon	VT	Biomass	Yes	Yes	NA
HIGHGATE - HIGHGATE FALLS UNIT #5	VT	Hydroelectric	Yes	Yes	NA
NORTH HARTLAND HYDRO	VT	Hydroelectric	Yes	No	NA
Hyde Park Solar - Waterhouse Project	VT	Solar Photovoltaic	Yes	Yes	NA
COOLIDGE SOLAR	VT	Solar Photovoltaic	Yes	Yes	NA
SHEFFIELD WIND PLANT	VT	Wind	Yes	Yes	NA
Modern LFG1	NY	Landfill gas	Yes	Yes	NA
Colonie - Colonie	NY	Landfill gas	Yes	Yes	NA
Development Authority of North County - DANC	NY	Landfill gas	Yes	Yes	NA
Hyland - Hyland	NY	Landfill gas	Yes	Yes	NA
High Acres II	NY	Landfill gas	Yes	Yes	NA
Mill Seat Landfill	NY	Landfill gas	Yes	Yes	NA
Chaffee Landfill	NY	Landfill gas	Yes	Yes	NA
Seneca Falls Landfill Gas Project - SENECA__ENERGY - ME	NY	Landfill gas	Yes	Yes	NA
Clinton - Clinton	NY	Landfill gas	Yes	Yes	NA
Fulton - Fulton	NY	Landfill gas	Yes	Yes	NA
Madison County - Madison County	NY	Landfill gas	Yes	Yes	NA

Unit Name	State	Fuel Type	Eligibility Class I	Class IA	TRECs
Chautauqua - Chautauqua	NY	Landfill gas	Yes	Yes	NA
Steuben Landfill Generator RI	NY	Landfill gas	Yes	Yes	NA
Auburn_LFGE - Auburn Energy	NY	Landfill gas	Yes	Yes	NA
High Sheldon Wind Energy Center	NY	Wind	Yes	Yes	NA
Cohocton Wind - CANDIGU_WT_PWR	NY	Wind	Yes	Yes	NA
Marble River, LLC - Marble River, LLC	NY	Wind	Yes	Yes	NA
Maple Ridge I - Maple Ridge I	NY	Wind	Yes	Yes	NA
Maple Ridge 2 Wind Farm	NY	Wind	Yes	Yes	NA
COPENHAGEN_WT_PWR	NY	Wind	Yes	Yes	NA
Cassadaga Wind Farm	NY	Wind	Yes	Yes	NA
Altona Facility	NY	Wind	Yes	Yes	NA
Bliss Facility	NY	Wind	Yes	Yes	NA
Chateaugay Facility	NY	Wind	Yes	Yes	NA
Ellenburge Facility	NY	Wind	Yes	Yes	NA
Clinton Facility	NY	Wind	Yes	Yes	NA
Wethersfield Facility	NY	Wind	Yes	Yes	NA
Kent Hills #3	NB*	Wind	Yes	Yes	NA
Caribou Wind Project	NB	Wind	Yes	Yes	NA
Kents Hill #1	NB	Wind	Yes	Yes	NA
Kents Hill #2	NB	Wind	Yes	Yes	NA
Lamèque Wind Farm	NB	Wind	Yes	Yes	NA
Wocawson Energy Project	NB	Wind	Yes	Yes	NA
Ellershouse 1	NS*	Wind	Yes	Yes	NA
Ellershouse 2	NS	Wind	Yes	Yes	NA
Ellershouse 3	NS	Wind	Yes	Yes	NA
Ellershouse 4	NS	Wind	Yes	Yes	NA
Ellershouse 5	NS	Wind	Yes	Yes	NA
Ellershouse 6	NS	Wind	Yes	Yes	NA
Ellershouse 7	NS	Wind	Yes	Yes	NA
Ellershouse 8	NS	Wind	Yes	Yes	NA
Ellershouse 9	NS	Wind	Yes	Yes	NA
Ellershouse 10	NS	Wind	Yes	Yes	NA
St-Felicien	QC*	Biomass	Yes	Yes	NA
Cutten Steam Plant Boiler 3	ME	Biofuel	NA	NA	Yes
Hancock Lumber	ME	Biomass	NA	NA	Yes
Hancock Lumber	ME	Biomass	NA	NA	Yes
Hancock Lumber	ME	Biomass	NA	NA	Yes
Maine Energy Systems - Southern	ME	Biomass	NA	NA	Yes
Enfield Facility	ME	Biomass	NA	NA	Yes
Robbins Lumber Inc. Boiler 4	ME	Biomass	NA	NA	Yes
Stratton Lumber Inc.	ME	Biomass	NA	NA	Yes
UMF Boiler #2	ME	Biomass	NA	NA	Yes
Innovative Natural Resource Solutions LLC	ME	Biomass	NA	NA	Yes
* NB (New Brunswick), NS (Nova Scotia), QC (Quebec)					

Appendix B: NEPOOL GIS Generators List – Maine Class II Certified

List derived from the NEPOOL GIS Generators list for Q3 2023.

