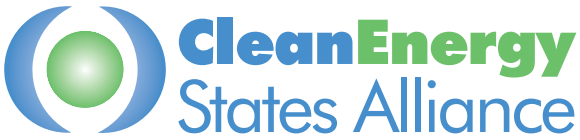

Progress Report

REVIEW OF STATE RENEWABLE PORTFOLIO STANDARD PROGRAMS IN THE NORTHEAST & MID-ATLANTIC REGIONS

Prepared for the Northeast and Mid-Atlantic States Collaborative on RPS Implementation

Exeter Associates, Inc.

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Clean Energy States Alliance
50 State Street, Suite 1
Montpelier, VT 05602
Phone 802.223.2554
Fax 802.223.4967
Email cesa@cleanegroup.org
Web www.cleanenergystates.org

TABLE OF CONTENTS

Introduction		1
Section I.	Basics of Northeast and Mid-Atlantic Electricity Markets	2
	Restructuring and Public Benefit Funds	2
	Regional Transmission Organizations	3
Section II.	History of RPS Policies in the Region	3
	RPS Design, Adoption and Implementation	3
	RPS Design Innovations from Northeast States	8
Section III.	Impact of the RPS on Renewable Energy Generation	13
	Renewable Generation Facilities	13
	Observations	19
Section IV.	RPS Implementation to Date	20
	REC Prices	26
	RPS Design Elements that Contribute to the Efficacy of RPS Programs	28
	Other Policies that Contribute to RPS Compliance and Non-Compliance	33
Section VI.	Observations and Considerations	42
	Resource and Technology Eligibility	43
	Geographic Eligibility and Electricity Deliverability Requirements	43
	Coordination of REC Tracking Systems	44
	Contracting Standards	45
	Transmission	45
	New Technologies	46
	REC Price Volatility and Compliance Reporting	46
	Siting and Permitting	47
Section VII.	Conclusion	47
Appendix A	State RPS Summary Tables	49
Appendix B	Model Resource Eligibility Definitions	77
Endnotes		87

List of Tables

1.1 State Funds for Renewable Energy Development 2
2.1 RPS Policies in the Northeast and Mid-Atlantic States 8
2.2 State Solar and Distributed Generation Set-Asides and Resulting Generation 11
3.1 Annual Incremental and Total Renewable Generating Capacity by State and Resource Type (MW) 14
4.1 RPS Compliance by State 22
4.2 Renewable Potential in Massachusetts (MW) 26
4.3 Geographic Eligibility and Electric Delivery Requirements 30
4.4 Massachusetts Green Power Partnership REC Contract Awards (June 2007) 40

List of Figures

3.1 New Renewable Generation (MW) in the Northeast and Mid-Atlantic States (1998–2007) 17
3.2 Total Installed Solar Capacity by State (MW) 17
3.3 Incremental Installed Solar Capacity—1998–2007 18
3.4 Total Incremental Renewable Energy Capacity Additions (MW), 1998–2007 18
4.1 Origin of RECs Used for Compliance with the Massachusetts RPS 21
4.2 Projected vs. Actual RPS Incremental Capacity Additions (MW) 25
4.3 Projected vs. Actual Incremental Solar RPS Capacity Additions (MW) 25
4.4 REC Prices in RPS Compliance Markets (Main Tier and Class I) 27
4.5 REC Prices in RPS Compliance Markets (Existing Tier and Class II) 28
4.6 Maryland Compliance RECs by Facility Location—2006 31

INTRODUCTION

When looking at a map of state-level renewable portfolio standards (RPS)[1] in the United States, there are two regions of the country that stand out —the Northeast and Mid-Atlantic. The states in these regions have served as national leaders in an effort to increase the amount of renewable energy capacity in the U.S. through a variety of policy initiatives; the most prevalent among them, the RPS. More than one-third of all state RPS policies in the country are located in the Northeast and Mid-Atlantic states.

With a grant from the U.S. Environmental Protection Agency and financial support from Clean Energy States Alliance, the Northeast and Mid-Atlantic States Collaborative on RPS Implementation was established in October 2006 to provide a forum for state RPS administrators to share information and pursue targeted opportunities for regional cooperation on RPS implementation. For the past two years, RPS administrators from 10 states—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont—and the District of Columbia have convened to identify and address specific challenges, obstacles and potential solutions to the successful implementation of RPS standards within the Northeast and Mid-Atlantic states and across the region. Clean Energy States Alliance served as host, support staff and facilitator of the Collaborative.

The purpose of this report is to review the progress to date of the states in the region in meeting their RPS objectives, to identify early successes and obstacles, and to offer some recommendations for future success.

- Section I of the report provides an overview of the electricity markets in the Northeast and Mid-Atlantic regions, looking in more detail at how restructuring has affected the development of the renewable energy industry in the aforementioned states.
- In Section II, the report summarizes the history of state RPS policies in the region including specifics on RPS design elements, initial adoption and subsequent amendments, and implementation successes and challenges. Design innovations unique to states in the Northeast and Mid-Atlantic are highlighted as well.
- Section III provides specifics on the results of the RPS programs in terms of meeting renewable energy targets and examines the amount and types of renewable generation in each of the states participating in the Collaborative. The report also draws conclusions about what, if any, impact the state RPS policies have had on driving new renewable energy generation, and how different technologies have benefited to date.
- Section IV provides a discussion of the various factors contributing to both RPS compliance and non-compliance to date followed by a literature review of the costs and benefits of these policies to the states thus far.
- The report concludes with observations of how the state RPS policies in the Northeast and Mid-Atlantic regions have functioned and recommendations regarding major issues that states should consider as they craft and implement RPS policies.

Restructuring and Public Benefit Funds

In the mid- to late-90s, every state participating in the Collaborative, with the exception of Vermont, adopted retail electric competition whereby consumers can choose their electric supplier. As part of retail competition, standard offer service was created for customers that opted to remain as a utility customer and not switch to a competitive retail electric supplier; utilities (or in the case of Maine, the state) typically solicited generation for standard offer customers under short-term arrangements, generally ranging from one to three years, although the details varied by state. The emphasis on short-term contracting poses difficulties for renewable energy development, as will be discussed later in this report.

As states introduced retail competition, there were concerns that investments in energy efficiency, renewable energy and low-income energy assistance programs would decrease or disappear altogether. In order to protect against this happening, four states—Connecticut, Maine, Massachusetts and New Jersey in the Northeast—created a renewable portfolio standards and public benefits funds[2]; the two were often designed to work in tandem. While the RPS requires electric service providers to secure a certain percentage of their resources from renewable generation, the public benefits fund programs provide financial resources to support the installation of both customer-sited and utility-scale renewable energy projects, in addition to providing support for energy efficiency initiatives and low-income energy assistance programs. It is important to note that these programs are typically run independent of one another. Today, all of the Collaborative members have some form of public benefit or clean energy fund in place (See Table 1.1)[3]. Most were created when the states restructured their electricity markets and are supported through a public benefits charge; they are all eligible to receive supplemental funding through RPS-related alternative compliance payments (ACP) and penalty payments.

Table 1.1. State Funds for Renewable Energy Development[4]

State	Contributions		Project Support					
	SBC	ACP	Grants	Loans	Rebates	Demo	R&D	Other[5]
CT	X	X	X	X	X			X
DE	X	X	X		X			
DC	X	X	X			X		
ME*		X	X	X	X	X	X	
MD*		X		X	X			
MA	X	X	X	X	X			X
NH*		X						X
NJ	X	X		X	X			X
NY	X		X	X	X			X
PA	X	X	X	X				
RI	X	X	X					X
VT**			X	X				X

* The funds in these states were created through the RPS legislation; funding comes from RPS compliance payments (ACP).
** The Vermont fund was created through an agreement between the state and Entergy, the owner/operator of the Vermont Yankee nuclear generating station in return for allowing waste fuel storage on-site at the facility.

Regional Transmission Organizations

Three regional transmission organizations (RTOs) in the Northeast and Mid-Atlantic regions—ISO New England, PJM Interconnection and NY ISO—are responsible for operating the bulk electricity grid and administering wholesale electricity markets. All three RTOs operate under a two-settlement system—the day-ahead market[6] and the real-time spot market. In addition, all three RTOs rely on locational marginal pricing[7] to set the real-time energy price and use some form of capacity market auctions to ensure that there are sufficient resources from supply or demand management to meet electricity demand. Two of the RTOs—ISO New England and PJM—operate a forward capacity market, where an auction is held three years before the identified time of capacity need.[8]

SECTION II. HISTORY OF RPS POLICIES IN THE REGION

The first state RPS policies in the region were established by Maine and Massachusetts in 1997 as a part of their electric industry restructuring initiatives. Over the course of the subsequent 10 years, the remaining states in the region and D.C. established mandatory RPS obligations, with the exception of Vermont which has a non-binding renewable energy target. If full compliance is achieved nationally, current mandatory state RPS policies across the country will require the addition of approximately 71 gigawatts of new renewable capacity by 2025, approximately 20 gigawatts of which will come from the Northeast and Mid-Atlantic regions.[9]

Other than New York, which established its RPS via regulation, the RPS policies in the region are legislative initiatives. As a general rule, RPS programs are designed to achieve specific goals. In addition to ensuring a certain percentage of renewable energy generation within the state and/or region, state RPS policies typically are intended to achieve other legislative objectives relative to economic development, environmental and health benefits, and energy independence and reliability. State RPS objectives typically include the following:

1. Economic development goals typically focus on the development of local renewable resources and creating new job opportunities both in individual states and the region as a whole.
2. Environmental benefits with a varying focus on realizing these benefits at the local, regional and/or global level. Typically, environmental objectives are rooted in concerns over air and water quality and public health.
3. From a reliability perspective, states are looking to the RPS to decrease reliance on traditional fossil generation and centralized power plants.
4. The security objective has two elements, an assumed increase in fuel diversity and reduction in the reliance on foreign fuels.

RPS Design, Adoption and Implementation

The one thing that state RPS policies have in common is a lack of similarity. Of the 10 states and the District of Columbia participating in the regional RPS Collaborative, no two state RPS policies address the major RPS elements in the same way.

The areas of greatest variation include biomass definitions, hydropower definitions, facility vintage requirements, geographic eligibility requirements and the numerical targets themselves. For example, biomass definitions vary with respect to the eligible feedstocks and the acceptable emissions profiles of the facilities, with state eligibility definitions ranging in their level of specificity and prescriptiveness. Hydropower eligibility definitions tend to vary with respect to limits on the capacity size of eligible projects and whether a project's operational characteristics must be environmentally "lower impact" in nature (e.g.. run-of-river facility). The requirements regarding the relative age of qualifying facilities (vintage) also varies from state to state as well; this vintage requirement is typically applicable to all RPS eligible technologies and resources with an objective of supporting newer facilities. Finally, there is no uniformity among the states with respect to the RPS targets and corresponding compliance dates.

The areas of greatest similarity among state RPS policies in this region include the use of ACPs, the use of technology set-asides, and the allowance of renewable energy credit trading. Specifically, the Northeast states have tended to set their ACP within a maximum +/- $10 range in the region (from $40 to nearly $60/MWh and growing because of the adjustments for inflation). In addition, all of the states, with the exception of New York, allow for renewable energy credit trading (and it is important to note that New York is in the process of developing a renewable energy credit trading system). Finally, seven of the eleven states included in this region include technology set-asides as part of their RPS programs, primarily for solar.

Across the region, the RPS mandates range from 8% in Pennsylvania to as much as 40% in Maine. However, these numbers mean very different things due to the differing approaches to the treatment of existing resources and will have varying effects in increasing a state's renewable energy capacity. For example, Maine initially established an RPS in 1999 calling for 30% of retail sales to come from renewable energy by 2000. However, because Maine allowed for existing renewable generators, high-efficiency cogeneration and larger hydropower facilities to qualify for compliance, the RPS requirement was met before the legislation was enacted. While subsequent legislation, passed in 2007, calls for an additional 10% of new renewable energy in the state, this is an example of how the various RPS design elements, especially resource eligibility, influence the effectiveness of the RPS to encourage new renewable generation and meet legislative objectives.

Each state identifies the eligible renewable resources and technologies that will qualify under its RPS through a state-specific approach. While some states have opted to keep their definitions more general in nature, others have established more detailed definitions. The complexities of the various definitions themselves and the definitional variations among the states have made it difficult to establish a common RPS renewable energy market in the Northeast and Mid-Atlantic regions. Variations in state specific definitions of renewable energy eligibility tend to segment the renewable energy markets across the region, resulting in smaller, less liquid markets that can increase the cost of RPS compliance.[10]

Many states only apply an RPS to investor owned utilities, and, in states with retail competition, to competitive electric service providers. However, in a few states, municipal utilities and electric cooperatives are required to comply as well. As illustrated in Table 2.1, just three states in the Northeast and Mid-

Atlantic regions—Connecticut, Maryland and New Hampshire—require municipal utilities and/or electric cooperatives to participate in the RPS program. The amount of each state's load that is covered by the RPS is principally based on which entities are required to comply with the policy. Connecticut provides a good example. The original RPS law in the state exempted electricity sales to standard offer service customers from the RPS requirements. This exemption effectively rendered the RPS meaningless because most of electric demand in Connecticut was served under standard offer service. The policy was amended to close this loophole; since 2004, the RPS applies to the vast majority of electricity service being consumed by end-users in the state and municipal utilities are given the flexibility to design their own RPS policies.

Table 2.1 provides a brief snapshot of the various RPS policies in the region. Detailed fact sheets on each of the individual state policies in place in the region are available in the Appendix.

Additionally, over the last ten years since the first RPS laws were enacted in the region, seven of the states—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey and Pennsylvania—made significant changes to their RPS policies. Three of the states—Connecticut, New Jersey and Pennsylvania —made sizable changes on multiple occasions. These recent changes are summarized below.

In general, the trend has been for the states in the region to increase their RPS standards (without extending the implementation timeline) and to add technology set-asides to promote resource diversity. The increasing mandates for renewable energy generation being established in the states' RPS laws could pose challenges to future compliance if there is inadequate generation development in the region.

Connecticut. The Connecticut RPS was created in 1998, requiring 13% renewable energy by 2009, and has been subsequently amended on a number of occasions to expand the applicability of the law to a broader group of obligated entities and to redefine the qualifying technologies and resources. In June 2007, the Connecticut General Assembly passed legislation increasing the state's RPS requirement to 23% by 2020[11], with at least 20% from Class I resources. Also included is a requirement that the Connecticut Municipal Electric Energy Cooperative develop renewable energy standards for the state's municipal utilities with annual progress reports made to the General Assembly.[12] Prior to this change, municipal utilities were not required to comply with the RPS, thus broadening the impact of the policy.

Delaware. The Delaware RPS was established in 2005, requiring 10% renewable energy by 2019. In July 2007, Delaware's RPS increased from 10% to 20% by 2019, while establishing a solar PV set-aside of 2.005% by 2019. The alternative compliance payment (ACP) level was set at $25/MWh to increase after the first year of use by an LSE to $50/MWh and after the second year of use by an LSE to $80/MWh. The solar ACP level was set at $250/MWh to increase to $300/MWh after the first year of use by an LSE and to $350/MWh after the second year of use by an LSE.[13] All ACPs are paid into the state's Green Energy Fund and will be used to support renewable energy project development. In addition, the legislation authorized 300% credit for in-state, customer-sited PV systems.

In June 2008, the Delaware General Assembly approved a 200 MW power purchase agreement

between Delmarva Power and Bluewater Wind for an offshore wind development. The legislation gives Delmarva 3.5 RECs per MWh of generation for purposes of RPS compliance.

Maine. In September 1999, the Maine PUC adopted rules for the state's 30% by 2000 renewable energy requirement. Because existing eligible resources far exceeded the RPS targets, the obligated entities had already met the requirement before it went into effect. In June 2007, the Maine legislature made mandatory an additional target of 10% of supply from new renewable capacity by 2017. This was initially stated as a non-binding goal in 2006 legislation. The ACP levels for this requirement are determined by the PUC, which subsequently established an ACP for the 10% requirement starting at $57.12/MWh in 2007 dollars, putting it in-line with the ACP levels in Massachusetts, New Hampshire and Rhode Island. The PUC was given additional discretion to suspend annual increases in the RPS standard if it determines there has been insufficient progress to meeting the target, or that meeting the target is burdensome to customers.[14] New legislation enacted in April 2008 expedites wind permitting requirements and sets a goal of at least 2,000 MW of installed wind capacity by 2015 and 3,000 MW by 2020.[15]

Maryland. The Maryland RPS was enacted in May 2004 setting a 7.5% renewable energy requirement by 2019. In April 2007, the Maryland General Assembly enacted legislation that increased the RPS from 7.5% to 9.5% by adding a 2% by 2022 requirement for solar, replacing an earlier 200% multiplier for solar technologies. To support the solar set-aside, the legislation established solar contracting requirements, revised solar REC ownership rules, and created a higher ACP for the set-aside.[16] Further revisions were made in 2008 that more than doubled the overall Tier I requirement to 20%, restricted eligibility to within PJM (unless the renewable generation is transmitted into PJM), and increased the alternative compliance payment to $40/MWh in 2011.[17]

Massachusetts. As part of its 1997 electric utility restructuring legislation, the General Court of the Commonwealth of Massachusetts created an RPS. In 2002, the state's Division of Energy Resources adopted RPS regulations requiring 4% renewable energy by 2009. In June 2008, the Massachusetts legislature increased the state's RPS to 15% by 2020, from the initial level of 4% by 2009, which will continue to increase 1% per year in perpetuity. Additionally, the legislation established separate resource classes for Class I and Class II resources, and an Alternate Energy Portfolio Standard (AEPS). The Department of Energy Resources to designate a portion of the Class I target to new, in-state, on-site systems of two MW or less that began operation after December 31, 2007. The legislation also established a 5-year pilot program requiring utilities to enter into long-term contracts, 10-15 years in length, for as much as 3% of their total load to spur the construction and financing of new renewables in state or in adjacent federal waters. In return for accepting the obligation of the long-term contract, the utilities will receive compensation of 4% of the annual contract payments. Finally, the Department of Energy Resources is directed to determine the feasibility of instituting a capacity requirement on RPS-eligible generation imported from control areas outside of and adjacent to ISO New England, as well as the feasibility of netting imports against electricity exports; if found feasible, the Department of Energy Resources must propose regulations.[18]

New Jersey. In 1999, New Jersey adopted an RPS requiring that 4% of retail sales come from renewable energy by 2012. This requirement was subsequently increased to 22.5% of retail sales by 2021, 2.12% of which is to come from solar. In 2007, the New Jersey Board of Public Utilities initiated significant changes to the implementation of the solar set-aside, transitioning from up-front rebates to a system that relies heavily on the purchase and sale of solar renewable energy credits (SRECs). The changes include: 1) an increase in the solar ACP level with a rolling 8-year price schedule set in advance, 2) an extension of the trading life of solar RECs to two years, 3) limiting the creation of solar RECs from PV systems to 15 years, 4) establishing a cost cap for solar incentive payments at roughly 2% of retail rates, and, 5) extending the timeframe for 2007 RPS compliance given the increase in Class I REC prices.[19]

New York. Recently, the New York Public Service Commission opened a docket to consider whether to update the base electricity usage forecast used for determining the amount of renewable energy generation that is necessary for 2002-2007, to incorporate the impacts of an Energy Efficiency Portfolio Standard that is under development, and whether to increase the New York RPS to 30% by 2015 or to otherwise adjust the RPS target. [20]

Pennsylvania. The Pennsylvania Alternative Energy Portfolio Standard was established in November 2004, requiring 18% alternative energy by 2020. In July 2007, the Pennsylvania legislature passed a bill that created a more detailed obligation schedule for the solar set-aside, clarified the force majeure clause, confirmed REC property rights for generators and customer-generators, added solar thermal to the list of Tier I eligible technologies, clarified that AEPS RECs cannot have been retired for other purposes such as compliance with voluntary programs, and somewhat limits the geographic scope of projects that may be eligible for compliance purposes.[21]

Table 2.1. RPS Policies in the Northeast and Mid-Atlantic States

State	Enacted	Initial Compliance Year	Current Requirement	Obligated Entities			Technology Set-Aside	Resource Class/Tiers
				IOUs	Coops	Munis		
CT	1998	2000	23% by 2020	X	N/A	X	N/A	Class I, II, III
DE	2005	2007	20% by 2019	X			Solar	New/Existing
DC	2005	2007	11% by 2022	X	N/A	N/A	Solar	Class I/II Technologies
ME	1999	2000	40% by 2017	X			N/A	New/Existing
MD	2004	2006	20% in 2022	X	X	X	Solar	Class I/II Technologies
MA	1997	2003	15% by 2020 Class II and AEPS TBD	X	N/A		Customer-sited tier to be added	Class I - new only Class II - new and existing
NH	2007	2008	23.8% by 2025	X	X	X	N/A	Class I, II, III, IV
NJ	1999	2001	22.5% by 2021	X			Solar	Class I/II
NY	2004	2006	24% by 2013	X			N/A	Main Tier Customer-Sited Tier
PA*	2001	2004	8% by 2020	X			Solar	Tier I/II
RI	2004	2007	16% by 2019	X	N/A		N/A	New/Existing
VT**	2005	2006	20% by 2017	X			N/A	N/A

*The 8% requirement refers only to Tier I resources.
**Vermont's RPS is a voluntary, non-binding goal. The requirement will become binding if the voluntary obligations are not met.

RPS Design Innovations from Northeast States

While the RPS tool got its start in Iowa back in 1983, it was not until the late 1990s when electric industry restructuring took off that the RPS gained momentum as a means for states to promote renewable energy development. Between 1997 and 1999, four Northeastern states—Connecticut, Maine, Massachusetts, and New Jersey—established RPS policies when they restructured their electric markets, the remaining states and D.C. did so between 2004 and 2007. While these states were innovators in being some of the first states in the country to establish an RPS, they also were innovators in design as well. Highlighted below are a few examples of innovative or noteworthy RPS approaches and elements taken by the states in this region.

New York State – Central Procurement

The New York State Energy Research and Development Authority (NYSERDA) is responsible for administering the state's incentive-based, central procurement RPS program. The New York RPS differs from RPS

policies in other states in that it does not require individual retail sellers of electricity to meet minimum targets for the procurement of renewable resources or to make payments into alternative compliance funds if they are unable to meet those targets. Instead, it calls for a centrally administered procurement mechanism managed by NYSERDA.

