

Memorandum

To: CLF/Pew

From: Bob Fagan and Patrick Knight, Synapse Energy Economics, Inc.

Date: 17 November 2011

Re: Renewable Portfolio Standards and Requirements

Overview

This memorandum describes and tabulates the renewable portfolio standards (RPS) applicable to electric utilities or electric load-serving entities in the six New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) and New York. It summarizes the year 2020 RPS quantities for “new” (i.e., Class I) RPS resources by state, and lists additional detailed information on renewable energy classification by state. It documents current state policies on whether or not new, large-scale hydro imports such as those considered for New England and New York are eligible to meet RPS standards. Lastly, it assesses the sensitivity of the New England renewable energy credit (REC) market to possible large scale, new imports of Hydro Quebec (HQ) power.

The context for this memo is the extent to which energy sourced from Hydro Quebec and transmitted to New England over the proposed Northern Pass transmission line would impact renewable energy supplies from non-HQ resources in New England. In short, this memo illustrates the following:

1. By 2020, RPS requirements for new¹ supply resources in New England will reach almost 18 TWh (terawatt hours, or millions of MWh). New York’s new supply requirements will reach roughly 10 TWh (the proposed Northern Pass line would transmit roughly 8 TWh per year to New England).
2. Except for Vermont, all New England states’ RPS exclude from eligibility large-scale hydro imports from Quebec. New York also has this exclusion.
3. Given the exclusion of HQ energy transmitted over the proposed Northern Pass line to qualify as RPS energy, the anticipated impact on New England REC markets is minimal (although if Vermont load-serving entities did choose to source all their RPS energy for 2020 from HQ, this implies that up to 331 MW of wind energy (957 GWh per year) or an equivalent GWh amount of other renewable energy from New England would not be procured). Under *hypothetical* changes to those regulations, the level of energy transmitted by Northern Pass would be a considerable fraction (~45%) of New England’s Class I RPS needs and thus it would likely impact

¹Most states have total renewable supply requirements, and requirements that arise from “new” supply constructed after a certain date. The latter are generally known as Class I resources. This memo focuses primarily on the Class I requirements, since the total requirements include the effect of existing resources, which should have little incremental impact on renewable policies and renewable market impacts going forward.

the viability of alternative New England wind projects, land-based or offshore; or other eligible renewable energy projects in New England.

Status of Renewable Portfolio Standards (RPS) Policies in New England and New York

Every state in New England and New York currently has an RPS in place. However, each RPS differs in the target generation percentage sought to be offset through renewables, the target date for this percentage to be fulfilled, and the types of renewables allowed as qualifying facilities. Table 1 summarizes the “new” RPS requirements across the region. Table 2 summarizes the RPS standards in full.²

Table 3 indicates the “classes” that different types of renewable sources fall into for each state, based on the information in Table 2.

It is important to note that in nearly every state under consideration, hydro sources are limited in their ability to comply as an RPS resource. The limitations are based on size (capacity), start of operation date, type of hydro facility (e.g., run-of-river), state or federal environmental standard attainment, or any combination of these constraints. The sole exception is Vermont, which has a 200 MW capacity limit in effect until July 1, 2012, at which point there will be no capacity limit. Note that this means that except for Vermont, no state allows large hydro to fulfill RPS requirements. The website of the proposed Northeast Utilities-NStar Northern Pass transmission project states that power transfers over the line will not qualify as an RPS resource (<http://www.northernpass.us/faq.html>, visited Nov. 1, 2011).

Table 1 - Summary of NE and NY Class I (“new”) RPS Resource Targets, 2020

State	2020 Energy w/o EE GWh	2020 EE Savings	2020 Net Energy for RPS Baseline	2020 Class I or Equiv. Target Renewables, % of LSE Energy	Total New RPS	Share of NE Market	Share of NY/NE Total Northeast Market
CT	35,103	2,076	33,027	20.0%	6,605	37.0%	
MA	59,125	14,781	44,344	15.0%	6,652	37.2%	
RI	9,518	429	9,088	14.0%	1,272	7.1%	
NH	13,815	415	13,400	11.0%	1,474	8.2%	
ME	13,055	3,917	9,139	10.0%	914	5.1%	
VT	7,000	619	6,381	15.0%	957	5.4%	
NE Total	137,615	22,237	115,378	15.5%	17,874	100.0%	64%
NY - Main Tier Requirements, Est.			173,332	6%	10,000		36%
Total New England and New York, GWh					27,874		100%

Source: Synapse, based on data from ISO NE, 2011 Renewable Portfolio Standards Spreadsheet, available at http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/eag/usr_sprdshts/index.html; and from NYSERDA’s RPS information, available at <http://www.nyserdera.org/rps/index.asp>.