Plant Name	Location	Fuel Type
COVANTA WEST ENFIELD	ISO New England	Biomass
COVANTA WEST ENFIELD	ISO New England	Biomass
Irving Forest Products	ISO New England	Biomass
J C MCNEIL	ISO New England	Biomass
Sappi Somerset Operations	ISO New England	Biomass
Rumford Paper Company	ISO New England	Coal
BERKSHIRE COW POWER	ISO New England	Digester gas
BLUE SPRUCE FARM	ISO New England	Digester gas
Lewiston-Auburn WPCA Anaerobic Digestor	ISO New England	Digester gas
AMOSKEAG	ISO New England	Hydroelectric
ASHUELOT HYDRO	ISO New England	Hydroelectric
AUTOMATIC HYDRO	ISO New England	Hydroelectric
AYERS ISLAND	ISO New England	Hydroelectric
AZISCOHOS HYDRO	ISO New England	Hydroelectric
BALTIC MILLS - QF	ISO New England	Hydroelectric
BARKER LOWER HYDRO	ISO New England	Hydroelectric
BARKER UPPER HYDRO	ISO New England	Hydroelectric
BARTON HYDRO	ISO New England	Hydroelectric
BATH ELECTRIC HYDRO	ISO New England	Hydroelectric
BELL MILL HYDRO	ISO New England	Hydroelectric
BELLOWS FALLS	ISO New England	Hydroelectric
BENTON FALLS HYDRO	ISO New England	Hydroelectric
Bethel Mills Hydroelectric Project	ISO New England	Hydroelectric
BHE SMALL HYDRO COMPOSITE	ISO New England	Hydroelectric
BLACKSTONE HYDRO LOAD REDUCER	ISO New England	Hydroelectric
BOATLOCK	ISO New England	Hydroelectric
BOATLOCK	ISO New England	Hydroelectric
BONNY EAGLE/W. BUXTON	ISO New England	Hydroelectric
BONNY EAGLE/W. BUXTON	ISO New England	Hydroelectric
BRASSUA HYDRO	ISO New England	Hydroelectric
BRIAR HYDRO	ISO New England	Hydroelectric
BROWNS MILL HYDRO	ISO New England	Hydroelectric
BRUNSWICK	ISO New England	Hydroelectric
BULLS BRIDGE	ISO New England	Hydroelectric
CABOT	ISO New England	Hydroelectric
CAMPTON DAM	ISO New England	Hydroelectric
CANAAN	ISO New England	Hydroelectric
CEC 002 PAWTUCKET U5	ISO New England	Hydroelectric
CEC 002 PAWTUCKET U5	ISO New England	Hydroelectric