The New York RPS requires investor-owned utilities to collect revenues from their retail customers for NYSERDA to purchase RECs through periodic auctions in order to increase the current level of electricity generated by renewable electricity to 24% by 2013. As noted earlier, the New York Public Service Commission adopted the RPS through administrative order and directed the utilities to enter into contracts or agreements with NYSERDA necessary for the implementation of the RPS.

The policy rationale for the central procurement approach is that it would expedite the start of the RPS program and provide more flexibility in managing the initial procurements under the program. Another rationale was that administrative costs could be reduced because the central procurement model provides economies of scale and includes a competitive selection process. The approach also was designed to address the fact that, because of generation divestiture requirements previously implemented by the New York Public Service Commission, it was unlikely New York utilities would be interested in signing long-term contracts with renewable energy generators because of the potential stranded costs concerns. The central procurement approach ensures the signing of long-term contracts that enables developers to obtain financing, while maximizing the ease with which such contracts can be secured.

The central procurement approach requires the regulated investor-owned utilities to collect a surcharge on most delivery customer bills, which are transferred to NYSERDA, the administrator of the RPS program. NYSERDA then enters into contracts to provide production-based incentives to renewable energy producers who both sell and deliver their energy into the New York wholesale market, or to those that provide funding for customers to install "behind-the-meter" renewable energy facilities.

This central procurement model is unique from other RPS programs in existence within the region and nationally in that New York does not place a requirement on the utilities to purchase renewable energy as part of their energy portfolios. Under the model, NYS anticipates that the incentives will result in more producers selling renewable energy into the NY-ISO wholesale market and also encourage the installation of customer-sited renewable energy systems. The ultimate objective is to transition the RPS from central procurement to a more market-based system. As part of a comprehensive review of the program in 2009, the PSC will require NYSERDA to file a proposed plan for transitioning to a market-based system.

New York State – Inclusion of the Voluntary Market

Typically, RPS program requirements are focused solely on the compliance markets; this is not the case in New York. Of the 25% renewable energy requirement in place in New York, at least 1% is expected to result from green power programs designed to encourage customers to voluntarily pay added costs associated with electricity generated from renewable resources. As noted above, the purpose of the NYS RPS is to eventually move the state to a market-based renewable energy development system. In order to

achieve that objective, the Commission adopted a set aside provision of 5% of a renewable energy facility's output to be used in the voluntary market. Accordingly, NYSERDA accepts up to 95% of a renewable generator's output; the renewable generator is free to do what it wants with the remaining 5%, on the theory that this is helping encourage more renewable energy generation. In addition, for its second and third solicitations, NYSERDA allows those under contract to suspend deliveries to NYSERDA in order to deliver RECs to the voluntary market.

NYSERDA has taken several steps to support the expansion of the voluntary market in New York. This has resulted in more than a dozen competitive energy service providers offering clean energy products to retail consumers in the state. The staff of the NY Department of Public Service estimates that in September 2007, more than 59,000 accounts statewide were purchasing renewable energy through "green power" providers with an estimated consumption of approximately 64,000 MWh.

In addition to the voluntary market provisions included in the RPS, Executive Order 111 requires NY state agencies to purchase 20% of their electricity from renewable sources by 2010. At the close of the program year in 2007, the NY State Office of General Services reported that state agency purchases of clean energy in compliance with EO 111 were estimated at 261,000 MWh or 83% of the 2007 target.[22]

Set-Asides and Tiers

As states in the Northeast and Mid-Atlantic regions developed their RPS policies, concerns arose that the traditional RPS program approach would likely benefit only the least-cost projects. (This is discussed in greater detail in Section III.) In response, seven of the eleven Collaborative members—DC, DE, MD, NH, NJ, NY and PA—have established set-asides and/or multipliers for these higher cost renewable technologies. A set-aside requires that some fraction of the RPS be met with a specific technology, while multipliers give favored technologies more credit towards meeting the RPS requirements.

While this design feature is not a creation of the Northeast, it has become a hallmark of the RPS policies in this region. Nationally, there are 12 set-aside/multiplier programs in place across the country; more than half of those are in the states in the Northeast and Mid-Atlantic regions. These programs could result in significant increases in grid-connected photovoltaic and other distributed generation systems. Table 2.2 outlines the set-asides, the expected capacity additions, and the percent of state load.

To augment their solar set-asides, Delaware and the District of Columbia, also provide additional credits for solar installed within a certain timeframe. In Delaware, each MWh of generation from solar systems installed before 2015 receives 3 RECs. In D.C., each MWh of generation from systems installed from 2007–2009 receives 1.1 RECs. The multiplier provides an additional revenue stream to help offset the investment of these typically higher cost technologies; although the level of that incentive is based entirely on the value of SRECs in a state. As a stand-alone mechanism, the multiplier does not provide enough incentive to drive significant solar installations. In fact, the multiplier effectively reduces the total amount of solar installed, with or without a set-aside.

Table 2.2 State Solar and Distributed Generation Set-Asides and Resulting Generation

State*	Set-Aside	2010 Capacity	2025 Capacity	2025 Solar Generation as a % of State Load
DC	0.386%	0.5 MW	54 MW	0.4%
DE	2.005%	0.5 MW	190 MW	1.4%
MD	2%	14 MW	1,500 MW	2.0%
NH	0.3%	4 MW	35 MW	0.3%
NJ	2.12%	210 MW	1,600 MW	2.1%
NY**	0.1542%	10 MW	15 MW	0.0%
PA	0.5%	25 MW	690 MW	0.5%
Total	N/A	264 MW	4,084 MW	N/A

* Massachusetts will be setting a distributed generation set-aside as part of its Class I RPS target.
** The New York set-aside is for distributed generation broadly.
Source: Lawrence Berkeley National Laboratory, July 2008.

New Jersey—Solar REC Program

An example of one of the most innovative RPS solar set-aside programs in the U.S., the New Jersey Renewable Energy Portfolio Standard requires 22.5% renewables by 2021, of which 2.12%, or an estimated 1,500 MW, must come from solar. This provision will require the state to expand its solar capacity from 90 MW in 2008 to an estimated 2300 MW by 2021, or 180 MW of solar capacity expansion each year. In order to achieve this ambitious goal, the state developed a solar financing program that consists of a comprehensive solar support approach involving federal tax credits, net metering, renewable energy certificates sold into the RPS and voluntary markets, rebates from the New Jersey Clean Energy Fund, and private capital. In an effort to transition to a more market-based solar financing approach, on September 12, 2007, the N.J. Board of Public Utilities (BPU) issued a decision to phase out the use of rebates by 2012 and to rely solely on SRECs.

Until the September 2007 decision, New Jersey's solar financing program relied heavily on up front rebates to provide up to 70% of the installation costs for PV systems. From May 2001 through November 2007, 45 MW of solar capacity was installed at a cost of $178 million in rebates. At $4.2 million per MW if the rebate program were to continue, it would cost the state an estimated $9.6 billion to achieve the RPS solar set-aside with a rate impact of 6.5%. Because this was not affordable, the New Jersey BPU launched a comprehensive evaluation of the many policy and financing options available to meet the state's solar goals. The result of this deliberation was a decision to move to a REC-based financing model.

To support the transition from solar rebates to SRECs, the solar alternative compliance payment (SACP) was increased and adjusted to a multi-year SACP for energy years[23] 2009–2017 to provide more regulatory and financing certainty regarding the state's long-term commitment to its solar goals. The higher SACP will allow the value of SRECs to rise, offsetting the need for the rebates. However, solar systems less than 10 kW will continue to receive rebates through 2012.

The BPU is responsible for establishing the SACP, which in turn sets the ceiling price for SRECs. Generally, the SACP is set above the target SREC levels so that electric suppliers have an incentive to purchase the SRECs rather than paying the SACP. The 8-year SACP schedule that was approved by the BPU in September 2007 follows:

Energy Year	2009	2010	2011	2012	2013	2014	2015	2016
SACP	$711	$693	$675	$658	$641	$625	$609	$594

Initially, electric suppliers were required to use SRECs within the energy year that they were created for purposes of compliance with the N.J. RPS. Beginning June 1, 2008, however, the trading life of SRECs was extended to two years, allowing suppliers to bank SRECs and the market to adjust in the event of an over or under supply of SRECs.[24]

The significant shift in New Jersey's solar financing programs raised questions as to the potential rate impacts. The BPU estimated that SREC costs and rate impacts will increase gradually until a peak of $904 million, or 4.76% increase in electricity bills, is reached. Board-imposed rate caps were put in place via rulemaking to ensure that the program does not exceed predetermined rate impact levels. The cap was set at 2% of total ratepayer electricity bills. The price cap will remain in effect until such time as solar costs drop below the pre-established threshold. Advantages and disadvantages to New Jersey's solar program are outlined below.[25]

Advantages	Limitations/Challenges
Potentially increases market participation in New Jersey solar market.	Results in higher overall costs due to increased risk.
Performance, rather than capacity based payments.	There is a high year to year uncertainty.
The projects with the best economics will be built.	
This approach is consistent with the current regional/national REC system.	
Builds a deeper market.	
Shared risk between the ratepayer and the developer.	

With the transition to the SREC program, the New Jersey BPU has placed an emphasis on the importance of "securitization," in which financing of a solar electric generation project can be supported by the cash flow expected from the project's ability to generate and sell SRECs. The BPU pointed out that the SACP schedule that was established would provide a signal to financial markets that there will be a certain amount of predictability in the price of SRECs over the long-term. The SACP is set high enough to allow SREC-based financing to occur.

New Jersey believes that a successful SREC-based financing model must be based not only on long-term certainty of maximum SREC prices, but also on greater certainty about the minimum cash flow that a project

can generate from the creation and sale of SRECs. To meet the latter goal, the BPU announced that a consensus exists that an additional mechanism or mechanisms will be necessary for the market to achieve levels of growth sufficient to meet RPS requirements at an acceptable cost. The Office of Clean Energy has been charged with initiating a proceeding to look into the need for additional securitization. If it is found to be necessary, the Office of Clean Energy will provide specific recommendations for the methods and costs of providing such securitization. This process was initiated in September 2007; a final recommendation will be made to the BPU by October 1, 2008.[26]

SECTION III. IMPACT OF THE RPS ON RENEWABLE ENERGY GENERATION

An RPS often is expected to result in two general outcomes: 1) new renewable generation facilities will be built in a state, and 2) the types of generation built will vary. An important purpose of this report is to evaluate whether or not these outcomes are occurring in the Northeast and Mid-Atlantic states.

Renewable Generation Facilities

A review of the RPS results in this region to date indicate that certain utility-scale renewable generation technologies have benefited from renewable portfolio standards—landfill gas, wind and hydropower. With respect to new generation facilities, wind and landfill gas have experienced the largest increase in growth since the advent of the RPS in these regions as is illustrated in Table 3.1 and Figure 3.1. These results are based on the fact that these particular technologies have advantages over other eligible resources: they are more cost competitive than other renewable energy technologies and, in the case of landfill gas facilities, they are easy to site. There also has been an increase in hydropower generation associated with the RPS programs in the region, mostly as a result of the repowering of existing facilities.

Table 3.1 provides information on state-by-state installation of renewable energy capacity between 1998 and 2007 in the region. The table is designed to look at renewable energy generation in each state from 1998-2007, regardless of when the RPS went into effect. Figure 3.1 then illustrates the collective generation across specific technologies in the region. Figures 3.2 and 3.3 focuses on solar-specific generation by state and over time. Finally, Figure 3.4 depicts total incremental renewable generation capacity increases state-by-state over the period.

Table 3.1. Annual Incremental and Total Renewable Generating Capacity by State and Resource Type (MW)

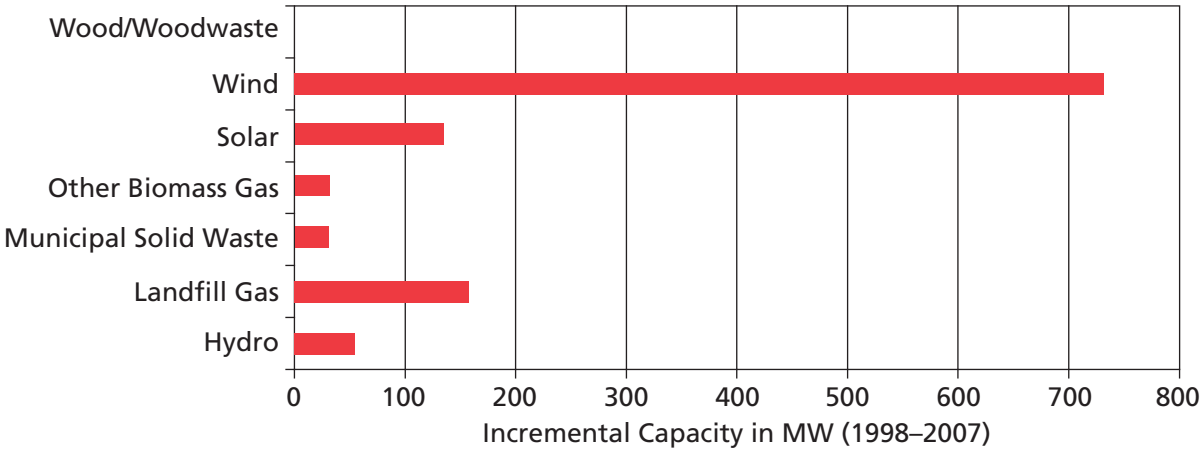
State	Energy Source	Before 1998*	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Incremental Increase (1998–2007)	Grand Total (MW)
Connecticut	Solar	0.056	0.004	0.003	0.004	0.023		0.003	0.031	0.156	0.671	1.837	2.732	2.788
	Landfill Gas	3	2.7										2.7	5.7
	Municipal Solid Waste	215.8											0	215.8
	Hydro	149.5											0	149.5
	Total	368.36	2.7	0	0	0.02	0	0	0.03	0.16	0.7	1.84	5.432	373.79
Delaware	Solar	0.019	0.001	0.016	0.004		0.063	0.357	0.039	0.003	0.259	0.45	1.192	1.211
	Landfill Gas										7		7	7
	Total	0.019	0	0.02	0	0	0.06	0.36	0.04	0	7.3	0.45	8.192	8.211
Maine	Municipal Solid Waste	65.6											0	65.6
	Other Biomass Solids	39.6											0	39.6
	Hydro	718.3							1				1	719.3
	Wood/Wood Waste	385.4							0.7				0.7	386.1
	Wind											33	33	33
	Total	1208.9	0	0	0	0	0	0	1.7	0	0	33	34.7	1243.6
Maryland	Solar	0.181	0.004	0.065	0.158					0.059	0.099	0.128	0.513	0.694
	Landfill Gas	2.7						4			3	4	11	13.7
	Municipal Solid Waste	129.2				4.3							4.3	133.5
	Hydro	494.4											0	494.4
	Wood/WoodWaste	3.8											0	3.8
	Total	630.28	0	0.07	0.16	4.3	0	4	0	0.06	3.1	4.13	15.813	646.09

State	Energy Source	Before 1998*	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Incremental Increase (1998–2007)	Grand Total (MW)
Massachusetts	Solar	0.041	0.075	0.139	0.02	0.001	0.027	0.284	0.583	0.64	1.452	1.381	4.602	4.643
	Landfill Gas	15.4			10.3				5.7			6.4	22.4	37.8
	Municipal Solid Waste	295.5											0	295.5
	Other Biomass Gas		17.5										17.5	17.5
	Hydro	1806		0.3		2							2.3	1808.3
	Wood/Wood Waste	27.3											0	27.3
	Wind											1.5	1.5	1.5
	Total	2144.2	17.6	0.44	10.3	2	0.03	0.28	6.28	0.64	1.5	9.28	48.302	2192.5
New Hampshire	Landfill Gas	13.6											0	13.6
	Municipal Solid Waste	18.5											0	18.5
	Hydro	445.4											0	445.4
	Wood/WoodWaste	165.9											0	165.9
	Total	643.4	0	0	0	0	0	0	0	0	0	0	0	643.4
New Jersey	Solar	0.068	0.002	0.008	0.007	0.009	0.764	0.757	2.136	5.52	17.88	16.41	43.493	43.56
	Landfill Gas	17.9	14.1	1.8			0.9					18.68	35.475	53.375
	Municipal Solid Waste	177.3											0	177.3
	Other Biomass Gas	11.4				12							12	23.4
	Hydro	466.2											0	466.2
	Wind										7.5		7.5	7.5
	Total	672.87	14.1	1.81	0.01	12	1.66	0.76	2.14	5.52	25	35.09	98.468	770.84

State	Energy Source	Before 1998*	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Incremental Increase (1998–2007)	Grand Total (MW)
New York	Solar	1.361	0.022	0.066	0.016	0.038	0.941	2.098	1.53	2.019	2.915	4.426	14.071	15.432
	Landfill Gas	24.1	8.2			5.6		3.2		2.4	11.2	16	46.6	70.7
	Municipal Solid Waste	327.3											0	327.3
	Hydro	5849.6		32.6				6				12.93	51.526	5901.1
	Wood/Wood Waste	40.8											0	40.8
	Wind				18.1	30				137	185	54.5	424.6	424.6
	Total	6243.2	8.22	32.7	18.1	35.6	0.94	11.3	1.53	141	199	87.9	536.797	6780
Pennsylvania	Solar		0.005	0.124	0.027	0.004	0.052	0.107	0.128	0.167	0.221		0.835	0.835
	Landfill Gas	111.1	9			9.9						3.2	22.1	133.2
	Municipal Solid Waste	247.6									24.1		24.1	271.7
	Hydro	2043.9											0	2043.9
	Wood/Wood Waste	30.5											0	30.5
	Wind				10.4	24		94.5			21.5	114.5	264.9	264.9
	Total	2433.1	9.01	0.12	10.4	33.9	0.05	94.6	0.13	0.17	46	118	311.935	2745
Rhode Island	Solar		0.043	0.025	0.003	0.027	0.017	0.012	0.103	0.119			0.349	0.349
	Landfill Gas	17.1							2.6	6.4			9	26.1
	Hydro	4.3											0	4.3
	Total	21.4	0.04	0.03	0	0.03	0.02	0.01	2.7	6.52	0	0	9.349	30.749
Vermont	Solar	0.001		0.033	0.042	0.029	0.023	0.044	0.166	0.044	0.1	0.236	0.717	0.718
	Landfill Gas											1.6	1.6	1.6
	Hydro	299.3											0	299.3
	Wood/Wood Waste	85											0	85
	Wind	6											0	6
	Total	390.3	0	0.03	0.04	0.03	0.02	0.04	0.17	0.04	0.1	1.84	2.317	392.62
Grand Total		14756	51.7	35.2	39.1	87.9	2.79	111	14.7	155	283	284	1064.301	15820

* The District of Columbia was deliberately left off of the table due to the fact that it has no renewable generating capacity.
** The pre-1998 solar data in these states had no associated installation dates.
Data Sources: AWEA, EIA, Energy Velocity 2007, IREC, and LBL.

Figure 3.1. New Renewable Generation (MW) in the Northeast and Mid-Atlantic States (1998-2007)



Going forward, customer-sited and small commercial solar PV facilities stand to benefit significantly from RPS policies in the region as a result of the growing use of technology specific set-asides in six states—Delaware, Maryland, New Hampshire, New Jersey, New York and Pennsylvania—and the District of Columbia. Three of the states—Delaware, Maryland and New Hampshire—established their set-asides in 2007 and have yet to see significant increases in solar generation in their states. However, three states—New Jersey, New York and Pennsylvania—have already begun to see results from their solar policies. This is especially

Figure 3.2 Total Installed Solar Capacity by State (MW)

