Mechanisms to Support Public Policy Resources in the New England States

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I. Executive Summary

Across New England, state governments adopt and then implement policies and practices they determine to be in the public interest. Some relate to energy and environmental objectives. For example, all six New England states have enacted laws to support resources that use renewable sources of fuel. Another public policy objective incorporated into some laws and regulations is the reduction of so-called greenhouse gas emissions, primarily carbon dioxide.

Public policy resources are generally more expensive than other resources with which they compete. Public policy resources may also have operating characteristics that make participating in and earning profits from the competitive market more challenging. Accordingly, states may provide economic support or incentives to certain types of electric generation resources that are able to satisfy these and other public policies. This occurs in the context of a federally regulated competitive wholesale market that is designed to be resource neutral and to identify which resources will serve consumers at the lowest cost.

This paper identifies a range of mechanisms available to states to support public policy resources, such as clean energy standards, contracting, and cap and trade programs. It describes each mechanism's mechanics, as well their interaction with the competitive wholesale markets and some legal and regulatory issues.

Aside from which mechanisms states may prefer to use to support public policy resources, New England is challenged by the fact that many public policy resources are located in geographic areas, such as northern Maine for example, that are distant from where consumers use power. Overcoming these geographical and technical issues will require incremental transmission infrastructure to reliably deliver such power to consumers. Accordingly, this paper explains New England's transmission-related challenges and issues and a few innovative approaches other regions have used to solve similar challenges.

Finally, because a number of public policy objectives can be achieved to some degree by reducing consumers' use of system power, including from clean energy sources located distant from where most energy consumers live and work, this paper describes New England states' investment in energy efficiency and distributed generation, such as local solar, and associated issues.

This paper does not opine about the relative merit or advantages and disadvantages of each mechanism or approach: whether and to what extent a particular set of approaches satisfies a state's objectives requires state officials' judgment.

II. Introduction and Background

The objective of this paper is to provide an overview of the mechanisms used by or available to the New England states through which to execute certain energy and environmental requirements in state laws and regulations. This paper also observes some market implications and legal issues associated with such mechanisms.

The paper presents information on the following subjects:

- Public Policy Standards, including Renewable Portfolio and Clean Energy Standards,
- Long-Term Contracts,
- Emission Reduction Programs, including Cap-and-Trade and Emissions Tax,
- Tax Credits and Incentives for Energy Resources,
- Transmission-Related Mechanisms and Issues, and
- Distributed Generation and Demand-Side Management.

Each section includes a discussion of market interactions and legal and regulatory issues, with a focus on New England. In connection with Transmission-Related Mechanisms and Issues, this paper also provides some a few examples of mechanisms used in other parts of the country.

This paper is not an endorsement of, or judgment about, any particular mechanism or public policy and should not be interpreted as such. Any views that may be expressed in, or inferred from, this paper should not be construed as representing those of NESCOE, any NESCOE Manager, or any state agency or official. While the paper draws on research that examines national trends, the scope of the paper pertains to New England. The information provided is largely drawn from publicly available reports and other documents. A reader should not make decisions based on the information in this paper without independent verification.

A. Public Policies and Rationales for Support Mechanisms

State legislatures often advance policies and practices they determine to be in the public interest by passing laws that give state administrative agencies various authorities and responsibilities. Such state laws either direct particular actions or, alternatively, grant these agencies broad discretion in how to achieve certain objectives. State administrative agencies execute those policy objectives by issuing regulations and orders, which provide additional legal detail or standards and have the binding effect of law.

State and federal law govern the economic regulation of the power sector. The federal government regulates New England's competitive *wholesale* electricity market and the transmission of electric power in interstate commerce.[1] State governments regulate New England's *retail* electricity service and the local monopoly distribution utilities. States regulate the way in which distribution utilities procure power for those customers who elect not to buy from a competitive supplier (default service procurement practices) and ensure that the costs a

[1] While Vermont has not restructured its electricity industry, its utilities' voluntary participation in the ISO New England markets and the rates its transmission utility may charge remain under the jurisdiction of the Federal Energy Regulatory Commission.

distribution company recovers from captive customers were incurred prudently. In the rare instance where federal and state laws conflict, federal law pre-empts state law, consistent with the Supremacy Clause of the U.S. Constitution.

States may provide economic support or incentives to certain types of electric generation resources that are able to satisfy public policies reflected in statutes and regulations. This paper refers to resources that receive such economic support as "public policy resources." The following section discusses some of the policy objectives underlying state mechanisms seeking to promote the development and sustainability of certain resource types.

1. Renewable Fuels

All six New England states have enacted laws to support resources that use renewable sources of fuel.[2] Some of the reasons states support increased use of renewable fuels include: meeting environmental objectives, enhancing energy security, encouraging economic development associated with new local resources, and reducing "dependence on natural gas and the impact of its price increases and volatility."[3] All six New England states now use an explicit mechanism to support increased use of renewable sources of fuel.[4] The resources that qualify as renewable fuels vary across New England. This is shown in Table 1 below.[5]

[2] Resources are typically deemed "renewable" based on a combination of fuel source and technology type. This introduction section discusses policies to support the use of renewable resources by identifying the eligible technology types, which are predominately based on the type of fuel source. Accordingly, some policies and associated mechanisms can be described as focused on a resource's input. In contrast, other policies that support emissions reduction, discussed below, can be described as focused on a resource's output.

[3] Massachusetts Department of Energy Resources, *Annual RPS Compliance Report for 2003*, February 15, 2005, at 1, available at http://www.mass.gov/eea/docs/doer/rps/rps-2003annual-rpt.pdf. *See also* Wiser, R. et al., Lawrence Berkeley National Laboratory, *Evaluating Experience with Renewables Portfolio Standards in the United States*, March 2004, at 1, available at http://eetd.lbl.gov/sites/all/files/publications/report-lbnl-54439.pdf.

[4] Conn. Gen. Stat. § 16-245a et seq.; 35-A Me. Rev. Stat.§§ 3210, 3210-C; Mass. Gen. Laws ch. 25A, § 11F; New Hampshire Statutes, Chapter 362-F; Rhode Island Gen. Laws §§ 39-26 et seq.; 30 V.S.A. §§ 8004, 8005, 8005a.

[5] Adapted from Black, J., ISO New England, *Outlook for Renewable Resources in New England: Rhode Island Technical Session*, August 27, 2013, at 6, available at http://www.ripuc.org/eventsactions/docket/4404-ISO-Presentation_8-27-13.pdf.

Table 1: Technologies to Meet State RPS

<table>
<tr><th>Common Technologies</th><th>State</th><th>Special Technologies or Restrictions</th></tr>
<tr><td rowspan="6">Solar thermal, photovoltaic, ocean thermal, wave, tidal, wind, biomass (MA: subject to eligibility requirements), small hydro, landfill gas, fuel cells</td><td>Maine</td><td>Municipal Solid Waste ("MSW") with recycling, cogeneration, and geothermal, "useful thermal energy"</td></tr>
<tr><td>Massachusetts</td><td>Fuel cells only with renewable fuels, MSW</td></tr>
<tr><td>Connecticut</td><td>Hydro <5 MW, sustainable biomass, MSW, fuel cells, energy efficiency and combined heat and power ("CHP"), large-scale hydro (only if shortfall in Class I resources, capped at 5% in 2020)</td></tr>
<tr><td>Rhode Island</td><td>Fuel cells only with renewable fuels, geothermal</td></tr>
<tr><td>Vermont</td><td>Agricultural wastes</td></tr>
<tr><td>New Hampshire</td><td>Geothermal, no fuel cells</td></tr>
</table>

There are some advantages to the varying definitions across the region of a renewable resource. Some of those advantages include a state's ability to: support particular resources best suited to certain locations and associated economic development implications (for example, off-shore wind along New England's coast or biomass in northern New England's forests); reflect local views about the environmental or other attributes of certain technologies; and leverage local industry, research and development efforts, and financial and intellectual capital expertise (for example, the fuel cell industry in Connecticut).

Some of the disadvantages of varying renewable resource definitions across the region include: limiting the market for certain types of resources; creating disparate Renewable Energy Certificate ("REC") pricing across the region; and increasing regulatory risk associated with different and changing eligibility, as discussed further below.

2. Carbon Emissions Reduction

Another public policy objective incorporated into some laws and regulations is the reduction of so-called greenhouse gas emissions, primarily carbon dioxide. Electricity generation units are a prominent source of emissions that, if let into the atmosphere, contribute to global warming and associated climate change. Fossil-fueled electricity generators are some of the largest contributors of carbon dioxide and other criteria air pollutants. State governments have adopted public policies to reduce the aggregate level of emissions from these sources.

In the past, economic consequences had not been imposed on owners of polluting power plants for emitting significant quantities of carbon dioxide into the atmosphere.[6] Today, governments increasingly seek to reduce carbon emissions by limiting emission levels and providing generating plant owners an economic *disincentive* for polluting the environment.[7]

Government mechanisms to achieve carbon emissions reduction typically involve payment obligations for emitting greenhouse gases: simply stated, if a power plant emits carbon,

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[6] Some air regulations also prescribe specific emission control strategies, including the use of "reasonably available" or "best available control technology" or requiring attainment of the "lowest achievable emission rate." The paper focuses on other, industry- or economy- wide mechanisms. For more information on air permitting requirements, see U.S. EPA RACT/BACT/LAER Clearinghouse at http://cfpub.epa.gov/rblc.

[7] The Regional Greenhouse Gas Initiative and the Clean Power Plan are discussed in Section V.A, at 37-41.

financial consequences ensue. By requiring polluting power plants to incur costs, governments improve the competitive position of *non-polluting* power plants.[8]

3. Emerging Technologies

Public policies may be designed to support new and emerging technologies in the energy sector. Common rationales for supporting emerging technologies include: increasing favorable environmental characteristics, providing operational benefits to the electric system (storage, for example), and/or promoting local economic development (jobs associated with increasing solar installations, for example).

New and emerging technologies are widely considered to face barriers to entry in the marketplace, which put them at a competitive disadvantage. For example, new technologies typically have a higher cost of production than more mature ones.[9] It is generally understood that costs associated with emerging technologies decline over time, with the benefit of experience, increased scales of production, and improved supply and distribution chain efficiencies.[10]

Further, New England's competitive wholesale electricity market came about after the region developed the infrastructure to interconnect traditional energy resources. New entrants therefore may face obstacles – sometimes costly obstacles – associated with interconnecting to the grid and participating in the markets. Policies supporting emerging technologies would seek to overcome some of these barriers to entry.[11]

4. Fuel Diversity

Some public policies focus on increasing fuel diversity. The rationale for interest in diverse fuel supply and sources may include flexibility in power system operations or insulation from disruptions in fuel supply, whether by natural or human causes, and energy security (for example, through distributed generation located close to consumers).[12]

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8 As discussed below, proceeds collected through emission reduction mechanisms are also used to support energy efficiency programs, invest in renewable energy resources, and mitigate consumer cost impacts.

9 Other barriers to entry include regulatory risk, a lack of revenue compensation mechanisms, a lack of markets in which to participate, and a lack of appropriate price signals. *See* Bhatnagar, D., et al., *Market and Policy Barriers to Energy Storage Deployment* (September 2013), available at http://www.sandia.gov/ess/publications/SAND2013-7606.pdf.

10 *See Petition for Approval of Two Long-Term Contracts to Purchase Wind Power and Renewable Energy Certificates Pursuant to G.L. c. 169, § 83 and 220 C.M.R. § 17.00 et seq.*, Testimony and Exhibits of Susan F. Tierney, Ph.D., on behalf of Massachusetts and Nantucket Electric Companies d/b/a National Grid, Docket No. D.P.U. 10-54 (June 4, 2010), at 83-88 ("Tierney Cape Wind Testimony").

11 For example, a state's Renewable Energy Investment Fund should "foster the growth, development and commercialization of renewable energy sources, related enterprises and stimulate demand for renewable energy and deployment of renewable energy sources that serve end use customers in this state and for the further purpose of supporting operational demonstration projects for advanced technologies that reduce energy use from traditional sources." Conn. Gen. Stat. 16-245n(c).)

12 *See, e.g.,* the following policy objectives reflected in the statutory codes of New England states: "[T]o encourage the use of renewable, efficient and indigenous resources, it is the policy of this State to encourage the generation of electricity from renewable and efficient sources and to diversify electricity

The regional wholesale electricity markets are resource neutral by design. They do not favor any technology or fuel type. According to the Federal Energy Regulatory Commission's ("FERC") standard market design whitepaper, this is the basis of the ISO New England Inc. ("ISO-NE") and other centralized electricity markets: "market rules must be technology- and fuel-neutral."[13] The purpose of such a market-based structure is to provide reliable service at the lowest cost.[14] According to ISO-NE, "[p]roviding the same compensation for the same performance enables healthy, strong competition that will reward cost-effective investments as new technologies emerge and the wholesale markets continue to evolve over time."[15]

New England's competitive wholesale market has identified and supported the lowest cost resources for consumers without respect to fuel type of other factors. At the same time, New England has become increasingly dependent on a single fuel source for electric power generation: natural gas. Accordingly, to be competitive and offer power at the lowest cost for consumers, private investors have increasingly developed generation resources that are fueled by natural gas. The growing reliance on natural gas-fired resources has led to substantial regional discussion over many years on a range of implications, including reliability, economic, and environmental consequences.

In some respects, the growing reliance on natural gas-fired resources is a foreseeable outcome of a resource-neutral competitive market: market participants that behave in a predictable and economically rational manner will invest private capital in resources that are most likely to provide the greatest return on investment. Moreover, to date, the potential for

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production[.]" 35-A M.R.S. § 3210; ". . . (i) the development and increased use and affordability of renewable energy resources in the commonwealth and the New England region; (ii) the protection of the environment and the health of the citizens of the commonwealth through the prevention, mitigation and alleviation of the adverse pollution effects associated with certain electricity generation facilities; (iii) the maximization of benefits to consumers of the commonwealth resulting from increased fuel and supply diversity. . ." M.G.L. ch. 23J § 9(c); "Renewable energy generation technologies can provide fuel diversity to the state and New England generation supply through use of local renewable fuels and resources that serve to displace and thereby lower regional dependence on fossil fuels." N.H.S. 362-F:1; "Providing support and incentives to locate renewable energy plants of small and moderate size in a manner that is distributed across the state's electric grid, including locating such plants in areas that will provide benefit to the operation and management of that grid through such means as reducing line losses and addressing transmission and distribution constraints." 30 V.S.A. § 8001(a)(7).

13 Federal Energy Regulatory Commission, *Working Paper on Standardized Transmission Service and Wholesale Electric Market Design*, Docket No: RM01-12-000 (March 15, 2002), at 6.

14 *See*, generally, ISO New England Inc. Transmission, Markets, and Services Tariff Section I.1.3, available at http://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_1/sect_i.pdf. The objective function used in the energy and capacity markets optimizes social welfare, which is not expected to be appreciably different from minimizing total costs. *ISO New England Inc. and New England Power Pool*, Testimony of Andrew G. Gillespie, on Behalf of ISO New England and New England Power Pool, Docket No. ER13-1880-000 (July 1, 2013), at 3-8, available at http://www.iso-ne.com/static-assets/documents/regulatory/ferc/filings/2013/jul/er13_1880_000_fca_mkt_clearing.pdf.

15 *ISO New England Inc. and New England Power Pool*, Testimony of Matthew White, PhD, on behalf of ISO New England, Docket No. ER14-1050-000 (Jan. 17, 2014), at 53-54, available at http://www.iso-ne.com/static-assets/documents/regulatory/ferc/filings/2014/jan/er14_1050_000_1_17_14_pay_for_performace_part_1.pdf.

disruptions to a fuel source has not been specifically valued in the competitive marketplace. To the extent that recent reforms to ISO-NE's Forward Capacity Market ("FCM") provide incentives for improved resource performance, going forward, the "Pay For Performance design will provide strong incentives for the installation and operation of oil-firing capability…."[16] Increased reliance on oil as a back-up fuel source, however, presents challenges to states seeking to reduce carbon emissions as discussed elsewhere in this paper.

B. Resource Economics

This section provides a brief review of resource economics to explain the need for and the function of certain mechanisms to support public policy resources. In short, public policy resources are generally more expensive than other resources with which they compete. Public policy resources may also have operating characteristics that make participating in and earning profits from the competitive market more challenging. Lastly, different financial structures can affect the competitive position of public policy resources relative to others forms of electricity generation.

1. Cost of Energy

In New England's competitive wholesale marketplace, a resource's ability to compete and earn a return on investment is determined by economic merit, or the lowest cost. The competitive market selects resources to provide power based on their offer prices (assuming, of course, the power system has the ability to deliver power to customers safely and reliably). The competitive market requires resources to convert the money they need to earn in order to operate and remain in business (referred to as "revenue requirements") into prices that are lower than their competitors.

a) Levelized Cost of Energy

One approach to examine the relative competitiveness of resources with different operational and economic characteristics is to compare them under a common metric. A way to do such a comparison is to look at the so-called Levelized Cost of Energy ("LCOE"). The LCOE combines all of a resource's expenses, both up front (to build, for example) and ongoing (fuel supply, for example), and distributes them over the resource's expected output over its useful life. The result is a single price for a unit of output from each resource type.

Table 2 shows the U.S. Energy Information Administration's latest estimated LCOE for various resource types. As the table shows, advanced combined cycle natural gas plants have one of the lowest LCOE.

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16 *ISO New England Inc.*, Fuel Assurance Status Report of ISO New England Inc., Docket Nos. AD13-7-000 and AD14-8-000. (Feb. 18, 2015), , at 4, available at http://www.iso-ne.com/static-assets/documents/2015/02/Final_for_Filing__Fuel_Assurance_Report.pdf.