CEC 002 PAWTUCKET U5	ISO New England	Hydroelectric
CEC 002 PAWTUCKET U5	ISO New England	Hydroelectric
CEC 004 DAYVILLE POND U5	ISO New England	Hydroelectric
CELLEY MILL U5	ISO New England	Hydroelectric
CHAMBERLAIN FALLS	ISO New England	Hydroelectric
CHEMICAL	ISO New England	Hydroelectric
CHINA MILLS DAM	ISO New England	Hydroelectric
COBBLE MOUNTAIN	ISO New England	Hydroelectric
COCHECO FALLS	ISO New England	Hydroelectric
COLLINS HYDRO	ISO New England	Hydroelectric
CORRIVEAU HYDROELECTRIC LLC	ISO New England	Hydroelectric
CRESCENT DAM	ISO New England	Hydroelectric
DEERFIELD 2/LWR DRFIELD	ISO New England	Hydroelectric
DEERFIELD 5	ISO New England	Hydroelectric
DERBY DAM	ISO New England	Hydroelectric
DODGE FALLS-NEW	ISO New England	Hydroelectric
DWIGHT	ISO New England	Hydroelectric
EASTMAN BROOK U5	ISO New England	Hydroelectric
EASTMAN FALLS	ISO New England	Hydroelectric
ELLSWORTH HYDRO	ISO New England	Hydroelectric
ENERGY STREAM HYDRO	ISO New England	Hydroelectric
ENOSBURG HYDRO	ISO New England	Hydroelectric
ERROL	ISO New England	Hydroelectric
ESSEX 19 HYDRO	ISO New England	Hydroelectric
ESSEX 19 HYDRO	ISO New England	Hydroelectric
EUSTIS HYDRO	ISO New England	Hydroelectric
FAIRFAX	ISO New England	Hydroelectric
FAIRFAX	ISO New England	Hydroelectric
FALLS VILLAGE	ISO New England	Hydroelectric
FIFE BROOK	ISO New England	Hydroelectric
FISKE HYDRO	ISO New England	Hydroelectric
FRANKLIN FALLS	ISO New England	Hydroelectric
GARDINER HYDRO	ISO New England	Hydroelectric
GARDNER FALLS	ISO New England	Hydroelectric
GARVINS/HOOKSETT	ISO New England	Hydroelectric
GARVINS/HOOKSETT	ISO New England	Hydroelectric
GLENDALE HYDRO	ISO New England	Hydroelectric
GLENDALE HYDRO	ISO New England	Hydroelectric
GOODRICH FALLS	ISO New England	Hydroelectric
GOODWIN DAM	ISO New England	Hydroelectric
GORHAM	ISO New England	Hydroelectric
GREAT FALLS LOWER	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Cascade	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Cross	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Cross	ISO New England	Hydroelectric

GREAT LAKES - BERLIN Gorham	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Gorham	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Riverside	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Sawmill	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Sawmill	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Shelburne	ISO New England	Hydroelectric
GREAT LAKES - BERLIN Shelburne	ISO New England	Hydroelectric
GREAT LAKES - MILLINOCKET	ISO New England	Hydroelectric
GREAT LAKES - MILLINOCKET	ISO New England	Hydroelectric
GREAT WORKS COMPOSITE	ISO New England	Hydroelectric
GREENVILLE HYDRO	ISO New England	Hydroelectric
GULF ISLAND COMPOSITE	ISO New England	Hydroelectric
HACKETT MILLS HYDRO	ISO New England	Hydroelectric
HADLEY FALLS 1&2	ISO New England	Hydroelectric
HADLEY FALLS 1&2	ISO New England	Hydroelectric
HARRIMAN	ISO New England	Hydroelectric
HARRIS 1	ISO New England	Hydroelectric
HARRIS 2	ISO New England	Hydroelectric
HARRIS 3	ISO New England	Hydroelectric
HARRIS 4	ISO New England	Hydroelectric
HG&E HYDRO/CABOT 1-4	ISO New England	Hydroelectric
HIRAM	ISO New England	Hydroelectric
HK SANDERS	ISO New England	Hydroelectric
Holyoke No. 3	ISO New England	Hydroelectric
Holyoke No. 3	ISO New England	Hydroelectric
Holyoke No. 4	ISO New England	Hydroelectric
Holyoke No. 4	ISO New England	Hydroelectric
Hoosic River Hydro	ISO New England	Hydroelectric
HOPKINTON HYDRO	ISO New England	Hydroelectric
HOPKINTON HYDRO	ISO New England	Hydroelectric
HOPKINTON HYDRO	ISO New England	Hydroelectric
HOPKINTON HYDRO	ISO New England	Hydroelectric
HOSIERY MILL DAM	ISO New England	Hydroelectric
HUNTINGTON FALLS-NEW	ISO New England	Hydroelectric
HUNT'S POND	ISO New England	Hydroelectric
HYDRO KENNEBEC	ISO New England	Hydroelectric
ICE HOUSE PARTNERS INC.	ISO New England	Hydroelectric
INDIAN ORCHARD	ISO New England	Hydroelectric
JACKMAN	ISO New England	Hydroelectric
Jay	ISO New England	Hydroelectric
Jay	ISO New England	Hydroelectric
Jay	ISO New England	Hydroelectric
Jay	ISO New England	Hydroelectric
KELLEYS FALLS	ISO New England	Hydroelectric
KENNEBAGO HYDRO	ISO New England	Hydroelectric