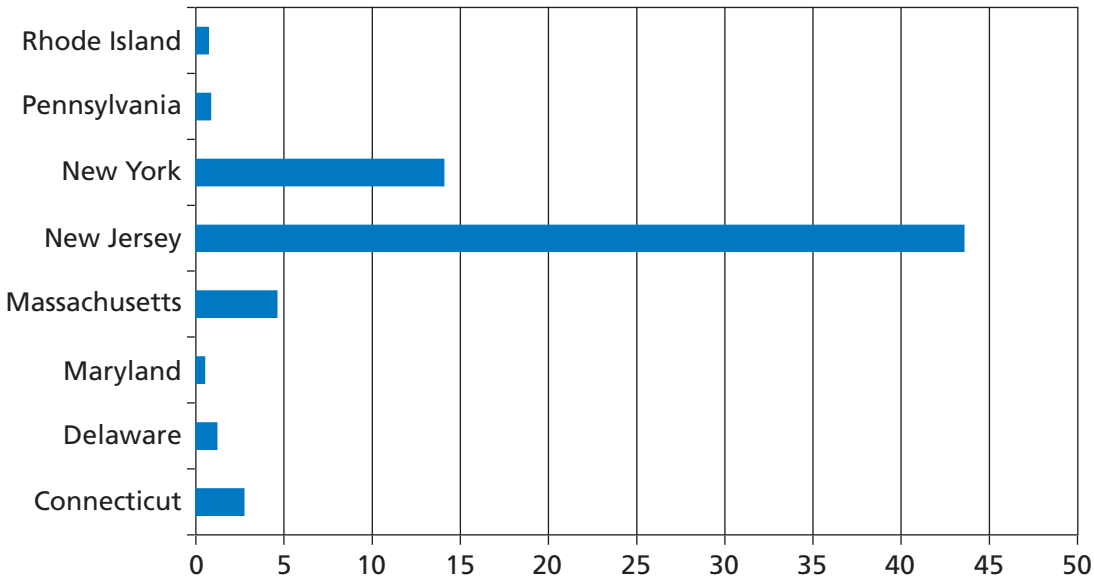
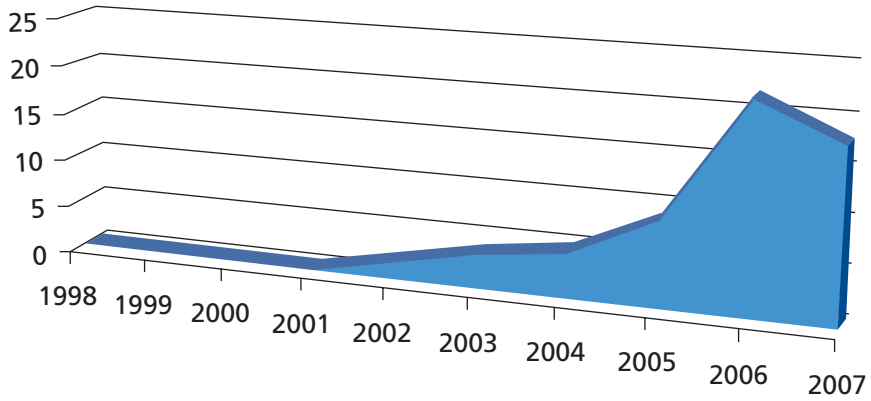
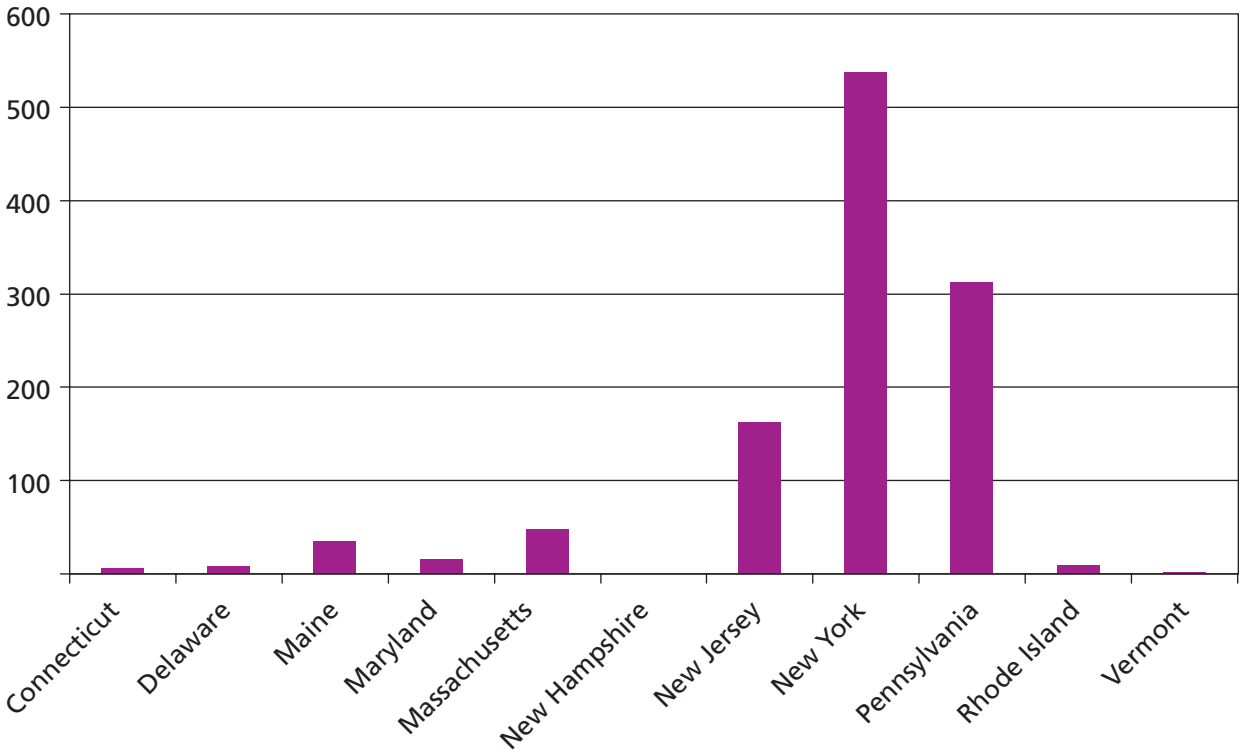


Figure 3.3 Incremental Installed Solar Capacity, 1998–2007



true in New Jersey, where more than 42 MW of customer-sited PV has been installed since 2003. Overall, there has been just less than 1,100 MW of renewable energy capacity added between 1998 through 2007 in these states. This is a relatively small capacity addition over a 10-year period, however in recent years additions have accelerated and are trending upward. Of this 1,100 MW, more than 700 MW is from wind, followed by 157 MW of landfill gas and just over 50 MW of hydro (likely repowered). As a direct result of the set-aside mechanism, solar also has contributed over 130 MW of new renewable generating capacity. By state, renewable energy capacity has increased most in New Jersey, New York and Pennsylvania as illustrated in Figure 3.2.

Figure 3.4. Total Incremental Renewable Energy Capacity Additions (MW), 1998–2007



Source: Exeter Associates, 2008.

Observations

As illustrated in Figure 3.2, New Jersey, New York and Pennsylvania are leading the states in new renewable generation capacity additions. Their success in this area may be attributed to various factors. Certainly, a major factor is that all of these states have established fairly aggressive RPS targets. However, all three states also have deployed dedicated clean energy funds to support innovative strategies to encourage renewable energy generation even before an RPS was adopted in their respective state. It also is important to note that historically these states have contributed more than half of the total installed renewable generation capacity in the region; their leadership over the past decade in using the RPS and other support for renewable generation serves to continue that trend.

New Jersey. Almost half of New Jersey's new renewable generation capacity since 1998 is from Tier 1 resources, the majority of which has been installed since 2004 and may be directly attributed to the solar set-aside in the state's RPS. Solar in New Jersey has also been aided by well-designed net metering and interconnection programs, solar rebates, and a supportive clean energy fund.

New York. There are a number of factors that contribute to New York's position as the state with the highest amount of new renewable generation capacity installations in the region. Even before the RPS was adopted in New York, NYSERDA administered a number of programs to encourage renewable energy generation in New York, such as production incentives for new wind projects, rebates and loans for solar systems and various sales and property tax incentive measures.

The New York RPS central procurement approach has allowed the state to invest in the development of new utility-scale renewable energy projects through the use of long-term contracts for renewable energy credits. Removing this investment risk has prompted greater confidence for developers to invest in the New York renewable energy market.

Finally, renewable generation capacity installed in New York serves RPS markets outside of the state. For example, RECs from New York generators are being used for compliance in Maryland and Massachusetts as is illustrated in Figures 4.1 and 4.6.

Pennsylvania. While Pennsylvania's RPS is still in the earlier stages of implementation, the state has seen great success in developing its wind resources, which account for more than half of the 312 MW of installed capacity since 1998.

The reason that Pennsylvania has been successful in developing their wind resources is early action by some LSEs in the state to acquire wind energy in anticipation that a RPS would be enacted, and strategic investments and production incentive auctions by Pennsylvania's public benefit funds, in particular the Sustainable Development Fund of Pennsylvania (SDF). Pennsylvania's relatively streamlined siting process, at least compared to other states in the northeast, also played a role. Pennsylvania relies on local siting and does not have a state siting process.

The Pennsylvania approach indicates the value of complementing an RPS with a clean energy fund. The clean energy funds in Pennsylvania have played a major role in helping to bring wind projects to fruition through production incentive auctions, whereby wind developers compete for the lowest five-year production incentive from funding that the funds made available. As of the end of 2007, seven of the utility-scale wind farms operating in Pennsylvania—representing 257 MW—had received financial support from the SDF.[27]

Regional Markets. However, it does not take an aggressive RPS target for a state to realize increases in their renewable generation capacity. For example, until the recent changes, Maine's RPS was not designed in a way to encourage new renewable capacity additions in the state. In spite of that, Maine had the fifth highest capacity additions in the region. The reason is that RECs from Maine renewable generation facilities were being used for compliance with other state RPS policies. In fact, Maine has been the largest supplier of RECs in the Massachusetts RPS compliance market.

Likewise, a 22 MW wind farm in Pennsylvania was constructed to supply RECs for the New York RPS, and as is illustrated in Figure 4.3, Pennsylvania is the largest supplier of RECs for compliance with the Maryland RPS.

The experiences from Maine, New York and Pennsylvania illustrate how individual state RPS policies have a regional impact on the development of new renewable generation. The states are not isolated and their individual policies have an impact beyond their borders.

SECTION IV. RPS IMPLEMENTATION TO DATE

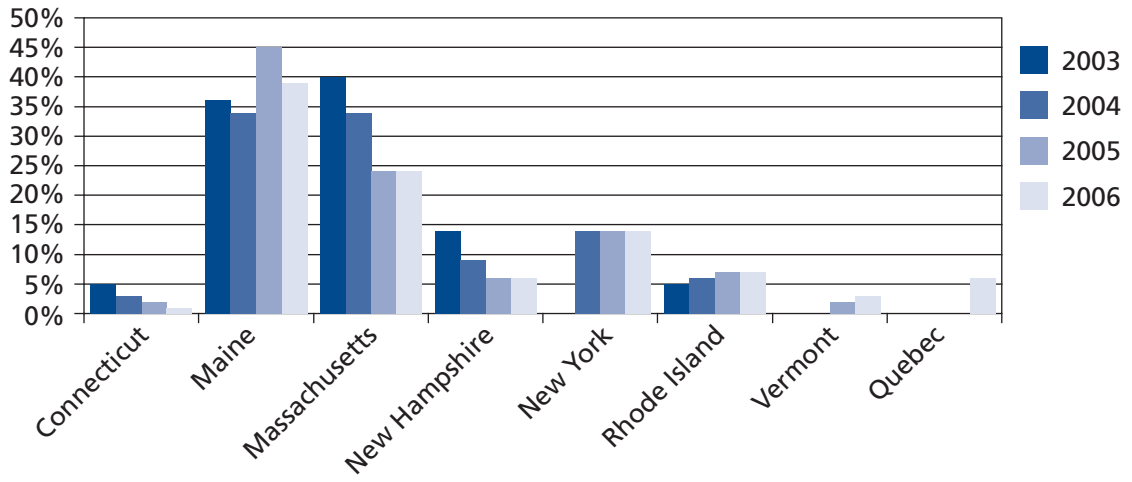
In addressing RPS compliance progress in the region, it is important to first define what is meant by compliance. For purposes of this report, compliance is the application of renewable electricity or RECs towards meeting RPS targets; this does not include the use of alternative compliance payments (ACPs) as a form of compliance.

Table 4.1 below outlines RPS obligations for the seven states in the Northeast and Mid-Atlantic region that have compliance information available. As the table illustrates, three states—Massachusetts, New York and Connecticut—have faced challenges in meeting their obligations, but for very different reasons.

Massachusetts initially faced severe REC shortfalls and, as a result, has had to rely on ACP payments for compliance purposes. The Massachusetts Division of Energy Resources (DOER) anticipated shortfalls of RECs in the early years of their RPS program, in part because of a difficult project development climate in the New England region as well as the lack of availability of long-term contracts. While the Massachusetts RPS is stimulating some new project development in the Commonwealth, it is also contributing to renewable energy growth in other states and Canadian Provinces as well. For example, the Massachusetts RPS has supported increased output at several vintage and retooled biomass plants and landfill methane projects in New England and New York; wind farms in Quebec and New York; the conversion of one of three

coal-fired boilers to biomass at the Schiller plant in New Hampshire and the retooled Greenville Steam Company biomass plant in Maine. Figure 4.1 provides a snapshot of the origin of the RECs for compliance with the Massachusetts RPS.

Figure 4.1. Origin of RECs Used for Compliance with the Massachusetts RPS



Data Source: Massachusetts RPS Annual Compliance Reports.

In New York state, only 52% of the 2006 RPS procurement target was met, primarily because of budget limitations that led to the delay of one wind facility coming on-line. Only 25% of the 2007 RPS procurement target was met because a majority of the projects pushed back their commercial operation date from December 2007 to November 2008. Therefore, current 2007 production data does not reflect the quantities bid and expected to be delivered under the second procurement. The results of NYSERDA's third procurement will be announced in the summer of 2008. Assuming the full development and operation of all projects under all three procurements, New York will have reached approximately 75% of the cumulative RPS target.

Finally, Connecticut experienced a modest REC shortfall in 2006, which can be partially attributed to the difficult New England project development climate and lack of long-term contracts. This shortfall also can be partially attributed to annual changes in the resource eligibility rules made by the Connecticut legislature. The continuous changes to what qualifies under the Connecticut RPS have resulted in an unstable policy climate in the state and do not encourage developers to invest in projects that might not qualify from one compliance year to the next.

In 2008, REC prices in Connecticut and Massachusetts declined from levels near the ACP, but for different reasons. A lack of a vintage requirement for the Connecticut Class I RPS standard resulted in Class I renewable energy generation not eligible in other New England states going to Connecticut. In Massachusetts, higher levels of imports and banking by LSEs in higher quantities helped moderate REC prices.

As an indication, average prices for 2008 Massachusetts RECs from the Massachusetts Renewable Energy Trust (MRET) in an October 2008 auction administered by Evolution Markets were $30.61, and $24.50 for 2008 Connecticut RECs. Indeed, prices were not strong enough for MRET to accept bids for 2009 Massachusetts RECs.[28] Previous auctions for Massachusetts RECs realized prices at or close to the Massachusetts ACP. For example, an earlier auction in May 2008 for Massachusetts RECs achieved prices of $54.58, just $2.12 below the Massachusetts ACP.[29] Changes to the Massachusetts RPS from the Green Communities Act in 2008, particularly those aimed at limiting renewable energy imports and provisions requiring long-term contracts for renewable energy generators, adds some uncertainty to REC prices going forward in Massachusetts.

It also should be noted that even where there has been noncompliance, the ACP funds collected by states are going into their respective clean energy funds to support the development of new renewable generation projects. In states that divide their RPS-eligible resources into tiers or classes, those funds go to support the development of Tier/Class I projects. In states with a solar set-aside, the solar ACP payments are used to support solar generation projects.

The following table provides a visual overview of how the state RPS requirements have been met to date. It is first important to note that only states that have had compliance filings to date are included in this table. Delaware, Rhode Island, New Hampshire, and the District of Columbia are still early on in the implementation process and do not yet have compliance information available for inclusion in this table.

Moving from left to the right, the table identifies the state, the compliance year, the percent target and the equivalent MWh for that compliance year, and how that target was met (through RECs, compliance payments, or a combination of the two). In states where compliance payments are utilized to meet a certain portion of the RPS obligation, the MWh and dollar equivalents are provided. Finally, the table tracks credits banked for future compliance purposes.

Table 4.1. RPS Compliance by State

State[30]	Compliance Year	Target (Class I) (Class II)	Compliance Achieved Through		Credits Banked for Future Compliance
			RECs	ACPs	
Connecticut	2004	1.0% - 301,000 MWh	301,000 MWh		
		3.0% - 903,000 MWh	903,000 MWh		
	2005	1.5% - 465,000 MWh	465,000 MWh		
		3.0% - 929,000 MWh	929,000 MWh		
	2006	2.0% - 591,000 MWh	488,651 MWh	102,349 MWh $5,629,220	
		3.0% - 887,000 MWh	861,000 MWh	26,000 MWh $1,430,000	

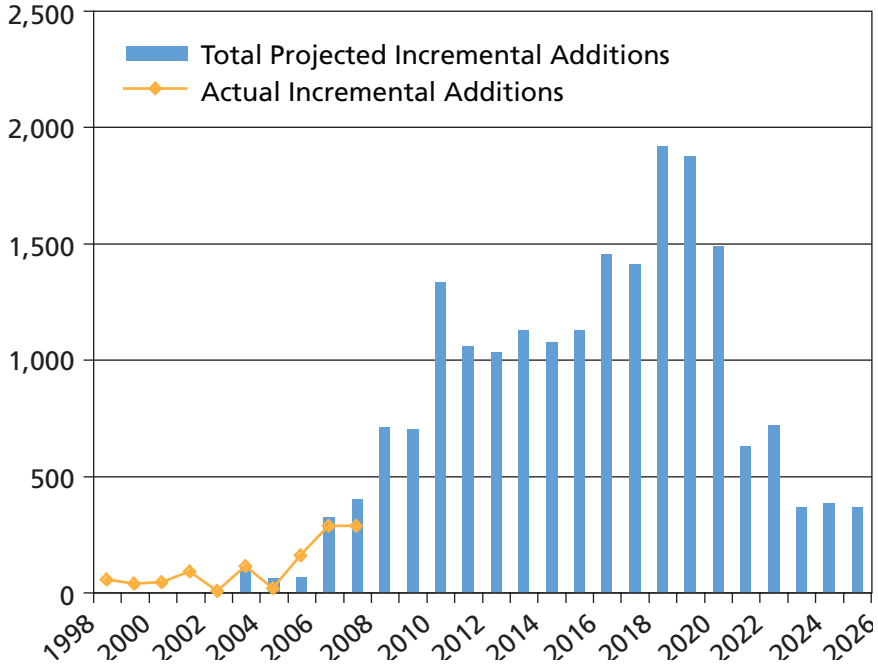
State[30]	Compliance Year	Target (Class I) (Class II)	Compliance Achieved Through		Credits Banked for Future Compliance
			RECs	ACPs	
Maine	2000	30% - 3,529,000 MWh	3,529,000 MWh		
	2001	30% - 3,532,000 MWh	3,532,000 MWh		
	2002	30% - 3,308,000 MWh	3,308,000 MWh		
	2003	30% - 3,361,000 MWh	3,361,000 MWh		
	2004	30% - 3,615,000 MWh	3,615,000 MWh		
	2005	30% - 3,598,000 MWh	3,598,000 MWh		
	2006	30% - 3,436,000 MWh	3,436,000 MWh		
Maryland	2006	1.0% - 525,000 MWh	525,000 MWh		
	2006	2.5% - 1,313,000 MWh	1,313,000 MWh		
	2007	1.0% - 434,171 MWh,	433,592 MWh	579 MWh $11,580	
	2007	2.5% - 1,085,419 MWh	1,083,970 MWh	1,449 MWh $21,735	
Massachusetts	2003	1.0% - 498,344 MWh	559,181 MWh[31]	181 MWh $9,050	60,353 MWh
	2004	1.5% - 750,954 MWh	444,680 MWh	265,424 MWh $13,645,448	61,147 MWh
	2005	2.0% - 1,031,449 MWh	644,849 MWh	367,858 MWh $19,566,367	19,531 MWh
	2006	2.5% - 1,253,600 MWh	938,772 MWh	322,625 MWh $17,786,316	1,661 MWh
	2007	3.0% - 1,529,359 MWh	1,606,396 MWh	10,920 MWh $623,750	80,559 MWh

State[30]	Compliance Year	Target (Class I) (Class II)	Compliance Achieved Through		Credits Banked for Future Compliance
			RECs	ACPs	
New Jersey	2005	.74% - 532,973 MWh	527,160 MWh		
		.01% - 5,714 MWh (Solar)	5,714 MWh	2,640 MWh $792,132	
	2006	.983% - 834,832 MWh	845,702 MWh	19 MWh $950	
		.017% - 10,450 MWh (Solar)	10,723 MWh	163 MWh $48,900	
	2007	2.037% - 1,697,054 MWh	1,340,428 MWh	492 MWh $24,600	
		.0393% - 32,742 MWh (Solar)	31,541 MWh	1,231 MWh $369,300	
New York[32]	2006	1,121,247 MWh	582,000 MWh		
	2007	2,326,171 MWh	1,921,562 MWh[33]		
	2008	4,767,994 MWh	824,550 MWh[34]		
Pennsylvania	2007	1.4987% - 21,784 MWh (Tier I)	21,784 MWh		
		.0013% - 26 MWh (Solar)	26 MWh		

Source: Exeter Associates, Inc., 2008 using data from state RPS compliance reports and filings.
*The 2007 Massachusetts compliance data was not finalized at the time of publication of this report.

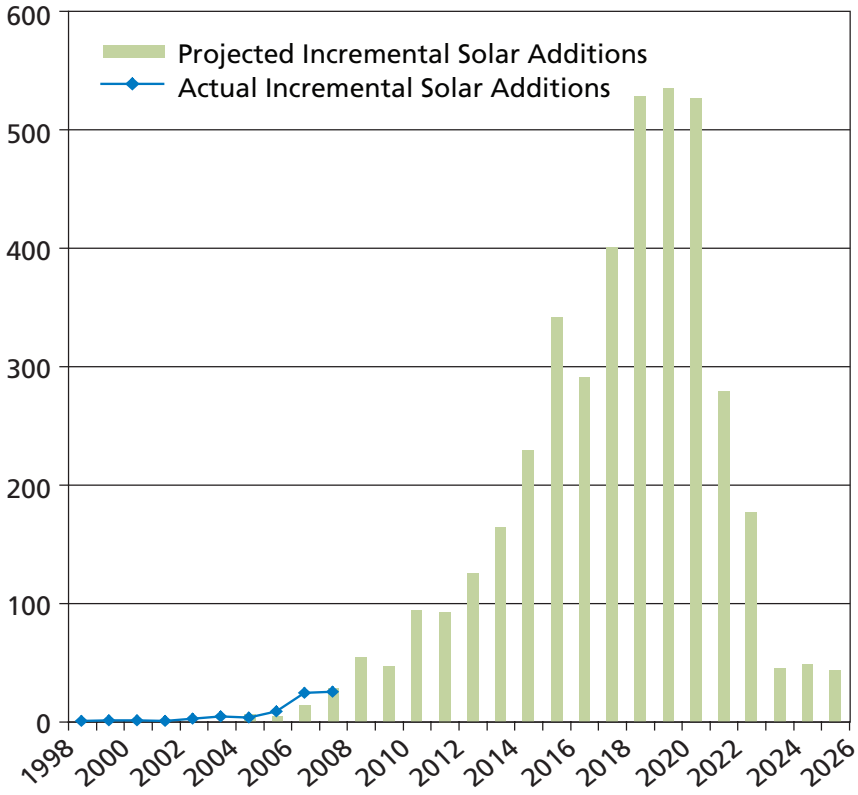
Figures 4.2 and 4.3 below compare actual annual renewable energy capacity additions since 1998 with projected incremental capacity additions needed in the Northeast and Mid-Atlantic regions as a whole in order for the RPS targets to be met. There have been significant increases in installed capacity since 2004; however installations are still below the estimates of what will be needed, as evaluated by Lawrence Berkeley National Lab (LBNL). The LBNL estimates of required capacity additions continue to steadily increase over the next 10 years.

Figure 4.2. Projected vs. Actual RPS Incremental Capacity Additions (MW) in the Northeast and Mid-Atlantic Regions



Data Source: Lawrence Berkeley National Laboratory, 2008.

Figure 4.3. Projected vs. Actual Incremental Solar RPS Capacity Additions (MW) in the Northeast and Mid-Atlantic Regions



Data Sources: Interstate Renewable Energy Council and Lawrence Berkeley National Laboratory, 2008.