Table 2: Estimated Levelized Cost of Energy (LCOE) for New Generation Resources, for Plants Entering Service in 2020[17]

Plant Type		Total System LCOE ($/MWh)
Dispatchable Technologies		
	Conventional Coal	95.1
	Advanced Coal	115.7
	Advanced Coal with CCS[18]	144.4
Natural Gas-fired		
	Conventional Combined Cycle	75.2
	Advanced Combined Cycle	72.6
	Advanced CC with CCS	100.2
	Conventional Combustion Turbine	141.6
	Advanced Combustion Turbine	113.5
	Advanced Nuclear	95.2
	Geothermal	47.8
	Biomass	100.5
Non-Dispatchable Technologies		
	Wind	73.6
	Wind – Offshore	196.9
	Solar PV	125.3
	Solar Thermal	239.7
	Hydroelectric	83.5

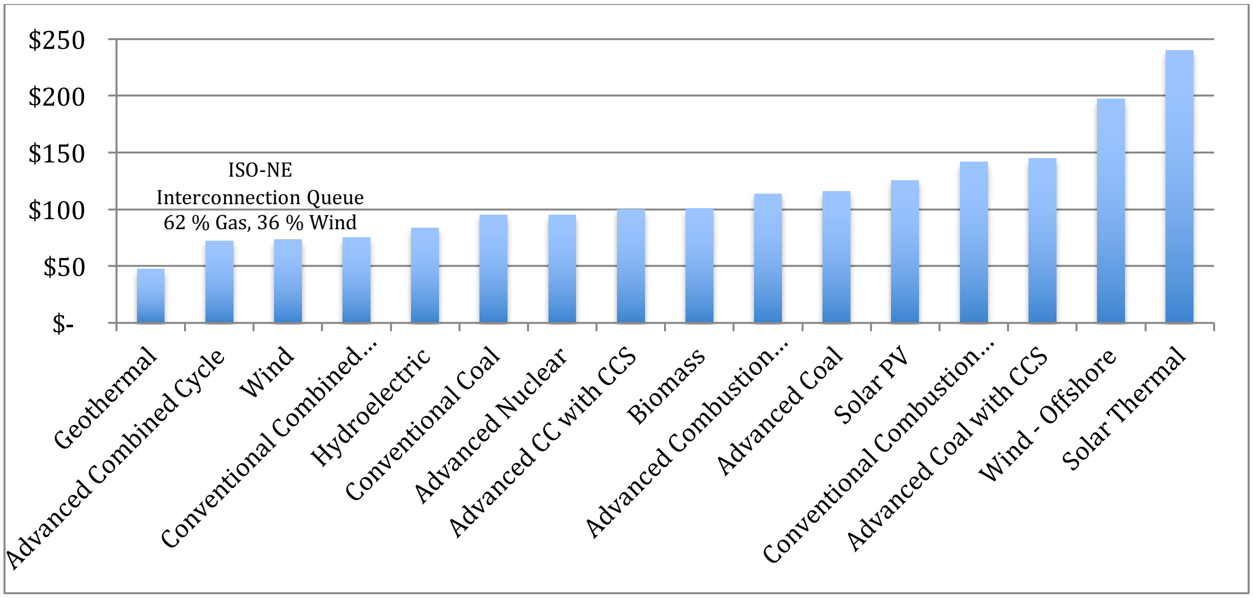
Figure 3 shows the same information in graphical form. For reference, the resources seeking to interconnect in New England are predominately natural gas-fired and wind turbines.[19]

17 U.S. Energy Information Administration, *Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2015*, June 2015, at 6, available at http://www.eia.gov/forecasts/aeo/pdf/electricity_generation.pdf. The analysis includes several cost components, including transmission investments, for each resource type.

18 Carbon Capture and Sequestration ("CCS"), while in the research and development phase, is projected to add cost through additional capital expenditure, higher operating expenses, and decreased generation efficiency.

19 *See, e.g.,* ISO New England 2015 Regional System Plan, Section 5.4, especially at Figure 5-3 (p 79), available at http://www.iso-ne.com/static-assets/documents/2015/11/rsp15_final_110515.docx. Not all resources in the interconnection queue will ultimately reach commercial operation. Moreover, the percentages of gas and wind in the queue are based on nameplate capacity, which may overstate the potential contribution of energy that would typically be produced by wind turbines. The queue statistics are provided merely to indicate that the resources in development in New England are on the low end of the LCOE spectrum.

Figure 3: Estimated Levelized Cost of Energy (LCOE) for New Generation Resources, for Plants Entering Service in 2020, sorted by LCOE



2. Comparison of Resource Types

In addition to a resource's cost profile, described above, a resource's *characteristics* affect its ability to recover expenses and make a profit from the market. A resource's control and electrical performance determines the markets in which it can participate and have an opportunity to achieve its revenue requirements.[20]

For example, intermittent resources such as wind turbines have a limited ability to follow a power system operator's dispatch instructions. Wind turbines can only operate effectively when the wind blows, for example. On the other hand, resources such as gas-fired power plants are generally able to start quickly and follow the grid operator's instructions closely.

Also, some renewable resources (e.g., wind in Maine) are unable to deliver all of their output throughout the year without new transmission infrastructure investment.

Due to the physics of the grid, resources that can follow the grid operator's dispatch instructions, and that are able to fine-tune the electrical properties of the power system, provide high value and have corresponding earning opportunities.

Table 4 below provides an overview of the products in New England's wholesale electricity market. Each of these represents an earning opportunity.

[20] Other factors, including a particular resource's specific configuration and location on the transmission network, can also influence relative competitiveness.

Table 4: Electricity Market Products

Wholesale Market:	Product:	Note:
Energy and Reserves	Production of, or the ability to instantaneously produce, energy	The largest market, typically providing ~ 85% of revenue[21]
Forward Capacity	Obligation to participate in the energy market every day	Second largest market, provides the critical remaining revenue requirements (profit)
Ancillary Services	Grid operating support, including voltage and frequency, and restart capability	Collectively, a small but important market segment

3. Fixed vs. Variable Costs

It is capital-intensive for a resource to participate in the electric power industry. In capital-intensive industries, a resource's financial structure makes a difference to whether and to what extent it will be competitive.

Most resources' costs can be broken into two groups: (1) Fixed Costs, which must be paid regardless of production (for example, debt), and (2) Variable Costs, which grow in proportion to the resources' production (for example, fuel).

To illustrate, consider that wind resources require significant up-front investment and then have very low variable costs – their fuel is low (or zero) cost. In contrast, natural gas-fired resources have relatively lower up-front costs and higher variable costs.[22] This is especially true in winter, when the cost of gas has hit historic highs in New England.

To be competitive and thus profit from the energy and reserves market, a resource needs to cover its variable costs *and* be able to operate when market conditions are favorable. To remain economically viable over time, a resource also needs to recover its fixed costs and earn a profit. Generally, resources cannot do this from the energy and reserves market alone and must earn additional revenue from the capacity and ancillary services markets. Moreover, resources are dispatched in the energy market based on their variable cost, which impacts recovery of both variable and fixed costs. Depending on physical characteristics and relative economic merit in the energy market, a resource may be more dependent on revenue from one market compared with another. For example, a nuclear plant would tend to be more dependent on energy market revenues. In contrast, an older gas- or oil-fired generator may rely more heavily on capacity market revenues, due to limited energy generation over the course of a year.

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21 For more information regarding the relative magnitude of the various wholesale electricity markets from 2008 to 2014*, see* 2014 Report of the Consumer Liaison Group (March 10, 2015), at Appendix C: Wholesale Electricity Costs, available at http://www.iso-ne.com/static-assets/documents/2015/03/2014_clg_report_final.pdf.

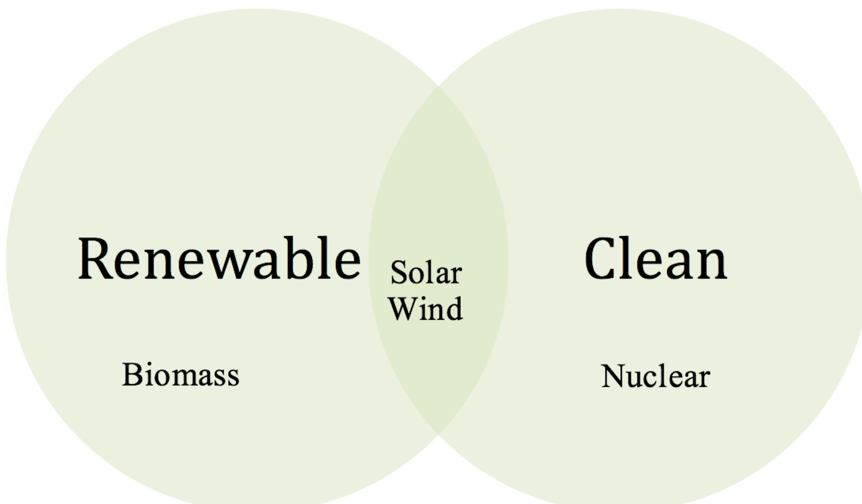
22 Certain fossil-fueled resources in New England must also buy allowances to emit carbon dioxide. For example, a combined cycle natural gas-fired generator with a 7,400 British thermal units (BTU)/kWh heat rate that purchases allowances at $7.50/ton CO_2 would include approximately $3.25/MWh in their energy market bid to cover such carbon compliance costs.

III. Public Policy Standards

In the electric power industry, "standards" are a type of mandate states require in furtherance of a public policy objective.

Two types of standards are generally used to implement policy objectives in the electric power sector:[23] (1) Renewable Portfolio Standards ("RPS")[24] and (2) Clean Energy Standards ("CES"). These two standards both have a requirement that regulated utilities or others providing certain services to consumers must either buy the desirable environmental attributes of certain power generation sources or pay a fee. The primary difference between RPS and CES and how states have implemented them, is the eligibility criteria.[25] Figure 5 below illustrates how certain resource types may qualify for a particular standard or both.[26]

Figure 5: Standards for Renewable and Clean Energy



23 There are other types of standards that affect the electric power industry. For example, an Emissions Performance Standard functions as a maximum emissions limit for criteria air pollutants for new (and sometimes existing) power generation resources.

24 Sometimes called Renewable Energy Standards ("RES"), for all intents and purposes, RES and RPS are synonymous.

25 As discussed above, resources are typically deemed "renewable" based on a combination of fuel source and technology type. In contrast, a CES, which focuses on emissions characteristics, can sometimes be more technology neutral relative to an RPS.

26 Figure 5 is provided merely for illustrative purposes and is not intended to be comprehensive. Some resources, such as hydroelectric power, may be considered renewable and/or clean (low carbon), depending on the vintage, size, and location specific characteristics. The degree to which Canadian hydropower is ultimately a low carbon resource is the subject of debate in some quarters. It is beyond the scope of this paper to evaluate any studies that question or present life-cycle emissions analysis regarding hydropower.

A. ***Renewable Portfolio Standards***

The New England states identify similar objectives for their RPS, including environmental, energy security, and economic development considerations. According to one state legislature, for example:

> Renewable energy generation technologies can provide fuel diversity to the state and New England generation supply through use of local renewable fuels and resources that serve to displace and thereby lower regional dependence on fossil fuels. This has the potential to lower and stabilize future energy costs by reducing exposure to rising and volatile fossil fuel prices. The use of renewable energy technologies and fuels can also help to keep energy and investment dollars in the state to benefit our own economy. In addition, employing low emission forms of such technologies can reduce the amount of greenhouse gases, nitrogen oxides, and particulate matter emissions transported into New Hampshire and also generated in the state, thereby improving air quality and public health, and mitigating against the risks of climate change. It is therefore in the public interest to stimulate investment in low emission renewable energy generation technologies in New England and, in particular, [in-state], whether at new or existing facilities."[27]

Another state's legislature enacted an RPS "to facilitate the development of new renewable energy resources . . . with goals of stabilizing long-term energy prices, enhancing environmental quality, and creating jobs [in-state] in the renewable energy sector."[28]

At a high level, RPS targets are designed to achieve a certain level of renewable energy penetration, typically in proportion to total electricity sales. States often set modest levels in early years, and escalate them over time to increase renewable energy penetration. States frequently establish the levels in statutes and may base them on analysis of supply and demand dynamics and cost impacts on consumers.[29] Moreover, the REC-based compliance feature is designed to use competitive market forces to identify the appropriate level of economic support to achieve the public policy goals. RPS program costs are generally limited by the level of an

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27 N.H. Rev. Stat. Ann. § R.S.A. 362-F:1 (2007), available at http://www.gencourt.state.nh.us/rsa/html/XXXIV/362-F/362-F-1.htm.

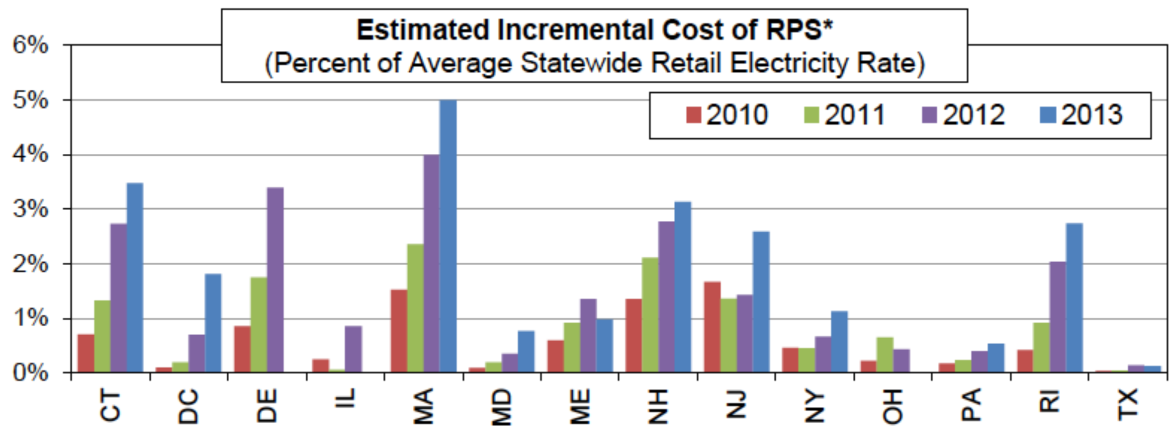
28 R.I. Gen. Laws § 39-26-3 (2014), available at http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26/39-26-3.HTM.

29 Chen, C., et al., Weighing the Costs and Benefits of State Renewables Portfolio Standards: A Comparative Analysis of State-Level Policy Impact Projections (March 2007), at 6, available at https://emp.lbl.gov/sites/all/files/REPORT%20lbnl%20-%2061580.pdf. See also, for example, Woolf, T., et al., Potential Cost Impacts of a Vermont Renewable Portfolio Standard (October 16, 2003), available at http://www.synapse-energy.com/sites/default/files/SynapseReport.2003-10.VT-PSB.Cost-Impacts-VT-RPS.03-32.pdf and Gittell, R., and Magnusson, M., Economic Impact of a New Hampshire Renewable Portfolio Standard (February 2007), available at http://des.nh.gov/organization/divisions/air/tsb/tps/climate/documents/unh_rps_report.pdf.

alternative compliance payment ("ACP"), as discussed further below. In general, RPS programs in New England have been projected to have a relatively modest impact on consumer costs, with rate increases "estimated at 1% or less in 2007."[30]

Over time, the costs of RPS programs have fluctuated. The current trend is upward. According to a recent Lawrence Berkeley National Laboratory ("LBNL") analysis, which estimates and summarizes historical RPS costs and benefits, Northeastern states had relatively high REC prices among the restructured markets. Costs rose from 2010 to 2013 and "led to correspondingly high and increasing incremental costs in those states, rising to $37-$47/MWh in 2013."[31] Figure 6 below presents LBNL's analysis of RPS costs for states with similarly organized electricity industries. To enable comparison, costs are shown as a percentage of retail sales.[32]

Figure 6: Cost of RPS in States with Restructured Markets[33]



** Incremental costs are estimated from REC and ACP prices and volumes for each compliance year, which may differ from calendar years. If available, REC prices are based on average prices reported by the PUC (DC, IL, MD, ME, OH, NJ, PA); they are otherwise based on published spot market prices, supplemented with data on long-term contract prices where available. Incremental costs for NY are based on NYSERDA's annual RPS expenditures and estimated REC deliveries.*

As discussed further below, RPS programs are highly customizable. States create classes or tiers, to differentiate new and existing resources of various types. States also use carve-outs,

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30 Wiser, R. and Barbose, G., *Renewable Portfolio Standards in the United States: A Status Report with Data Through 2007* (April 2008) at 29, available at https://emp.lbl.gov/sites/all/files/REPORT%20lbnl-154e-revised.pdf.

31 Barbose, G., et al., *Costs and Benefits of Renewable Portfolio Standards in the United States* (July 2015), at 9, available at https://emp.lbl.gov/sites/all/files/lbnl-187516.pdf.

32 While declining retail electricity prices, with all other things being equal or held constant, would result in an increasing RPS compliance cost (as a percentage of sales) metric, the study authors attributed the recent increases to the stringency of the RPS targets in certain states. *Id.* at 10.

33 *Id.* at 10.

or set-asides, to target *specific* resource types (for example, a solar REC or "SREC"). In terms of the effect that such customization has had on RPS program costs, the LBNL study found that:

> Differing mixes of resource tiers within each state's RPS also contributed to variations in compliance costs. In particular, RPS costs were generally low for states with large secondary-tier targets, because REC pricing for those tiers is typically quite low, reflecting a typical surplus of supply for those lower value resources. . . Conversely, RPS compliance costs have tended to be higher in states with relatively high solar set-aside requirements, as SREC prices have been generally high compared to other tiers, though SREC prices have softened substantially in recent years.[34]

Since states have implemented RPS programs, questions have arisen regarding the RPS mechanisms' ability to provide adequate incentives to ensure that new renewable resources will be developed. Specifically, developers' ability to finance renewable energy projects based on the combination of energy and REC revenues depends on many factors. Compared with vertically-integrated regulated utilities, participation in competitive markets and the financial community's expectations regarding revenue and investments risks have had an impact on the success and costs of RPS program implementation.[35] According to a 2007 National Renewable Energy Laboratory ("NREL") study, "[r]educing revenue risk often requires that a project have a power purchase agreement (PPA) long enough to assure revenues during the debt repayment period, generally eight to 15 years."[36] Moreover, "[i]nvestment risks, perceived or actual, are often greater for renewable energy projects than for conventional energy projects."[37] Further, the NREL analysis found that "[i]n states and regions where short-term trade in RECs dominates over long-term contracting, RPS policies appear to be a costly and unstable way of achieving renewable energy objectives."[38] To address project finance-related issues, as discussed further below, some states have pursued several different strategies, including innovative RPS reforms,[39]

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34 *Id.* at 9-10.

35 Cory, K., and Swezey, B., *Renewable Portfolio Standards in the States: Balancing Goals and Implementation Strategies* (December 2007), at 20-23, available at http://www.nrel.gov/docs/fy08osti/41409.pdf.

36 *Id.* at 20. Also, see the introduction to Section IV. Long Term Contracts, below, for more information.

37 *Id.*

38 *Id.* at 21.

39 For example, the Massachusetts S-REC I program used a carve-out with an adjustable minimum standard (measured initial growth), a price collar (solar clearinghouse establishes a price floor and forward ACP rate schedule establishes a price cap), and an extended term (eligible for 10 years, then become regular Class I). For more information, *see* http://www.mass.gov/eea/docs/doer/renewables/solar/srec-presentation.pdf. S-REC I reached its 400 MW cumulative capacity goal in 2014 and has been incorporated into the S-REC II Program's 1600 MW by 2020 target.

establishing or enhancing lending institutions,[40] and long-term contracts for energy, capacity, and/or RECs.[41]

1. Mechanics

Through an RPS, states create a market for the resource attributes states consider to have societal value. By mandating demand for power from resources that use renewable fuels, states establish a new revenue stream for RPS-eligible resources. In the case of a region like New England, this revenue stream supplements a resource's earnings from the wholesale electricity markets.