KEZAR MIDDLE FALLS	ISO New England	Hydroelectric
KEZAR UPPER FALLS	ISO New England	Hydroelectric
LAWRENCE HYDRO	ISO New England	Hydroelectric
LAWRENCE HYDRO	ISO New England	Hydroelectric
LEDGEMERE	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
Livermore Falls	ISO New England	Hydroelectric
LOCKWOOD	ISO New England	Hydroelectric
LOWER LAMOILLE COMPOSITE	ISO New England	Hydroelectric
LOWER ROBERTSON DAM	ISO New England	Hydroelectric
LOWER VALLEY HYDRO U5	ISO New England	Hydroelectric
LOWER VILLAGE	ISO New England	Hydroelectric
MADISON HYDRO	ISO New England	Hydroelectric
Mansfield Hollow Hydro	ISO New England	Hydroelectric
MARSHFIELD 6 HYDRO	ISO New England	Hydroelectric
MASCOMA HYDRO	ISO New England	Hydroelectric
MCINDOES	ISO New England	Hydroelectric
MECHANIC FALLS HYDRO	ISO New England	Hydroelectric
Mechanicsville Hydro	ISO New England	Hydroelectric
Mechanicsville Hydro	ISO New England	Hydroelectric
MEDWAY	ISO New England	Hydroelectric
MIDLEBRY	ISO New England	Hydroelectric
MIDLEBRY	ISO New England	Hydroelectric
MIDLEBRY	ISO New England	Hydroelectric
MILFORD HYDRO	ISO New England	Hydroelectric
MILFORD HYDRO	ISO New England	Hydroelectric
MILO_HYDRO	ISO New England	Hydroelectric
MILTON MILLS HYDRO	ISO New England	Hydroelectric
MINIWAWA	ISO New England	Hydroelectric
MONTY	ISO New England	Hydroelectric
MWRA COSGROVE	ISO New England	Hydroelectric
N_RUTLND	ISO New England	Hydroelectric
N_RUTLND	ISO New England	Hydroelectric
NEW BARRE HYDRO	ISO New England	Hydroelectric
NORTH GORHAM	ISO New England	Hydroelectric

OAKLAND	ISO New England	Hydroelectric
OLD NASH DAM	ISO New England	Hydroelectric
ORANGE HYDRO 1	ISO New England	Hydroelectric
ORANGE HYDRO 1	ISO New England	Hydroelectric
ORANGE HYDRO 2	ISO New England	Hydroelectric
ORANGE HYDRO 2	ISO New England	Hydroelectric
Otis	ISO New England	Hydroelectric
Otis	ISO New England	Hydroelectric
OTIS MILL HYDRO	ISO New England	Hydroelectric
PEJEPSCOT	ISO New England	Hydroelectric
PENNACOOK FALLS UPPER	ISO New England	Hydroelectric
PITTSFIELD HYDRO	ISO New England	Hydroelectric
PONTOOK HYDRO	ISO New England	Hydroelectric
POWDER MILL HYDRO	ISO New England	Hydroelectric
PROCTOR	ISO New England	Hydroelectric
PROCTOR	ISO New England	Hydroelectric
PUMPKIN HILL	ISO New England	Hydroelectric
PUTNAM	ISO New England	Hydroelectric
PUTNAM	ISO New England	Hydroelectric
PUTNAM	ISO New England	Hydroelectric
PUTNAM	ISO New England	Hydroelectric
PUTTS BRIDGE	ISO New England	Hydroelectric
PUTTS BRIDGE	ISO New England	Hydroelectric
PUTTS BRIDGE	ISO New England	Hydroelectric
PUTTS BRIDGE	ISO New England	Hydroelectric
QUINEBAUG	ISO New England	Hydroelectric
RAINBOW 1 HYDRO	ISO New England	Hydroelectric
RAINBOW 2 HYDRO	ISO New England	Hydroelectric
RED BRIDGE	ISO New England	Hydroelectric
RED BRIDGE	ISO New England	Hydroelectric
RED BRIDGE	ISO New England	Hydroelectric
RED BRIDGE	ISO New England	Hydroelectric
Riley	ISO New England	Hydroelectric
Riley	ISO New England	Hydroelectric
Riley	ISO New England	Hydroelectric
RIVER MILL HYDRO	ISO New England	Hydroelectric
RIVERSIDE 4-7	ISO New England	Hydroelectric
RIVERSIDE 4-7	ISO New England	Hydroelectric
RIVERSIDE 8	ISO New England	Hydroelectric
RIVERSIDE 8	ISO New England	Hydroelectric
ROCKY GORGE CORPORATION	ISO New England	Hydroelectric
ROLLINSFORD HYDRO	ISO New England	Hydroelectric
RUMFORD FALLS	ISO New England	Hydroelectric
RUMFORD FALLS	ISO New England	Hydroelectric
SALMON BROOK STATION 3	ISO New England	Hydroelectric