² Data for this table was derived from the “Detailed table of State Policies” by the Pew Center for Climate Change, available at http://www.pewclimate.org/what_s_being_done/in_the_states/rps.cfm and data from the Database of State Incentives for Renewables & Efficiency (DSIRE), available at <http://dsireusa.org/>.

Table 2 – New England and New York Renewable Portfolio Standards

State	Target	Year	Notes	Carve-outs/Classes/Tiers				Hydro	Overseeing Agency
CT	27%	2020	---	Class I (20%): advanced renewable energy conversion technologies, fuel cells, methane from landfills, ocean thermal, some hydro, solar, sustainable biomass <500 kWh constructed before 7/1/2003, tidal, wave, wind.	Class I or II (3%): biomass facilities in operation before 7/1/1998, some hydro, trash-to-energy facilities.	Class III: CHP, waste heat recovery, in-state conservation and load management programs	---	Class I: run-of-the-river hydro <5 MW that began operation after 7/1/2003; Class II: run-of-the-river hydro <5 MW that began operation before 7/1/2003.	Connecticut Department of Public Utility Control
MA	15%	2020	1% annual increase after 2020	Class I: Renewables installed after 12/31/1997; eligible biomass, biofuels, fuel cells using renewable fuels, geothermal, certain hydro facilities, landfill gas, marine or hydrokinetic energy, ocean thermal, solar PV, solar thermal electric, tidal, wave, and wind	---	---	---	≤25 MW constructed after 12/31/1997, meets environmental standards, and results in no new diversions.	Massachusetts Division of Energy Resources
	7.1%	2009	Based on kWh sales to end-use customers	Class II (3.6%): Renewable resources installed before 12/31/1997; also waste to energy	Class III (3.5%): Municipal solid waste	---	---	≤5 MW constructed before 12/31/1997, meets environmental standards, and results in no new diversions.	Massachusetts Division of Energy Resources
	5.0%	2020	Based on load, not generation; 0.25% annual increase after 2020	Alternative energy portfolio standard: gasification, CHP/waste heat, flywheel energy storage, paper-derived fuel, efficient steam technology	---	---	---	---	Massachusetts Division of Energy Resources
ME	10%	2017	---	Class I (10% new generation by 2017): Biomass, fuel cells, geothermal, hydro, landfill gas, solar, tidal, and wind.	Class II (30% of kWh sales from eligible resources by 2000): Class I resources and hydro, municipal solid waste, and qualifying cogeneration.	All non-wind sources must come from facilities ≤100 MW	---	Class I: facilities that meet all state and fed fish passage requirements; Class II: all hydro.	Maine Public Utilities Commission

State	Target	Year	Notes	Carve-outs/Classes/Tiers				Hydro	Overseeing Agency
NH	23.8%	2025	---	Class I (16%): Eligible biomass; geothermal; hydrogen derived from biofuels or biologically derived methane; hydropower, biologically derived methane; ocean thermal, wave, current, or tidal; solar beyond Class II requirements; solar water heating; wind; began operation after 1/1/2006.	Class II (0.3%): Solar electricity; began operation after 1/1/2006.	Class III (6.5%): Eligible biomass ≤ 25 MW or biologically derived methane, in operation prior 1/1/2006.	Class IV (1%): Hydropower, in operation before 1/1/2006.	Class I: Incremental new hydropower production; Class IV: ≤5 MW and compliant with environmental criteria.	New Hampshire Office of Energy and Planning
RI	16%	2019	---	<2% of total retail electricity sales can come from renewable resources in operation before 12/31/1997	---	---	---	Small hydro facilities, <30 MW, and no new diversions.	Rhode Island Public Utilities Commission
VT	20%	2017	20% goal will become mandatory if two criteria are not met.	Criterion 1: Between 1/1/2005 and 7/1/2012, qualifying resources are ≥ total statewide growth in retail electric sales and at least 5% of the 2005 total retail electric sales are provided by qualified resources.	Criterion 2: Qualifying resources ≥ 10% of the retail electric sales in 2005.	Qualifying resources: Solar Water Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Fuel Cells using Renewable Fuels	---	≤200 MW currently, no capacity limit starting July 1, 2012.	Vermont Public Service Board
	25%	2025	25% of energy consumed, emphasis on farms and forests						-
NY	29%	2015	Additional goal of 1% from voluntary green market sales	Main Tier: Biogas, biomass, liquid biofuel, fuel cells, hydroelectric, solar PV, ocean, tidal, waste-to-energy using eligible biomass, wind	Customer-Sited Tier: Anaerobic digesters, fuel cells, solar PV, wind			Incremental increases and new run-of-river facilities ≤ 30 MW	New York Public Service Commission

Source: Synapse, derived from “Detailed Table of State Policies” found at the Pew Center for Climate Change web site, <http://www.pewclimate.org/docUploads/State%20rps%20aeps%20details.pdf>.