RPS-eligible resources must compete against one another to supply renewable energy. For that reason, an RPS is considered to provide financial support through a market-based mechanism. As discussed in more detail below, the RPS creates an obligation on retail electricity providers to (1) purchase RECs that are produced in proportion to the energy consumed by their customers from qualifying resources, or (2) pay a penalty fee, also known as an ACP.[42]

a) Obligation

An RPS obligation is usually expressed as a percentage of some future years' electricity consumption, for example, fifteen percent (15%) of load in future year X.[43] In general, an RPS establishes an obligation for retail electricity providers (those entities that sell power directly to consumers) either to generate renewable power or purchase RECs from qualifying renewable resources. Retail electricity providers can include generators, marketers and brokers, aggregated pools of electricity customers, and electric distribution utilities.[44] For the most part, the obligation applies to the competitive supplier industry (for example, marketers and brokers) and electric distribution utilities, which provide electric service for customers that do not elect to take service from a competitive supplier. *In many states, municipal entities and publicly-owned power systems are exempt from RPS requirements.*

Retail electricity providers demonstrate RPS compliance by submitting information to regulatory agencies, commonly the governor's energy planning office or the state public utility commission, on a periodic basis (at least annually).

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40 For example, *see* the Connecticut Green Bank at http://ctcleanenergy.com.

41 For example, *see* Peregrine Energy Group et al., *Study on Long-term Contracting Under Section 83 of the Green Communities Act* (December 31, 2012), available at http://www.mass.gov/eea/docs/doer/pub-info/long-term-contracting-section-83-green-communitiesa-act.pdf.

42 Several of the New England states performed comprehensive RPS program reviews in 2011: Connecticut • Maine • New Hampshire • Vermont.

43 *See*, generally, Conn. Gen. Stat. § 16-245a et seq.; Me. Rev. Stat. §§ 3210, 3210-C; Mass. Gen. Laws ch. 25A, § 11F; N. H. Rev. Stat. Ann. § 362-F; R.I. Gen. Laws §§ 39-26 et seq.; 30 V.S.A. § 8004.

44 N.H. Rev. Stat. Ann. § R.S.A. 374-F holds that, “"Electricity suppliers" means suppliers of electricity generation services and includes actual electricity generators and brokers, aggregators, and pools that arrange for the supply of electricity generation to meet retail customer demand….”,…”, available at http://www.gencourt.state.nh.us/rsa/html/xxxiv/374-f/374-f-mrg.htm.

b) Renewable Energy Certificates

RECs serve several purposes in the context of an RPS. RECs provide additional revenue to qualifying renewable resources in proportion to the energy each resource generates. RECs also create a market: the REC market reveals the additional price required, beyond energy and capacity payments, to make projects economically viable and also identifies when there is a need for additional resources. Competition among renewable resources in the REC market can lower the costs of achieving policy objectives and foster innovation.

RECs are based on the concept that one can separate what is physically and intuitively inseparable: the resource's renewable energy attributes and the resource's power output.[45] If one assumes that a resource can be divided into its physical electrons and its environmental characteristics, it follows that a resource can produce RECs in direct proportion to its electrical energy. Just as that resource's energy, capacity, and ancillary service capabilities are already valued in the wholesale electricity markets, the resource's environmental attributes are sold into the REC markets and are therefore assigned a value through competitive dynamics.

The market for RECs is typically conducted by buyers and sellers interacting directly with one another. This is called a bilateral market. Sellers must get state agencies to certify them as RPS-eligible. Sellers commonly get certified by several states to take advantage of the best prices available at the time, irrespective of states' geographic boundaries.[46] Buyers can either purchase RECs from sellers or generate the renewable power themselves.

Buyers and sellers of RECs have accounts with a REC market administrator. In New England, the Generation Information System ("GIS") functions as a bank for REC market participants.[47] Qualified renewable resources receive a credit in the GIS for each megawatt-hour of power they produce.[48] Once a buyer and seller complete a transaction, the GIS system is updated to reflect the new balance for buyers and sellers. Buyers then comply with the RPS by retiring a commensurate number of RECs in their GIS account.

According to a 2011 report for the Maine Public Utilities Commission that further describes the REC market:

> There is no effective marginal cost of producing RECs as it is co-produced with the energy. The price of RECs is based on break-even economics, specifically the shortfall between the all-in-levelized costs of renewable investment and revenues that the

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45 Wiser, R., et al., *Renewables Portfolio Standards: A Factual Introduction to Experience from the United States* (April 2007), at 5, available at https://emp.lbl.gov/sites/all/files/lbnl%20-%2062569.pdf.

46 Frayer, J., Wang, E., *Maine Public Utilities Commission RPS Report 2011: Review of RPS Requirements and Compliance in Maine* (January 30, 2012), at 41, available at http://www.maine.gov/energy/pdf/RPS%20MPUC%20Final%20Report.pdf.

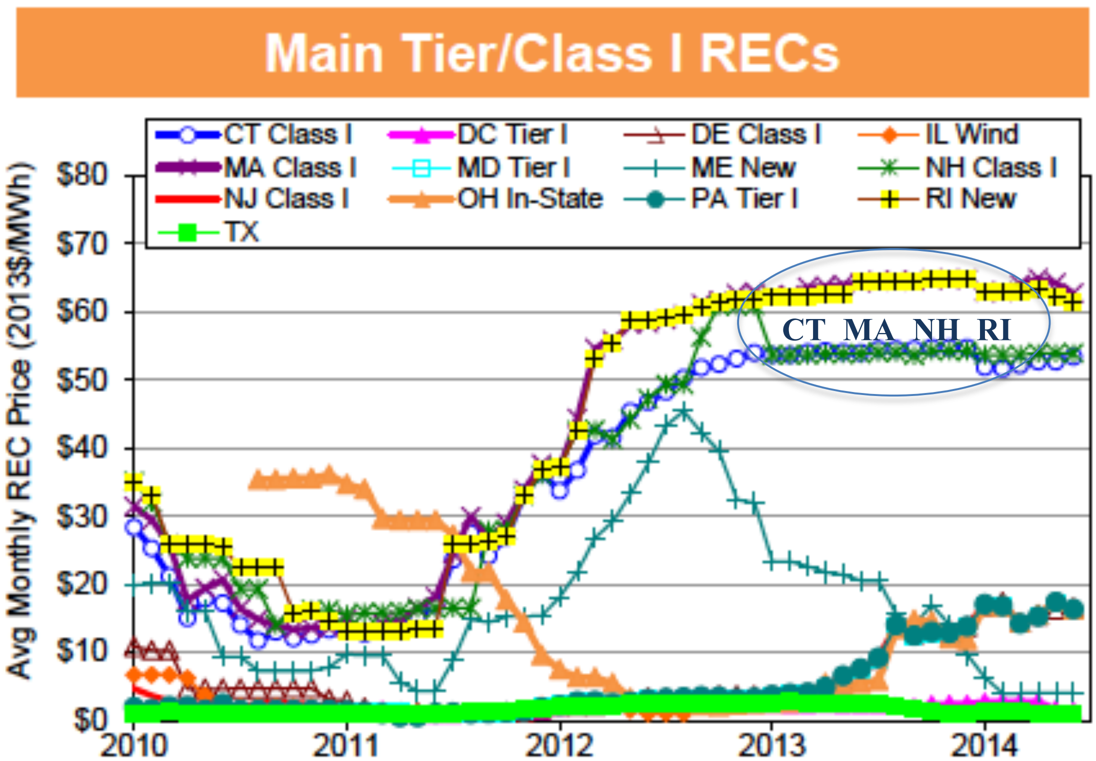
47 Tracking RECs in the GIS enables regulatory agencies to oversee the measurement and verification of renewable power generated in furtherance of policy objectives. For more information, *see* http://www.nepoolgis.com.

48 Technically, all generation resources receive credits in the GIS for each megawatt-hour of energy produced, whereas only qualified renewable resources receive RECs. In this way, the NEPOOL GIS system also enables disclosure of the environmental characteristics of retail energy supplies.

> renewable investment receives from the sale of associated energy and capacity. Therefore, high REC prices can be viewed as a market signal for more investment in renewables.[49]

More recent analysis of REC market prices observes that "[r]ising Class I REC prices in Northeastern states reflect tightening supply…"[50] As shown in Figure 7 below, REC prices reached their lowest point in 2011. For the last several years in most New England states, the REC market has sustained high prices.

Figure 7: Selected Class I REC Prices (2010-2014)[51]



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49 Frayer, J., Wang, E., *Maine Public Utilities Commission RPS Report 2011: Review of RPS Requirements and Compliance in Maine* (January 30, 2012), at 30 (footnote omitted), available at http://www.maine.gov/energy/pdf/RPS%20MPUC%20Final%20Report.pdf.

50 Barbose, G., Presentation to Renewable Energy Markets Conference, *Renewable Portfolio Standards in the United States: An Update* (December 4, 2014), at slide 11, available at http://emp.lbl.gov/sites/all/files/2014%20REM.pdf. *See*, generally, https://emp.lbl.gov/projects/renewables-portfolio-stan.

51 *Id.*

c) Alternative Compliance Payments

Retail electricity providers have the option to pay an ACP rather than buying RECs.[52] The ACP is a means of RPS compliance in two cases: 1) in the event that the supply of RECs is inadequate to meet the standard or 2) when RECs become too expensive. The price of the ACP is usually set through a legislative or regulatory process and represents a limit on the "potential burden on ratepayers."[53] The theory behind the ACP is that states desire to satisfy RPS requirements, but not at any cost. States usually direct that ACPs paid in a given compliance be used to support renewable and other clean energy development loan funds.[54]

Figure 8: Historical Comparison of ACP Rates in New England[55]

	Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
ME	Class I					$57.1	$ 58.6	$ 60.9	$ 60.9	$ 62.1
	Class II	N/A								
CT	Class I			$55.0	$55.0	$55.0	$ 55.0	$ 55.0	$ 55.0	$ 55.0
	Class II			$55.0	$55.0	$55.0	$ 55.0	$ 55.0	$ 55.0	$ 55.0
	Class III					$31.0	$ 31.0	$ 31.0	$ 31.0	$ 31.0
MA	Class I	$50.0	$51.4	$53.2	$55.1	$57.1	$ 58.6	$ 60.9	$ 60.9	$ 62.1
	Class I Solar Carve-Out								$600.0	$550.0
	Class II RE							$ 25.0	$ 25.0	$ 25.5
	Class II WE							$ 10.0	$ 10.0	$ 10.2
	APS							$ 20.0	$ 20.0	$ 20.4
NH	Class I						$ 58.6	$ 60.9	$ 60.9	$ 62.1
	Class II						$153.8	$160.0	$160.0	$163.2
	Class III						$ 28.7	$ 29.9	$ 29.9	$ 30.5
	Class IV						$ 28.7	$ 29.9	$ 29.9	$ 30.5
RI	New RES Existing RES					$57.1	$ 58.6	$ 60.9	$ 60.9	$ 62.1

52 Other cost containment mechanisms include rate impact/revenue requirement caps, surcharge caps, renewable energy contract price caps, renewable energy funding caps, and financial penalties. Heeter, J. et al., *A Survey of State-Level Cost and Benefit Estimates of Renewable Portfolio Standards* (May 2014), at 45-46, available at http://www.nrel.gov/docs/fy14osti/61042.pdf.

53 *Id.* at 45.

54 For more information regarding use of ACP funds, see the latest annual program reports, available at: Connecticut • Massachusetts • Maine • New Hampshire • Rhode Island

55 Frayer, J., Wang, E., *Maine Public Utilities Commission RPS Report 2011: Review of RPS Requirements and Compliance in Maine* (January 30, 2012), at 86 (Appendix A), available at http://www.maine.gov/energy/pdf/RPS%20MPUC%20Final%20Report.pdf.

2. Classes – Resource Types and Vintages

Many RPS requirements are organized into classes, such as Class I, Class II, etc. Classes target and support those specific resources best able to satisfy specific objectives. The two main drivers of RPS classes are: (1) vintage and (2) resource-type eligibility.

The vintage, or the year the resource was/is first placed into service, differentiates new and existing resources. The targets for new resources are designed to achieve growth in the renewable energy sector. In contrast, "compliance targets [for existing resources] are generally intended to provide the minimum amount of additional revenue believed to be necessary to keep these existing renewable energy facilities in operation."[56]

RPS classification is also designed to target the resource types eligible for economic support. Most RPS programs consider solar, wind, small hydro, biomass, and landfill gas to be Class I. Some programs include municipal solid waste and combined heat and power as Class II or III. Other resource characteristics (for example, size) can also affect eligibility classification.

States customize RPS targets according to policy preferences through vintage and resource-type classifications. Such RPS classifications result in similarities and differences across a region, see Figure 9 below.

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56 Rhode Island Public Utilities Commission, *Annual RES Compliance Report for Compliance Year 2013*, at 21, available at http://www.ripuc.ri.gov/utilityinfo/RES-2013-AnnualReport.pdf.

Figure 9: Comparison of RPS Eligibility in New England in 2011[57]

Fuel type	ME		CT			MA				NH				RI	
	Class I	Class II	Class I	Class II	Class III	Class I	Class II RE	Class II WE	APS	Class I	Class II	Class III	Class IV	New RES	New/ Existing RES
Solar thermal	<=100 MW	<=100 MW	✓			✓	✓				✓			✓	
Photovoltaic	<=100 MW	<=100 MW	✓			✓	✓				✓			✓	
Ocean thermal			✓			✓	✓			✓				✓	
Wave			✓			✓	✓			✓				✓	
Tidal	<=100 MW	<=100 MW	✓			✓	✓			✓				✓	
Marine or hydrokinetic						✓	✓								
Hydro	<=100 MW	<=100 MW	<5 MW	<5 MW		<25 MW	<5 MW			✓			<5 MW	<30 MW	
Wind	✓	<=100 MW	✓			✓	✓			✓				✓	
Biomass, biofuels	<=100 MW	<=100 MW	low emission rate	✓		low emission, advanced technology	✓			✓	< 25 MW			✓ (including cofiring with fossil fuels)	
Landfill gas	<=100 MW	<=100 MW	✓			✓	✓			✓		✓		✓	
Anaerobic digester						✓	✓			✓		✓		✓	
Fuel cells	<=100 MW	<=100 MW	✓			w/ renewable fuel	✓							w/ renewable resources	
Geothermal	<=100 MW	<=100 MW				✓	✓			✓				✓	
Municipal solid waste		<=100 MW		✓				✓							
Cogeneration, Combined heat and power ("CHP")		built through 1/1/1997			consumer sites, fuel efficiency >50%				✓						
Energy efficiency					✓										
Note	COD after 9/1/2005		COD after 7/1/2003			COD after 12/31/1997				COD after 1/1/2006	COD after 1/1/2006			COD after 12/31/1997	

Note: RE=Renewable Energy; WE=Waste Energy; APS=Alternative Portfolio Standard; RES=Renewable Energy Standard

3. Carve-Outs

Another way states further customize RPS targets is to designate a portion of the goal to a specific sub-class of resources. The so-called "carve-out" supports resource types that may be lagging in development or that may be a state's preferred way to achieve certain objectives. A common example of an RPS carve-out is for solar resources.[58]

While the market-based nature of RPS programs has benefits, discussed above, it can result in a concentration of single resource types in meeting compliance obligations. For example, on-shore wind has lower costs than many other RPS-eligible resources and has the biggest presence of all renewable resources in ISO-NE's generator interconnection queue (those

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57 Frayer, J., Wang, E., *Maine Public Utilities Commission RPS Report 2011: Review of RPS Requirements and Compliance in Maine* (January 30, 2012), at 84 (Appendix A), available at http://www.maine.gov/energy/pdf/RPS%20MPUC%20Final%20Report.pdf. (Vermont is not included in the table as it did not have an RPS in 2011.)

58 *See* Bird, L., et al., *Solar Renewable Energy Certificate (SREC) Markets: Status and Trends* (November 2011), available at http://apps3.eere.energy.gov/greenpower/pdfs/52868.pdf.

generators in line for studies to allow them to interconnect to the power system).[59] To diversify the resource types used to comply with RPS programs, some states create carve-outs that identify a minimum amount of specific resources that retail electricity providers must buy. In many ways, a carve-out achieves the same goals as a separate RPS class. Some states have chosen to create separate classes without carve-outs, while others use both.

The Massachusetts SREC I and II programs provide an example of a solar carve-out with a variety of features.[60] SREC I included an adjustable minimum standard to reflect measured, initial growth in the compliance requirement.[61] To help stabilize anticipated REC market revenues, the Massachusetts programs also included an SREC price floor and provided qualifying solar resources an extended term of ten years of SREC eligibility before becoming a regular (non-carve-out) Class I resource. A solar clearinghouse auction established the SREC price floor and provided a market for SREC sellers. A published, forward ACP rate schedule established a price cap. After achieving SREC I's 400 MW target, the SREC II program expanded the solar carve-out to a cumulative 1600 MW by 2020.[62] The SREC II program included other enhancements. The SREC II price collar (combination of floor and cap) gradually declines over time to automatically reduce the level of incentive mechanism. To target certain segments of the market, SREC II also adjusts the number of SRECs earned by certain solar resources. For example, small residential installations are able to earn full SRECs while more commercial-type facilities receive SRECs in proportion to a discount factor.

4. Market Interactions

An RPS is generally considered compatible with New England's competitive wholesale markets.[63] An independent group of economists that oversee New England's wholesale electricity market consider RECs to be permissible sources of revenue in the context of the broader market.[64] In other words, RECs are not generally viewed as interfering with the

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59 *See* ISO New England 2015 Regional System Plan, Section 5.4, especially at Figure 5-3 (p. 79), available at http://www.iso-ne.com/static-assets/documents/2015/11/rsp15_final_110515.docx..

60 Database of State Incentives for Renewables and Efficiency ("DSIRE"): Massachusetts Renewable Portfolio Standard, available at http://programs.dsireusa.org/system/program/detail/479. *See also* Connecticut LREC, ZREC, and SHREC programs at DSIRE: Connecticut Renewable Portfolio Standard, available at http://programs.dsireusa.org/system/program/detail/195.

61 December 18, 2012 Massachusetts Department of Energy Resources ("MA DOER") presentation, *Massachusetts Solar Carve-Out (SRECs): Overview & Program Basics*, available at http://www.mass.gov/eea/docs/doer/renewables/solar/srec-presentation.pdf.