There are some indications that the market now is responding to Northeast RPS policies and their significant targets by proposing new renewable energy projects, particularly wind projects. For example, at the end of 2007, PJM had 35 GW of wind in its generator interconnection queue, while the New York ISO had 7 GW and ISO New England had 2 GW.[35] However, these numbers should be viewed with caution, as not all of these proposed projects will come on-line. It is common for developers to have several interconnection requests for the same project, a number of requests are ultimately withdrawn, and a number of projects are ultimately withdrawn for various reasons.

Some states in the Northeast have recently studied their renewable resource potential to determine whether there are sufficient available renewable resources to meet RPS targets. For instance, in 2008, Massachusetts, determined that the state has 3,500 MW of economic renewable energy potential, of which wind represents 3,000 MW. The theoretical and technical potential of renewable energy resources is far higher than the economic potential as is illustrated in Table 4.2[36]

Table 4.2. Renewable Potential in Massachusetts (MW)

	Theoretical	Technical	Economic (by 2020)*
Wind	25,200	7,800	3,000**
Biomass	1,100	240	240
River	280	30	15
Ocean	***	180	24
Solar	41,900	8,700–1,299****	>250*****

Source: Navigant Consulting, 2008.
* The economic potential shown here is for the year 2020 in one of the scenarios analyzed. The scenario had the following assumptions. Wholesale electricity prices rise at an average annual rate of about 6% between 2009-2020. Renewables become more competitive with grid prices, REC prices decline at an average annual rate of about 2% in this time period, and Federal tax credits for renewables are not renewed.
** No entity has comprehensively mapped offshore wind sites that could be developed. Of the 6,300 MW of technical potential for offshore wind, over 4000 MW are excluded from being economic because they are not currently associated with specific sites. Once a comprehensive analysis of sites is completed, some part of the 4000 MW could be added to the economic potential.
*** No primary study of the theoretical potential has been conducted to date.
**** Unlike the other resources, the technical potential for solar increases over time as rooftop space increases.
***** Because of the existing policy commitment to 250 MW of solar PV by 2017, this was treated as the minimum economic potential for this technology.

REC Prices

As illustrated in Figures 4.2 and 4.3, REC prices have varied substantially across regions and resource types. Perhaps more importantly though, these charts show that significant price fluctuations are occurring within an individual state over a relatively short period of time.

Key REC price trends include:[37]

- High prices to serve the Massachusetts RPS because of a limited supply available to meet the RPS demand.
- Dramatically falling and then increasing prices under the Connecticut Class I RPS reflecting policy changes in biomass resource eligibility rules over time.

- A large spike in the price for Class I RECs under the New Jersey RPS due to increasing renewable energy targets in the state and growth in the RPS requirements in the PJM region placing greater competition on available supply.
- Downward trending prices for Maryland and D.C. Class I RECs as a result of surplus eligible renewable energy supply. As noted earlier, Maryland changed its geographic eligibility requirements in 2008 that restricted eligibility to within PJM and that likely will put some upward pressure on REC prices.

Figure 4.4. REC Prices in RPS Compliance Markets (Main Tier and Class I)

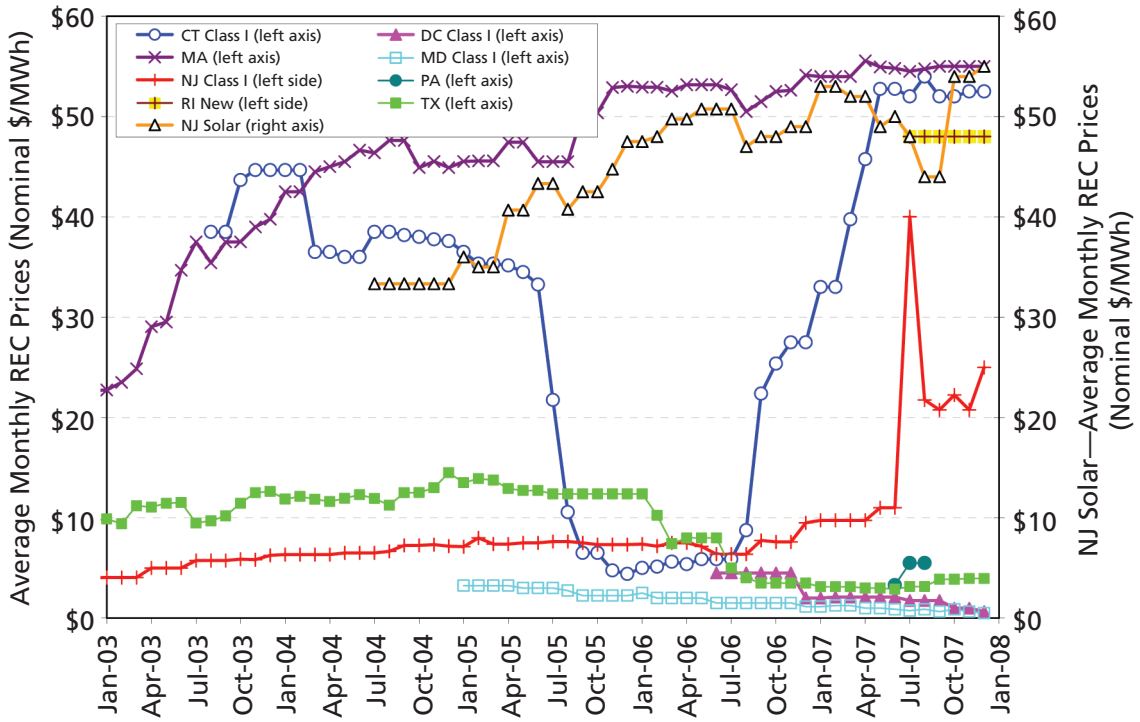
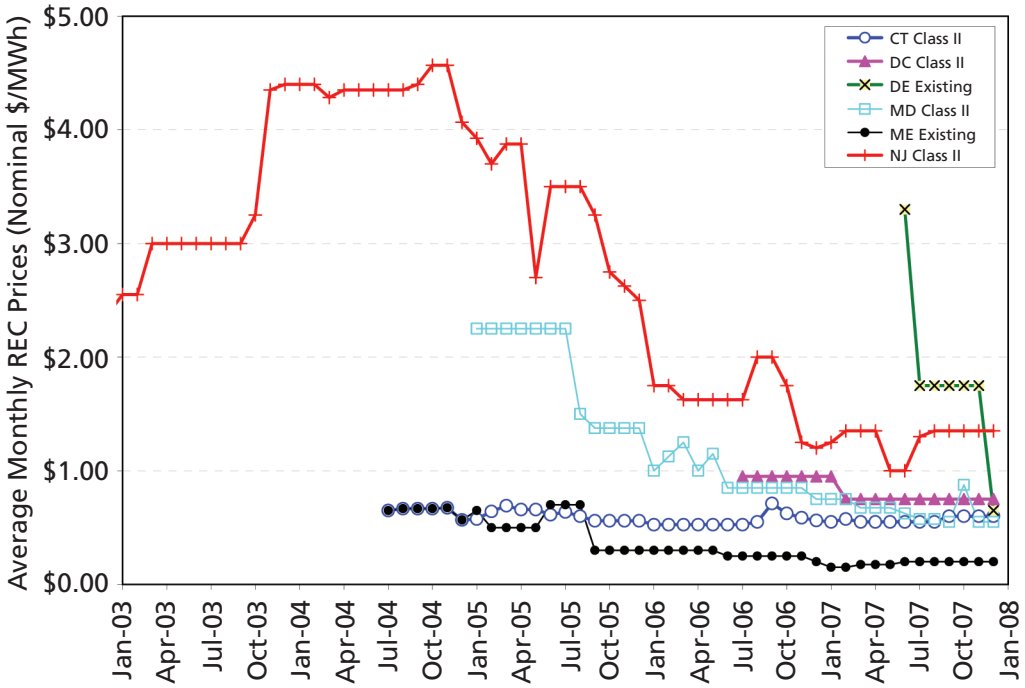


Figure 4.5. REC Prices in RPS Compliance Markets (Existing Tier and Class II)



RPS Design Elements that Contribute to the Efficacy of RPS Programs

As noted earlier, the RPS is a complex policy with a number of elements that significantly influence whether or not obligated entities will be able to achieve compliance, and whether or not that compliance will result in new renewable generation in a state or even a region. The effective design of RPS policy elements—such as definitions of qualifying resources and technologies, facility vintage, geographic eligibility, and deliverability, cost caps, level of ACPs—and other factors such as supply/demand balance, reasonable siting policies, adequate transmission capacity, and the presence of complementary public policies, will determine whether obligated entities are able to meet the targets laid out in any state RPS policy. Some broad examples of key ingredients for RPS success are provided below, followed by specific state examples of how these factors are contributing to RPS compliance or non-compliance in the region.

Qualifying Resources and Technologies

A well-designed RPS will support increased renewable energy production and eligibility of decisions on fuel, technology, and vintage will be guided by policy objectives and by the need of projects for extra-market revenue. The actual definition of eligible resources and technologies serves as the foundation for the RPS. If a state is broadly inclusive with respect to technologies, the age of the facility and the size of the facility, then compliance is easily achievable and there will be less of a net increase in the amount of renewable electricity that results.

For example, if a state establishes an RPS that allows for all existing renewable generators to qualify, it essentially supports the continued operation of existing generators without incentivizing the construction of new renewable generators. Maine provides the best example of this approach as noted earlier in this report.

Looking beyond the question of what is eligible, there also is the issue of how consistent the requirements remain over time. If a state continuously redefines which resources are eligible, project developers will most likely choose to invest in a state that has proven consistency over time. The two most complex resource definitions—biomass and hydropower—are those resources subject to the most revision and ambiguity in eligibility, making them the most susceptible to change and case-by-case determinations.

Particularly in the case of biomass, the states in the Northeast region often have not provided well-defined and stable resource eligibility definitions, resulting in market uncertainty. Without this certainty, renewable developers are less likely to pursue projects.

As an example of this problem, the Connecticut legislature has made almost annual changes to the RPS program since its inception in 1998, primarily changing biomass resource and technology eligibility. The constantly changing eligibility provisions made developers wary of building generation projects that qualified for the Connecticut RPS at the time construction began, but might not once they went into operation. Conversely, there is the possibility that eligibility might be significantly expanded, thus increasing supply and effectively lowering prices.

In contrast, but also problematic from a project financing and development perspective, Massachusetts has made case-by-case determinations regarding which biomass plants would qualify to meet the state's RPS requirements. These ad hoc decisions have the power to impact the entire New England renewable power market as a whole, since the power market is regional in scope and in operation.

Geographic Eligibility and Electricity Delivery

Decisions on the eligibility of out-of-state renewable generation affects the aggregate impact of an RPS, the location of the benefits delivered, and the legal defensibility of the policy. Often, RPS policies impose geographic restrictions on resource eligibility such as requiring renewable generators to be located in a state, region or control area or requiring the electricity to be delivered into a state or control area. The definition of the scope of geographic eligibility in a state RPS has the potential either to place severe restrictions on a state's ability to meet their RPS objectives by limiting imports and potentially raising compliance costs, or conversely, to allow use of imports from a broader market that could result in support for renewable energy generation in other states.

Within the PJM and ISO New England areas, states have taken a more regional approach to resource eligibility rules and promoted the development of regional REC markets. State RPS policies typically allow RECs from RPS-eligible generators within PJM (for states within PJM) and ISO New England (for states within ISO New England) to be used to meet RPS requirements. The District of Columbia's RPS is even more broad in its treatment of imports and allows RECs from states within PJM and adjacent to PJM to qualify. For both the New York RPS and New England state RPS policies, however, RPS-eligible generators from outside New York and New England must meet hourly scheduling requirements.

Table 4.3. Geographic Eligibility and Electric Delivery Requirements

	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT
In-State Generation Requirement												
In-Region Generation Requirement[38]										X		
Electricity Delivery Required to State or LSE												
Direct transmission intertie between generators and state.												
Broader delivery requirements to state or LSE.[39]									X			
Electricity Delivery Required to Broader Region												
Generators anywhere outside region must deliver electricity to region.[40]		X		X				X				
Generators in limited areas outside region must deliver electricity to region.[41]	X		X		X	X	X				X	
In-State Generation Encouragement												
Cost-effectiveness test.												
Limit on RECs from out-of-state generators.												

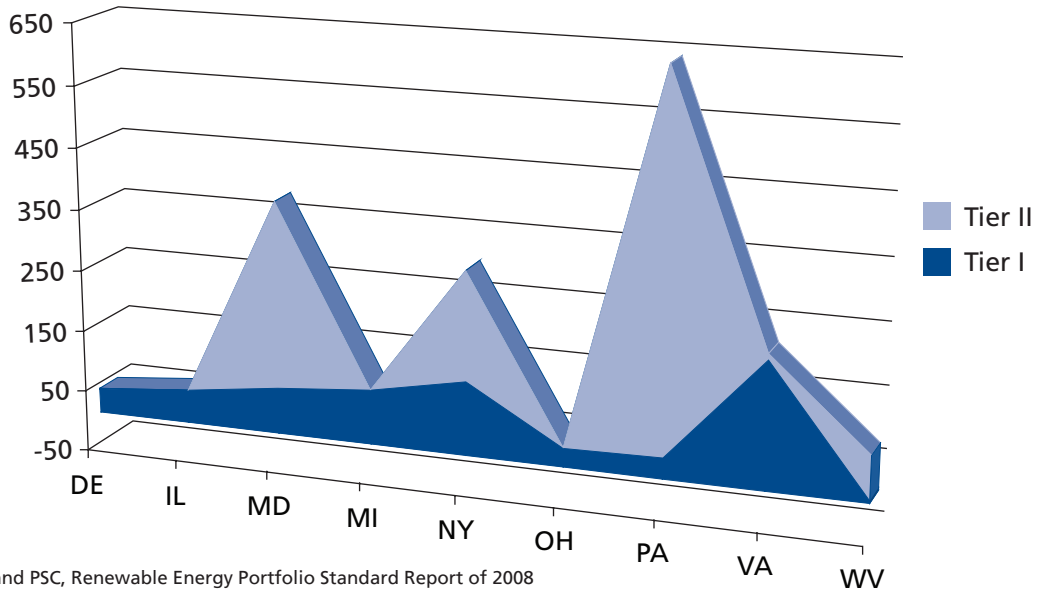
Source: Lawrence Berkeley National Laboratory, April 2008.

To indicate the actual regional impact of the use of broader geographic eligibility provisions, the state of Maryland provides a useful example. Maryland's RPS employs a relaxed delivery requirement. As originally enacted, the Maryland RPS allowed the use of RECs generated within the PJM region and in states adjacent to PJM, and electricity delivered into PJM for RPS compliance. This provision was changed in 2008 (effective 2011) to limit eligibility to resources within or delivered to PJM. Renewable energy generation outside of PJM must be delivered into the region to be used for RPS compliance. Even with this change, Maryland's broad geographic eligibility still allows for RECs generated as far away as Illinois to count towards compliance with the Maryland RPS. If the REC prices in PJM-adjacent states are significantly lower than in PJM, it is more than likely that they would be purchased for Maryland RPS compliance purposes, and thereby reducing the RPS-related incentive provided to advance new generation opportunities in the state.

With this RPS framework in mind, Figure 4.6 illustrates the location of the Tier I and Tier II RECs that were used for compliance with the Maryland RPS in 2006. It is important to note that with the recent changes to the Maryland RPS noted above, all of the PJM and ISO-NE states now offer the same flexibility with respect to facility location and electricity delivery for RPS compliance purposes.

Most of the states in the Northeast region rely significantly on the use of out-of-state generators to provide RECs for compliance with their state's RPS. This use of more flexible geographic eligibility and electricity delivery requirements makes a regional market approach possible. In contrast, the State of New York, with the most stringent delivery requirements in the region, has just one out-of-state project —a wind farm in Pennsylvania—providing RECs for its RPS program.[42] The trade-off is that New York potentially pays more for RPS compliance than states with more flexible delivery requirements.

Figure 4.6. Maryland Compliance RECs by Facility Location – 2006[43]



Source: Maryland PSC, Renewable Energy Portfolio Standard Report of 2008

RPS Applicability to LSEs

A well-designed RPS will ideally apply equally to all load-serving entities in a state, ensuring that all those who benefit from increased renewable energy production also bear a proportion of the costs. However, nationally, the majority of RPS policies apply only to investor owned utilities (IOUs). This is largely true in the Northeast and Mid-Atlantic regions' RPS policies as well. Only three states—Connecticut, Maryland and New Hampshire—require municipal utilities and electric cooperatives (in Maryland and New Hampshire) to comply with the RPS. These "scope of coverage" provisions determine what percentage of a state's electricity sales will be covered under the RPS. For example, in New York, the RPS only applies to the state's six IOUs, which cover 73% of electricity sales. The more widely applicable the RPS is to electricity providers, the more renewable generation will result.

Alternative Compliance Payments

An effective RPS must typically be mandatory and impose repercussions on those providers who fail to meet the mandates to ensure political and financing stability. One effective enforcement approach is to allow for alternative compliance payments, in which suppliers are given the option of paying a set price into a fund in lieu of procuring renewables. An ACP offers a less punitive approach to enforcement. Overall, the Northeast states have demonstrated a strong commitment to enforcement through use of effective ACPs.

Except for New York, every state in the Northeast with an RPS policy allows for the use of alternative compliance payments as an option for LSEs if they do not have enough RECs to meet RPS requirements in a given compliance period. Because New York uses a central procurement approach, RPS compliance is ensured and alternative compliance payments are not necessary.

In the region, for non-solar Tier 1 RECs, ACP levels range from $20/MWh in Maryland (rising to $40/MWh in 2011) to over $50/MWh in Connecticut, Massachusetts and New Jersey. Alternative compliance payments also act as a de facto cost cap on state RPS policies, i.e., if REC prices exceed the ACP level, then LSEs can simply make the alternative compliance payment instead of procuring RECs. States in the region typically direct proceeds from ACPs into a clean energy fund for investment in clean energy projects as illustrated in Table 1.1 on page four of this report. Although alternative compliance payments are typically fixed by the region's states, there are several variations to this. Massachusetts adjusts their ACP for inflation. The New Jersey Board of Public Utilities periodically establishes a multi-year schedule that indicates how their ACPs levels will change over a period of years. The Delaware ACP is set at $25/MWh, but it increases after its first use by an LSE to $50/MWh and after the second use by the LSE to $80/MWh.

RPS Enforcement Flexibility

While credible RPS enforcement is important, state RPS policies ideally allow for some compliance flexibility in the face of supply constraints and demand fluctuations. To this end, some states in the region have established provisions that allow the RPS administrator to alter or suspend the requirements of the RPS in any given year to reflect resource/supply imbalances.

For example, the Pennsylvania Alternative Energy Portfolio Standard includes a provision known as a force majeure clause. Under this clause, the Pennsylvania Utility Commission can make a determination as to whether there are sufficient alternative energy resources in the market for utilities to be able to meet their targets. If the Commission determines that utilities are unable to comply with the standard despite good faith efforts, the Commission may alter the obligation for a given year; it may then require higher obligations in subsequent years to compensate for shortfalls.

Another interesting example of providing flexibility in an RPS to address resource supply and cost concerns is the approach of Rhode Island. On or about January 1, 2010, as well as January 1, 2014, the Rhode Island Public Utilities Commission (PUC) is to determine the adequacy of renewable energy supplies to meet the RPS targets in 2011 and 2015, respectively. Among other factors, the Rhode Island PUC is to consider the historic use of alternative compliance payments in Rhode Island and in other states in New England. Should the Rhode Island PUC find that renewable energy supplies are or may be inadequate, the Commission may delay the scheduled percentage increase in the RPS for one year or recommend a revised RPS schedule to the Rhode Island General Assembly.

Finally, Maryland's RPS law provides provisions for delaying compliance with the solar set-aside and the non-solar Tier 1 requirements. If the actual or projected dollar-for-dollar cost for purchasing solar RECs in any one year is greater than or equal to 1% of the electric supplier's total annual electricity sales revenues in Mary-

land, the electricity supplier may ask the public utility commission to delay the compliance dates one year. The delay will continue until the actual or anticipated cost is less than 1% of the supplier's annual sales revenue in Maryland, at which time the supplier will be subject to the next scheduled percentage increase.

Other Policies that Contribute to RPS Compliance and Non-Compliance

A successful RPS program is dependent on the compatibility of other policies to support renewable energy development. As shown in such states as Connecticut, Massachusetts and New York, progress in meeting a state's renewable energy goals is dependent upon many other program, financial, regulatory and policy issues in addition to the RPS design itself. States in the region have found that an RPS should be complemented with other public policies and programs to achieve RPS compliance goals—such as clean energy funds and effective siting and permitting frameworks.

Public Benefit Funds

State public benefit fund programs play important but varying roles in RPS implementation in the states, including providing financial assistance to renewable generation projects, serving as the recipient and manager of ACPs, and administering the RPS itself. State public benefit funds have also helped to encourage resource diversity in state RPS policies by providing incentives to help bring down the costs of higher cost RPS-eligible technologies. Also, as noted earlier, state public benefit funds in New York and Pennsylvania were crucial in helping to bring RPS-eligible projects on-line even before RPS policies in those two states were adopted.

As an example, in Connecticut, a public benefit fund has been helpful in ensuring that the RPS results in support for fuel cell deployment—a higher cost technology. The Connecticut Clean Energy Fund (CCEF) has long supported the deployment of fuel cell technologies in the state through various incentive programs. When the Connecticut RPS program was established, fuel cells, regardless of whether the fuel type is from renewables or non-renewables, were included as eligible for RPS compliance. This technology inclusion served to stimulate demand for behind-the-meter installations of fuel cells at Connecticut commercial, industrial and institutional buildings. Because fuel cells are a higher cost technology, they are not competitive in the RPS market, however, due to the incentives provided by the CCEF, these technologies are able to contribute to the state's RPS compliance objectives.

In all of the states in the region, the public benefit fund programs receive and disburse the ACPs made by obligated entities when they do not have sufficient RECs for compliance purposes. States, such as Maryland and New Hampshire that did not have a fund already in place, created them as part of the RPS to administer compliance and penalty payments. These payments are used to support renewable energy generation projects that are eligible for compliance with the RPS.

Siting and Permitting

From a geographic perspective, the Northeast and Mid-Atlantic regions are looking to develop a significant amount of new renewable resources in a relatively small geographic area. This challenge is further complicated by the fact that the regulatory processes for siting a renewable energy project vary widely from state to state, and are not designed to address the issues associated with renewable energy development.