SALMON FALLS HYDRO	ISO New England	Hydroelectric
SCOTLAND	ISO New England	Hydroelectric
SEARSBURG	ISO New England	Hydroelectric
Sebec Hydro	ISO New England	Hydroelectric
SHAWMUT	ISO New England	Hydroelectric
SHELDON SPRINGS	ISO New England	Hydroelectric
SHEPAUG	ISO New England	Hydroelectric
SHERMAN	ISO New England	Hydroelectric
SIMPSON G LOAD REDUCER	ISO New England	Hydroelectric
SIMPSON G LOAD REDUCER	ISO New England	Hydroelectric
SIMPSON G LOAD REDUCER	ISO New England	Hydroelectric
SIMPSON G LOAD REDUCER	ISO New England	Hydroelectric
SKELTON	ISO New England	Hydroelectric
SKINNER	ISO New England	Hydroelectric
SMITH	ISO New England	Hydroelectric
SOUTH BARRE HYDRO	ISO New England	Hydroelectric
SPAULDING POND HYDRO	ISO New England	Hydroelectric
STEELS POND HYDRO	ISO New England	Hydroelectric
STEVENSON	ISO New England	Hydroelectric
STILLWATER	ISO New England	Hydroelectric
SUGAR RIVER 2	ISO New England	Hydroelectric
SWEETWATER HYDRO U5	ISO New England	Hydroelectric
SYSKO STONY BROOK	ISO New England	Hydroelectric
TAFTVILLE CT	ISO New England	Hydroelectric
THUNDERMIST HYDRO QF	ISO New England	Hydroelectric
THUNDERMIST HYDRO QF	ISO New England	Hydroelectric
TOUTANT	ISO New England	Hydroelectric
TUNNEL	ISO New England	Hydroelectric
TURNERSFALLS	ISO New England	Hydroelectric
UNDER 1MW	ISO New England	Hydroelectric
UNDER 1MW	ISO New England	Hydroelectric
UNDER 1MW	ISO New England	Hydroelectric
UNDER 1MW	ISO New England	Hydroelectric
UNDER 1MW	ISO New England	Hydroelectric
VAIL & GREAT FALLS	ISO New England	Hydroelectric
VALLEY HYDRO (STATION NO. 5)	ISO New England	Hydroelectric
VALLEY HYDRO (STATION NO. 5)	ISO New England	Hydroelectric
VERNON	ISO New England	Hydroelectric
VERNON	ISO New England	Hydroelectric
VERNON	ISO New England	Hydroelectric
VERNON	ISO New England	Hydroelectric
WARE HYDRO	ISO New England	Hydroelectric
WARE HYDRO	ISO New England	Hydroelectric
WARE HYDRO	ISO New England	Hydroelectric
WARE HYDRO	ISO New England	Hydroelectric