62 December 13, 2013 MA DOER presentation, *RPS Solar Carve-Out II: Final Policy Design*, available at http://www.mass.gov/eea/docs/doer/rps-aps/doer-srec-ii-final-design-restructuring-roundtable-sylvia-121313.pdf.

63 Some commentators and market participants may nevertheless criticize an RPS program as a government intrusion into the marketplace and advise against picking winners and losers by any means. For more information, *see* Moot, J., *Subsidies, Climate Change, Electric Markets and the FERC,* 35 Energy Law Journal 345 (November 18, 2014), at 347, available at http://www.felj.org/sites/default/files/docs/elj352/19-345-374-Moot-final-11.1.pdf.

64 For more information on ISO New England's market monitors, *see* http://www.iso-ne.com/markets-operations/market-monitoring-mitigation.

economics of the regional market, and that RECs are generally available to the competitive marketplace is an important factor in that determination. (This is in contrast to a long-term contract with a select resource or project, for example.)[65] Other factors that lead economists and many market participants to be comfortable with RECs working within the competitive markets include the fact that RECs are:

- "tradable throughout the New England Control Area" and not "restricted to resources within a particular state or other geographic sub-region;"
- "available to all resources of the same physical type . . . regardless of the resource owner;" and
- "offered broadly by state or local government and that are not expressly intended to reduce prices"[66]

In the competitive market, RPS-eligible resources supplement their electricity market revenues with REC market revenues. As described above, resources earn energy, capacity, and ancillary service revenues through the wholesale markets administered by ISO-NE. REC revenues provide an additional income stream. The combination of the revenues, less variable and fixed costs, determines profitability. Notably, when a resource participates in the capacity market (the one that provides the remainder of a resources' revenue requirement), economists that oversee the market consider REC revenues factored into a resource's offer price to be legitimate competitive behavior. Thus, resources that get revenue from an RPS program have no impediment to participation in the regional markets.

a) Negative Prices

An issue that relates to RPS requirements arises when RPS-eligible resources produce surplus power during periods of low demand (in the middle of the night, for example). At this time, and until there is a greater ability to store grid power for later use, power has to be used immediately when it is produced. At night, when electricity demand tends to be lower, most generators turn off. However, some other kinds of resources have a limited ability to just turn off (a nuclear plant, for example) or control the availability of their fuel source (a wind turbine, for example). When the demand for power is low and the output from these resource types is high, there can be too much generation for the power system to accommodate. To reflect these physical conditions and to send signals to the market, the energy market price level will dip *below* zero.[67] This is referred to as negative pricing. A negative price inverts the relationship between generator and customer – generators pay to continue operating and buyers get paid to consume.

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65 Some contend that a long-term contract with a select resource or project is not market-based, even if the contract award is the result of a competitive solicitation process.

66 ISO New England Inc. Transmission Markets and Services Tariff Section III.A.21.2(b)(i), available at http://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_append_a.pdf.

67 Ela, E. et al., *Evolution of Wholesale Electricity Market Design with Increasing Levels of Renewable Generation* (September 2014), at 1-2, available at http://www.nrel.gov/docs/fy14osti/61765.pdf.

Some attribute negative pricing to certain renewable resources, such as wind, which continue to earn REC revenues (and tax incentives) when energy prices are negative and thus have an economic interest in continuing to operate even when there is no demand for power.[68] Economists favor negative prices in concept because it is a signal for efficiently allocating society's resources.[69] Others contend that resources that operate without regard to energy market prices, for example, in order to comply with a contract, are part of the problem. Nuclear industry executives, for instance, have commented that subsidized renewable resources were leading to negative overnight prices, and that without FERC action on energy market price issues, more nuclear facilities would be unable to operate profitably.[70]

5. Legal and Regulatory Issues

The RPS mechanism, primarily a state law creation, is compatible with federal law as discussed above. It is well settled that wholesale (sales of electricity for resale) rates and certain practices affecting wholesale rates are subject to FERC jurisdiction. However, the FERC has clearly endorsed the use of RECs to support state public policies.[71] The FERC "has expressly acknowledged the rights of states to promote particular generation resources as a legitimate policy interest within their jurisdiction."[72]

a) Regulatory Risk

A challenge for renewable energy developers is so-called regulatory risk. Regulatory risk is generally defined as "[t]he risk that a change in laws and regulation will significantly impact

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68 In this example, REC revenues, tax credits, and other production-related incentives exceed the generators' payments associated with negative prices.

69 *See*, for example, *ISO New England Inc. and New England Power Pool*, Joint Testimony of Robert G. Ethier and Christopher A. Parent, on behalf of ISO New England, Docket No. ER13-1877-000, at 17-20, (July 1, 2013) available at http://www.iso-ne.com/static-assets/documents/regulatory/ferc/filings/2013/jul/er13_1877_000_mkt_offer_flex_7_1_2013.pdf; Ela, E., *Using Economics to Determine the Efficient Curtailment of Wind Energy* (February 2009), available at http://www.nrel.gov/wind/pdfs/45071.pdf.

70 Platts, *Inside FERC*, Nuclear industry executives chide FERC about inaction on price formation issues (Ostroff, J.), May 18, 2015. *See also*, February 12, 2015 Nuclear Energy Institute Briefing for the Financial Community, *Nuclear Energy 2014-2015: Recognizing the Value*, at 3, available at http://www.nei.org/CorporateSite/media/filefolder/Policy/Wall%20Street/WallStreetBriefing2015.pdf.

71 "RECs are state-created and state-issued instruments certifying that electric energy was generated pursuant to certain requirements and standards. Thus, a REC does not constitute the transmission of electric energy in interstate commerce or the sale of electric energy at wholesale in interstate commerce. Therefore, RECs and contracts for the sale of RECs are not themselves jurisdictional facilities subject to the Commission's jurisdiction under [Federal Power Act] section 201." *WSPP Inc.*, 139 FERC ¶ 61,061 (2012), at P 21 (2012), at 21.

72 Brief for the U. S. and the FERC as Amici Curiae at 17, *PPL EnergyPlus, LLC et al. v. Solomon et al*, 766 F.3d 241 (3d Cir. 2014), (Nos. 13-4330 and 13-4501), referencing *PJM Interconnection, L.L.C.*, 135 FERC ¶ 61,022 at P 142 (2011) (a state may "act within its borders to ensure resource adequacy or to favor particular types of new generation"); *PJM Interconnection, L.L.C.*, 137 FERC ¶ 61,145 at P 3 (2011) (recognizing that states have their own policies and objectives regarding the development of new capacity resources); *id.* at P 89 (affirming that states may have policy reasons to "provide assistance for new capacity entry").

an institution."[73] A paper published by the National Renewable Energy Laboratory described the "policy/regulatory environment that prevails in the market" as determining "the facility with which financiers can commit th[e] capital and the certainty that they can earn their returns."[74] An example of regulatory risk is the ongoing uncertainty associated with whether Congress will extend federal production and investment tax credits for renewable resources.[75] Another example of regulatory risk is state governments regularly changing RPS laws affecting eligibility for a certain resource type or vintage.[76] To address uncertainty associated with potential changes in regulatory policies, resource developers may incorporate additional risk premiums in their pricing, which increases the cost of achieving policy objectives.

B. Clean Energy Standards

Similar to an RPS, a CES can promote policy objectives by providing economic support for certain resources. CES programs tend to focus on the *output* characteristics of energy resources, rather than a resource's fuel source.[77] For this reason, a CES mechanism might be implemented to advance public policies to reduce air emissions from the electric power industry.[78]

1. Mechanics

Similar to an RPS, a CES creates: (a) an obligation on electric service providers and (b) a tradable certification of clean energy attributes. A CES provides an additional revenue stream for qualifying resources in order to promote the resource's ability to achieve policy objectives. Similar to the RPS, described above, a CES mechanism has a market-based system for compliance, uses an ACP, and creates resource classes and/or carve-outs. Some of the important considerations in developing a CES are in Table 10 below.

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73 The definition continues, "A change in laws or regulations enacted by a governmental or regulatory body can dramatically increase the costs of conducting a business, decrease the attractiveness of an investment, or change the competitive landscape." International Risk Management Institute website glossary, available at https://www.irmi.com/online/insurance-glossary/terms/r/regulatory-risk.aspx.

74 Lowder, T. et al., *Continuing Developments in PV Risk Management: Strategies, Solutions, and Implications*, National Renewable Energy Laboratory (February 2013), at 8, available at http://www.nrel.gov/docs/fy13osti/57143.pdf.

75 Wiser. R, et al., *2014 Wind Technologies Market Report* (August 2015), at 62, available at https://emp.lbl.gov/sites/all/files/lbnl-188167.pdf.

76 Weiss, J., Marin, P., *Reforming Renewable Support in the United States: Lessons from National and International Experience* (November 1, 2012) ("Brattle 2012"), at 27, available at http://www.brattle.com/system/publications/pdfs/000/004/826/original/Reforming_Renewable_Support_in_the_United_States_Weiss_Marin_Nov_1_2012.pdf?1378772133.

77 In contrast to a renewable portfolio standard that focuses on attributes of a resource's fuel source, or its input, a clean energy standard is focused on the resource's emissions attributes, its output.

78 Certain states have implemented a CES, but a national uniform standard does not exist. For more information on the interaction of an RPS/CES with an Air Emission Reduction Program, see the introduction to Section V., below.

Table 10: Comparison of Clean Energy Standard Objectives and Design Options[79]

Potential Objectives	Design Options
• Reduce CO_2 emissions at low cost • Create incentives for innovation • Distribute risk, employment and electricity price effects	• How is cleanliness defined? • What is the target? • Existing generators? • Safety valve (ACP and others) • Clean Energy Certificate trading, banking and borrowing details

The primary distinction is resource-type eligibility, with low- or zero-emissions characteristics factoring into the design. Depending on the objective(s) of the CES, resource-type eligibility can be controversial.[80] See Table 11 below for an example of the diversity in resource-type eligibility in recent federal proposals.

79 Based on presentation materials prepared for a Joint Resources For the Future/U.S. Environmental Protection Agency Workshop, *A Federal Clean Energy Standard: Understanding Important Policy Elements* (July 27, 2011), available at http://www.rff.org/events/event/2011-07/federal-clean-energy-standard-understanding-important-policy-elements.

80 Several proposals for a federal clean energy standard have included some fossil resources. *See* Brown, Phillip, *Clean Energy Standard: Design Elements, State Baseline Compliance and Policy Considerations,* (Mar. 25, 2011), at 16, available at http://digital.library.unt.edu/ark:/67531/metadc99032/.

Table 11: Comparison of CES Resource Type Eligibility for Selected Proposals[81]

American Clean Energy and Security Act (H.R. 2454, as passed by the House)	American Clean Energy Leadership Act of 2009 (S. 1462, as reported by the Senate Energy Natural Resources Committee)	Practical Energy and Climate Plan Act (S.3464, as introduced)	Clean Energy Standard Act of 2010 (S. 20, as introduced)
• Solar; • Wind; • Geothermal; • Qualified hydropower; • Marine and hydrokinetic renewable energy; • Renewable biogas, or biofuels, biomass (Biomass definition is similar to that in the EISA of 2007, in which there are limitations placed on extraction from federal and state-protected lands); and • Landfill gas, wastewater treatment gas, coal-mine methane, and qualified waste-to-energy	• Solar; • Wind; • Geothermal and incremental geothermal • Qualified incremental hydropower; • Marine and hydrokinetic renewable energy; • Ocean (including tidal, wave, current, and thermal); • Biomass (Biomass definition is the same as in the Energy Policy Act of 2005, in which there are no constraints on the extraction of defined biomass from federal lands); • Landfill gas; and • Coal-mined methane, or qualified waste-to-energy sources or other innovative sources as determined through rulemaking	• Solar; • Wind; • Geothermal; • Qualified hydropower; • Marine and hydrokinetic renewable energy; • Biomass (no definition); • Landfill and biogas; • Coal mine methane; • Waste-to-energy; • Coal-fueled generation coupled with CCS (at least 65 percent capture required for partial credit through 2029 and at least 80 percent capture required thereafter); • Qualified nuclear energy (nuclear generating units placed in service after enactment of this bill); and • Any other energy source that will result in at least an 80 percent reduction in GHG emissions compared to average emissions of freely emitting sources in the calendar year prior to certification of the Secretary, as determined by the Secretary through rulemaking	• Solar; • Wind; • Geothermal and incremental geothermal; • Qualified hydropower; • Marine and hydrokinetic renewable energy; • Ocean energy; • Biomass (defined with limited constraints on extraction from federal lands); • Landfill gas; • Coal-mined methane; • Qualified waste-to-energy; • Advanced coal generation (i.e., coal-fueled generation coupled with carbon capture and storage [at least 65% capture]); • Qualified nuclear energy (i.e., generation from reactors placed in service after enactment); • Eligible retired fossil fuel generation (i.e., avoided generation from carbon-intensive generators permanently retired from the date of enactment through 2014); or • Another clean energy source based on innovative technology, as determined by the Secretary through rulemaking

2. Market Interactions

While markets in New England have more experience with RPS requirements than with CES requirements, CES requirements are generally considered to be compatible with the competitive market structure. A CES is similar to an RPS in that the certificates are generally available to qualifying resources in the marketplace. The certificates of clean energy attributes are also tradable across a geographic region and would be offered broadly regardless of resource

81 Based on Center for Climate and Energy Solutions' *Comparison Chart: Diversified/Renewable Energy Standard Provisions in Climate and Energy Legislation in the 111th Congress*, available at http://www.c2es.org/federal/congress/111/comparison-chart-diversified-renewable-energy-standard-provisions.

ownership.[82] Thus far, standards' market-based qualities appear to function well within the competitive wholesale electricity markets. However, according to an ISO-NE discussion paper, increasing penetration of public policy resources may impact the wholesale electricity markets in a way that undermines other public policy objectives.

> The capacity market will play a key role in ensuring that reliability is maintained as increasing levels of renewables are integrated onto the system. Additional renewables are expected to decrease wholesale electric energy prices, which in turn will increase capacity prices to meet resource adequacy needs. The shift in revenues from the energy to the capacity market will also affect the resource mix, putting additional financial pressure on energy-market dependent resources. . . . This financial pressure will likely cause them to retire sooner than they otherwise would. While this is an expected market response given the changing resource mix and incentives, it will have side effects. In addition to accelerating the retirement of otherwise reliable resources, to the extent that nuclear units are shuttered it will likely result in increased CO_2 emissions as fossil resources fill at least some of the energy gap. This is almost certainly an unintended consequence given that much of the rationale for states to sponsor renewable resources is the reduction of CO_2 emissions.[83]

3. Legal and Regulatory Issues

Similar to an RPS, the legal authority for a CES would be contained in state or federal statute. The market-based qualities of an RPS would likely apply to a CES and would therefore be compatible with such laws. Some have suggested that an RPS and CES could be combined, or function together.[84] In addition to the federal proposals mentioned above, some states have been active in considering CES mechanisms. A few examples, described below, illustrate policy options associated with creating a CES.

a) Resource Eligibility and Vintage

On February 26, 2015, House Bill 3293, Low Carbon Energy Portfolio Standard, was filed in the Illinois General Assembly.[85] The bill would require electric utilities to procure low

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82 *See* Congressional Budget Office, *The Effects of Renewable or Clean Electricity Standards* (July 2011), at 3-6, available at https://www.cbo.gov/sites/default/files/112th-congress-2011-2012/reports/07-26-energy.pdf.

83 ISO New England Discussion Paper (Revised), *The Importance of a Performance-Based Capacity Market to Ensure Reliability as the Grid Adapts to a Renewable Energy Future* (October 2015), at 3 and 12, available at http://www.iso-ne.com/static-assets/documents/2015/10/iso-ne_discussion_paper_--_capacity_market_and_renewable_energy_future_--_revised_version_--_10-30-2015.pdf.

84 *Id.* at 5.

85 99th Illinois General Assembly, 2015 and 2016, House Bill 3293 ("HB3293"), available at http://www.ilga.gov/.

carbon energy credits from low carbon energy resources in an amount equal to 70% of each electric utility's annual retail sales of electricity.[86] Low carbon energy resources are defined as including new and existing solar photovoltaic, solar thermal, wind, small hydro (less than 3 MW), nuclear, tidal energy, wave energy, and clean coal.[87] Eligibility for the standard is limited to the generation resources: (1) that do not already receive a state-regulated rate, and (2) that do not have long-term contracts (greater than 5 years) for energy and capacity output.[88] Electric utilities would be entitled to recover all costs of compliance through an automatic adjustment clause applied to *all* utility customers, not just retail supply customers, in their state-jurisdictional tariffs.[89]

In Massachusetts, a prior administration, through the Department of Environmental Protection ("Mass DEP"), proposed a regulatory mechanism similar to Illinois' Low Carbon Energy Portfolio Standard proposal. The Mass DEP proposal was structured in a way that would support only resources that became operational after 2010. This date would have the effect of not supporting nuclear units. The proposed regulation, 310 CMR 7.75: Clean Energy Standard ("CES"), has a lower standard (49% by 2024) compared with the Illinois proposal (70% effective immediately) and different eligibility requirements. The MA CES, as was proposed, would establish eligibility criteria based on either (a) qualification as a Class I Renewable Portfolio Standard resource, or (b) as a generation unit, *with a commercial operation date after 12/31/2010*, with net lifecycle greenhouse gas emissions that are projected to be less than 50% of a new combined cycle natural gas resource. The proposed CES is currently under Mass DEP review.[90]

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86 HB3293, Amending 20 Ill. Comp. Stat.ILCS 3855/1-75 to include (d-5) Low Carbon Portfolio Standard, at 50-51, available at http://www.ilga.gov/legislation/99/HB/PDF/09900HB3293lv.pdf.

87 HB3293, Amending 20 Ill. Comp. Stat. 3855/1-10: Definitions, at 13.

88 *Id.* at 14.

89 HB3293, Amending 220 Ill. Comp. Stat. 5/516-108(k), at 68-69.

90 More information is available at http://www.mass.gov/eea/agencies/massdep/climate-energy/climate/ghg/ces.html. *See also* Stanton, E. et al., *A Clean Energy Standard for Massachusetts* (November 2013), available at http://www.synapse-energy.com/project/analysis-massachusetts-clean-energy-performance-standard.

IV. Long-Term Contracts

In the 1990s, five of the six New England states restructured the electric utilities operating within their respective jurisdictions. Through restructuring, these states directed electric utilities to divest their generation assets, transforming these entities into transmission and distribution companies. Unregulated merchant power companies bought and took ownership of most of the region's generation resources. In this way, New England transitioned to competitive wholesale energy markets that ISO-NE administers and that the FERC regulates.