Some states have vested primary siting authority for energy facilities in a state agency (Connecticut and Vermont), while others have left this authority to local governments to handle through land use and zoning ordinances (New York and Pennsylvania). As development of offshore wind and ocean technologies increases, federal permitting and siting requirements also will apply to projects pursuant to the jurisdictions of the Minerals Management Service, FERC, and the Army Corps of Engineers (siting on Great Lakes). The lack of uniformity among regulatory programs at the local, state, and federal levels often results in a complex process involving multiple levels of review with the ease of siting renewable energy projects differing considerably from state-to-state within the Northeast. All things being equal, developers will gravitate to the states with less burdensome or more streamlined siting and permitting processes.

A further challenge is that most state siting processes are not designed for renewable energy technologies such as wind and solar. For these renewable energy technologies, the environmental impacts differ from fossil-fuel plants, with more focus on species, habitat, and visual issues (wind) and less concern about air and water emissions. There also is little coordination between regulatory review of renewable projects between states, local governments, and federal agencies. Finally, opposition to renewable energy projects involving unfamiliar, new technologies, even if by a relatively small number of people, can be a significant obstacle, particularly at the local level.

Another factor that is particularly problematic in the Northeast region is the challenge of siting a large number of renewable energy installations in a densely populated, small geographic area. Maryland, for example, has yet to site a large utility-scale renewable energy project in the state, despite the enactment of the Maryland RPS in 2004 and significant efforts to plan and site three wind projects in the state, two were proposed way back in 2002. Community based challenges also have emerged for wind energy projects in states in the Northeast. The opposition to one such project, Cape Wind, has come to the attention of the entire country. Siting challenges therefore add to the difficulties in states meeting their RPS targets in the Northeast.

States in the Northeast recognize that siting renewable energy technologies face a significant hurdle and are taking a variety of approaches to address the problem. For example, Maryland dramatically streamlined siting requirements for on-shore wind projects below 70 MW. Other states, such as Pennsylvania, have developed voluntary siting guidelines for wind projects, addressing such issues as wildlife impacts and best siting practices. New York State has developed a comprehensive toolkit to provide information to help local communities address the siting issues associated with wind projects. The toolkit, developed by NYSERDA, included a wind energy model ordinance, examples of effective local government laws, and recommendations on how to assess wind energy impacts on visual resources and on birds and bats.

Maine has taken strong leadership to designate some of the state as appropriate for expediting permitting for wind projects. The Maine Wind Energy Act[44] encourages the development and siting of appropriate wind energy production in Maine, promoting wind energy development in a manner that is, among other things, consistent with all state and federal environmental standards. The 2008 legislation improves the permitting process for wind power projects, establishes expedited permitting areas, and promotes development of community-level wind power.

Transmission

Meeting state RPS goals often requires transmission investment to deliver energy from major new generation resources in more remote areas to loads. Several states in the Mid-West and West with good wind resources have decided to expand their states' transmission to enable the development of location-constrained, clean, and diversified resources areas to meet state renewable goals. Texas, Minnesota, Colorado, and California, for example, are leaders in renewable energy development and have created new models for planning, siting, and cost recovery/allocation for new transmission. Additionally, North Dakota, South Dakota, Wyoming, Kansas, Colorado, Idaho and New Mexico have established new authorities to spur investment in additional transmission infrastructure.

In many parts of the country, new transmission infrastructure studies, plans, and projects are now underway to support major new renewable generation. Recent activities include:

- Planning by the Western Governors' Association's Clean and Diversified Energy Advisory Commission.
- The creation of Competitive Renewable Energy Zones by the State of Texas Legislature.
- California's Renewable Energy Transmission Initiative to identify and facilitate transmission corridor designation and transmission and generation siting and permitting.

In contrast, however, the New England and Mid-Atlantic regions have not to date aggressively pursued proactive transmission policies to access renewable energy resources, such as competitive renewable energy zones, location-constrained resource interconnections, or open seasons. However, transmission is an important issue in the Northeast, with several significant transmission proposals in various stages of planning and regulatory review primarily to address electric reliability and transmission congestion issues. Should these transmission projects go forward, renewable resources, particularly wind energy, may benefit from the additional capacity to transmit renewable energy generation to load centers, although that is not the primary intent of these proposed transmission projects.

In the PJM region, three large multi-state transmission projects are under various stages of planning and regulatory review:

- The Trans-Allegheny Interstate Line (TrAIL) consists of a 500-kV line from southwestern Pennsylvania to West Virginia to northern Virginia, and three 138-kV lines in southwestern Pennsylvania. Allegheny Energy and Dominion Energy are both involved with the TrAIL project. If regulatory approvals are received, TrAIL is expected to come on-line in 2011.
- The Potomac-Appalachian Transmission Highline (PATH), a joint venture of Allegheny Energy and American Electric Power, would consist of a 765-kV transmission line in West Virginia, and twin-circuit 500-kV lines from West Virginia into Maryland, with a scheduled in-service date of 2012.
- The Mid-Atlantic Power Pathway (MAPP) would be a 500-kV transmission line extending from northern Virginia to Maryland, Delaware and New Jersey. PEPCO Holdings Inc. is the sponsor of the line, with a scheduled in-service date of 2013.

In New York State, the New York Regional Interconnect, Inc., a joint venture of Borealis Infrastructure and American Consumer Industries, has proposed to build and operate a 190 mile, 400-kV high-voltage direct current line from northern New York into New York City. The proposed line has received opposition within New York, and the New York PSC has not yet accepted NYRI's application for review, citing information deficiencies.

The U.S. Department of Energy also has designated New York and the Mid-Atlantic states as critically constrained transmission corridors. Under the Energy Policy Act of 2005, FERC can approve proposed new transmission facilities in these corridors if states fail to do so within one year, among other conditions. Considerable controversy surrounds DOE's designation, and several efforts to reverse these designations are underway.

In New England, discussion is occurring over how to allocate costs for new transmission built in part to access remote renewable energy resources. Maine, for instance, has good wind resources but inadequate transmission, with the northern part of the state not even part of the ISO New England grid. Central Maine Power and Maine Public Service have plans to construct a 150- to 200-mile, 345-kV line to connect northern Maine with the rest of the state and to accommodate a significant amount of new wind generation. The Maine utilities are proposing that all of the New England states should bear the costs for a substantial portion of the project. However, Connecticut and Massachusetts have expressed concern that, among other things, such transmission projects can mask generation subsidies and that there should be a more careful review of transmission projects designed to bring more generation online.[45] Complicating matters is that Maine is considering leaving ISO New England because of complaints over high prices from the ISO New England capacity market and other issues. Separately, the New Hampshire General Court (the state legislative body) enacted legislation creating a commission to develop a transmission expansion plan for transmitting renewable energy generation in the states.

As this regional transmission overview shows, a major challenge to renewable energy resource development in the Northeast and Mid-Atlantic regions is overcoming the many barriers to transmission investment, including transmission planning, allocation of the costs, assurances of cost recovery, and siting of new transmission facilities. Meeting the states' collective RPS goals will require a change in the way transmission planning is occurring today in the region. Numerous stakeholders across the region will need to collaborative to develop a common regional plan and approach for ensuring appropriate transmission projects go forward to accommodate the significant renewable energy goals.

Long-Term Contracts

RPS implementation experience to date indicates that development of projects has been most successful where developers have been able to secure long-term contracts. This has proved particularly challenging in the Northeast region because of restructured markets where retail customers are free to switch providers, making long-term investment more difficult for suppliers. Project developers often were unwilling to construct projects without the ability to secure long-term contracts for either the RECs, or the power, or both. Most customers have chosen to stay with their host utility under standard offer service, but standard

offer contracts generally run from only 1-3 years. To address this mismatch, a few states in the region developed innovative programs designed to ensure the availability of long-term contracts for renewable energy projects. For the most part, these approaches have been successful in fostering long-term contracts for renewable energy generation projects.

Examples of three different state approaches to address the critical need for developers to secure long-term contracts with creditworthy parties are provided below.

New York Central Procurement

Under the central procurement approach, which is described in more detail earlier in the report, NYSERDA has conducted two Main Tier solicitations to adhere to the renewable energy procurement targets established by the Public Service Commission. As a result of these solicitations, NYSERDA has contracts with 25 facilities for an estimated 1,206 MW of new renewable capacity. The resulting contracts are in place for between 1 and 10 years depending on the project. If a project's contract expires before the next solicitation is issued, it is again eligible to bid into the RFP.

Vermont Sustainably Priced Energy Enterprise Development Program (SPEED)

The Vermont SPEED program was developed to assist retail electricity service providers in the state to supply their total incremental energy growth between January 1, 2005 and January 1, 2012 through the use of electricity generated by new renewable resources. A minimum SPEED goal is to generate 5% of Vermont's 2005 load with SPEED resources. A additional SPEED goal is to generate 20% of Vermont's load with SPEED resources by 2017.

Eligible SPEED projects are new generation facilities, or modifications or expansions of existing generation facilities, that are located within the State of Vermont. The program is administered by a designated SPEED Facilitator (Facilitator) whose primary purpose is to promote the development of SPEED resources by "bringing together SPEED projects and Vermont utilities seeking to purchase power."[46]

There are three types of contracts supported through the SPEED program. These are outlined in more detail below.

1. "Voluntary Contracts by Vermont Utilities" consist of contracts between Vermont utilities and the owners of SPEED projects in which the utility purchases all of the energy (but not RECs) from a project or less than all of the energy (but not RECs) from a project and the remainder is sold into the regional market or by contract to one or more out-of-state purchasers.

2. "SPEED Facilitator Contracts Allocated to Vermont Utilities." In this scenario, the Facilitator purchases electricity products from one or more SPEED projects and allocates the products to Vermont utilities.

3. "SPEED Facilitator Contract for Sale into Regional Market." Finally, the Facilitator is authorized to offer a contract to SPEED projects under which the Facilitator purchases the power and resells it into the regional market. These are the contracts of last resort that the Facilitator may only consider after reasonable efforts have been made to establish either of the other two contract options. There are specific

contract elements that must be included: i) a duration of no less than 10 years; ii) special pricing requirements for the energy, capacity and ancillary service products, and transmission; iii) review and approval of the contract by the Vermont Public Service Board; iv) sale of the energy through the regional market; v) any profit or loss from the contract will be split equally among the parties to the contract.

To date, the SPEED facilitator has not been involved in any contracts for purchases from SPEED-eligible resources, and the SPEED program has not had a significant effect on development of renewable energy projects. As an example, the recently approved contract for a UPC Wind[47] project in Sheffield, Vermont, was indexed to the market price of power (at a slight discount), rather than meeting the statutory objective of the SPEED program: to promote long-term stably priced contracts for renewables. The Public Service Board (PSB) is addressing this issue by conditioning approval of the UPC Wind project upon the developer making all reasonable efforts to negotiate a long-term, price stable contract with Vermont utilities. Independent of the negotiations for the Sheffield project, the PSB initiated a broader discussion with various stakeholders to address why long-term, sustainably-priced contracts have not transpired.

Massachusetts Green Power Partnership

Massachusetts has been a pioneer in establishing a program to providing direct purchase of RECs or a form of REC price insurance to provide some long-term price stability for RECs to encourage long-term contracting.

The Massachusetts Technology Collaborative (MTC) through its Massachusetts Renewable Energy Trust (MRET) initiated the Massachusetts Green Power Partnership (MGPP) in 2003 to stimulate private investment in new clean electric generating facilities in Massachusetts and New England to satisfy both the Massachusetts RPS requirements and demand for voluntary green power. The program was developed on the premise that renewable energy developers are dependent on multiple revenue streams to cover future payments to equity and debt investors and generate project income. These revenue streams include 1) power sales, 2) tax incentives, and 3) RECs.

The absence of long term contracts for RECs with creditworthy entities has made it difficult for developers to secure equity and debt financing for their projects. The MGPP was launched to address this problem by providing long term REC contracts, offered as a direct purchase or a purchase option. The contracts are backed by funds collected from a system benefit charge fund and from alternative compliance payments.

In addition to direct purchases of RECs, in the MGPP, MRET also offers a variety of put and call options in an attempt to ensure long-term REC price stability. More specifically, MRET relies on the following options:

- Put Options, wherein the proposer, after paying an initial option premium to MRET, has the right to sell the RECs to MRET at a set per-unit price, essentially guaranteeing a floor price for RECs.
- Put Back Option contracts, which are similar to the Put Option contract. Under this option, the proposer generally pays a lower option premium, retains the right to sell RECs at a set price to MRET,

but also provides MRET the right to sell any of these RECs back to the proposer at a price below what MRET paid for them. This option allows the proposer to retain some of the REC price risk in exchange for a lower initial option premium.

- Price Collar Contracts (also referred to as "Put and Call Option" contracts), where MRET gives a Put Option to the proposer at no cost in exchange for the right to purchase (or call) RECs from the proposer. If MRET decides to buy RECs, they would pay a higher price then if the proposer decided to sell the RECs to Massachusetts. This arrangement creates a floor and ceiling price for RECs.

The program works as follows: In response to MRET solicitations, applicants submit a proposed product, price and term to MRET. The arrangement does not have to start in the first year of a project's operation. MRET and the proposer enter into a contract, and MRET escrows funds to cover its obligation. The renewable energy facility receives financing and is constructed, and MRET receives or guarantees RECs, depending on the contractual terms. Escrowed funds are released if the renewable energy project is not built or financed. Contracts are restricted to a term of 10 years, in 12-month option periods, but cannot extend past 2021 under any circumstances. New generating projects or incremental generation from existing projects are eligible.[48] MRET sells all the RECs that it purchases to raise funds for other renewable energy support activities.

In 2003, MRET awarded six companies $33 million in REC purchase commitments, representing 100 MW. Massachusetts issued a second REC purchase solicitation in 2005, using $15 million in public benefit funds and $13 million in RPS alternative compliance payments. Seven projects representing 106 MW received awards.[49] Since then, one award was cancelled because the project developer lost control of its site.

In its two solicitations, MRET found more bidder interest in price support for the time period after the initial five years, i.e., years five through 15, where REC price uncertainty appears to be greatest. Bidders also were interested in put options. However, the MRET found the funds dedicated to this program are insufficient to support large renewable energy projects or demand for renewable energy in Massachusetts.[50]

While the MGPP is no longer open, it was successful in funding 12 projects in four states totaling a little over 200 MW of generation. The projects were supported almost equally by public benefit funds and alternative compliance payments. However, two of the projects that are not eligible for the Massachusetts RPS only received funding from public benefit funds. To date, nine of the projects are operating and the remaining three are expected to enter into commercial operation in 2008.

Through the MGPP, Massachusetts has helped to minimize REC price uncertainties for project developers and assumed some of the market risk associated with future REC value. However, the funding made available for the program is not adequate to fulfill the Massachusetts RPS requirements.

Table 4.4. Massachusetts Green Power Partnership REC Contract Awards (June 2007)

Developer	Technology/ State	Capacity (MW)	Contract Type	RET Nominal Value (million $)	ACP Nominal Value (million $)	Development Status (Commercial Operation Date)
Round 1 (2003)						
Berkshire Wind, LLC	Wind/MA	15	Purchase	9.9	0	Financing (2007)
City of Brockton	PV/MA	.4	Put Option	.9	0	Operating (2006)
CommonWealth New Bedford Energy	LFG/MA	3.3	Put w/ Put Back	3.0	0	Operating (2005)
Hoosac Wind, LLC	Wind/MA	30	Collar	17.1	0	Permitting (2008)
Pepperell Hydro, LLC	Hydro/MA	1.3*	Purchase	.8	0	Operating (2006)
Public Service Co. of New Hampshire	Bio/NH	50	Collar	2.7	0	Operating (2006)
					100 MW and $34.4 Million	
Round 2 (2005)						
Greenville Steam Company	Bio/ME	19	Collar	2.8	2.8	Operating (2006)
Indian River Power Supply, LLC	Hydro/MA	1.6	Purchase	2.2	0	Financing (2008)
Panda Development Group	Bio/MA	30	Purchase	4.9	5	Cancelled, Lost Site
Woronoco Hydro LLC	Hydro/MA	0.9*	Purchase	1.8	0	Construction (2007)
CEI-New Hampshire Wind, LLC	Wind/NH	24	Collar	2.1	2.1	Permitting (2008)
UPC Vermont Wind	Wind/VT	30	Collar	5.4	5.5	Permitting (2008)
					106 MW and $34.6 Million	

Source: Massachusetts Renewable Energy Trust, 2007

Connecticut's Project 150

Project 150, formerly called Project 100, is a state legislatively-mandated initiative aimed at increasing clean energy supply in Connecticut by at least 150 MW of installed capacity. Project 150 is designed to

encourage financing of renewable energy projects through the stability of long term electricity purchase agreements. Under Project 150, the electric distribution utilities must enter into power purchase agreements with generators of Class 1 renewable energy with contract durations between 10 and 20 years. Pricing will include a premium of up to 5.5 cents/kWh.

In 2004, the Connecticut Clean Energy Fund (CCEF)[51] first launched the original Project 100 in response to legislative revisions to the state's electric restructuring legislation that mandated local electric distribution companies to enter into power purchase agreements with Class I renewable energy resources for a minimum of 10 years. The legislation required the contracting of a minimum of 100 MW of clean energy resources by July 1, 2008. This was subsequently increased in 2007 legislation to mandate purchase agreements for 150 MW by July 1, 2010.

The CCEF offered four pricing options through Project 100 for its Round 1 solicitations, not to exceed the wholesale price plus up to 5.5¢/kWh in incentive payments. The four pricing options were:

1. The Market Clearing Price (LMP) plus a Fixed Renewable Adder (not to exceed 5.5 cents/kWh).
2. Indexed Wholesale Price plus a Fixed Renewable Adder.
3. Minimum Pricing with Index Adjustment.
4. Fixed Rate.

For Round 2 solicitations, CCEF added two more pricing options:

5. 50% of Wholesale Market Price plus Natural Gas Fuel Cost (Fuel cost is NYMEX plus pipeline and LDC tariff charges).
6. 50% of Wholesale Market Price plus Natural Gas Fuel Cost (LDC tariff firm gas rate charges).

For its recent Round 3 solicitations, CCEF added Option 6a:

6a. 50% of Wholesale Market Price plus Natural Gas Fuel Cost with Price Modifier (an amount if cents/kWh that adjusts the bid price downward to reflect project specific resources that are not represented in any of the other formula terms).

The first round of solicitations received more than 133 MWs in project proposals for a 30 MW target—6.7 MWs of which were for fuel cells. One contract ultimately was approved for a 15 MW wood biomass project. The second round's 85 MW target resulted in more than 330 MWs of project proposals—160 MWs of which were for fuel cells. Of these, seven contracts were approved representing 109.2 MW, of which 60 MW was from wood biomass; 3 MW from a digester biomass project; 30 MW from landfill gas and 16.2 MW from fuel cells. In June 2008, a third round of solicitations where 71 MW in project proposals were received for a 25 MW target. All but one of the proposals were for fuel cells. In September 2008, the CCEF recommended that the Connecticut Department of Public Utility Control consider long-term contracts for five fuel cell projects totaling 27.3 MW. In addition to providing long-term contracts for renewable generation projects, Project 150 has also served to support Connecticut's growing fuel cell industry.

Federal Production Tax Credit

Another major factor affecting state RPS success is the presence of stable and long-term federal tax credits for renewable resources. For example, the federal Renewable Electricity Production Tax Credit (PTC) has been a major driver of wind power development. The PTC was set to expire at the end of 2008, but the Emergency Economic Stabilization Act, just passed, includes a one-year extension. This Act also provided an 8 year extension of the commercial and residential solar investment tax credits.

The PTC provides the best example of the chilling effect on renewable development of the lack of a long-term Congressional commitment to federal tax credits. The PTC is a per kilowatt-hour tax credit for electricity generated by qualified energy resources. It provides a tax credit of 1.5¢/kWh (in 1993 dollars and indexed for inflation) for wind, closed-loop biomass and geothermal. Currently, the PTC for these technologies is 2.0¢/kWh. Electricity from open-loop biomass, marine and hydrokinetic facilities over 150 kW, landfill gas, and municipal solid waste resources, receive half that rate—currently 1.0¢/kWh. The duration of the credit is 10 years. However, open-loop biomass, geothermal, small irrigation hydro, landfill gas, and municipal solid waste combustion facilities placed into service after October 22, 2004, and before enactment of EPAct 2005, on August 8, 2005, are eligible for the credit through the end of 2010 and through the end of 2011 for marine and hydrokinetic facilities, while the PTC for wind expires at the end of 2009.

The PTC has expired twice and until 2005 has been renewed for very short periods of time, typically between one to three years. The on-again, off-again nature of the federal PTC has led to a lot of uncertainty in the renewable energy development community. While the presence of an RPS in a state provides a guaranteed market for renewable generation, the PTC helps make a number of these projects financially viable. In fact, New York accelerated its first RPS solicitation so that projects could take advantage of the PTC that was set to expire at the end of 2005. The boom/bust cycle created by the inconsistency of the federal PTC can stall or kill projects that were designated for RPS compliance.

SECTION VI. OBSERVATIONS AND CONSIDERATIONS

While the majority of the RPS programs in place in the Northeast Collaborative states are still relatively early in the implementation process, there has been enough experience to make some general observations on what is needed to ensure continued progress toward successful implementation of RPS polices. As noted earlier in this report, the states in the Northeast and Mid-Atlantic regions established RPS policies with sizable targets and aggressive implementation timelines. Meeting these RPS targets represents a steep challenge, and states may have to undertake additional actions to ensure success. In order to facilitate meeting these requirements, the states would benefit from learning from each other and from implementation experiences, both positive and negative, to date.

While the following observations and associated considerations are based on the experiences of the state RPS administrators participating in the Collaborative throughout the past two years, the following section does not represent the views of the individuals or states represented in this effort.

Resource and Technology Eligibility

Every state has its own definitions of the resources and technologies that qualify for their state's RPS. However, these definitions, if made more uniform, could serve as a common platform upon which states in the region can build a broader, more liquid renewable markets and lower compliance costs by allowing renewable generators to qualify for multiple state RPS programs and provide multiple state market outlets for their project output.[52]

Currently, the variations in state resource eligibility definitions have a tendency to segment the renewable energy markets, resulting in smaller, less liquid markets and possibly increase RPS compliance costs. A common definition of renewable resources has the potential to allow states to more readily integrate their markets and increase the liquidity of RECs.