WATERBURY 22	ISO New England	Hydroelectric
WATSON DAM	ISO New England	Hydroelectric
Wells River	ISO New England	Hydroelectric
WEST DANVILLE 1	ISO New England	Hydroelectric
WEST ENFIELD	ISO New England	Hydroelectric
WEST HOPKINTON HYDRO	ISO New England	Hydroelectric
WEST SPRINGFIELD HYDRO U5	ISO New England	Hydroelectric
WESTON	ISO New England	Hydroelectric
WESTON DAM	ISO New England	Hydroelectric
WILDER	ISO New England	Hydroelectric
WILLIAMS	ISO New England	Hydroelectric
WOLCOTT HYDRO	ISO New England	Hydroelectric
WORUMBO HYDRO	ISO New England	Hydroelectric
WORUMBO HYDRO	ISO New England	Hydroelectric
WRIGHTSVILLE	ISO New England	Hydroelectric
WYANDOTTE HYDRO	ISO New England	Hydroelectric
WYMAN HYDRO 1	ISO New England	Hydroelectric
WYMAN HYDRO 2	ISO New England	Hydroelectric
WYMAN HYDRO 3	ISO New England	Hydroelectric
Chicopee	ISO New England	Landfill gas
Chicopee	ISO New England	Landfill gas
GRANBY SANITARY LANDFILL QF	ISO New England	Landfill gas
ROCHESTER LANDFILL	ISO New England	Landfill gas
TURNKEY LANDFILL	ISO New England	Landfill gas
MMWAC	ISO New England	Municipal solid waste
MATEP (COMBINED CYCLE)	ISO New England	Natural Gas
Rumford Paper Company	ISO New England	Oil
A & A MARKET	ISO New England	Solar Photovoltaic
AARON SLEEPER	ISO New England	Solar Photovoltaic
Bethel Mills Electric, 500kw Solar Project #1	ISO New England	Solar Photovoltaic
Bondville Solar Farm	ISO New England	Solar Photovoltaic
BOOTHBAY REGIONAL YMCA	ISO New England	Solar Photovoltaic
Bridgeo, John	ISO New England	Solar Photovoltaic
Caribou Solar LLC	ISO New England	Solar Photovoltaic
CASCO STANDISH SOLAR LLC	ISO New England	Solar Photovoltaic
City Solar Garden	ISO New England	Solar Photovoltaic
CLC YMCA	ISO New England	Solar Photovoltaic
Cobb Road Jarvis Solar	ISO New England	Solar Photovoltaic
Cold River Solar Project	ISO New England	Solar Photovoltaic
Creek Path Solar Farm	ISO New England	Solar Photovoltaic
CVPS Solar Education Center	ISO New England	Solar Photovoltaic
EUPHORIA 415, LLC	ISO New England	Solar Photovoltaic
GARDINER A LLC	ISO New England	Solar Photovoltaic
GMP MicroGrid	ISO New England	Solar Photovoltaic

GMP MicroGrid	ISO New England	Solar Photovoltaic
GMP RECs	ISO New England	Solar Photovoltaic
GMP SOLAR	ISO New England	Solar Photovoltaic
GMP Solar	ISO New England	Solar Photovoltaic
GMP Solar/Storage	ISO New England	Solar Photovoltaic
GORHAM SOLAR LLC	ISO New England	Solar Photovoltaic
GRAY LANDFILL	ISO New England	Solar Photovoltaic
HEP BAREFOOT SPV	ISO New England	Solar Photovoltaic
HEP BROADHEAD SPV	ISO New England	Solar Photovoltaic
Keene Waste Water Treatment Plant Solar	ISO New England	Solar Photovoltaic
KENNEBUNK SAVINGS BANK	ISO New England	Solar Photovoltaic
LONGFELLOWS GREENHOUSE	ISO New England	Solar Photovoltaic
MAINE DG SOLAR PITTSFIELD	ISO New England	Solar Photovoltaic
Mass Energy	ISO New England	Solar Photovoltaic
MEV DOT CIVIC CENTER DR	ISO New England	Solar Photovoltaic
MEV WATERVILLE	ISO New England	Solar Photovoltaic
MEV WHITTEN RD	ISO New England	Solar Photovoltaic
MEVS DOT LLC EXIT 109	ISO New England	Solar Photovoltaic
MIDDLESEX SOLAR	ISO New England	Solar Photovoltaic
Monson Community Solar	ISO New England	Solar Photovoltaic
MSD Guimond, LLC	ISO New England	Solar Photovoltaic
MSD WISCASSET	ISO New England	Solar Photovoltaic
NORWAY RD SOLAR	ISO New England	Solar Photovoltaic
PORT PROPERTY MGMT_BIDDEFORD	ISO New England	Solar Photovoltaic
RANDOLPH SOLAR	ISO New England	Solar Photovoltaic
RE SKOWHEGAN SOLAR	ISO New England	Solar Photovoltaic
ROYAL RIVER NATURAL FOODS	ISO New England	Solar Photovoltaic
SALT PUMP CLIMBING CENTER	ISO New England	Solar Photovoltaic
Searsport Solar 1, LLC	ISO New England	Solar Photovoltaic
SHAW BROTHERS CONSTRUCTION	ISO New England	Solar Photovoltaic
Stockton Springs Solar	ISO New England	Solar Photovoltaic
STURGEON QUARRY SOLAR LLC	ISO New England	Solar Photovoltaic
STURGEON TOWN HOUSE	ISO New England	Solar Photovoltaic
Sundog Solar LLC	ISO New England	Solar Photovoltaic
Toray Solar	ISO New England	Solar Photovoltaic
Town of Bristol	ISO New England	Solar Photovoltaic
TOWN OF OAKLAND	ISO New England	Solar Photovoltaic
Waldoboro	ISO New England	Solar Photovoltaic
Ward, Ryan	ISO New England	Solar Photovoltaic
BRISTOL REFUSE	ISO New England	Trash-to-energy
ECO MAINE	ISO New England	Trash-to-energy
LISBON RESOURCE RECOVERY	ISO New England	Trash-to-energy
OGDEN-MARTIN 1	ISO New England	Trash-to-energy
RESCO SAUGUS	ISO New England	Trash-to-energy
Rumford Paper Company	ISO New England	Trash-to-energy