A primary reason for moving from the vertically-integrated utility model, characterized by resource decisions made in the context of central planning, to a competitive wholesale generation structure, where competition would identify what resources would deliver service most efficiently, was to shift the risk of investment decisions from ratepayers to shareholders.[91]

Today, the competitive electricity market provides resources with price signals and competitive discipline. Under the competitive market structure, shareholders or private capital largely assume the risk for generation investments.

Two significant differences between the current market structure and the former regulated cost of service framework are: (1) the time horizon over which resource investments are amortized, and (2) the market-based revenue recovery, which varies with supply and demand. These differences have affected the type of resource that private capital has been willing to fund.[92]

In short, resources with lower initial fixed costs have a competitive advantage in the marketplace over resources with higher initial fixed costs in attracting investment capital. Based on the current state of mature grid-scale technologies, many resources with low cost (or free) fuel such as solar and wind have higher up-front costs. This affects the ability to finance some renewable or clean energy projects. According to one commentator:

> solar and wind projects need to operate over a relatively long period in order to recover these high up-front costs. It tends to mean, too, that they cannot be financed – and therefore will face relatively higher economic barriers to entry – in a market that provides only short-term instruments to finance and support investment.[93]

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91 *See*, for example, Joskow, P., *Restructuring, Competition and Regulatory Reform in the U.S. Electricity Sector*, Journal of Economic Perspectives, Volume 11, Number 3 (Summer 1997) 119-138, at 125, available at http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.11.3.119.;

92 Weiss, J., Sarro, M., *The importance of long-term contacting for facilitating renewable energy project development* (May 7, 2013), at 27 ("Brattle 2013"), available at http://www.brattle.com/system/publications/pdfs/000/004/927/original/The_Importance_of_Long-Term_Contracting_for_Facilitating_Renewable_Energy_Project_Development_Weiss_Sarro_May_7_2013.pdf?1380317003.

93 Tierney Cape Wind Testimony at 79.

In recent years, some states have authorized their transmission and distribution utilities to enter long-term contracts with public policy resources in order to facilitate the financing of those that may have financial barriers to entry. Some states have adopted statutory requirements for various entities to solicit long-term contracts for clean energy resources to address challenges "in financing and building new renewable generation to keep up with the increasing demand for" RECs and states' experiences associated with increases in REC prices.[94] In Connecticut, the legislature has granted authority to the Department of Energy and Environmental Protection ("DEEP") to issue such solicitations. State objectives in facilitating the development of renewable resources through long-term contracts vary.

Some analysts argue that long-term contracts are important to reducing development risk and revenue uncertainty for investors, which in turn drives down capital costs for renewable projects.[95] While using long-term contracts to cost-effectively meet RPS targets is one objective,[96] some states have also identified "stabilizing long-term energy prices" and other economic benefits.[97]

For example, a 2014 Rhode Island law authorizing the use of long-term contracts to procure hydroelectric power, renewable resources and/or natural gas infrastructure was driven by "the objectives of achieving a reliable, clean-energy future that is consistent with meeting regional greenhouse gas reduction goals at reasonable cost to ratepayers" and the intent to work collaboratively with New England states to make strategic energy investments.[98]

Similarly, in 2015, Connecticut enacted Public Act 15-107, which provided DEEP with new authority to issue solicitations "for long-term contracts from providers of resources that can provide Connecticut's reasonable share of the investments New England needs to address the gas infrastructure challenge."[99] These resources include energy efficiency, energy storage, Class I

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94 Peregrine Energy Group, *Study on Long-Term Contracting Under Section 83 of the Green Communities Act*, Submitted to Massachusetts Department of Energy Resources, Dec. 31, 2012, at p. 6, available at http://www.mass.gov/eea/docs/doer/pub-info/long-term-contracting-section-83-green-communitiesa-act.pdf; see Connecticut Department of Energy and Environmental Protection, 2012 Integrated Resource Plan for Connecticut, at p. 49, available at http://www.ct.gov/deep/lib/deep/energy/irp/2012_irp.pdf (stating that "DEEP believes that mechanisms such as long-term contracts must be explored to encourage the development of low-cost renewable generation" and discussing the evaluation of "costs and risks that Connecticut customers face in complying with the existing RPS Class I requirements."). See, also, Brattle 2013 at 28.

95 Brattle 2013 at 8-18.

96 *See* Brattle 2013 at 21-23.

97 R. I. Gen. Laws § 39-26.1. See, also, NYSERDA, *Managing Retail Electricity Price Volatility Through Long-Term Renewable Energy Contracts Between Generators and End-Users: A Case Study* (June 2014), available at http://www.nyserda.ny.gov/-/media/Files/Publications/Research/Electic-Power-Delivery/Managing-Retail-Electricity-Price.pdf.

98 Affordable Clean Energy Security Act, R.I. Gen. Laws § 39-31-2.

99 Department of Energy and Environmental Protection, Procurement of Resources Pursuant to Public Act 15-107: Notice of Proceedings and Opportunity for Public Comment, Aug. 31, 2015, at 4, available at http://www5.cbia.com/epc/wp-content/uploads/2013/02/Notice-of-proceedings-and-opportunity-to-comment-08.31.15.pdf; see Section 1(a) of Public Act No. 15-107, An Act Concerning Affordable and Reliable Energy (stating that the objective of such solicitations is "to secure cost-effective resources to

renewable resources, large-scale hydroelectric power, and incremental natural gas capacity, liquefied natural gas, or gas storage products. DEEP is granted authority to direct the state's utilities to enter into contracts following the competitive solicitation process, and those contracts are subject to the review of the state's public utility commission.

The State of Maine, through the Maine Public Utilities Commission ("MPUC"), can approve long-term power contracts with renewable or other resources.[100] The MPUC is authorized by statute to direct Maine's electric utilities to enter into long-term contracts for capacity and associated energy. The statutes define what types of resources qualify and establish a resource priority order.

Specifically, the MPUC is authorized to solicit long-term contracts through periodic competitive bid processes. Such solicitation is to occur no less often than every three years, unless the likely benefits to ratepayers from any contracts that might result from the solicitation process will not exceed the likely costs. Long-term contracts must be for capacity and associated energy with the primary purpose being to lower and stabilize electricity rates in Maine.

Maine's statute does not allow contracts for RECs only. The statute provides for contracts for "capacity resources" and then also for "energy and/or RECs associated with capacity resources." In addition, since 2009, the statute has been amended in a way that would make the purchase of "RECs associated with capacity resources" less likely. In particular, prices paid for RECs must be less than prices received by the utility at the time the RECs are resold. (Note that Maine utilities have no load-serving obligation and, therefore, would re-sell RECs to realize value for ratepayers.)

Vermont is the only vertically integrated state in New England, and utilities are allowed to own and build generation as well as enter into long-term contracts. Vermont has a statutory goal of "providing an incentive for the State's retail electricity providers to enter into affordable, long-term, stably priced renewable energy contracts that mitigate market price fluctuation for Vermonters."[101] In addition to this goal, Vermont has a statutory program that requires utilities to enter into long-term, fixed price contracts with renewable resources with a nameplate capacity of 2.2 MW or less; there is a cap on the program of 127.5 MW.[102] Certain contracts for energy or capacity must receive prior approval from the Vermont Public Service Board.[103]

As discussed below, questions and issues have arisen in New England and other regions regarding the compatibility of long-term power contracts and wholesale competitive markets.

A. ***Mechanics***

A long-term contract provides selected resources with a legally enforceable revenue stream for a defined period of time. The products included in a long-term contract could be

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provide more reliable electric service for the benefit of the state's electric ratepayers and to meet the state's energy and environmental goals and policies established in the Integrated Resources Plan.").

[100] 35-A Me. Rev. Stat. § 3210-C.

[101] 30 V.S.A. § 8001(a)(3).

[102] 30 V.S.A. § 8005a.

[103] 30 V.S.A. § 248.

energy, capacity, and ancillary services and/or certificates associated with resource attributes such as RECs. The time horizon over which the agreement would take effect differs from state to state, but a term of at least ten (10) years is customary.[104] Long-term contracts are customizable, with a variety of possible terms and conditions.

1. Products – Energy, Capacity, and Renewable Energy Certificates

Resources capable of achieving policy goals produce energy and have associated environmental attributes. As discussed above, these resources may already participate in the wholesale electricity markets and qualify for RECs under state RPS programs. Long-term contracts with such resources could be for energy, capacity and/or environmental attributes. The contract can specify a bundled price for all of the products, or establish a separate price for energy, capacity, RECs, and so on. If a contract is for more than one product, separate pricing may enable different risk sharing arrangements. The products subject to the long-term contract also have a significant impact on the legal and regulatory jurisdiction, as discussed further below.

2. Contract Length

Most long-term contracting laws are designed to facilitate financing, at least presumably in a way that RECs have not. On one end of the spectrum, a short-term contract may not provide a resource with sufficient revenue certainty needed to facilitate financing.[105] On the other end, a long-term agreement may limit states' ability to adjust to changing market and policy conditions, increase price risk, and create for customers the risk of stranded costs over the long-term. History shows that some long-term contracts exceed market prices over the term of the contract and others do not, and which result occurs depends on a wide range of factors.

Various New England states have taken slightly different and evolving approaches to the permissible length of PPAs under long-term contracting statutes. Some examples are informative. In Massachusetts, the long-term contracting authority provided in 2008 under Section 83 of the Green Communities Act restricted the contract length to a term of ten to 15 years.[106] In 2012, this statute was amended by adding, among other provisions, a new Section 83A which required two more solicitations for renewable power.[107] Under procurements conducted pursuant to Section 83A, the allowable contract term is ten to 20 years.[108]

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104 Cory, K., and Swezey, B., *Renewable Portfolio Standards in the States: Balancing Goals and Implementation Strategies* (December 2007), at 21, available at http://www.nrel.gov/docs/fy08osti/41409.pdf. Moreover, the ISO-NE capacity market now provides new resources with seven years of locked-in revenue. *ISO New England Inc. and New England Power Pool Participants Committee*, 147 FERC ¶ 61,173 (2014). *See* ISO New England Transmission, Markets and Services Tariff Section III.13.1.1.2.2.4.

105 Brattle 2013 at 27.

106 An Act Relative to Green Communities, Mass. Session Laws, St. 2008, c. 169, § 83.

107 An Act Relative to Competitively Priced Electricity in the Commonwealth, Mass. Session Laws, St. 2012, c. 209, § 36.

108 *Id.*

Connecticut's long-term contracting statutes have allowed for PPA terms for Class I resources that, depending on the type of resource, can either be up to ten or up to 20 years.[109] Eligible contracts for large-scale hydroelectric power are up to 15 years under Section 7 of Connecticut Public Act 13-303 and up to 20 years under Section 1(c) of Connecticut Public Act 15-107.

Rhode Island statutes provide more discretion regarding contract length for renewable energy contracts. While the limit is generally set to no more than 15 years, it allows for contracts of greater length if approved by the Rhode Island Public Utilities Commission.[110] There is no contract limit for PPAs entered into pursuant to the Affordable Clean Energy Security Act, although they must be "commercially reasonable" as defined by the law and meet other criteria that the Rhode Island Public Utilities Commission will apply in considering the contract.

In Maine, contracts can be for demand or supply resources and cannot exceed ten (10) years unless the MPUC finds a longer term to be prudent.

Vermont law does not put an upper bound on the term of voluntary contracts, while establishing maximum term limits in its required contracting program of 25 years for solar resources and 20 years for all other resource types.

3. Terms and Conditions

Contracts' terms and conditions identify the parties' rights and obligations. Price terms can vary significantly, ranging from fixed, graduated, and indexed. The terms and conditions include or refer to a schedule of payments and deliverables. Terms and conditions include many options, such as an extended or shortened term, or future transaction prices. Long-term contracts also commonly include a required regulatory review provision.

B. Market Interactions

Long-term contracts are used in a variety of ways in the *energy* markets. Some resources agree to supply energy for a term of years at a given price. Resources with long-term supply contracts will then offer into the regional wholesale electric energy market, and, if permitted, self-schedule the generation and delivery of energy into the grid. Such bilateral transactions are a significant portion of the wholesale energy market in New England. The ISO-NE markets establish prices based on the remainder of the trades in the spot energy and reserves market. Other resources use long-term contracts to firm up a revenue stream for the *renewable or clean energy attributes* of a resource.

Some market participants take issue with the use of customer-funded long-term contracts to encourage the development of public policy resources and not all resources. The concern centers on the potential for state-approved contracts with select resources to influence prices in the competitive wholesale market that are designed to provide the right price signal for new

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109 Sections 6-8 of Public Act No. 13-303, An Act Concerning Connecticut's Clean Energy Goals; Section 1(c) of Public Act No. 15-107, An Act Concerning Affordable and Reliable Energy. See also Connecticut Department of Energy and Environmental Protection, 2014 Integrated Resource Plan for Connecticut, at 43, available at http://www.ct.gov/deep/lib/deep/energy/irp/2014_irp_final.pdf.

110 R. I. Gen. Laws § 39-26.1.3.

market entry as well as the continued operation of existing resources.[111] Another general concern is the shift of investment risk from shareholders back to electricity consumers. Other market participants argue in favor of long-term contracts for public policy resources given their ability to satisfy requirements of state laws and the resource development challenges described above.

As discussed further below, in regions with competitive wholesale *capacity* markets like ISO-NE, questions have arisen regarding the compatibility of long-term contracts with those capacity markets.

1. Forward Capacity Market - Minimum Offer Price Rules

In New England's FCM, new resources are required to submit a "minimum offer price" consistent with the resource's projected costs. The purpose is to prevent a resource from submitting a lower bid, which would artificially suppress capacity prices.[112] In administering this so-called "Minimum Offer Price Rule" ("MOPR"), ISO-NE takes into account out-of-market revenues that a resource obtains, such as from state-approved, long-term contracts for energy and capacity. In 2014, the FERC accepted a narrowly tailored "Renewable Technology Resource" ("RTR") exemption to the MOPR as part of a package of changes implementing a sloped demand curve in New England.[113] This allows certain renewable resources (200 MW annual max) that further state policies to be exempt from MOPR review. NESCOE first proposed such an exemption in 2012.[114]

To qualify as an RTR, the resource must "(1) receive an out-of-market revenue source supported by a state- or federally-regulated rate, charge, or other regulated cost recovery mechanism and (2) qualify as a renewable or alternative energy generating resource under any New England state's mandated renewable or alternative energy portfolio standards or, in states without a standard, qualify under that state's renewable energy goals as a renewable resource."[115] In addition, "the resource must qualify as a renewable or alternative energy generating resource in the state in which it is geographically located."[116] The RTR exemption "is coupled with a sloped demand curve that will limit the impact of price suppression."[117]

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111 *See*, generally, ISO New England Inc. and New England Power Pool Participants Committee, 135 FERC ¶ 61,029 (2011).

112 *ISO New England Inc. and New England Power Pool Participants Committee*, 135 FERC ¶ 61,029 at P 158 (2011).

113 *ISO New England Inc. and New England Power Pool Participants Committee*, 147 FERC ¶ 61,173 (2014).

114 *See New England States Committee on Electricity v. ISO New England Inc.*, Complaint, Docket No. EL13-34-000 (Dec. 28, 2012). On the same day, NESCOE filed a related protest to the compliance filing made by ISO-NE in Docket No. ER12-953-001.

115 *ISO New England Inc. and New England Power Pool Participants Committee*, 150 FERC ¶ 61,065 at P 9 (2015).

116 *Id.*

117 *ISO New England Inc. and New England Power Pool Participants Committee*, 147 FERC ¶ 61,173 at P 83 (2014). *See*, also, *ISO New England Inc., New England Power Pool Participants Committee*, Demand Curve Changes to be effective 6/1/2014, Docket No. ER14-1639-000 (April 1, 2014), Testimony of Robert G. Ethier, at 40-41.

C. Legal and Regulatory Issues

Long-term contracts may be subject to both federal and state jurisdiction. At the *wholesale* level, defined as a sale for resale, the FERC authorizes sellers' cost recovery at 1) a cost-of-service regulated rate or 2) under a market-based rate. Traditional cost-of-service rates allow for a reasonable rate of return on invested capital. Resources with market-based rate authority may agree on price terms. These are presumed to be based on good faith, arms' length negotiations and therefore just and reasonable.

Once a contract has been made, certain market-based rates are adjusted only when a court finds it in the public interest to do so. At the retail level, defined as a sale for end use, state regulatory authorities review the prudency of buyers' long-term contracting decisions based on the criteria set forth in applicable state law. A finding of imprudence does not automatically negate the contract but instead limits the contracting utility's ability to recover from ratepayers the full costs of the contract.

1. Contracts and Wholesale Rates - New Jersey and Maryland Cases

In 2013, two federal district court decisions, one in Maryland and one in New Jersey, held that certain state contracting actions relative to the development of generating resources violated the Supremacy Clause and were unconstitutional.[118] The cases addressed similar programs in Maryland and New Jersey:

> Maryland and New Jersey are both part of PJM, which operates wholesale markets for energy and capacity. Both states determined that insufficient generation was causing high power prices and had the potential to lead to reliability issues. Concluding that PJM's markets were providing an insufficient incentive for building new plants in their States, the Maryland Public Service Commission and the New Jersey Legislature created their own incentives to encourage new gas-fired generation.
>
> Under the States' incentive programs, the two States conducted competitive solicitations to construct new capacity. After selecting a developer or developers, each State then required its regulated distribution companies to sign contracts with the developer(s) that guaranteed certain revenues. In Maryland, the distribution companies paid the developer the difference between PJM clearing prices for energy and capacity and energy and capacity prices set by the developer and approved by the State's Public Service Commission. In New Jersey, the distribution companies paid the developers the difference between PJM's clearing prices for

118 *PPL Energyplus v. Nazarian*, 974 F.Supp.2d 790 (D.Md. 2013) and *PPL Energyplus v. Hanna*, 977 F.Supp.2d 372 (D.N.J. 2013). Under Article IV, Section 2 of the U.S. Constitution, the Constitution and "Laws of the United States . . . shall be the supreme Law of the Land," providing authority for Congress to preempt state law. For a general overview of the Supremacy Clause, see http://statepowerproject.org/supremacy-clause/.