Consideration

Adopt a set of common resource eligibility definitions across the Northeast and Mid-Atlantic regions to support greater and accelerated investment in renewable generation facilities through the establishment of multi-state markets. Establish reciprocity between state RPS programs which could contribute to building a larger, more regional market for renewable energy generation.

Geographic Eligibility and Electricity Deliverability Requirements

The various geographic limitations and delivery requirements that states have established in their RPS policies impose an additional layer of complexity and restriction to achieving compliance. All of the Collaborative states have some form of geographic eligibility and/or energy delivery requirement with varying degrees of stringency.

New York is the strictest, requiring hourly scheduling to the state, while D.C. is the most lenient jurisdiction, allowing generation from all of PJM and states adjacent to PJM to satisfy its RPS. Restricted geographic generation and monthly matching requirements are designed to help encourage more in-state generation. However, the tradeoff is that the generation may be at a potentially higher cost and that robust regional renewable energy markets will be slower to develop. Electric delivery requirements go one step further by requiring that the out-of-region renewable generation is being delivered into the state, hindering intermittent resources such as wind.

One option that does not restrict imports but provides additional incentives for in-state renewable development is for states to consider providing credit multipliers for in-state generation. This approach is being employed in Delaware for PV and offshore wind. This may encourage generators to locate in the state without restricting use of out of state resources when it makes economic sense.

Consideration

If a state chooses to include a delivery requirement in its RPS rules, it should be structured in a way that is friendly to variable generators and the REC markets. It is important to look carefully at what level of matching a state requires for the schedule; allowing generators to "true-up" at the end of

the month, rather than hourly or daily, provides far more flexibility. That said, states should recognize that relaxing delivery requirements may result in more out-of-state renewables meeting state RPS requirements rather than the development of new in-state renewable energy facilities.

If in-state generation is a priority, states should consider establishing a multiplier to incentivize projects to locate within their borders, rather than restricting imports. If a state chooses to establish a multiplier for in-state resources, the level should be set so as to encourage developers to locate projects within a state, but without potentially oversupplying the REC market as a whole and drastically reducing the net amount of new generation resulting under the RPS targets.

Coordination of REC Tracking Systems

In the Northeast and Mid-Atlantic regions, there are three primary control areas and soon to be three separate REC tracking systems—the PJM Generation Attribute Tracking System (GATS), the New England Generation Information System (GIS) and the New York system that is under development by the Department of Public Service and NYSERDA. Currently, the movement of certificates between any two adjacent systems is complicated, cumbersome and time consuming; moving certificates between the GATS and the GIS is nearly impossible because of energy delivery requirements.

Building on the geographic eligibility discussion above, if states choose to broaden their locational and delivery requirements, the ability for these tracking systems to communicate with one another becomes increasingly important. This very issue was raised in the 2004 Connecticut RPS Compliance Report. "…if and when Connecticut opens its RPS program to generators located in the geographic region defined in statute, an interface between the GIS and PJM [GATS] may need to be considered."

The Environmental Tracking Network of North America (ETNNA) has created a platform for these "seams" issue discussions to occur, but there has yet to be any such activity in this regard between the tracking systems. Further discussions among tracking system administrators, RPS administrators, and the ISOs are needed in order to identify and address the technological and political barriers that exist to removing barriers to allow inter-system transactions to occur.

Consideration

Convene the RPS administrators and representatives from each of the tracking systems and ISOs in the region to identify the existing challenges to coordination—both technical and political—and develop a plan of action to address them. As is illustrated earlier, the majority of the RPS programs have opened eligibility to generators within the geographic region. This makes the issue of tracking system coordination timely and pertinent. These discussions should happen under the purview of ETNNA in order to take advantage of the work that has already been done in this area. Any coordination of the tracking systems at this level will require leadership, and more likely pressure on tracking system administrators, from state policymakers and RPS administrators, if states believe that REC tracking system coordination should be pursued.

Contracting Standards

Typically, long-term contracts are necessary to ensure development of renewable energy projects. However, electricity contracts available in New England and in the Mid-Atlantic region are relatively short-term in length.

Consideration

States should consider requiring that some or all contracts signed with renewable energy generators for RPS compliance be a minimum length (i.e., 10 years or more), such as Connecticut does in Project 150. States also may wish to consider providing long-term REC support mechanisms (i.e., puts, swaps, purchases), such as the Massachusetts Renewable Energy Trust's Green Power Partnership.

Another option is for states to require that long-term contracts be offered to RPS-eligible generators, perhaps for a portion of the RPS requirement, as the recently passed Massachusetts Green Communities Act requires. Alternatively, if utility distribution companies purchase electricity for standard offer service customers under short-term contracts via an auction, then state regulators or legislators might require utilities to meet a portion of their standard offer service requirements by purchasing renewable energy via longer-term contracts.

Transmission

Like the rest of the country, transmission is an important challenge in the Northeast. However, the New England and Mid-Atlantic states have not pursued bold policies such as competitive renewable energy zones or location-constrained resource interconnections designed to overcome the "chicken and egg" problem with transmission and generation. In the Mid-Atlantic states, three large, multi-state transmission lines have been proposed, intended to maintain reliability within PJM but also to transmit generation in the western part of PJM (including wind power) to load centers in the eastern part of PJM. In New York, the NYRI has proposed a line from northern New York to New York City that has sparked controversy. PJM and New York are both within the U.S. Department of Energy's designated transmission congestion areas, and any proposed transmission lines not approved or acted upon by a state are subject to FERC review and perhaps override.

New England has also planned and constructed transmission lines in recent years to reduce transmission congestion and improve reliability. While northern New England has considerable onshore wind and biomass potential, access to those resources will require additional transmission. Maine, in particular, asserts that the New England region should share in the costs of building that transmission if the renewable energy benefits are primarily for the other states.

Consideration

Because renewable resources are generally located in areas away from load centers, the states in the region may wish to consider requesting that their respective RTOs study, as part of their regional transmission plans, the feasibility and cost of building transmission to access areas with renewable resources and transmitting them to load centers. Regions such as New England may wish to consider allowing regional cost recovery for transmission built to access renewables, but only up to a predetermined cost threshold or capacity limit.

Other regions of the country are tackling the transmission issue through the creation and implementation of competitive renewable energy zones and/or through innovative transmission cost recovery or allocation mechanisms designed to encourage the large-scale build-out of new transmission.

New Technologies

With recent increases in the Delaware, Maryland and Massachusetts RPS requirements, and the limited and heavily populated geography of the eastern states, offshore wind and ocean technologies may need to play a significant role and/or the region may need to import renewable energy from other regions if the RPS targets are to be achieved. It makes sense for these states to begin to prepare for the development of these emerging resources and the siting challenges that these technologies may pose.

Consideration

Consider the addition of credit multipliers for these new technologies that are particularly promising for the Northeast region to tap, as Delaware has done to support offshore wind development. Because of the scale of most of these ocean-based projects, a multiplier rather than using a separate technology set-aside is likely to be a more effective tool to support a significant number of these projects (in contrast to the merits of a set aside for customer-sited or solar installations).

State funds also have an opportunity to play an important role in offsetting the initially higher costs of these new technologies. The development of ocean-based project support programs to offset technology costs and the use of long-term contract initiatives can give these technologies the early support that they need to break into the market.

REC Price Volatility and Compliance Reporting

REC prices are a product of market functions reflecting the balance between supply and demand of renewable energy generation. As such, a certain amount of REC price volatility can be expected. However, significant and frequent price increases or decreases result in market instability by creating investor insecurity. There are several elements of an RPS program that can be altered to temper aggressive swings in REC prices.

Consideration

States can consider broadening geographic eligibility and electricity delivery requirements to allow for an increased number of out-of-state RECs to be used for compliance. Also, increasing the availability of and requirements for providers to enter long-term contracts with renewable energy generators will serve to stabilize REC prices.

Another option is for states to allow for greater banking and borrowing of RECs for future year compliance. In times of shortfall, obligated entities may use banked RECs to meet their obligations, while in times of excess, they may bank additional RECs for use in future years.

Finally, states could address their use of different reporting periods and methods of reporting RPS

compliance data. For example, New Jersey's compliance period is from June 1 of one year to June 1 of the following year, while other states use a calendar year. The use of a common reporting period and format is another approach that could help to address the issue of REC availability and price fluctuations.

Siting and Permitting

To date, states have not created regulatory programs that have specific, predictable siting standards for wind, solar and other renewable energy generators. The majority of existing siting and permitting standards were not designed with these technologies in mind. In addition, many of the states have not worked to provide local governments with the resources and assistance needed to understand the impacts of facilities and potential mitigation measures. Additionally, coordination among jurisdictions is a rare occurrence in these regions.

Consideration

States should consider developing clear and reasonable siting and permitting standards appropriate for renewable generating technologies. Additionally, the siting authority should coordinate with the state environmental agency to understand the relative environmental risks of renewable versus other energy resources and the appropriate approaches to addressing these risks (e.g., with respect to species and habitat impacts). A state-supported public education program could serve to answer many of the local citizens' questions and reduce opposition to renewable energy developments.

VII. CONCLUSION

In the Northeast and Mid-Atlantic region, ten states and the District of Columbia have put in place bold RPS policies that require anywhere from 8% to 25% renewable energy procurement as early as 2013. As these policies continue to ramp up, some of the challenges identified in these early implementation years may become more pronounced and the efficacy of the programs may be challenged. RPS success will become increasingly dependent upon the effective design, consistency and commitment to these programs, especially clarity and stability in the treatment of resource and technology eligibility definitions, which are the foundation of the RPS policy.

This region has significant renewable technology potential, especially when the offshore environment is considered. In fact, the region is poised to serve as host to the nation's first offshore wind farms in Delaware, Massachusetts and New Jersey. Offshore wind and ocean energy conversion technologies are abundant, close to load centers, and have the potential to play a leading role in assisting these states to meet, and perhaps exceed their RPS targets. Additionally, the technology set-aside mechanism has proven quite successful in spurring the installation of customer-sited renewable energy generation systems, particularly solar, and diversifying the mix of technologies benefiting from state RPS policies.

That said, the Northeast region has installed only about 1,000 MW of renewable energy since 1998. Much

more renewable energy capacity will be needed to be installed if the region is to meet RPS targets. This is particularly true with states, such as Connecticut, Delaware, Maryland, and Massachusetts, substantially increasing their RPS requirements.

The members of the Northeast and Mid-Atlantic States Collaborative on RPS Implementation are in a unique position to work in a coordinated fashion to ensure the success of their programs. Combined, these states cover a geographic area smaller than Texas, while the region is more densely populated than the West. With these unique geographic and population factors facing the region, it is unclear if the resources exist to allow these states to meet their self-assigned targets. In order to succeed, the Collaborative states are and must continue to "think outside the box" and employ unique design elements—such as central procurement, long-term contracting, technology set-asides and in-state credit multipliers—while looking to new, unproven technologies (in the U.S.) such as offshore wind and ocean energy.

One promising factor for success in the region is represented by the existence of this multi-state Collaborative. Over the course of the past two years, the Collaborative has allowed the states to take a hard look at their existing RPS policies and to identify challenges and solutions for successful RPS implementation. The establishment of this network of state RPS administrators holds the promise of driving further coordination and cooperation to move the region to successful development of its renewable energy resource potential.

Appendix A

State RPS Summary Tables

State	Connecticut
Title of Standard	Renewables Portfolio Standard
Implementing Authority	Connecticut Department of Public Utility Control
Contact	Ginger Teubner
Address	10 Franklin Square New Britain, CT 06051
Phone/Email	860.827.2630 – ginger.teubner@po.state.ct.us
URL	http://www.state.ct.us/dpuc
Citation	Conn. Gen. Stat. § 16-245a et seq. (1998) Conn. Pub. Act 07-242, §40-44
Overview	Connecticut's 1998 electric utility restructuring law created an RPS requiring 13% of total electricity output to be supplied by renewable resources by 2009; this requirement has since been revised to require 23% renewable by 2020. Exempt from the law are private power producers, exempt wholesale generators, non-participating municipal electric utilities, municipal electric energy cooperatives, electric cooperatives, and any other electric utility owned, leased, maintained, operated, managed or controlled by any unit of local government. The state's municipal electric utilities were not required to meet restructuring requirements, but could have chosen to "opt-in" to competition, in which case they would have been subject to the RPS. In 2007, the Connecticut legislature passed a law requiring the Connecticut Municipal Electric Energy Cooperative (CMEEC) to develop portfolio standards for the municipal electric utilities in the state, and report standards annually to the group that manages Connecticut Innovations, Inc. Electric distribution companies that fail to comply with the RPS during an annual period must pay $55 per MWh to the DPUC; these payments will be allocated to the Connecticut Clean Energy Fund (CCEF) for the development of Class I renewable (see below).

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State	Connecticut (continued)			
Targets	Compliance Date	Class I	Class I or II	Class III
	1/1/06	2.0%	3%	
	1/1/07	3.5%	3%	1%
	1/1/08	5.0%	3%	2%
	1/1/09	6.0%	3%	3%
	1/1/10	7.0%	3%	4%
	1/1/11	8.0%	3%	4%
	1/1/12	9.0%	3%	4%
	1/1/13	10.0%	3%	4%
	1/1/14	11.0%	3%	4%
	1/1/16	14.0%	3%	4%
	1/1/17	15.5%	3%	4%
	1/1/18	17.0%	3%	4%
	1/1/19	18.5%	3%	4%
	1/1/20	20.0%	3%	4%
Resource/ Technology Eligibility	Class I	Solar, wind, new sustainable biomass, landfill gas, fuel cells (using renewable or non-renewable fuels), ocean thermal power, wave or tidal power, low-emission advanced renewable energy conversion technologies, new run-of-the-river hydropower facilities with a maximum capacity of 5 MW, and electricity produced by end-user distributed generation systems using any of the resources mentioned.		
	Class II	Trash-to-energy facilities, biomass facilities not included in Class I, and certain hydropower facilities.		
	Class III	Customer-sited CHP systems with a minimum operating efficiency of 50% installed at commercial or industrial facilities on or after January 1, 2006, electricity savings from conservation and load management programs that started on or after January 1, 2006, and systems that recover waste heat or pressure from commercial and industrial processes installed on or after April 1, 2007.		
Geographic Eligibility	Resources must be located in ISO New England. Resources located in Delaware, Maryland New Jersey, New York or Pennsylvania are eligible pending approval of that state's RPS by the Connecticut PUC.			
Electricity Delivery/Hourly Matching	There are no hourly matching requirements in the Connecticut RPS.			

State	Delaware
Title of Standard	Renewable Portfolio Standard
Implementing Authority	Delaware Public Service Commission
Contact	Pamela Knotts or Courtney Stewart
Address	861 Silver Lake Blvd. Cannon Bldg., Suite 100 Dover, DE 19904
Phone/Email	302.739.4247 – pamela.knotts@state.de.us or courtney.stewart@state.de.us
URL	http://depsc.delaware.gov/electric/delrps.shtml
Citation	Del. Code tit. 26, § 351 et seq. (2005, amended 2007) Delaware PSC Order No. 7377 (2008) Senate Bill 328 (2008)
Overview	The Delaware RPS, created in 2005, requires retail electricity suppliers to provide 10% renewable by 2019; the requirement was amended in 2007 to increase the standard to 20% with a 2% solar set-aside. The RPS applies to the state's investor owned utilities, municipal utilities, and rural electric cooperatives. Municipal utilites and rural electric cooperatives were allowed to opt out of the RPS requirements if they established a voluntary green power program and created a green energy fund; all cooperative and municipal utilities have opted out. Sales to industrial customers with a peak load of more than 1,500 kilowatts (kW) are exempt from the standard's requirements. The 2007 amendments set two separate compliance schedules. Schedule I describes the general renewable energy benchmarks, while Schedule II applies only to wholesale renewable energy purchases for Standard Offer Service (SOS) for compliance years 2007, 2008, 2009 and 2010. Under Schedule II, the benchmarks that were in place during the 2005 and 2006 SOS auctions are preserved. Beginning in June 2011 the schedules are identical and the new PV requirement is the same in both schedules. It should also be noted that the PV target is not in addition to the main target, it is a portion of the overall requirement. For all suppliers, no more than 1% of each year's total retail sales may be met by eligible renewable resources placed into service on or before December 31, 1997. In compliance year 2020 and each year afterward, all eligible renewable resources used to meet the standard must be placed into service after December 31, 1997.

CONTINUED

State	Delaware (continued)			
Overview (continued)	Suppliers must submit an annual report detailing their compliance status; those that fail to comply with the standard must pay an alternative compliance payment (ACP) of $25 per MWh of shortfall into the Delaware Green Energy Fund. For those that choose to pay it, the ACP increases to $50 per MWh after the first year and to $80 per MWh after the second year. The solar ACP begins at $250 per MWh, increasing to $300 per MWh with the second use, and $350 per MWh for any subsequent use. The Delaware Energy Office has the authority to review and adjust the ACP and solar ACP. The RPS includes credit multipliers for several renewable energy technologies. Suppliers will receive 300% credit toward RPS compliance for in-state customer-sited photovoltaic generation and fuel cells using renewable fuels that are installed on or before December 31, 2014. Suppliers will also receive 150% credit toward RPS compliance for energy generated by wind turbines sited in Delaware on or before December 31, 2012. Finally, PSC regulated electric companies (i.e., Delmarva Power & Light, the state's only investor-owned utility) will receive a 350% credit for offshore wind facilities sited on or before May 31, 2017. Suppliers may recover actual dollar-for dollar costs of RPS compliance—with a conditional exception of alternative-compliance payments—through a non-bypassable surcharge on customer bills.			
Targets	Compliance Date	Schedule I	Schedule II	PV Set-Aside
	6/1/07	2.0%	1.0%	
	6/1/08	3.0%	1.5%	0.011%
	6/1/09	4.0%	2.0%	0.014%
	6/1/10	5.5%	5.0%	0.018%
	6/1/11	7.0%		0.048%
	6/1/12	8.0%		0.099%
	6/1/13	10%		0.201%
	6/1/14	11.5%		0.354%
	6/1/15	13%		0.559%
	6/1/16	14.5%		0.803%
	6/1/17	16%		1.112%
	6/1/18	18%		1.547%
	6/1/19	20%		2.005%

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State	Delaware (continued)
Resource/Technology Eligibility	solar electric, solar heating and cooling that offsets electricity, wind, ocean tidal, ocean thermal, fuel cells powered by renewable fuels, hydroelectric facilities with a capacity of 30MW, sustainable biomass, anaerobic digestion, and landfill gas
Geographic Eligibility	Energy sold or displaced by a customer-sited eligible energy resource can generate renewable energy credits for RPS compliance, provided the system is sited in Delaware. Large-scale generators must be located within the PJM region or imported into the PJM region and tracked through the PJM Market Settlement System.
Electricity Delivery/ Hourly Matching	There are no electricity delivery requirements in the Delaware RPS.

State	District of Columbia	
Title of Standard	Renewables Portfolio Standard	
Implementing Authority	District of Columbia Public Service Commission	
Contact	Grace Hu	Emil King
Address	DC Public Service Commission 1333 H Street, NW, Suite 200 Washington, DC 20005	District Department of the Environment Energy Division 2000 14th Street, NW, 300 East Washington, DC 20009
Phone/Email	202.626.5148 – Ghu@psc.dc.gov	202.673.6700
URL	http://www.dcpsc.org/customerchoice/whatis/electric/elec_restruc.shtm#Link24, http://www.dcenergy.org/	
Citation	D.C. Code § 34-1431 et seq. DC PSC Order No 14697	
Overview	In January 2005, the District of Columbia Council enacted a renewable portfolio standard (RPS) that applies to all retail electricity sales in the District. In October 2008 the RPS was amended by the Clean and Affordable Energy Act of 2008. District utilities must meet the RPS by obtaining renewable energy credits (RECs) that equal the percentage requirement for electricity sold or by paying specified compliance fees. Energy from Tier 1 resources is eligible for inclusion in meeting the RPS regardless of when the generating system or facility was activated. Electricity suppliers that fail to comply with the requirements must pay $50 per MWh of shortfall from required Tier 1 resources, $10 per MWh for shortfall from Tier 2 resources and $500 per MWh for each MWh of shortfall from required solar resources. Certain renewable resources receive preferential treatment. Between January 1, 2007, and December 31, 2009, electricity suppliers will receive 110% credit for energy generated by wind or solar. Before January 1, 2010, electricity suppliers will receive 110% credit for energy generated by landfill methane or wastewater-treatment methane. The act that created DC's RPS also established the Renewable Energy Development Fund (REDF). This fund, administered by the DC Energy Office, issues loans and grants to support the creation of new solar-energy resources in the District. The REDF is supported by RPS compliance payments, payments received in repayment of a loan, and investment earnings of the fund.	

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State	District of Columbia (continued)			
Targets	Compliance Date	Tier I	Tier II	PV Set-Aside
	2007	1.5%	2.5%	.005%
	2008	2%	2.5%	.011%
	2009	2.5%	2.5%	.019%
	2010	3%	2.5%	.028%
	2011	4%	2.5%	.04%
	2012	5%	2.5%	.07%
	2013	6.5%	2.5%	.10%
	2014	8%	2.5%	.13%
	2015	9.5%	2.5%	.17%
	2016	11.5%	2%	.21%
	2017	13.5%	1.5%	.25%
	2018	15.5%	1%	.30%
	2019	17.5%	0.5%	.35%
	2020	20%	0%	.4%
Resource/ Technology Eligibility	Tier 1	Solar water heat, solar thermal electric, wind, biomass, landfill gas, wastewater-treatment gas, geothermal, ocean and fuel cells fueled by other "Tier 1" resources.		
	Tier 2	Hydropower (other than pumped-storage generation) and municipal solid waste.		
Geographic Eligibility	RECs must be purchased from the PJM Interconnection region, adjacent PJM States or an adjacent control area that feeds into the PJM Interconnection region.			
Electricity Delivery/Hourly Matching	There are no electricity delivery requirements in the D.C. RPS.			