Table 3 – New England and New York RPS Classes

State	Class I	Class II	Class III	Class IV	Other	Hydro Class I	Hydro Class II
CT	Advanced renewable energy conversion technologies, fuel cells, methane from landfills, ocean thermal, some hydro, solar, sustainable biomass <500 kWh constructed before 7/1/2003, tidal, wave, wind.	Biomass facilities in operation before 7/1/1998, some hydro, trash-to-energy facilities.	CHP, waste heat recovery, in-state conservation and load management programs			Run-of-the-river hydro <5 MW that began operation after 7/1/2003	Run-of-the-river hydro <5 MW that began operation before 7/1/2003.
MA	Renewables installed after 12/31/1997; eligible biomass, biofuels, fuel cells using renewable fuels, geothermal, certain hydro facilities, landfill gas, marine or hydrokinetic energy, ocean thermal, solar PV, solar thermal electric, tidal, wave, and wind	Renewable resources installed before 12/31/1997; also waste to energy	Municipal solid waste		Alternative energy portfolio standard: gasification, CHP/waste heat, flywheel energy storage, paper-derived fuel, efficient steam technology	≤25 MW constructed after 12/31/1997, meets environmental standards, and results in no new diversions.	
ME	Biomass, fuel cells, geothermal, hydro, landfill gas, solar, tidal, and wind.	Class I resources and hydro, municipal solid waste, and qualifying cogeneration.			All non-wind sources must come from facilities ≤100 MW	Facilities that meet all state and federal fish passage requirements	All hydro
NH	Eligible biomass; geothermal; hydrogen derived from biofuels or biologically derived methane; new hydropower, biologically derived methane; ocean thermal, wave, current, or tidal; solar beyond Class II requirements; solar water heating; wind; began operation after 1/1/2006.	Solar electricity; began operation after 1/1/2006.	Eligible biomass ≤25 MW or biologically derived methane, in operation prior 1/1/2006.	Hydropower, in operation before 1/1/2006, ≤5 MW and compliant with environmental criteria			
RI	Any renewable resources in operation before 12/31/1997					Small hydro facilities, <30 MW, and no new diversions.	
VT	Solar Water Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Fuel Cells using Renewable Fuels					≤200 MW currently, no capacity limit starting July 1, 2012.	
NY	Biogas, biomass, liquid biofuel, fuel cells, hydroelectric, solar PV, ocean, tidal, waste-to-energy using eligible biomass, wind	Anaerobic digesters, fuel cells, solar PV, wind				Incremental increases and new run-of-river facilities ≤30 MW	

Current RPS Regulations – Large Scale Hydro Quebec Imports

Five New England states (Maine, New Hampshire, Massachusetts, Connecticut, and Rhode Island) currently exclude new, large-scale hydro imports from Hydro Quebec from eligibility towards meeting RPS requirements. Vermont allows new HQ large-scale hydro resources to count towards its voluntary RPS target. New York also excludes new large-scale hydro resources from its RPS requirements. Table 4 documents the large hydro exclusions.

Table 4. Documentation of Large Scale Hydro Exclusion from RPS Eligibility – NE and NY

	Description	Regulation or Law
Massachusetts	Class I hydro source must be 25 MW or less, not involve any dam or water diversion structure and must meet low impact standards.	225 CMR 14.05(1)(a)6. a) and b)
Connecticut	Class I hydro must be run of river and not greater than 5 MW.	Conn. Gen. Stat. §16-1(a)(26)
Rhode Island	Small hydro only, not greater than 30 MW and no new impoundments or diversions.	R.I General Laws Section 39-26-5 (5) and RI PUC Rules and Regulations Governing the Implementation of a Renewable Energy Standard
Maine	Class I hydro must not exceed 100 MW and must meet state and federal fish passage laws.	CMR 65-407-311
New Hampshire	Incremental production from existing facilities if increment comes from improvement in efficiency of generation, not change to operations.	New Hampshire Statutes Chapter 362-F, Electric Renewable Portfolio Standard
Vermont	Large Scale Hydro imports – eligible to meet voluntary RE goals.	
New York	No new storage impoundment. 30 MW or less for a new facility. NYSERDA as central procurement administrator for Main Tier resources.	Appendix B to NY PSC Order in Case 03-E-0188, 9/24/2004

While we have seen mention of the prospect of state law changes to allow Northern Pass power to qualify for RPS treatment in New England, at the current time the laws and regulations are clear that such power is ineligible for RPS status (except in Vermont).