> capacity and a price authorized by the Board of Public Utilities that is based on the developers' fixed costs.
>
> Following two separate trials, Federal District Courts in Maryland and New Jersey determined that these state incentive schemes are unconstitutional. The Courts found that the schemes violated the Supremacy Clause because the States effectively set rates of wholesale power transactions, thus invading FERC's exclusive jurisdiction over wholesale power transactions. The Courts also agreed that the States' schemes did not offend the Commerce Clause because the in-state benefit of enhanced reliability was reasonable in light of the minimal burden on interstate commerce.[119]

Appellate courts in the Third Circuit and the Fourth Circuit affirmed the decisions in the New Jersey and Maryland cases, respectively.[120] Both appellate courts emphasized the continued role states may play in electricity markets and that state actions that incidentally affect federal-jurisdictional markets are not necessarily preempted. The Third Circuit Court of Appeals noted, as did the District Court originally hearing the case, that "New Jersey could have used other means to achieve its policy goals."[121] Citing to the lower court decision, the Court stated that such mechanisms include "utilization of tax exempt bonding authority, the granting of property tax relief, the ability to enter into favorable site lease agreements on public lands, the gifting of environmentally damaged properties for brownfield development, and the relaxing or acceleration of permit approvals."[122] The Court additionally stated that "New Jersey may also directly subsidize generators so long as the subsidies do not essentially set wholesale prices."[123]

The U.S. Supreme Court has recently granted petitions to review the Fourth Circuit decision (Maryland), with petitions to review the Third Circuit decision (New Jersey) currently pending. While the lower court decisions are limited to the Maryland and New Jersey programs at issue, the outcome at the Supreme Court has potential implications for states in New England and elsewhere that have implemented long-term contracting mechanisms to encourage the development of new generation facilities, including renewable resources. For example, the Maryland and New Jersey cases have been cited to in challenges to power purchase agreements executed pursuant to clean power procurement statutes in Connecticut and Massachusetts.[124] In

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119 http://statepowerproject.org/states/maryland-and-new-jersey/.

120 *PPL EnergyPlus, LLC v. Solomon*, 766 F.3d 241 (3d Cir. 2014); *PPL EnergyPlus LLC v. Nazarian*, 753 F.3d 467 (4th Cir. 2014).

121 *PPL EnergyPlus, LLC v. Solomon*, 766 F.3d at 254.

122 *Id*. at n.4.

123 *Id*.

124 *See* Complaint, *Allco Fin. Ltd. v. Klee*, No. 3:15cv608 (D. Conn. Apr. 26, 2015); *Allco Fin. Ltd. v. Klee*, No. 3:13CV1874 JBA, 2014 WL 7004024 (D.Conn. 2014); *Town of Barnstable v. Berwick,* 17 F. Supp. 3d 113 (D.Mass. 2014). In August 2015, a complaint was filed in federal district court in Rhode Island claiming, in part, that a power purchase agreement for renewable energy should be invalidated on the basis of the Supremacy Clause. *Riggs et al. v. Curran*, No. 1:15CV00343-S-LDA (D.R.I. 2015). While

the Connecticut case decided last year, the federal District Court took the opportunity to distinguish the program from the Maryland and New Jersey programs.[125] If the Maryland and New Jersey decisions are left standing, these early challenges to other states' programs suggest a likelihood of continued litigation based on Supremacy Clause principles. Against that legal backdrop, it is possible that some states may consider changes to existing programs. Alternatively, states defending their long-term contracting statutes (and the solicitations conducted pursuant to those laws) will distinguish their programs from the Maryland and New Jersey cases.

not explicitly referencing the Maryland and New Jersey cases, the complaint appears to adopt some of the same preemptive claims put forward in those proceedings. Additionally, in February 2015, a generator filed a claim in a New York federal district court based in part on the Supremacy Clause and citing to the Maryland and New Jersey decisions. *See Entergy v. Zibelman et al.*, No. 15-cv-230-DNH-TWD (D.N.Y. 2015). The claim challenged the New York Public Service Commission's ("PSC") approval of a contract between a New York electric distribution company and the operator of a power plant that had announced an intent to "mothball" its facilities but was determined by the PSC to be needed for reliability.

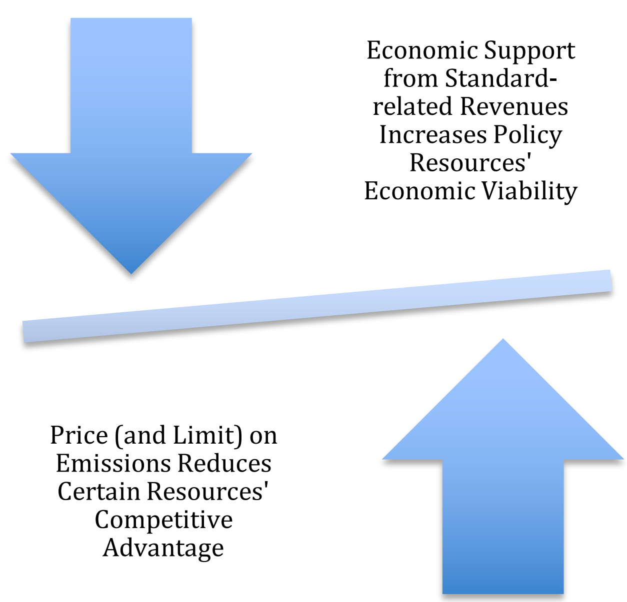
125 The Second Circuit Court of Appeals affirmed the lower court's decision on alternative grounds, finding that the plaintiff lacked standing and failed to exhaust administrative remedies. *Allco Fin. Ltd. v. Klee*, 805 F.3d 89 (2d Cir. 2015). The Massachusetts decision was also appealed, to the First Circuit Court of Appeals, which remanded the case to the District Court in May 2015 based on an Eleventh Amendment claim. *Town of Barnstable v. O'Connor*, 786 F.3d 130 (1st Cir. 2015). The remand order did not substantively address the Supremacy Clause claim. The Massachusetts case has been stayed in District Court until January 2016.

V. Air Emission Reduction Programs

Air emission reduction programs are another mechanism through which states execute policy objectives in the electric sector. These programs offer economic incentives to resources in exchange for reducing greenhouse gases and other air emissions. To this end, some states establish: (1) a limit on aggregate emissions and/or (2) a price on emissions. Certain resources are required by law to pay into a fund in proportion to emissions, as measured at the point of discharge. These payments can be used to invest in programs that advance public policies and/or to mitigate the costs of resources' compliance with the program that consumers ultimately pay. Emission reduction programs are generally considered to be a means to achieve policy objectives at a relatively reasonable cost.

Emission reduction programs make energy from emitting resources more expensive, or, as is sometimes stated by proponents, these programs help to price the environmental costs associated with air emissions into the marketplace. The costs to comply with the program diminish any competitive advantage these resources may possess, relative to their competitors. The approach of pricing emissions is different from providing resources with economic support through standards and contracts. Accordingly, emission reduction programs are compatible with, and complementary to, other mechanisms with similar policy objectives. Figure 12 below illustrates the independent effects that (1) emission reduction programs and (2) public policy standards have on electric power sector market dynamics.

Figure 12: Combined Impacts of Standard and Emission Reduction Program



A. ***Cap and Trade***

A Cap-and-Trade program establishes a price on emissions and an aggregate limit for a given time period. The program can apply to a particular sector (for example, electric power, transportation, agriculture) or to a broad cross-section of the economy.[126]

The price of emissions is established in the marketplace, as a function of supply and demand between entities subject to the cap. The aggregate emissions limit, or cap, is translated into a specific number of available certificates, called allowances. Resources must present the allowances to the relevant regulatory authority in proportion to the resource's emission totals for a given time period.

Allowances are made available to the market place through auction-based processes and other direct allocation methods. Secondary market and administrative safety valves (such as banking and borrowing or price collars) provide flexibility to resources and help control the program's costs. The auction proceeds are often directed at complementary clean energy policies (such as, for example, energy efficiency and renewable development) and/or to help mitigate the program's price impacts on consumers.

New England's experience with the Regional Greenhouse Gas Initiative ("RGGI") is well documented. Pursuant to a 2005 Memorandum of Understanding between Northeastern Governors, a state working group developed a model rule to serve as a template for state authority. Following participating states' enactment of statutes and development of regulations, RGGI held its first auction in September 2008.[127]

Since RGGI began, "[o]wners of fossil-fueled power plants have spent nearly $2 billion to buy CO_2 allowances over the six years, and include the cost of allowances in their offer prices in wholesale electricity markets in New England, New York, and parts of the PJM region."[128]

RGGI is widely considered to be successful in at least two ways: (1) RGGI demonstrates the feasibility of a multi-state, market-based emissions reduction program,[129] and (2) RGGI generates "substantial economic benefits for the RGGI states while continuing to reduce emissions of CO_2."[130] According to the 2015 RGGI Report:

> This recent positive economic outcome from the RGGI program results in large part from the states' decision to sell CO_2

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126 For example, *see* California Greenhouse Gas Cap-and-Trade Program at http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

127 For more information, *see* http://www.rggi.org/.

128 Hibbard, P., et al., *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI's Second Three-Year Compliance Period* (2012-2014) (July 14, 2015) ("2015 RGGI Report"), at 2, available at http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf. Even if allowances are directly allocated to resources, the opportunity cost of selling such allowances are incorporated into the resources' electricity market offers.

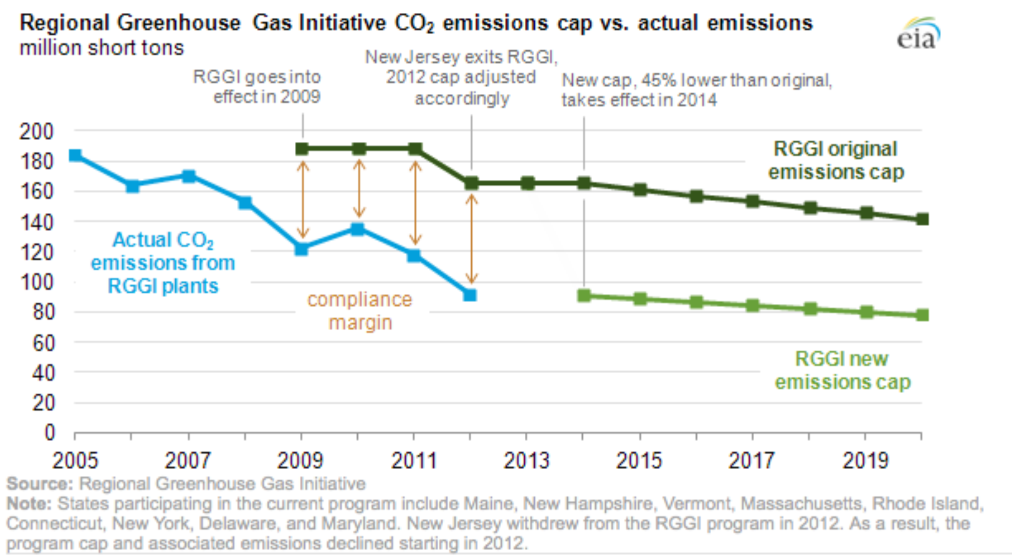
129 *See* Ramseur, J., *The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Congress* (July 2, 2015), available at https://www.fas.org/sgp/crs/misc/R41836.pdf.

130 2015 RGGI Report at 10.

> allowances via a centralized auction and then use the proceeds from the auction in various ways that address state policy objectives, primarily by returning funds to electric ratepayers and funding local investment in energy efficiency ("EE") and renewable energy ("RE") resources. [131]

Most recently, RGGI reduced the aggregate emissions limit, or lowered the cap, to adjust to current circumstances and policy objectives. Figure 13 below shows the initial and revised cap levels.

Figure 13: RGGI Emissions Cap and Actual Emissions[132]



In terms of economic impacts, the RGGI program is considered to provide net savings. Initial cost estimates for the RGGI program in 2005, before the impact of investing allowance proceeds in energy efficiency and renewable energy, were forecasted to range from $2.90 to $36.84 per year, per household in 2015.[133] In practice, "[a]lthough the net electricity price increases to New England consumers from 2009-2011 were relatively small (0.6 percent), the long-term gains more than offset these initial increases in electricity bills and also offset the net revenue losses to power producers."[134] According to the Analysis Group, overall

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131 *Id.* at 6.

132 U.S. Energy Information Administration, *Today in Energy* (February 3, 2014), available at http://www.eia.gov/todayinenergy/detail.cfm?id=14851.

133 Breger, D. and RGGI Staff Working Group, *RGGI Region Projected Household Bill Impacts*, at 2, available at http://www.rggi.org/docs/rggi_household_bill_impacts12_12_05.ppt. For more information, *see* http://www.rggi.org/design/history/modeling.

134 "From a consumer perspective, RGGI program impacts are net positive over the study period. Although CO2 allowances tend to raise electricity prices in the near term, there is also a lowering of prices over time because the states invested so much of the allowance proceeds on energy efficiency programs." Hibbard,

macroeconomic impacts to the New England region were a net positive: from 2009-2011 – $900 million and from 2012-2015 – $560 million.[135]

B. Emissions Tax

Another type of emission reduction mechanism is a tax. In a tax, governments determine the price on emissions administratively (rather than through a market) and can adjust that determination from time to time. Similar to cap-and-trade, the proceeds of the tax can be used to further renewable or energy efficiency policies and/or to mitigate consumer price impacts of the tax. In a tax system, there is not necessarily an explicit limit to aggregate emissions levels – the tax is designed to deter greenhouse gas and other air emissions by providing an economic disincentive. In this respect, a tax is a relatively simple and straightforward mechanism that governments can apply to a particular sector or to activities that generate harmful emissions.[136]

There is continuing debate regarding the efficacy of a tax versus a cap-and-trade program. Some of the issues are: whether an absolute limit on emissions is preferable, the degree of complexity associated with cap-and-trade, and the sectors over which the program would apply. A cap-and-trade program includes an aggregate emissions limit and uses a market-based approach to minimize compliance costs. In contrast, the tax level is set administratively and must be at the proper level over time in order to achieve specific policy goals. Since a tax and a cap-and-trade program both establish a price on emissions, pursuing both simultaneously would require careful program design to avoid duplicative effects.

C. Market Interactions

To date, emission reduction programs appear to be compatible with wholesale electricity markets. As previously discussed, generators that participate in the ISO-NE markets incorporate emissions allowance costs into their offer prices. While integrating these costs can influence the relative competitiveness of resources and affect market-clearing prices, the RGGI emissions reduction program is widely considered to function efficiently in combination with the ISO-NE markets.

The degree to which an emission reduction program affects resources that ISO-NE economically dispatches depends, in large part, on 1) the magnitude of the emissions price and 2) the resource supply curve. A recent analysis of the RGGI program found "an overall drop (on an NPV basis) in electric market revenues to owners of generating assets of approximately $500 million."[137] However, "from a consumer perspective, RGGI program impacts are net positive

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P., et al., *The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States: Review of the Use of RGGI Auction Proceeds from the First Three-Year Compliance Period* (November 15, 2011) ("2011 RGGI Report"), at 34 and 39-40, available at http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/economic_impact_rggi_report.pdf

135 2011 RGGI Report, at 39, and 2015 RGGI Report, at 45.

136 For example, *see* ISO New England June 9, 2011 Newswire, available at http://isonewswire.com/updates/2011/6/9/connecticuts-2011-energy-legislation-includes-study-of-whole.html and *Estimate of Connecticut's Generator Tax on New England's Wholesale Energy Prices* (June 6, 2011), available at http://www.iso-ne.com/static-assets/documents/pubs/spcl_rpts/2011/est_impact_of_ct_gen_tax_on_ne_whlsle_enrgy_prices.pdf.

137 2015 RGGI Report at 42.

over the study period" and, in the long-run, RGGI affords a competitive advantage to power plants with lower CO_2 emissions than their competitors."[138]

D. Legal and Regulatory Issues

One issue that arises with most emission reduction programs is referred to as "leakage."[139] The program's scope and coverage limits its geographic area and the markets subject to regulation.[140] Leakage thus occurs when the emissions reductions within a defined area are offset by emissions increases outside that area.[141] For example, consider RGGI, which covers the Northeast, in the context of the U.S. grid. Leakage can occur when the Northeast imports from neighboring systems (that are not subject to RGGI) and the emissions profile of those imports is more carbon-intensive than power generated within the area subject to RGGI. Without adequate tracking systems in place, imported power brought to the Northeast from outside the region can mask the emissions attributes of the power that Northeastern states consume.[142]

Another emerging issue is the U.S. Environmental Protection Agency's ("EPA") Clean Power Plan for existing power plants under Section 111(d) of the Clean Air Act. The EPA "has expressed willingness to allow states or groups of states to use existing programs, such as [RGGI's] CO_2 cap-and-trade program in the Northeast or the AB32 cap-and-trade program in California, as compliance mechanisms."[143] If the states in the Northeast propose such a compliance approach, and EPA accepts the states' plan, adjustments to RGGI may or may not be necessary to conform to the federal rule.

As the RGGI experience in the ISO-NE markets demonstrates, emission reduction programs are compatible with FERC-jurisdictional markets.

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138 *Id.* at 41.

139 In California, leakage is also called "resource shuffling." See Cullenward, D., and Weiskopf, D., *Resource Shuffling and the California Carbon Market* (July 18, 2013), available at http://law.stanford.edu/wp-content/uploads/sites/default/files/publication/440262/doc/slspublic/Resource%20Shuffling%20-%20Cullenward%20and%20Weiskopf.pdf.

140 The issue of leakage can arise under many types of programs that have a geographic limit including renewable portfolio or clean energy standards.

141 *See* RGGI Emissions Leakage Multi-State Staff Working Group to the RGGI Agency Heads, *Potential Emissions Leakage and the Regional Greenhouse Gas Initiative (RGGI): Evaluating Market Dynamics, Monitoring Options, and Possible Mitigation Mechanisms* (March 14, 2007), available at http://www.rggi.org/docs/il_report_final_3_14_07.pdf.

142 In November 2015, the New England Power Pool approved revisions to the GIS operating rules related to the creation of unit-specific certificates for generators in adjacent control areas. Corresponding changes are likely needed on the other side of New England's borders.

143 Palmer, K., and Paul, A., *A Primer on Comprehensive Policy Options for States to Comply with the Clean Power Plan* (April 2015), at 5, available at http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-15-15.pdf, citing 79 Fed. Reg. 34829-34958 at 34838 (2014), available at http://www.gpo.gov/fdsys/pkg/FR-2014-06-18/pdf/2014-13726.pdf.

VI. Tax Credits and Incentives for Energy Resources

Direct tax incentives are a long-standing mechanism for supporting public policy resources. The authority for such incentives can be federal, state, or local in nature. In general, tax incentives either: (1) reduce the amount of a resource's taxable revenue or (2) provide a resource an offset (or refund) on the tax due. An issue that developers have identified with tax programs is the uncertainty associated with a program's sunset date and whether and, if so, when governments will grant extensions and the length of such an extension.[144] While governments can customize tax incentives, a few prominent examples follow.[145]

A. ***Investment Tax Credit***

The federal Business Energy Investment Tax Credit ("ITC") "provides an income tax credit for business investments in solar systems and small wind turbines, among other things."[146] The amount of the credit is equal to 30% of certain qualifying investments (solar, fuel cells, small wind) and 10% for others (geothermal, microturbines, and CHP).[147] Eligible investments must be placed in service before December 31, 2016, with the amount decreasing to 10% or expiring afterward for most resources.