State	Maine
Title of Standard	Renewables Portfolio Standard
Implementing Authority	Maine Public Utilities Commission
Contact	Mitch Tannenbaum
Address	#18 State House Station Augusta, ME 04330
Phone/Email	207.287.1391 – mitchell.tannenbaum@maine.gov
URL	http://www.state.me.us/mpuc
Citation	Me. Rev. Stat. tit. 35-A, § 3210 (1999), Code Me. R. 65 § 407, Ch. 311 (2004), Me. Rev. Stat. tit. 35-A, § 3210-C (2006), Public Law, Chapter 403 (2007)
Overview	Maine's 1997 restructuring law required the state to establish an RPS for which the state Public Utilities Commission (PUC) adopted rules in 1999. The rules require each competitive electricity provider, including standard offer providers, to supply at least 30% of their total retail electric sales in Maine from eligible renewable resources. This requirement was less than the amount of renewable energy being generated in Maine at the time. In June 2006, Maine enacted legislation creating a renewable portfolio goal to increase new renewable-energy capacity by 10% by 2017. Eligible new renewable-energy systems include those placed into service after September 1, 2005. Unlike the original 30% standard, municipal solid waste facilities and CHP systems are not eligible under the new renewables standard, and hydropower facilities must meet all state and federal fish passage requirements. New wind-power installations may exceed 100 MW in capacity.* The PUC approved the use of NEPOOL Generation Information System (GIS) certificates (which are similar to renewable-energy credits, or RECs) to satisfy the portfolio requirement. GIS certificates used to satisfy Maine's new capacity requirement may not also be used to satisfy the state's 30% portfolio requirement.

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<table>
<tr><th>State</th><th colspan="2">Maine (continued)</th></tr>
<tr><td>Overview (continued)</td><td colspan="2">In June 2007, the legislature authorized the PUC to set an Alternative Compliance Payment (ACP) that utilities may pay instead of satisfying the standard by procuring GIS certificates. The PUC set the alternative compliance base rate at $57.12 per MWh in 2007. The alternative compliance payment rate will be adjusted annually for inflation beginning in 2008. Revenues from the ACP will be directed to the state's Renewable Resource Fund.

The PUC may review the new capacity target in 2010, 2012, 2014 and 2016 to determine if progress has been insufficient or if the new target has burdened consumers. The PUC may suspend scheduled increases in the new renewable resource portfolio requirement under certain conditions specified in the commission's rules.

* Legislation enacted in April 2008 established two goals for wind-energy development in Maine: (1) at least 2,000 MW of installed capacity by 2015; and (2) at least 3,000 MW of installed capacity by 2020, of which there is a potential to produce 300 MW from facilities located in coastal waters.</td></tr>
<tr><td>Targets</td><td>Compliance Date</td><td>Renewables Requirement</td></tr>
<tr><td></td><td>2008</td><td>1%</td></tr>
<tr><td></td><td>2009</td><td>2%</td></tr>
<tr><td></td><td>2010</td><td>3%</td></tr>
<tr><td></td><td>2011</td><td>4%</td></tr>
<tr><td></td><td>2012</td><td>5%</td></tr>
<tr><td></td><td>2013</td><td>6%</td></tr>
<tr><td></td><td>2014</td><td>7%</td></tr>
<tr><td></td><td>2015</td><td>8%</td></tr>
<tr><td></td><td>1016</td><td>9%</td></tr>
<tr><td></td><td>2017 +</td><td>10%</td></tr>
<tr><td>Resource/ Technology Eligibility</td><td colspan="2">Fuel cells, tidal power, solar arrays and installations, wind power installations, geothermal installations, hydroelectric generators, biomass generators, or generators fueled by municipal solid waste in conjunction with recycling. Electricity generated by efficient combined heat and power (CHP) systems and other systems that qualify as "small power production facilities" under PURPA also are eligible.</td></tr>
<tr><td>Geographic Eligibility</td><td colspan="2">Maine will accept NEPOOL General Information System certificates, which are similar to renewable energy credits, towards its RPS. GIS certificates are awarded based on the number of kilowatt-hours of eligible electricity generated. GIS certificates used to satisfy Maine's new capacity requirement may not also be used to satisfy the state's 30% portfolio requirement.</td></tr>
<tr><td>Electricity Delivery/ Hourly Matching</td><td colspan="2">There are no hourly matching requirements in the Maine RPS.</td></tr>
</table>

State	Maryland
Title of Standard	Renewable Energy Portfolio Standard
Implementing Authority	Maryland Public Service Commission
Contact	Gregory Kim
Address	6 St. Paul Street, 22nd Floor Baltimore, MD 21202
Phone/Email	410.767.8130 – RPSProgram@psc.state.md.us
URL	http://www.psc.state.md.us/psc/electric/rps/home.htm
Citation	Md. Code Ann., Public Utility Companies § 7-701 et seq. (2004) Md. Code Ann., Public Utility Companies § 7-705 (2008) Md. Code Ann., Public Utility Companies §7-701, 7-704 (2008)
Overview	Maryland established an RPS in 2004 that was subsequently amended in 2007 and 2008. The standard requires electricity suppliers (all utilities and competitive retail suppliers) to supply 20% of their electricity from Tier 1 resources in 2022 and beyond, and 2.5% from Tier 2 resources from 2006 through 2018. The Tier 2 requirement sunsets, in 2019. Additionally, the RPS requires 2% of electricity sales from solar over and above the 7.5% renewables derived from other Tier 1 resources. The set-aside is projected to result in the development of roughly 1,500 MW of solar capacity by 2022. Electricity suppliers demonstrate compliance with the standard by accumulating renewable energy credits (RECs) equivalent to the required percentages outlined above. A REC has a three-year life during which it may be transferred, sold, or otherwise redeemed. Initially, RECs generated within the PJM region or in states adjacent to the PJM, or electricity delivered into the PJM were eligible to be counted towards RPS compliance. This provision was changed in 2008 (effective 2011) to require that generation from PJM-adjacent states be transmitted into Maryland. Provisions specific to the solar set-aside include the following: • If the owner of a solar generating system chooses to sell RECs, the owner must first offer the RECs for sale to an electricity supplier for RPS compliance; • Electricity suppliers purchasing RECs directly from a solar energy system owner must enter into a contract for at least 15 years; • The parties are free to negotiate a price for solar RECs that varies over time; • Electricity suppliers purchasing RECs from solar systems with a capacity of 10 kW or less must purchase the RECs with a single upfront payment representing the full estimated projection of the systems for the life of the contract; and • Maryland's Public Service Commission developed a method for estimating annual production, determined the REC payment amount, and designated an individual to develop the solar program requirements and outreach activities.

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State	Maryland (continued)
Overview (continued)	Each electricity supplier must submit a report to the Public Service Commission annually that demonstrates compliance with the RPS. Compliance fees paid into the Maryland Strategic Energy Investment Fund, which is administered by the Maryland Energy Administration, will be used to fund grant and loan programs for Tier 1 renewable energy resources. Compliance fees for the solar obligation may only be used to support new solar resources in the state. The Strategic Energy Investment Fund replaces the Maryland Renewable Energy Fund, which was repealed in 2008. Electricity suppliers may recover costs incurred to comply with the standard in the form of a generation surcharge on all customers. However, the RPS law provides compliance cost caps and provisions for delaying compliance with the solar set-aside and non-solar Tier 1 requirements.

Targets

Compliance Date	Tier I	Tier II	PV Set-Aside
2006	1.0%	2.5%	0%
2007	1.0%	2.5%	0%
2008	2.005%	2.5%	.005%
2009	2.01%	2.5%	.01%
2010	3.025%	2.5%	.025%
2011	5%	2.5%	.04%
2012	6.5%	2.5%	.06%
2013	8.2%	2.5%	.1%
2014	10.3%	2.5%	.15%
2015	10.5%	2.5%	.25%
2016	12.7%	2.5%	.35%
2017	3.1%	2.5%	.55%
2018	15.8%	2.5%	.9%
2019	17.4%	0%	1.2%
2020	18%	0%	1.5%
2021	18.7%	0%	1.85%
2022 +	20%	0%	2.0%

CONTINUED

State	Maryland (continued)	
Resource/ Technology Eligibility	Tier I	Solar, wind, qualifying biomass (excluding sawdust), methane from the anaerobic decomposition of organic materials in a landfill or wastewater treatment plant, geothermal, ocean (including energy from waves, tides, currents and thermal differences), fuel cells powered by methane or biomass, small hydroelectric plants (systems less than 30 megawatts in capacity and in operation as of January 1, 2004), and poultry-litter incineration facilities.
	Tier II	Hydroelectric power other than pump-storage generation, and waste-to-energy facilities.
Geographic Eligibility	Maryland counts renewable energy generation or RECs generated in or delivered into the PJM region.	
Electricity Delivery/Hourly Matching	There are no hourly matching requirements in the Maryland RPS.	

State	Massachusetts
Title of Standard	Renewable Portfolio Standard
Implementing Authority	Massachusetts Department of Energy Resources
Contact	Howard Bernstein
Address	100 Cambridge Street, Suite 1020 Boston, MA 02114
Phone/Email	617.626.7355 – doer.rps@state.ma.us
URL	http://www.state.ma.us/doer/
Citation	Mass. Gen. Laws ch. 25A, § 11F (1997, as revised 2008) Mass. Regs. Code tit. 225 § 14.00 (2007)
Overview	Massachusetts's 1997 electric-utility restructuring legislation created the framework for a renewable portfolio standard (RPS). In April 2002, the Massachusetts Department [then "Division"] of Energy Resources (DOER) adopted RPS regulations. The Statute was significantly expanded by legislation enacted in July 2008; this legislation established two separate standards—a standard for "Class I" new (post-1997) renewables and a standard for existing (pre-1998) "Class II" renewables, as well as an alternative energy portfolio standard (AEPS) for certain non-renewables. Beginning January 1, 2009, only □Class I□ renewables are eligible to meet the recently revised RPS described above. Customer-sited systems are eligible if system output is verified by an independent system participating in the NEPOOL GIS tracking system. In meeting the "Class I" standard, retail suppliers must provide a fraction—to be determined by the DOER—of the required renewable energy from new, in-state, on-site systems of not more than two megawatts (MW) in capacity that began commercial operation after December 31, 2007. A separate "Class II" standard, which takes effect January 1, 2009, requires all retail electricity suppliers to provide annually a minimum percentage—to be determined by the DOER—of kWh sales to end-use customers in Massachusetts from "Class II" renewables, which pre-date 1998. Retail suppliers must submit annual reports to the DOER demonstrating compliance. The DOER will establish alternative compliance payment rates for Class I renewables (including a separate rate for small on-site, in-state Class I units), for Class II renewables and for "alternative energy technology" resources.

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State	Massachusetts (continued	
Targets	Compliance Date	Class I Renewable Energy Requirement
	2003	1.0%
	2004	1.5%
	2005	2.0%
	2006	2.5%
	2007	3.0%
	2008	3.5%
	2009	4.0%
	…	…
	2020*	15%
	*An additional 1% of sales each year after 2020 with no stated expiration date for the policy.	
Resource/ Technology Eligibility	Eligible Technologies	The RPS allows solar, wind, ocean thermal, wave, and tidal, fuel cells using renewable fuels, landfill gas, small hydroelectric, low emission, advanced technology biomass, marine or hydrokinetic, and geothermal.
	Class I	Class I is limited to facilities that began commercial operation after December 31, 1997.
	Class II	Class II sources are limited to facilities that began commercial operation before December 31, 1997.
Geographic Eligibility	Eligible renewable facilities must be located within ISO New England or in control areas adjacent to ISO New England.	
Electricity Delivery/Hourly Matching	There are no hourly matching requirements in the Massachusetts RPS except for those imported from outside ISO New England.	

State	New Hampshire
Title of Standard	Renewables Portfolio Standard
Implementing Authority	New Hampshire Department of Environmental Services
Contact	Tom Frantz
Address	8 Old Suncook Road Concord, NH 03301
Phone/Email	603.271.2431 – tom.frantz@puc.nh.gov
URL	http://www.puc.state.nh.us/
Citation	N.H. Rev. Stat. Ann. §362-F (2007) N.H. Code Admin. R. Ann. Puc 2500 (2008)
Overview	New Hampshire's RPS was established in May 2007 and requires electricity providers to acquire renewable energy certificates (RECs) equivalent to 23.8% of retail electricity sold to end-use customers by 2025. Of the 23.8% target, 16.3% is to be derived from sources installed after January 1, 2006, whereas the remainder is to be derived from existing resources. The New Hampshire Public Utilities Commission (PUC) established a renewable energy certificate (REC) program utilizing the regional generation information system (GIS) administered by ISO-New England and the New England Power Pool (NEPOOL). RECs from customer-sited sources are assigned to the system owner, and behind-the-meter generation located in New Hampshire is eligible to participate in the RPS. Electric utilities may enter into multi-year contracts for RECs or electricity bundled with RECs to meet the RPS upon approval from the PUC. Rural electric cooperatives may enter into multi-year contracts without approval from the PUC. Compliance reports are due to the PUC by July 1 of each year from each electricity provider. In lieu of meeting the portfolio requirements, an electricity provider may make payments to a new renewable energy fund established by the RPS to support renewable energy initiatives. Class II ACP payments will only be used to support solar energy technologies in New Hampshire. The ACP schedule is as follows: Class I - $57.12; Class II - $150; Class III - $28; Class IV - $28. Beginning in 2008, the PUC will adjust these rates by January 31 of each year using the federal Consumer Price Index. Default service providers are authorized to recover prudently incurred costs of the RPS from the ratepayers. The PUC must conduct a review of the RPS program and report its findings to the legislature in 2011, 2018 and 2025.

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State	New Hampshire (continued)				
Targets	Compliance Year	Class I	Class II	Class III	Class IV
	2008	0.00%	0.00%	3.50%	0.50
	2009	0.50%	0.00%	4.50%	1%
	2010	1%	0.04%	5.50%	1%
	2011	2%	0.08%	6.50%	1%
	2012	3%	0.15%	6.50%	1%
	2013	4%	0.20%	6.50%	1%
	2014	5%	0.30%	6.50%	1%
	2015	6%	0.30%	6.50%	1%
	2025	16% (*)	0.30%	6.50%	1%
	* Class I increases an additional one percent per year from 2015 through 2025. Classes II, III and IV remain at the same percentages from 2015 through 2025.				
Resource/ Technology Eligibility	Class I	Wind energy, geothermal energy, hydrogen derived from biomass, biogas, or landfill gas, ocean thermal, wave, current, or tidal energy, biogas or landfill gas, certain biomass, solar electric not used to meet Class II, or customer-sited solar water heating that displaces electricity, the production of electricity from Class III or IV sources that have been upgraded or repowered through significant capital investment.			
	Class II	Solar generation.			
	Class III	Existing biomass and methane generation.			
	Class IV	Hydroelectric facilities that began operation prior to January 1 2006, a gross nameplate capacity of 5 MWs or less, and meet other environmental protection criteria.			
Geographic Eligibility	To be eligible for RPS compliance, renewable energy generators must be within the New England control area, unless the source is located in a control area adjacent to the New England control area and the energy produced by the source is actually delivered into the New England control area for consumption by New England customers.				
Electricity Delivery/Hourly Matching	There are no hourly matching requirements in the New Hampshire RPS.				

State	New Jersey
Title of Standard	Renewables Portfolio Standard
Implementing Authority	New Jersey Board of Public Utilities
Contact	Benjamin Scott Hunter
Address	44 South Clinton Avenue PO Box 350 Trenton, NJ 08625-0350
Phone/Email	609.777.3300 – benjamin.hunter@bpu.state.nj.us
URL	http://www.bpu.state.nj.us
Citation	N.J. Stat. § 48:3-49 et seq. (1999) and amendments (2008) N.J. Admin. Code tit. 14 § 8-2.1 et seq. (2001) NJ BPU SACP Board Order, 2007 N.J. Laws c. 300
Overview	New Jersey's RPS, established in 1999, requires each supplier/provider serving retail customers in the state to include 22.5% qualifying renewables in the electricity it sells by 2021. The New Jersey Board of Public Utilities (BPU) made extensive revisions to the RPS in April 2006, significantly increasing the required percentages of "Class I" and "Class II" renewable energy, as well as the required separate percentage of solar electricity. If a supplier/provider is not in compliance for a reporting year, the supplier/provider must remit an alternative compliance payment (ACP) and/or a solar alternative compliance payment (SACP) for the amount of RECs and solar RECs that were required, but not submitted. The BPU determines prices for ACPs and SACPs, and reviews the prices at least once per year. The price of an ACP and an SACP will be higher than the estimated competitive market cost of: 1) meeting the requirement by purchasing a REC or solar REC, or 2) meeting the requirement by generating the required renewable energy. Revenue generated by the ACP will be used to fund renewable-energy projects through the New Jersey Clean Energy Program. Revenue generated by the SACP will be used to fund solar projects under the program. The initial ACP and SACP levels were set by BPU order in 2004 at $50 per MWh and $300 per MWh respectively. These levels were subsequently renewed several times without changes; however, in September 2007 the BPU issued an order revising the way the SACP level is determined effective for the RPS reporting year beginning in June 2008.

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State	New Jersey (continued)
Overview (continued)	The SACP is now determined according to an eight-year set schedule. The BPU will continue to conduct annual reviews of the SACP, adding one additional year to the back end of the schedule during each review. The initial eight-year schedule for the SACP is as follows: • 2008–2009: $711 per MWh • 2009–2010: $693 per MWh • 2010–2011: $675 per MWh • 2011–2012 :$685 per MWh • 2012–2013: $641 per MWh • 2013–2014: $625 per MWh • 2014–2015: $609 per MWh • 2015–2016: $594 per MWh Each supplier/provider is required to file an annual compliance report with the BPU by September 1, demonstrating that the requirements for the preceding reporting year have been met. Failure to comply with any provision of the RPS may result in suspension of the supplier's license, financial penalties, disallowance of recovery of costs in rates, and/or prohibition on accepting new customers.

Targets

Compliance Date	Class I	Class II	PV Set-Aside
2005	0.740%	2.5%	0.0100%
2006	0.983%	2.5%	0.0170%
2007	2.037%	2.5%	0.0393%
2008	2.924%	2.5%	0.0817%
2009	3.840%	2.5%	0.1600%
2010	4.685%	2.5%	0.2210%
2011	5.492%	2.5%	0.3050%
2012	6.320%	2.5%	0.3940%
2013	7.143%	2.5%	0.4970%
2014	7.977%	2.5%	0.6210%
2015	8.807%	2.5%	0.7650%
2016	9.649%	2.5%	0.9280%
2017	10.485%	2.5%	1.1180%
2018	12.325%	2.5%	1.3330%
2019	14.175%	2.5%	1.5720%
2020	17.880%	2.5%	2.1200%

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State	New Jersey (continued)	
Resource/ Technology Eligibility	Class I	Solar energy, wind energy, wave or tidal action, geothermal energy, landfill gas, anaerobic digestion, fuel cells using renewable fuels, and certain biomass.
	Class II	Small hydropower facilities and some resource-recovery facilities.
Geographic Eligibility	Renewable energy must be generated in or delivered into the PJM Interconnection region in order to count towards the RPS.	
Electricity Delivery/Hourly Matching	There are no hourly matching requirements in the New Jersey RPS.	

State	New York	
Title of Standard	Renewable Portfolio Standard	
Implementing Authority	New York State Department of Public Service	New York State Energy Research and Development Authority
Contact	Information – PSC	John Saintcross
Address	Three Empire State Plaza Albany, NY 12223	17 Columbia Circle Albany, NY 12203
Phone/Email	518.474.7080	518.862.1090, x3384 – js1@nyserda.org
URL	http://www.dps.state.ny.us/03e0188.htm	
Citation	NY PSC Order, Case 03-E-0188 NY PSC Order, Case 03-E-0188	
Overview	The New York Public Service Commission (PSC) adopted a renewable portfolio standard (RPS) in September 2004 and issued implementation rules in April 2005. New York's RPS has a target of 25% by 2013. Of this, approximately 19.3% of the target will be derived from existing (2004) renewable energy facilities and one percent (1%) of the target is expected to be met through voluntary green power sales*. The remainder will derive from new, eligible resources centrally procured by the New York State Energy Research and Development Authority (NYSERDA). NYSERDA manages an RPS fund gathered through a surcharge on each kilowatt-hour sold by the state's investor-owned utilities. The RPS surcharge is separate from and in addition to the state system benefits charge (SBC). Customers exempt from contributing to the SBC are also exempt from the RPS charge. Municipal utilities, the New York Power Authority and the Long Island Power Authority do not fall under the jurisdiction of this program, but have been encouraged by the PSC to adopt similar programs. To encourage the growth of the state's voluntary green-power market to meet the 1% target, the PSC adopted a set-aside provision of 5% of a renewable facility's output. Accordingly, renewable generators must demonstrate that at least 5% of their output is available for voluntary green market sales outside the RPS program. (NYSERDA will pay incentives for only 95% of a project's actual monthly output up to the contract amount). The PSC has indicated that it supports a transition to a certificate-based attribute accounting system similar to other systems deployed in the market region (e.g. NEPOOL GIS and PJM ETS). Furthermore, the PSC has stated that it supports a regionally compatible tracking system that can fully support the state's Environmental Disclosure Program.	

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<table>
<tr><th>State</th><th colspan="3">New York (continued)</th></tr>
<tr><td>Overview (continued)</td><td colspan="3">The PSC will review the RPS program in 2009. This process will include an assessment of the costs and benefits of the RPS, consideration for any needed modifications to the list of eligible resources, consideration of the appropriateness of continuing the delivery requirement outlined in the PSC's implementation rules, and recommendations on transitioning to a more market-based system.