SECREC-PRESTON	ISO New England	Trash-to-energy
SES CONCORD	ISO New England	Trash-to-energy
WHEELABRATOR BRIDGEPORT, L.P.	ISO New England	Trash-to-energy
WHEELABRATOR NORTH ANDOVER	ISO New England	Trash-to-energy
WMI MILLBURY 1	ISO New England	Trash-to-energy
BLOCK ISLAND WIND FARM	ISO New England	Wind
CAMELOT_WIND_ID1240	ISO New England	Wind
Gloucester Engineering	ISO New England	Wind
KINGDOM COMMUNITY WIND	ISO New England	Wind
Mass Energy	ISO New England	Wind
Portsmouth Abbey School	ISO New England	Wind
PORTSMOUTH ABBEY WIND QF	ISO New England	Wind
SEARSBURG WIND	ISO New England	Wind
Bigelow	ISO New England	Wood
Bigelow	ISO New England	Wood
DG WHITEFIELD, LLC	ISO New England	Wood
DG WHITEFIELD, LLC	ISO New England	Wood
PINETREE POWER	ISO New England	Wood
REENERGY LIVERMORE FALLS	ISO New England	Wood
REENERGY STRATTON	ISO New England	Wood
Allens Falls	New York (NY ISO control area)	Hydroelectric
Allens Falls	New York (NY ISO control area)	Hydroelectric
Black River	New York (NY ISO control area)	Hydroelectric
Eagle	New York (NY ISO control area)	Hydroelectric
Eagle	New York (NY ISO control area)	Hydroelectric
East Norfolk	New York (NY ISO control area)	Hydroelectric
East Norfolk	New York (NY ISO control area)	Hydroelectric
Effley	New York (NY ISO control area)	Hydroelectric
Effley	New York (NY ISO control area)	Hydroelectric
Elmer	New York (NY ISO control area)	Hydroelectric
Herrings	New York (NY ISO control area)	Hydroelectric
High Falls	New York (NY ISO control area)	Hydroelectric
Higley	New York (NY ISO control area)	Hydroelectric
Johnsonville	New York (NY ISO control area)	Hydroelectric
Kamargo	New York (NY ISO control area)	Hydroelectric
Norfolk	New York (NY ISO control area)	Hydroelectric
Norfolk	New York (NY ISO control area)	Hydroelectric
Norwood	New York (NY ISO control area)	Hydroelectric
Norwood	New York (NY ISO control area)	Hydroelectric
Parishville	New York (NY ISO control area)	Hydroelectric
Raymondville	New York (NY ISO control area)	Hydroelectric
Raymondville	New York (NY ISO control area)	Hydroelectric
Sewalls	New York (NY ISO control area)	Hydroelectric
Sugar Island	New York (NY ISO control area)	Hydroelectric
Upper & Lower Newton Falls	New York (NY ISO control area)	Hydroelectric

Copenhagen Wind Project LLC	New York (NY ISO control area)	Wind
Bryson - Bryson	Quebec	Hydroelectric
Chute-Hemmings - Chute-Hemmings	Quebec	Hydroelectric
Drummondville - Drummondville	Quebec	Hydroelectric
Hart-Jaune - Hart-Jaune	Quebec	Hydroelectric
Rapide-2 - Rapide-2	Quebec	Hydroelectric
Rapide-7 - Rapide-7	Quebec	Hydroelectric
Riviere-des-Prairies - Riviere-des-Prairies	Quebec	Hydroelectric
Tinker Hydro Generation Station Canada	Maritime Provinces (including NMISA)	Hydroelectric
Evergreen Wind Power - Mars Hill Wind	Maritime Provinces (including NMISA)	Wind
West Cape Wind Farm	Maritime Provinces (including NMISA)	Wind