B. ***Production Tax Credit***

The federal Renewable Energy Production Tax Credit ("PTC") "provided a 10-year, inflation-adjusted income tax credit based on the amount of renewable energy produced at wind and other qualified facilities."[148] The PTC expired on December 31, 2014.[149] The amount of the PTC varied by technology, ranging from \$0.011/kWh to \$0.023/kWh. The PTC "has periodically expired and then been extended" with a significant impact on new on-shore wind capacity additions.[150] While the ITC and PTC tax credits are available to eligible resources, a resource may claim only one at a time, not both.

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144 *See* Brown, P., *U.S. Renewable Electricity: How Does the Production Tax Credit (PTC) Impact Wind Markets?* (June 20, 2012), available at https://www.fas.org/sgp/crs/misc/R42576.pdf.

145 *See*, generally, Bolinger, M., *An Analysis of the Costs, Benefits, and Implications of Different Approaches to Capturing the Value of Renewable Energy Tax Incentives* (May 2014), available at https://emp.lbl.gov/sites/all/files/lbnl-6610e.pdf.

146 U.S. Government Accountability Office, *Information on Federal and Others Factors Influencing U.S. Energy Production and Consumption from 2000 through 2013* (September 2014) ("GAO"), at 76, available at http://www.gao.gov/assets/670/666270.pdf.

147 For more information, *see* http://energy.gov/savings/business-energy-investment-tax-credit-itc.

148 GAO at 75.

149 To "claim the PTC, construction on an eligible project must have 'commenced construction' prior to January 1, 2015." Database of State Incentives for Renewables & Efficiency ("DSIRE"). For more information, *see* http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc.

150 GAO at 75, citing U.S. Government Accountability Office, *Wind Energy: Additional Actions Could Help Ensure Effective Use of Federal Financial Support* (March 11, 2013).

In terms of the relationship between the ITC and PTC, according to one analysis:[151]

> [B]ecause the ITC reduces the cost of constructing the generator rather than providing a production subsidy, there are two important differences between the ITC and PTC, both of which make the ITC inferior to the PTC. The first is that the amount of the subsidy increases with the capital intensity of the project. Whereas the PTC leads investors to choose projects with the highest market value, the ITC skews investment toward more capital-intensive projects, which may or may not be the most valuable projects. Second, because the ITC subsidizes investment rather than generation, it could cause investment in generators that are unreliable and produce little energy. This is important for untested technologies, which receive a substantial share of the value of the ITC.

C. Accelerated Depreciation

Another widely used tax mechanism is accelerated depreciation, or modified accelerated cost recovery system. Rather than provide an offset to the amount of tax due (a credit), accelerated depreciation provides an incentive by reducing the amount of revenue subject to taxation (a deduction). Depreciation expenses are intended to represent the loss in value associated with wear and tear through normal use. An accelerated depreciation schedule includes a larger expense (and therefore larger deduction) in the early years of an asset's useful life.

D. Market Interactions

As a general matter, tax incentives are considered compatible with the competitive wholesale electricity market, since they are generally available to all investors. Some federal and state tax incentives predate the existence of the ISO-NE markets and are not known to have any significant conflicts with market administration. Generators participating in the wholesale electricity markets incorporate applicable tax incentives into their offer prices. Federal incentives like the PTC enable a generator to reduce their effective offer prices. This improves the resource's competitive position relative to other resources. Since tax incentives are generally available to the competitive marketplace (similar to RECs, discussed above), economists and many market participants seem to be comfortable with tax incentives working within the competitive markets.

However, in connection with government-supported renewable resources, some market participants have argued that federal wind subsidies have had adverse implications on base load resources:

> Perversely, because of the PTC [federal tax credit] subsidy, wind producers often pay the market to run (rather than getting paid by

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[151] Fell, H. et al., *Designing Renewable Electricity Policies to Reduce Emissions* (December 2012), at 12 (footnote omitted), available at http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-12-54.pdf.

> the market to run), yet still profit because of the subsidy's steep \$35 per megawatt hour (pre-tax) payout. For example, a wind producer could pay the market \$10 per MWh and still make \$25 because of the value of the PTC. This forces around-the-clock baseload power, like nuclear and coal, producers to pay to run their plants or to shut down for long periods of the day when their power is needed most. In Texas, for instance, where new generation is needed, investors are reluctant to build new power plants – even low-cost natural gas – because subsidized wind has so distorted the market.[152]

E. <u>Legal and Regulatory Issues</u>

Renewable and clean energy-related tax credits and incentives are generally temporary in nature. State, federal, and/or local legislative bodies create tax incentives. They typically expire after a certain period and/or are subject to revision over time. Like other tax matters, legislative bodies decide whether to extend or renew incentives. A government's fiscal position can influence these decisions. Accordingly, project developers identify a degree of risk associated with the duration of tax-related mechanisms. As described above, renewable resources often have higher up-front fixed costs (relative to more traditional forms of energy) that must be recovered to maintain economic viability. The short-term uncertainty associated with tax incentives can therefore have a significant impact on the development of public policy resources.

Aside from project finance-related issues, tax incentives are widely considered to be a non-disruptive means of advancing public policy goals within the competitive wholesale markets.[153] According to FERC, "states may legitimately subsidize particular resources provided the implementation of the subsidy does not interfere with the Commission's statutory responsibility to maintain the reliable operation of wholesale energy markets at just and reasonable rates."[154]

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152 Exelon Corp., *Climate Change 2015 Information Request, CDP*, at 11 available at http://www.exeloncorp.com/assets/environment/docs/Exelon_Investor_CDP.pdf; *see,* generally, http://www.exeloncorp.com/performance/policypositions/Pages/overview.aspx. Also, *see* Brown, P., *U.S. Renewable Electricity: How Does Wind Power Generation Impact Competitive Power Markets?* (November 7, 2012), available at https://www.fas.org/sgp/crs/misc/R42818.pdf.

153 *See*, generally, *Midwest Power Sys., Inc.*, 78 FERC ¶ 61,067 (1997) (noting that states have tools such as tax incentives and direct subsidies to encourage renewable resources without setting wholesale prices); *S. Cal. Edison Co.*, 71 FERC ¶ 61,269 (1995) (states have broad powers to direct the planning and resource decisions of utilities under their jurisdiction, including encouraging certain types of generation facilities through tax structure or direct subsidies).

154 Brief for the U.S. and the FERC as Amici Curiae at 18-19, *PPL EnergyPlus, LLC et al. v. Solomon et al*, 766 F.3d 241 (3d Cir. 2014), (Nos. 13-4330 and 13-4501).

VII. Transmission-Related Mechanisms and Issues

In New England, many public policy resources are located in geographic areas that require incremental transmission infrastructure to reliably deliver power to consumers. This section describes several transmission-related issues and initiatives related to public policy objectives.

In New England, no entity has exclusive rights to flow power over the physical transmission system. In other words, subject to limited exceptions, once an entity funds and builds a transmission upgrade, it is available to that entity and others to use on an equal basis. Because an entity that builds transmission upgrades generally does not have the right to control which resources use that upgrade, which tends to benefit the entire system, it is challenging for developers to make the business case to voluntarily fund new transmission upgrades.[155]

In addition, generators need to keep their costs down to remain competitive. However, a generator that invests in transmission to accommodate more power incurs a cost, and that investment may also serve to benefit its competitors (i.e., other generators waiting in the interconnection queue). Accordingly, rather than invest in transmission upgrades, some generators may instead seek to encourage consumers to pay for upgrades through an investment that is socialized across the region.

A. Approach in Three-State Clean Energy RFP

In 2015, state agencies and utilities in Connecticut, Massachusetts and Rhode Island, with NESCOE's assistance, developed a request for proposals ("RFP") for clean energy projects based on each state's statutory authority. The RFP, issued in early November 2015, is designed to explore whether a multi-state procurement might attract larger-scale clean energy projects that are more economic than could a single state proceeding on its own. The RFP seeks bids for Class I renewable powers (e.g., wind, solar, small hydropower, biomass, fuel cells) that are at least 20 MW in size and large-scale hydropower that meets statutory requirements in participating states.

Three project types are eligible to participate in the RFP: 1) traditional PPAs that do not require transmission upgrades, 2) traditional PPAs with associated transmission, and 3) transmission projects containing clean energy delivery commitments without associated PPAs. Under the clean energy delivery commitment model, payments for the new transmission investment would be tied to the project's performance in fulfilling its commitments to deliver clean energy. Payments would be made under a FERC filed and accepted transmission tariff and/or rate schedule paid for by participating states.

The RFP issuers will jointly and individually evaluate bids and have no obligation to select any project if not cost-effective and beneficial for their consumers, consistent with each state's statutory standards for such review and decision. The timeline for project selection, if

155 Financial transmission rights can, in theory, address this issue, but they have yet to provide meaningful incentives to developers to fund transmission in New England. *See*, generally, *Long-Term Firm Transmission Rights in Organized Electricity Markets*, 116 FERC ¶ 61,077 (2006) ("Order No. 681").

any, is early to mid-2016, with reviews by applicable state and federal regulatory agencies to follow. The RFP and additional details about the RFP process is available at cleanenergyrfp.com.

B. Interconnection Challenges in New England and Curtailment

In New England, new and existing generators must follow an ISO-NE process to interconnect their resource to the New England grid. The process involves ISO-NE conducting engineering studies to examine whether the proposed interconnection will have an adverse electrical impact on existing generators and the transmission network. ISO-NE must conclude that a proposed generation project causes no "significant adverse effect" in accordance with Section I.3.9 of the Tariff in order for it to proceed.[156] ISO-NE conducts engineering studies in the order in which ISO-NE receives interconnection requests. A project sponsor's place in line is known as its "queue" position.

Several factors influence the interconnection process, its cost and timing. Those include the size and technology of the resource and whether it intends to provide capacity. In addition to new generators, existing generators that increase output and make material modifications are subject to this process. In accordance with ISO-NE's Tariff, the interconnecting generator is financially responsible for any upgrades ISO-NE determines to be necessary to interconnect. ISO-NE uses the queue to determine the order of the interconnection studies given that "the facilities needed for one Interconnection Customer are affected by the facilities needed for other generators that come before it in the queue."[157] The order plays a critical role in cost responsibility.[158]

Historically, one of the most challenging issues for interconnecting generators has been the time it takes to go through the entire interconnection study process, especially for those interconnecting in Maine. According to ISO-NE, "[t]he average study time is approximately 15 months."[159] However, there can be delays before the study process begins. ISO-NE has had long and expensive generator interconnection processes relative to other Regional Transmission Organizations ("RTOs").[160] No two power systems are alike of course, and power system differences between New England and other regions account for some of the variation. The most recent data covering the years 2011-2014 indicates that ISO-NE has still one of the longer

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156 ISO-NE Tariff Section I.3.9, available at http://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_1/sect_i.pdf.

157 104 FERC ¶ 61,103 at P 132 (2003) ("Order No. 2003"), available at http://www.ferc.gov/legal/maj-ord-reg/land-docs/order2003.asp.

158 *Id.*

159 ISO-NE Training Materials, Introduction to ISO New England System Planning: ISO 101, at 4, available at http://isonewengland.net/static-assets/documents/2014/08/iso101-t5-plncore.pdf.

160 Federal Energy Regulatory Commission Staff Report, *Common Metrics*, Docket No. AD14-15 (Aug. 26, 2014), at 35-36, available at http://www.ferc.gov/legal/staff-reports/2014/AD14-15-performance-metrics.pdf.

average generation interconnection request processing times, but has improved in recent years.[161] In fact, "with the exception of the Maine portion of the system (which has experienced a back log of mostly wind interconnection requests), substantially all the generator interconnection requests made through 2014 have completed the system impact study phase or have moved to the Interconnection Agreement and commercialization phases."[162]

As noted, ISO-NE's Tariff requires interconnecting generators to pay to correct any adverse electrical impact their facility may have on the existing system. Should the interconnection study process identify adverse impacts, the study will identify resource and/or transmission system upgrades to address the adverse impacts. Depending on the circumstances and the outcome of the studies, there can be significant upgrades necessary to interconnect that can change a project's engineering and/or economics. In some cases, adverse study results could fundamentally alter a project's business case.

If there are delays and adverse study results, a project sponsor may have to change the project details. When a project changes significant details, ISO-NE's Tariff may require them to go to the end of the interconnection queue.[163] For example, some generator technologies improve rapidly, and, over the course of a multi-year study, a project developer may wish to switch to a new and better technology. If the improved technology has materially different electrical characteristics, ISO-NE treats it as a separate project and starts the process over.

The nature of New England's power grid presents some particular and serious interconnection challenges. That is, public policy resources are often distant from the existing system and/or may connect to areas of the power system that are electrically weak. Remote sections of northern New England, where the on-shore wind resource is strongest, are somewhat electrically isolated and operate on low-voltage networks. The population in those areas is relatively small, and therefore New England did not develop the system to accommodate massive amounts of power. Such weak portions of the system are more fragile and require power generated there to travel long electrical (low voltages) and physical (hundreds of miles) distances to reach consumers (load). Power that is generated in remote northern sections of the ISO-NE grid encounters bottlenecks on its way to load centers in southern New England. Such limitations occur in several so-called "interfaces." At certain times (high demand and/or high intermittent generation), the transmission system cannot deliver all of the power generated behind these interface limits. To maintain controlled operation of the system, ISO-NE attempts to first curtail resources that are more expensive or less capable of regulating their electrical output. Indeed, even low priced, flexible generation can be subject to curtailment depending on the severity of the situation. Previously, there was considered to be a "race" to develop wind

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161 PJM Interconnection et al., *ISO/RTO Joint Common Performance Metrics Report*, Docket No. AD14-15-000 (Oct. 30, 2015) ("2015 ISO/RTO Metrics Report"), available at http://www.iso-ne.com/static-assets/documents/2015/10/ad14-15-000_10-30-15_iso-rto_common_metric_rpt.pdf.

162 2015 ISO/RTO Metrics Report at 94.

163 More information regarding so-called Material Modifications and their impact on the study process and queue position can be found in a September 30, 2014 ISO-NE presentation at a Renewable Energy Northeast ("(RENEW")) interconnection workshop ("(ISO-NE/RENEW Presentation")) at 30-32, 52-71, available at http://renew-ne.org/wp-content/uploads/2014/10/ISO-NE-Presentation-9-30-14_rev6.pdf.

resources to utilize available transmission, referred to as "headroom." Now, transmission system upgrades are considered necessary to address existing and new wind generator curtailments.

C. *Upgrading the Transmission System in New England*

Under ISO-NE's Tariff, there are several different categories of transmission upgrades.[164] The type of transmission upgrade determines the process and cost responsibility for planning and developing infrastructure enhancements.[165] Projects to upgrade the transmission system in New England include:[166]

1. Reliability

In order to maintain reliable operation of the transmission system, ISO-NE periodically conducts forward-looking engineering studies called "Needs Assessments." In these studies, ISO-NE will identify potential system issues based on forecasted loads, resources in the wholesale marketplace, and expected future transmission system elements and configuration. To the extent that a Needs Assessment uncovers potential system issues, ISO-NE conducts additional engineering studies on possible solutions. According to a FERC-approved Tariff, transmission projects developed to meet reliability needs are paid for by consumers across the whole region, or "socialized", in proportion to electricity demand. These have been the most common types of transmission upgrades in New England in recent years.

2. Market Efficiency

When transmission system congestion arises, ISO-NE may examine whether an upgrade is a cost-effective means of addressing the congestion. Specifically, ISO-NE can conduct an economic analysis to examine whether the estimated reduction in the total cost of serving electricity demand is greater than the cost of upgrades associated with relieving such congestion, or put another way, whether the benefits outweigh the costs.

There has not been a Market Efficiency Transmission Upgrade ("METU," pronounced "me too") project constructed to date. New England has virtually no congestion on its system. However, studies in connection with potential upgrades to the Maine portion of the system are currently underway. Should a METU eventually arise, like reliability projects, the costs would be socialized across the region in proportion to electricity demand.

3. Public Policy

As discussed further below, pursuant to FERC Order No. 1000, going forward, ISO-NE will perform economic and engineering studies to address transmission needs driven by

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164 ISO New England Open Access Transmission Tariff, Section II.B, Attachment N, Procedures for Regional System Plan Upgrades, available at http://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_2/oatt/sect_ii.pdf .

165 For more information, see ISO New England, *Transmission Planning Process Guide* (July 20, 2015), available at http://www.iso-ne.com/static-assets/documents/2015/07/transmission_planning_process_guide.pdf.

166 *See also* ISO New England, 2015 Regional System Plan, at Section 2.1.1, available at http://www.iso-ne.com/system-planning/system-plans-studies/rsp.

identified public policy requirements.[167] To the extent that upgrades are selected through this process, pursuant to a FERC-approved cost allocation method, according to the FERC mandate, unless there is a specific proposal for the allocation of a project's costs, they would be apportioned in the following manner: 70% of the costs would be socialized across the region in proportion to electricity demand and 30% of the costs would be allocated to the states having an identified policy need for the project . Under the FERC-approved changes to the ISO-NE Tariff under Order No. 1000, the New England states play a prominent role in identifying state and federal laws that drive incremental transmission investments, which is a precursor to (i) high-level analyses of potential transmission solutions, (ii) any subsequent competitive procurement of transmission projects, and (iii) the selection of a project or projects which would be eligible for regional cost allocation.[168]

4. Generator Interconnections

At the request of resources seeking to interconnect, ISO-NE will conduct engineering analysis to determine whether the new facility will have an adverse impact on the existing system. The cost of any transmission upgrades identified as necessary to alleviate such adverse impacts are the responsibility of the interconnecting resource. Interconnection requests are evaluated in the order in which they are submitted (the "queue," as discussed above).

5. Elective and Merchant Facilities

Entities seeking to build new or to improve existing transmission facilities can propose, develop and fund transmission upgrades. Similar to generator interconnection requests, ISO-NE examines elective and merchant transmission facilities sequentially, in the order in which developers submit them, and in coordination with the generator interconnection queue. These types of facilities may also participate in the capacity markets under certain circumstances.

D. Innovative Examples from Other Regions

This section of the paper provides information about transmission development approaches in furtherance of policy objectives that states in other areas of the country have used.