Sensitivity of New England and New York REC Markets to Large-Scale HQ Imports

The New England renewable energy certificate (REC) market is known as a “compliance” market, since state RPS requirements (excluding Vermont) are mandatory. REC markets reflect the price associated with the renewable attribute of the resource, separate from the physical market value for energy or capacity from the renewable resource. In New England, RPS requirements can be met by load-serving entities (who bear the obligation to meet RPS requirements) through procurement of

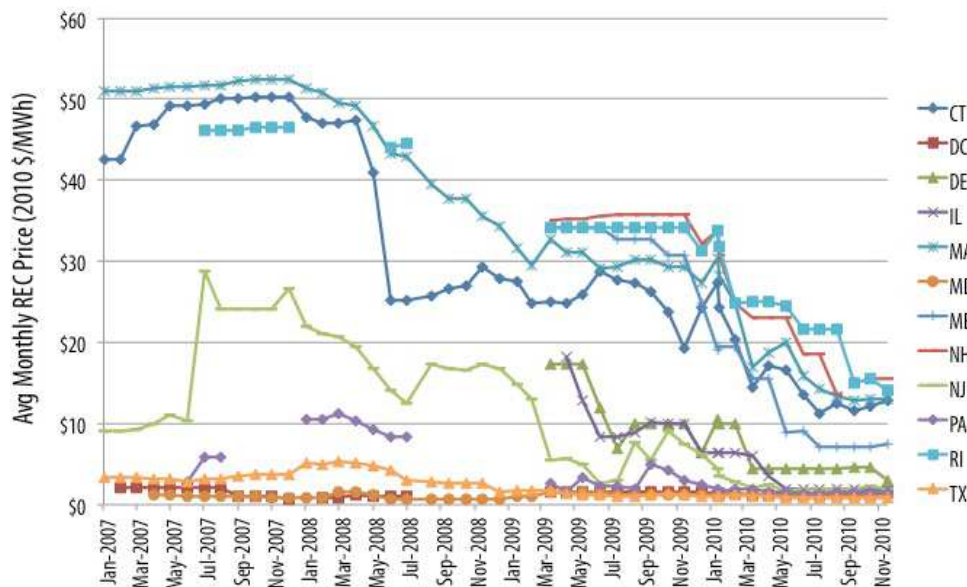
RECs, procurement of physical renewable energy inclusive of the renewable attribute, or through payment of an alternative compliance payment (ACP) set by the applicable state – or some combination of the three. Generally, REC prices tend to not exceed ACP.

Scenario 1: Status Quo Conditions with Large-Scale Hydro Not Qualifying

The graph in Figure 1 below, reproduced from the US DOE’s Green Power website, shows the pattern of New England REC market prices over the past four years. For the end of 2010, it shows New England states REC prices converging in the range of \$12 to \$16 per REC, continuing a REC price decline that commenced in 2008.

Figure 1. Renewable Energy Compliance Market Prices 2007-2010, Including New England States

Compliance market (primary tier) REC prices, January 2007 to December 2010. Sources: Evolution Markets (2007) and Spectron Group (2010).



Note: Plotted values are the last trade (if available) or the mid-point of bid and offer prices for the current or nearest compliance year for various state compliance RECs.

Source: US DOE EERE Green Power Markets, available at <http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=5>

If current RPS eligibility rules in New England and New York are retained and large-scale hydro imports remain ineligible to participate in the REC markets (except for delivery to Vermont load-serving entities), we would not expect significant impacts from the Northern Pass line on New England REC markets since Vermont’s 2020 share of the REC market is only 5.4% (thus representing a “cap” on the share of New England RPS that Northern Pass could garner). If Vermont chooses to use a portion of Northern Pass imports to meet *all* of its RPS goals in 2020, then roughly 957 GWH/year of other renewables would be displaced. This is effectively a cap on the impact Northern Pass could have on alternative renewable wind projects (or other eligible resources) in New England, unless state laws were changed to allow large hydro energy to be eligible to meet RPS requirements. If the displaced energy

was New England land-based wind power at an average 33% capacity factor, 957 GWh/year equates to roughly 331 MW of installed wind power. While this is only 5.4% of New England's total RPS requirement, and would have a minimal impact on the REC market itself it nonetheless implies that a sizable quantity of renewable energy would not be built in New England if Vermont met all its RPS targets with HQ imports. If Vermont chooses to meet just a portion of its RPS targets with HQ imports, then the impact on other renewable projects would be proportionately less than the 5.4% shown in Table 1.

Scenario 2: Impacts of Allowing Large-Scale Hydro to Qualify Under RPS

If RPS standards were changed to allow Northern Pass imports to meet state requirements, then a significant disruption to the New England REC and physical renewable energy market would be expected. Northern Pass is projected to inject roughly 7,972 GWh (1,400 MW at .65 capacity factor) into the New England grid each year. This represents 45% of the 2020 Class I RPS requirement (i.e., the “new” technology-neutral resource requirement) in New England, a very significant share that would have the effect of displacing other New England renewable resources that would otherwise be built. If this came to pass, it would likely disrupt the plans for many renewable energy projects currently contemplated to meet RPS requirements in 2020, and any other eligible RPS projects in the conceptual or planning stage.