1. Competitive Renewable Energy Zones

Pursuant to a 2005 statute, the Texas Public Utility Commission ("PUCT") established Competitive Renewable Energy Zones ("CREZ") in order to encourage the development of renewable energy, specifically wind located far from population centers in Texas.[169] CREZs are areas where Texas wind power has the highest availability. In 2008, the PUCT designated five

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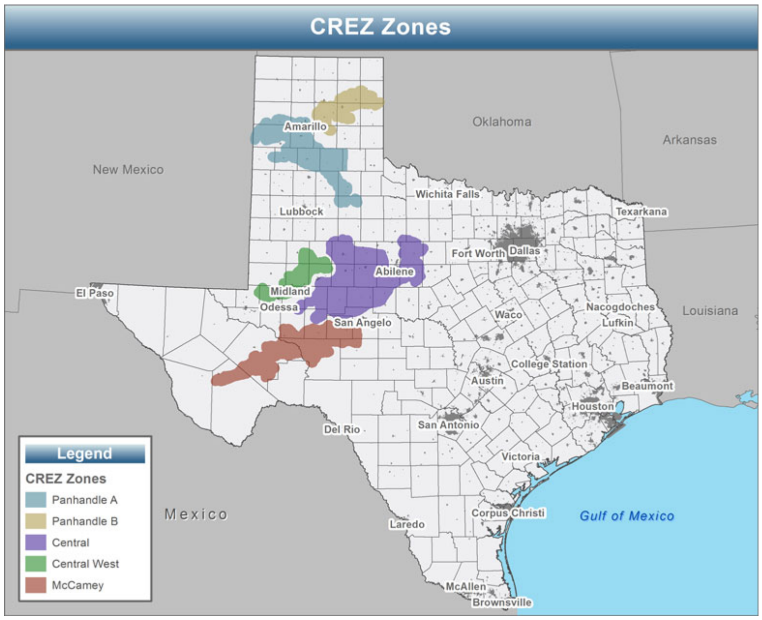
167 *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, 136 FERC ¶ 61,051 at P 326 (2011) ("Order No. 1000").

168 As noted below, on behalf of and together with five New England states, NESCOE has appealed certain aspects of the ISO-NE Order No. 1000 public policy process to the D.C. Circuit Court of Appeals. That appeal is pending. *Emera Maine et al. v. FERC*, Nos. 15-1139 and No. 15-1141, (D.C. Cir. filed May 15, 2015), *see* http://nescoe.com/resources/o1000-appeal-issues-jun2015/.

169 Tex. Senate Bill No. 20, 2005, available at http://www.legis.state.tx.us/tlodocs/791/billtext/html/SB00020F.HTM.

CREZs for the generation of wind power and defined the required transmission upgrades necessary to deliver wind-generated energy to Texas consumers.[170] Ultimately, the CREZ effort was considered to significantly increase Texas's level of wind generation capacity to 18,500 MW.[171] Below is Figure 14, a map of the CREZ zones.[172]

Figure 14: Texas Competitive Renewable Energy Zones



The total cost associated with CREZ projects is $6.9 billion.[173] CREZ consists of 186 individual projects, including 345 kV transmission lines and network upgrades to dozens of substations, switches and terminals. The projects span across nearly 3,600 miles, running as far north as Amarillo and as far south as San Antonio. CREZ's scope and cost have grown considerably from a 2008 estimate envisioning 109 projects for approximately $4.9 billion.[174] According to one commentator, "initial cost estimates did not account for a number of factors, such as financing costs during constructions, costs related to reactive compensation, upgrades to

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170 Lasher, W., presentation to U.S. Department of Energy Quadrennial Energy Review ("ERCOT QER"), *Competitive Renewable Energy Zones Process* (April 11, 2014), available at http://energy.gov/sites/prod/files/2014/08/f18/c_lasher_qer_santafe_presentation.pdf.

171 The Texas system, the Electric Reliability Council of Texas ("ERCOT"), is one of the three separate transmission grids in North America. The ERCOT system operates within the state of Texas and therefore does not share costs of transmission system expansions with other states. California also employs a CREZ approach to transmission development as part of its Renewable Energy Transmission Initiative. For more information, see http://www.energy.ca.gov/reti/.

172 For more information, *see* Competitive Renewable Energy Zone Program Oversight, CREZ Progress Report No. 17 (December 2014) ("Final CREZ Report"), available upon request.

173 Final CREZ Report at 6.

174 *Id.*

lower-voltage transmission facilities, or the fact that the length of transmission lines increased due to re-routing requirements."[175]

In order to define the project, ERCOT, the grid operator in Texas, generated a Transmission Optimization Study to determine the most cost-effective transmission investments to deliver electricity from the remote CREZs to the load centers in the major cities. ERCOT then established a series of proposals based on the conclusions of the Transmission Optimization Study. Selected transmission companies were required to pay the initial up-front costs for the transmission investments, but the funding for the projects comes from Texas consumers through a cost socialization method applied across the entire ERCOT footprint (all within Texas). Based on the initial of $4.9 billion total project costs, these socialized costs were originally expected to add $4.04 to the monthly utility bill of customers throughout the ERCOT region.[176] The CREZ approach was commonly referred to as a "build it and they will come" method of transmission development.[177]

As in New England, all resources generally have a right to access and use the CREZ transmission facilities. Accordingly, the CREZ approach has resulted in the addition of gas-fired generation to the circuits developed for integrating renewable energy.[178] For example, the 774 MW gas-fired Antelope-Elk Energy Center's "point of interconnection with ERCOT is located on existing transmission facilities built and operated by Sharyland [Utilities, L.P.] pursuant to the CREZ initiative."[179] According to the PUCT,[180]

> While the objective of a CREZ is to increase the amount of renewable resources on the grid and provide necessary transmission for those resources, ERCOT will include existing and anticipated fossil-fueled units in its study of potential CREZs, and the commission may take all resources into account when evaluating the choices and seeking transmission solutions. The commission's mandate to encourage renewable energy development by placing transmission infrastructure in places advantageous to renewable energy generation resources in a

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175 Pfeifenberger, J., Hou, D., *Summary of Transmission Project Cost Control Mechanisms in Selected U.S. Power Markets* (October 2011), at 2 and 7-8, available at http://www.brattle.com/system/publications/pdfs/000/004/843/original/Summary_of_Transmission_Project_Cost_Control_Mechanisms_in_Selected_US_Power_Markets_Pfeifenberger_Hou_Oct_2011.pdf.

176 Final CREZ Report, at 9.

177 *See*, for example, Trabish, H., Utility Dive (April 22, 2015), available at http://www.utilitydive.com/news/mission-accomplished-inside-the-battle-over-texas-renewable-energy-incen/389444/.

178 *See*, e.g., ERCOT QER, at 11 ("Some CREZ circuits are also being used to connect new shale-gas load to the ERCOT system.").

179 *Golden Spread Electric Cooperative, Inc., and Sharyland Utilities, L.P.*, 149 FERC ¶ 61,015 at P 8 (2014), available at http://www.ferc.gov/CalendarFiles/20141003170002-EL14-81-000.pdf.

180 *Rulemaking Relating to Renewable Energy Amendments*, Project No. 31852, Order Adopting New §25.174, at 32, available at http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/31852_215_533923.PDF.

manner that is most beneficial and cost-effective to the customers. Physical access to the transmission network must remain open to any technology, however.

2. Tehachapi Renewable Transmission Project

In California, Southern California Edison ("SCE") is constructing the Tehachapi Renewable Transmission Project.[181] The project "facilitates the ability of California utilities to comply with the State of California's RPS by providing access to planned renewable resources in the Tehachapi Wind Resource Area."[182] The Tehachapi project includes "transmission facilities equaling 250 miles (spanning an area of approximately 173 miles) that will deliver electricity from renewable wind energy generators in Kern County southward through Los Angeles County and eastward to the existing Mira Loma Substation in Ontario."[183] According to the project developer, the planning process was state driven.[184]

> In response to adoption of the state's Renewables Portfolio Standard goals, and recognizing further untapped potential in the Tehachapi area, the [California Public Utilities Commission ("CPUC")] established the Tehachapi Collaborative Study Group "to develop a comprehensive transmission development plan for the phased expansion of transmission capability in the Tehachapi area."

The study group considered two alternative transmission configurations in detail: either one or two connections to the existing grid, with roughly comparable cost estimates.[185] The single connection alternative was ultimately chosen. Selection of the final project transmission configuration was based on a range of factors including: least cost, reliability benefits, congestion relief, and facilitation of compliance with state RPS.[186]

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181 Southern California Edison is part of the California ISO ("CAISO") system. CAISO is predominately in the state of California, with a small portion in Nevada. As part of the Western Interconnection, CAISO is subject to FERC jurisdiction.

182 "Any load-serving entity that enters into a contract for generation located in the [Tehachapi Wind Resource Area] would be able to use the Tehachapi facilities to deliver that energy on an open access basis." *Southern California Edison Company*,121 FERC ¶ 61,168 at P 6 (2007).

183 Southern California Edison website, Tehachapi Renewable Transmission Project webpage, Project Description, available at www.sce.com/tehachapi.

184 S. Cal. Edison, *Greening the Grid: Tehachapi Renewable Transmission Project* (Fall 2012) ("SCE Tehachapi Brochure"), at 2, available at https://www.sce.com/wps/wcm/connect/de51569e-7756-4dd8-b8ac-50750550ac4c/GreeningTheGrid2012.pdf?MOD=AJPERES.

185 California Public Utilities Commission, *Second Report of the Tehachapi Collaborative Study Group*, (April 19, 2006), at 8, available at ftp://ftp.cpuc.ca.gov/puc/energy/electric/renewableenergy/tehachapi+2nd+report_vol+1+of+5.pdf.

186 *Southern California Edison Company*, Petition for Declaratory Order For Incentive Rate Treatment, Exhibit H - December 29, 2006 CAISO South Regional Transmission Plan for 2006, Part II: Findings and Recommendation on the Tehachapi Transmission Project, Docket No. EL07-62-000 (May 18, 2007), at 35.

Figure 15: California's Tehachapi Wind Resource Area

A memorandum prepared for the California Independent System Operator ("CAISO") Board of Governors described the project funding mechanism,[187]

> The total cost of the Tehachapi Transmission Project is estimated at $1.8 billion dollars . . . The full cost and ownership of the Network Upgrades associated with this project will be assigned to SCE. SCE will recover such costs, including the commensurate rate-of-return, directly through the CAISO transmission Access Charge (TAC) upon approval from FERC.
>
> The present Tehachapi plan of service contemplates that the network upgrades will be constructed over a number of years. One or more of the transmission line segments may be characterized as bulk-transfer gen-tie lines for an interim period of time until additional lines and transmission interconnections are built. If some of the line segments are temporarily or permanently characterized as bulk-transfer gen-tie lines, generators would be charged a pro-rata rate for transmission service over the gen-tie line. The residual revenue requirement for any unsubscribed portion of the gen-tie line would be recovered either from retail ratepayers under CPUC-approved rates [PUC Section

187 *Southern California Edison Company*, Petition for Declaratory Order For Incentive Rate Treatment, Exhibit I – January 18, 2007 Memorandum to CAISO Board of Governors from Vice President of Planning and Infrastructure Development, (Docket No. EL07-62-000) (May18, 2007), at 8.

> 399.25(b)(4)] or from all transmission customers in FERC-jurisdictional TAC rates if a future proposal by the CAISO is approved by FERC. In this manner, generators will be charged for generation tie-lines consistent with FERC's policy that gen-tie costs are usually assessed to generators. If any such bulk-transfer gen-tie later converts into a network facility, generators would be relieved of their pro-rata share of the transmission service charge prospectively.

According to recent trade press, the project is almost complete, [188]

> When finished, the project will deliver 4,500 MW of wind and solar energy from the Tehachapi Wind Resource Area 75 miles north to downtown Los Angeles, and then through portions of the Antelope Valley, the Angeles National Forest, the San Gabriel Valley and the Western Inland Empire. Originally, the project was scheduled to be in service by December 2013. However, because of a petition to bury a section of overhead line in Chino Hills, the project is still underway as linemen are working on installing the first section of 500-kV line underground in North America and the fourth in the world.

E. <u>Market Interactions</u>

Transmission infrastructure enables new and existing resources to interconnect to the grid. Adequate transmission infrastructure is necessary for a public policy resource to participate in the wholesale electricity markets. Moreover, ISO-NE system operators require an unconstrained transmission network in order to dispatch the most efficient generation resources. In some circumstances, transmission infrastructure (to the extent that it enables imports into the ISO-NE system) can also compete against resources in the capacity market.

In terms of interconnecting new resources and/or enabling imports from neighboring systems, transmission investment can add substantial costs to the delivery of power. Some analyses evaluate the cost of new public policy resources without also considering the cost of transmission and associated infrastructure. A more comprehensive approach that shows the overall costs and benefits also considers the necessary transmission investment. The so-called "all-in delivered cost" approach examines various alternatives for meeting public policy objectives, including any costs of new transmission needed to deliver the power to a common location. This approach evaluates the delivered cost of power on a comparable basis from resources that may have very different resource and transmission needs and elements, with very different price implications. Some market participants argue that transmission investments designed to reach public policy resources are a "subsidy."

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[188] Transmission and Distribution World, *SCE Energizes New Line to Transport Green Energy* (August 27, 2015), available at http://tdworld.com/features/sce-energizes-new-line-transport-green-energy.

F. Legal and Regulatory Issues

In 2011, the FERC issued Order No. 1000, which required major changes in regional transmission planning and competition for transmission project development. One requirement under Order No. 1000 was for planning regions to identify transmission needs driven by public policy requirements and to evaluate potential solutions to those needs. Order No. 1000 also required that there be in place a cost allocation method to allocate transmission costs from public policy-driven projects.

Five of the New England states, through NESCOE, indicated to FERC in various filings that that Order No. 1000 is one way, but not the only way, for states to advance public policy objectives. In May 2015, NESCOE and five states sought review by the D.C. Circuit Court of Appeals of several New England-based Order No. 1000 compliance orders, challenging aspects of ISO-NE's public policy planning process. The appeals argues that FERC unlawfully changed course on Order No. 1000 through these compliance orders, with critical consequence to states' ability to implement their own policies.[189] NESCOE's pending appeal focuses on FERC's shift from requiring only studies and analysis based on public policies to mandating the selection of a transmission project for development and funding.

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[189] *Emera Maine et al. v. FERC*, Nos. 15-1139 and No. 15-1141, (D.C. Cir. filed May 15, 2015), *See* http://nescoe.com/resources/o1000-petition-may2015/ and http://nescoe.com/resources/o1000-appeal-issues-jun2015/.

VIII. Distributed Generation and Demand-Side Management

A. Issue Overview

States are making significant investment in Distributed Generation ("DG") resources and Demand-Side Management programs like Energy Efficiency ("EE").

Over the past 10 years, the New England states have dramatically increased investments in EE resources. Massachusetts, for example, has increased EE spending by 150% between the years 2009 and 2012 and ranks first among the fifty states in energy efficiency spending. In fact, four of the New England states – Massachusetts, Connecticut, Rhode Island, and Vermont – are in the top ten of states nationally for energy efficiency investment, based on rankings by a national organization.[190]

At the states' request to ensure that the value of investments in EE is captured for consumers, ISO-NE now reflects EE resources in regional planning studies through an EE forecast. The forecast effort showed that, despite continued growth in the summer peak, the region's annual energy consumption is on the decline and energy efficiency investments have succeeded in deferring certain transmission projects that would have been needed for system reliability. In light of substantial ongoing state investments in DG and a recognition that these resources provide a reliability benefit to consumers that must be accounted for in determining system needs,[191] ISO-NE has also developed, at states' request, a solar photovoltaic ("PV") forecast which is used to help determine resource adequacy and capacity needs. ISO-NE has also begun to reflect the DG forecast in transmission planning studies.

B. Distributed Generation Forecast

ISO-NE's Distributed Generation Forecasting Working Group ("DGFWG") began in September 2013 with the goal of forecasting DG resources in New England. The states requested that ISO-NE account for DG in transmission planning studies, resource adequacy studies, and capacity needs.

The states worked with ISO-NE, through the DGFWG, to provide the data ISO-NE requested to complete the forecast. ISO-NE stated that it would focus solely on solar PV resources in developing its initial forecast because that was the primary DG resource growing exponentially. The current solar PV forecast estimates that, at nameplate capacity, approximately 2,400 MW will be online by 2024.[192]

ISO-NE's methodology divides the solar PV in the forecast into four categories: 1) existing behind the meter, 2) future behind the meter, 3) settlement only resources ("SOR")

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190 American Council for An Energy Efficiency Economy, *2015 State Energy Efficiency Scorecard* (October 21, 2015), available at http://aceee.org/research-report/u1509.

191 Further, certain state initiatives, such as micro-grids and smart grid/grid modernization emphasize resiliency and reliability.

192 *See* ISO-NE, Final 2015 Solar PV Forecast Details, available at http://www.iso-ne.com/static-assets/documents/2015/04/2015_solar_forecast_details_final.pdf.

and, 4) capacity resources. Behind the meter resources are units smaller than 5 MW, which do not to participate in ISO-NE energy or capacity markets and therefore are not visible to ISO-NE. However, these resources serve to reduce energy demand and are therefore reflected over time in ISO-NE's calculation of system needs. SORs receive revenues from the ISO-NE energy market but are not dispatchable by the ISO-NE and these resources have chosen not to participate in the capacity market. Capacity Resources are already participating in the FCM. ISO-NE now incorporates both existing and future behind the meter solar into its load forecast for purposes of determining Installed Capacity Requirements ("ICR").

C. ***Market Interactions***

The ICR is the amount of capacity resources ISO-NE determines is needed to meet system reliability needs. These resources are procured through the FCM, whereby ISO-NE holds an auction three years ahead of the year in which those resources will purchase in the FCM. The application of the solar PV forecast results in a lower ICR in recognition of the load reduction effect of these resources. ISO-NE has incorporated the Solar PV Forecast of behind the meter PV resources into the inputs used to determine ICR for the tenth FCM auction.

D. ***Legal and Regulatory Issues***

As described above, behind-the-meter resources will eventually be reflected in so-called historical load calculations that input into overall system needs. Use of the solar PV forecast in determining ICR eliminates this lag between a resource placed in service and a decrease in system demand.

Some stakeholders have observed that such a lag creates a risk that ISO-NE will over-procure resources through the FCM and, ultimately, unjust and unreasonable rates charged to consumers. In contrast, some generator entities have linked ISO-NE's recognition of behind-the-meter solar PV in the load forecast to the FCM's renewable resource exemption, which is discussed above. Some are litigating this matter in the D.C. Circuit Court of Appeals. These and other related issues are also part of regional stakeholder discussions regarding the most recent ICR calculation.