*The total incremental increase in renewable energy production as a result of this law is expected to be 7.7%. This figure is arrived at by subtracting the existing renewable generation (19.3%) from the goal (25%) to get 5.7% and adding additional generation to account for expected transmission and distribution losses. The 2% Customer-Sited Tier contribution is also calculated with this in mind.</td></tr>
<tr><td rowspan="9">Targets</td><td colspan="2">Compliance Date</td><td>Renewable Energy Requirement</td></tr>
<tr><td colspan="2">2006</td><td>1,330,452 MWh</td></tr>
<tr><td colspan="2">2007</td><td>2,761,886 MWh</td></tr>
<tr><td colspan="2">2008</td><td>4,216,520 MWh</td></tr>
<tr><td colspan="2">2009</td><td>5,668,079 MWh</td></tr>
<tr><td colspan="2">2010</td><td>7,151,832 MWh</td></tr>
<tr><td colspan="2">2011</td><td>8,687,348 MWh</td></tr>
<tr><td colspan="2">2012</td><td>10,194,134 MWh</td></tr>
<tr><td colspan="2">2013</td><td>11,749,110 MWh</td></tr>
<tr><td rowspan="2">Resource/ Technology Eligibility</td><td>Main Tier</td><td colspan="2">Methane digesters and other forms of biomass, liquid biofuels, fuel cells, hydroelectric power, photovoltaics (PV), ocean power, tidal power, and wind power.</td></tr>
<tr><td>Customer-Sited Tier</td><td colspan="2">Fuel cells, photovoltaics, wind turbines, and methane digesters.</td></tr>
<tr><td>Geographic Eligibility</td><td colspan="3">There is a preference for in-state resources in the RPS solicitation process.</td></tr>
<tr><td>Electricity Delivery/Hourly Matching</td><td colspan="3">The New York RPS solicitation requires strict hourly scheduling to the state.</td></tr>
</table>

State	Pennsylvania
Title of Standard	Alternative Energy Portfolio Standard
Implementing Authority	Pennsylvania Public Utility Commission
Contact	Calvin Birge
Address	PO Box 3265 Harrisburg, PA 17105-3265
Phone/Email	717.783.1555 – cbirge@state.pa.us
URL	http://www.puc.state.pa.us/electric/electric_alt_energy.aspx
Citation	PA. Stat. Ann. tit. 73 § 1648.1 et seq. (2004, amended 2007)
Overview	Pennsylvania's Alternative Energy Portfolio Standard (AEPS), enacted November 30, 2004, requires each electric distribution company and electric generation supplier to retail electric customers in Pennsylvania to supply 18% of its electricity using alternative-energy resources by 2020.* Pennsylvania's standard provides for a solar share, mandating a certain percentage of electricity generated by photovoltaics (PV). The law established an alternative compliance payment (ACP) of $45 per megawatt-hour; however, a separate ACP for solar PV has been set at "200% of average market value" of the solar credits sold during the reporting period. Compliance is based on renewable energy credits (using PJM's Generation Attributes Tracking System), and banking of excess credits will be allowed for up to two years. The PUC has determined that electric distribution companies may fully recover "the reasonable and prudently incurred costs of complying" with the AEPS. These include the costs for purchases of alternative energy or alternative energy credits, payments to credit program administrators, and costs levied by RTOs to ensure that alternative resources are reliable. Recoverable costs generally do not include ACPs. The costs will be recovered through an automatic adjustment and are considered to be a cost of generation supply. Electric generation suppliers have not been granted cost recovery by the PUC.

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State	Pennsylvania (continued)			
Overview (continued)	The AEPS contains a force majeure clause under which the Commission can make a determination as to whether there are sufficient alternative energy resources in the market for utilities to meet their targets. If the Commission determines that utilities are unable to comply with the standard despite good faith efforts, the Commission may alter the obligation for a given year. The Commission may then require higher obligations in subsequent years to compensate for shortfalls. * Pennsylvania's rural electric cooperatives must offer retail customers a voluntary program of energy efficiency and demand-side management programs to satisfy compliance with the AEPS.			
Targets	Compliance Date	Tier I (net of Solar Share)	Solar Share	Tier II
	2006	1.4987%	0.0013%	4.2%
	2007	1.4970%	0.0030%	4.2%
	2008	1.9937%	0.0063%	4.2%
	2009	2.4880%	0.0120%	4.2%
	2010	2.9797%	0.0203%	6.2%
	2011	3.4765%	0.0325%	6.2%
	2012	3.9490%	0.0510%	6.2%
	2013	4.4160%	0.0840%	6.2%
	2014	4.8560%	0.1440%	6.2%
	2015	5.2500%	0.2500%	8.2%
	2016	5.7067%	0.2933%	8.2%
	2017	6.1600%	0.3400%	8.2%
	2018	6.6100%	0.3900%	8.2%
	2019	7.0567%	0.4433%	8.2%
	2020	7.5000%	0.5000%	10%
Resource/ Technology Eligibility	Tier I	Photovoltaic energy, solar-thermal energy, wind, low-impact hydro, geothermal, biomass, biologically-derived methane gas, coal-mine methane and fuel cells.		
	Tier II	Waste coal, distributed generation (DG) systems, demand-side management, large-scale hydro, municipal solid waste, wood pulping and manufacturing byproducts, and integrated gasification combined cycle (IGCC) coal technology.		
Geographic Eligibility	Eligible resources may originate within Pennsylvania or within the ISO (PJM or MISO) of each individual utility.			
Electricity Delivery/Hourly Matching	There are no hourly matching requirements in the Pennsylvania RPS.			

State	Rhode Island	
Title of Standard	Renewable Energy Standard	
Implementing Authority	Rhode Island Public Utilities Commission	
Contact	Mary Kent	Andrew Dzykewicz
Address	Rhode Island Public Utilities Commission 89 Jefferson Boulevard Warwick, RI 02888	Rhode Island Office of Energy Resources One Capitol Hill Providence, RI 02908-5890
Phone/Email	401.780.2157 – mary.kent@puc.state.ri.us	401.222.7524 – adzykewicz@energy.ri.gov
URL	http://www.ripuc.org/eventsactions/docket/3659page.html	
Citation	R.I. Gen. Laws § 39-26-1 et seq. (2004) R.I. Code R. 90-060-015 (2006)	
Overview	Rhode Island's Renewable Energy Standard (RES), enacted in June 2004, requires the state's retail electricity providers—including non-regulated power producers and distribution companies—to supply 16% of their retail electricity sales from renewable resources by the end of 2019.* In 2020, and each year thereafter, the minimum renewable energy standard established in 2019 must be maintained unless the Rhode Island Public Utilities Commission (PUC) determines that the standard is no longer necessary. Compliance with the RES may also be achieved through the purchase of GIS certificates or by making an alternative compliance payment of $50 per megawatt-hour (MWh), in 2003 dollars, to the state's Renewable Energy Development Fund. Voluntary green-power purchases may not be counted toward RPS compliance. The legislation that created Rhode Island's RPS directed the Rhode Island State Energy Office to maximize the combined impact and efficiency of the Rhode Island Renewable Energy Fund (RIREF) and the RPS. Legislation enacted in June 2006 provided for increased cooperation between the REF and the RPS. * On or about January 1, 2010, the Rhode Island Public Utilities Commission (PUC) must open a docket to determine the adequacy, or potential adequacy, of renewable energy supplies to meet the increase in the percentage requirement of energy from renewable energy resources to go into effect in 2011. RES increases in 2011 and thereafter are subject to the PUC's findings.	

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State	Rhode Island (continued)	
Targets	Compliance Date	Renewable Energy Requirement
	2007	3.0%
	2008	3.5%
	2009	4.0%
	2010	4.5%
	2011	5.5%
	2012	6.5%
	2013	7.5%
	2014	8.5%
	2015	10.0%
	2016	11.5%
	2017	13.0%
	Compliance Date	Renewable Energy Requirement
	2018	14.5%
	2019	16.0%
	2020+	16.0%
Resource/ Technology Eligibility	The RPS will count energy from direct solar radiation, wind, ocean, geothermal, small hydroelectric facilities, certain biomass facilities, and fuel cells using renewable resources.	
Geographic Eligibility	Rhode Island will utilize NEPOOL's General information System certificates. Generation units must be located in NEPOOL or adjacent to NEPOOL so long as the energy produced is delivered into the control area.	
Electricity Delivery/Hourly Matching	There are no electricity delivery requirements in the Rhode Island RPS.	

State	Vermont
Title of Standard	Renewable Portfolio Goal
Implementing Authority	Vermont Department of Public Service
Contact	Riley Allen
Address	112 State Street, Drawer 20 Montpelier, VT 05602-2601
Phone/Email	802.828.4053 – riley.allen@state.vt.us
URL	http://www.state.vt.us/psd
Citation	30 Vt. Stat. Ann. tit. 30 § 8001 et seq. 2008 Vt. Acts & Resolves 209
Overview	Vermont's original renewable portfolio goal, enacted in June 2005, calls for the state's electric utilities to meet any increase in statewide retail electricity sales between 2005 and 2012 with renewable energy resources. In March 2008, Vermont enacted legislation establishing a separate state goal that 20% of total statewide electric retail sales before July 1, 2017, are generated by qualifying renewables. The PSB must report to the Vermont General Assembly by December 31, 2011, and by December 31, 2013, with regard to the state's progress in meeting this goal. In addition, the 2008 legislation established another separate goal of producing 25% of the energy consumed within the state through the use of renewable energy sources, with an emphasis on farms and forests. The Vermont Agency of Agriculture, Food and Markets, in consultation with the Vermont Department of Public Service (DPS) and the Vermont Department of Forests, Parks and Recreation, must present a plan for achieving this latter goal to the Vermont General Assembly by January 15, 2009. Unlike most other states in the Northeast, Vermont's goal does not require utilities to procure renewable energy credits (RECs) to demonstrate compliance. Instead, utilities are expected to enter into long-term power purchase agreements (PPAs) for electricity with renewable energy generators. Renewable energy generators are then free to sell their RECs into other markets (e.g. other state RPS markets or voluntary green power programs). The amount of renewable energy that each utility is encouraged to supply is capped at 10% of its 2005 total retail electric sales. If this goal is not achieved by 2012, it will become a mandatory renewable portfolio standard (RPS) in 2013.

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State	Vermont (continued)
Overview (continued)	Renewable energy facilities placed into service after December 31, 2004, count toward Vermont's goal. Furthermore, additional energy from existing renewable energy facilities retrofitted with advanced technologies, or otherwise modified or expanded to increase electrical output, also may be eligible. The renewable portfolio goal applies to all retail electricity providers, unless the PSB determines that compliance with the standard would impair a utility's ability to meet the public's need for energy services after safety concerns have been addressed, at the lowest present value life-cycle cost, including environmental and economic costs. The PSB must begin a proceeding by December 31, 2011, to determine if the amount of new renewable resources exceeds 10% of total statewide retail sales for 2005. If the total does not exceed that threshold, then the RPS goal will become mandatory; the PSB will make this determination by January 1, 2013. Utilities may meet the mandatory RPS by constructing or contracting for renewable with RECs still attached, by purchasing new RECs or by a combination of the two. Instead of, or in addition to purchasing RECs, utilities may make alternative compliance payments into the Vermont Clean Energy Development Fund.
Targets	There are no incremental renewable energy requirements included in the Vermont Renewable Energy Goal.
Resource/ Technology Eligibility	The law explicitly includes hydropower, and methane from landfill gas, anaerobic digesters and sewage-treatment facilities. Additional sources may be approved by the Vermont Public Service Board.
Geographic Eligibility	There are no geographic eligibility requirements in the Vermont RPS.
Electricity Delivery/Hourly Matching	There are no electricity delivery requirements in the Vermont RPS.

Appendix B

Model Resource Eligibility Definitions

Northeast and Mid-Atlantic States Collaborative on RPS Implementation—Model Resource Eligibility Definitions

States have multiple policy objectives for enacting renewable portfolio standards (RPS) and these objectives often vary from state to state. States are interested in taking advantage of some or all of the various benefits associated with renewable energy, such as obtaining environmental benefits, improving resource diversity, advancing technologies, promoting in-state economic development, and responding to public support for renewable energy.

Each of these objectives, however, can inform different definitions of renewable resources that are eligible for the RPS. In designing an RPS, policy makers seek to match their goals with the characteristics of the different renewable resources. As a result, there is substantial variation between state RPS programs in the definitions of eligible resources.

While there is no single, ideal way to define eligible RPS resources, there is merit in establishing some clear, common definitions of renewable resources for states to consider as RPS programs evolve and mature. To that end, the members of the Northeast and Mid-Atlantic States Collaborative on RPS Implementation have developed a set of model resource eligibility definitions. In developing these definitions, members took into consideration each state's current definitions as a starting point; selected definitions where there was substantial commonality between states already; crafted new definitions when warranted that are clear, specific, and consistent with the major RPS policy objectives of the states; and considered special issues associated with specific technologies and fuels (i.e. unique characteristics of hydropower and biomass).

The following recommended model definitions are based on the experience of RPS administrators participating in the Northeast and Mid-Atlantic States Collaborative. They are based on identification of best practice design elements and broad policy design principles. These standard definitions can be productively used to guide successful RPS policy design both at the states and federal level. However, designing an effective RPS often requires balancing sometimes-conflicting goals. Therefore, while these recommended definitions can guide state RPS definitions, considering policy tradeoffs will remain important.

There are several reasons why common RPS eligibility definitions have merit for consideration by policymakers at the state and federal levels.

First, these definitions can assist state policymakers as they develop new, or amended, RPS policies so that they include clear, well-crafted definitions of resource eligibility.

Second, use of common definitions by states serves the overriding goal of an RPS—to advance renewable energy resources in the most efficient and low cost manner possible. Today, variations in state specific definitions of renewable energy or REC eligibility tend to segment renewable energy markets across the region and the nation. This results in smaller, less liquid markets that can increase the cost of RPS compliance by limiting the types and sources of renewable energy that can be used to meet compliance. A common definition of renewable resources would allow states to more readily integrate their markets and increase the liquidity of RECs.

Third, the recommended common definitions are designed to allow states to avoid vague and unclear terms when crafting eligible resource definitions. In order to support investment in renewable facilities, developers need to know with certainty whether or not a facility will qualify before making significant financial commitments and must have confidence that definitions are sufficiently clear so that the universe of possible competitors is known. Developers and investors also are more likely to pursue new renewable projects if there are multiple state market outlets for the project output.

Fourth, the use of common and clear definitions will reduce administrative complexities and costs by avoiding debates over sometimes vague resource eligibility definitions. It will help to free regulators from the burden of holding time-consuming regulatory proceedings to determine whether a particular facility qualifies towards an RPS mandate.

Finally, use of common definitions by states will allow for the development of RPS reciprocity between states, i.e. a renewable energy generator that registers in one state RPS would automatically be eligible in other states with RPS policies. Reciprocity will help ease RPS administration; make it easier for renewable energy generators to register for multiple states' RPS policies; and thereby help contribute to a larger, more regional market for renewable energy generation.

For these reasons, the following definitions are crafted to provide a common RPS eligibility foundation while providing flexibility to allow for technology advancement and development. The definitions are technology and fuel inclusive and attempt to avoid discrimination against any one renewable resource. The definitions also are crafted to minimize the need for policymakers to determine the forms of technology that should receive market preference or to continuously revise the mandate to include new technologies that may be developed.

Energy vs. Electricity: Each definition begins with the phrase "Electricity derived from…" because, unless specified by a state as electricity generation, renewable resources can mean energy from eligible resources that have not been converted to electricity. Such energy, for example,

could come from geothermal heat pumps, solar water heating systems, biomass used as a heating fuel, and landfill gas that is upgraded and supplied in a gas pipeline.

Because most existing state RPS policies seek to achieve increases in the quantity of renewable resources in the portfolio of a retail electricity seller, the recommended definitions restrict eligibility to resources and technologies that generate electricity. While some states include energy efficiency resources in their RPS, the model common definitions are focused on renewable energy electricity generation. This approach provides consistency and ensures that each resource definition is geared towards electricity production, rather than avoided consumption.

On the following pages is a suggested model definition of each renewable energy resource and the rationale for the definition.[24]

Resource

Wind

Definition

Electricity derived from wind energy.

Rationale

Existing state definitions vary from the very generic—"wind"—to the more specific—"wind turbines," and include other variations without policy significance, such as "wind power," "wind energy," and "electricity derived from wind energy." The concept of wind power is universal and simple as defined by the states. The recommended fuel-based wind standard, "electricity derived from wind energy" is specific, inclusive of all wind-based electricity-production technologies, consistent with or implied in the various existing state "wind" definitions, and does not conflict with respective state policies or affect differing political realities. States could adopt the proposed definition with no significant alteration in the meaning of how any specific state defines wind-based electricity as an eligible resource in their RPS.

Resource

Solar

Definition

Electricity derived from solar energy.

Rationale

All states include solar power in their RPS policies. However, the definitions vary greatly, with some states not specifying any particular form of solar technology and other states listing specific eligible solar technologies. Existing definitions range from the very generic "solar" to the very specific "radiant energy, direct, diffuse, or reflected, received from the sun at wavelengths suitable for conversion into thermal, chemical, or electrical energy." Some states list solar technologies and photovoltaic technologies as two separate fuel sources.

The recommended definition of "electricity derived from solar energy" is specific, universal, and inclusive of all solar-based technologies that create electricity using a technology that employs solar radiation. It includes photovoltaics and solar thermal electric technologies. The inclusive definition is not significantly different from what is included, or implied, in the majority of state solar-based definitions (except for those few states that limit eligibility to PV or states that include solar thermal energy).

The recommended model definition also provides a broad fuel-based definition that affords states the flexibility to incorporate new solar electric technologies as they are developed without requiring legislative or regulatory changes.

Resource

Fuel Cells

Definition

Electricity derived from any electrochemical device that converts chemical energy in a hydrogen-rich fuel directly into electricity without combustion.

Rationale

Currently, there is little consensus among state RPS policies regarding whether certain kinds of fuel cells powered by natural gas and other "non-renewable" fuels should be included in the definition of technologies eligible for RPS compliance purposes. Only a few states qualify fuel cells as eligible technologies without imposing renewable fuel requirements.

In contrast, the majority of states include only fuel cells that operate on renewable fuel in their RPS as eligible resources.

The disparity of approaches by states regarding fuel cell eligibility is limiting the ability of RPS policies to promote fuel cell technology advancements. Because fuel cells represent an advanced

energy technology that is vital to the transition to a clean energy future, the recommended definition includes fuel cells as eligible RPS resources, regardless of fuel source. This "technology-based" definition would allow fuel cells to participate in RPS markets, irrespective of fuel source. The definition encourages the use of the technology, rather than a specific fuel, with the intent of helping fuel cells to "compete" with other technologies in RPS compliance. From a policy perspective, the definition is based on the recognition that, with their low emissions profile and advanced energy character, fuel cells are important for environmental and climate reasons and their potential to act as a zero-emissions technology.

The recommended definition also is consistent with the major policy goals that states are trying to achieve through an RPS, including technology advancement, environmental benefits, in-state generation, distributed generation, and resource diversity.

Resource

Geothermal

Definition

Electricity derived from geothermal sources.

Rationale

Most states include geothermal fuel resources in their RPS. While the definition of geothermal power varies among states, the different definitions are fairly broad, have no major policy significance and are not mutually exclusive. For example, some states not do define geothermal power while others use particular phrases in reference to this type of power, such as "steam turbine," "hot water or steam," "earth's crust," or "heat of the earth." Since the definitions are all very similar and often identical in meaning, states could adopt the proposed definition with no significant alteration in the scope of eligibility under current state-specific definitions.

The recommended geothermal power definition is inclusive and is consistent with the major state RPS policy objectives—obtaining environmental benefits, advancing renewable energy technologies, and promoting energy diversity.

Resource

Oceans, Lakes and Rivers

Definition

Electricity derived from the tidal currents, thermal gradients and waves of oceans, lakes or rivers.

Rationale

Ocean-based technologies are eligible under several state RPS policies. However, most of the states with ocean-based resource eligibility do not clearly specify the three types of ocean-based technologies that might be eligible: tidal current, wave, and ocean thermal. For the most part, the various definitions used by states are general in nature and are not intended to restrict specific forms of ocean energy.

No state lists tidal currents, thermal gradients, and waves in lakes and rivers as eligible resources. Many of the aforementioned technologies will operate in all bodies of water. The recommended ocean/lake/river definition is intended to be inclusive of all the types of ocean, lake, and river-based energy technologies, with the exception of hydropower. Broadening the definition to include all three technology applications in oceans, lakes and rivers provides states with the flexibility to take advantage of these new, evolving technologies in all viable water-based locations. The definition also makes this resource category relevant to all states, allowing even non-coastal states to receive the in-state benefits of multi-state RPS support for wave, current and thermal energy.

Resource

Biomass

Definition

Electricity produced by the direct combustion or co-firing of solid, liquid and gaseous fuels derived from organic, non-fossil materials, not to include:

a) Construction and demolition waste;

b) Black liquor from pulp and paper mills;

c) Mixed municipal solid waste;

d) Old-growth timber.

Also included is methane from the anaerobic decomposition of organic materials from sources such as:

a) Landfills;

b) Wastewater treatment;

c) Agricultural operations;

d) Sewage treatment facilities;

e) Food and beverage processing, sales or distribution facilities.

Eligible biomass fuels may be co-fired, or blended, with fossil fuels, provided that only the renewable energy fraction of production from multi-fuel facilities shall be considered eligible. The facilities must meet or exceed current federal or state air emission standards, whichever is more stringent. Biomass facilities must meet the emission limits of the state whose market it is selling into, rather than just the state that it is operating in, unless the emissions regulations in the operating state are more stringent.

Rationale

The term "biomass" is very general and can be interpreted to include a wide variety of resources, such as primary biomass resources (whole trees and crops grown for energy purposes), forest and agricultural wastes, urban wood wastes, municipal solid waste, landfill gas, and black liquor (a by-product of pulp and paper production). Methods of converting biomass to electricity also vary and include direct combustion, co-firing with coal, gasification, anaerobic digestion, and pyrolysis. Each of these technologies has varying emission rates and energy conversion efficiencies. As a result, the various state RPS definitions for biomass eligibility exhibit a high degree of complexity, variation, and ambiguity.

There are a number of policy-based restrictions placed on the eligibility of biomass involving such factors as air quality, a desire to support new biomass projects, and concern over the potential over-harvesting of forests and overuse of farm lands for energy crops. Furthermore, the use by some states of terms such as "non-hazardous," "sustainable" and "low-emission" introduces substantial uncertainty over which biomass fuels and facilities do and do not qualify. For example, there is no generally agreed upon standard to ensure sustainable biomass harvest and cultivation. Regardless of the policy rationale, these eligibility restrictions can make it difficult for biomass energy projects to benefit from RPS policies.

Therefore, crafting a standard biomass RPS-eligibility definition which allows for adding more biomass capacity and addresses the range of state biomass restrictions poses a significant challenge. Faced with this challenge, the recommended definition does not use descriptive restrictions such as "non-hazardous," "sustainable" and "low-emission" because these terms do not have commonly accepted definitions, only introduce ambiguity, and are difficult to enforce.

Instead, the recommended biomass definition excludes those specific biomass resources that many states have excluded on policy grounds due to environmental concerns—black liquor,

construction waste and mixed municipal solid waste. The exclusions also include old growth forests because of the significant sustainability problem facing this resource and recognized public interest value in maintaining the remaining old growth forest.

The proposed biomass definition also includes a broad, inclusive category for methane gas resources—including landfills, sewage and wastewater treatment facilities, food and beverage wastes, and wastes from agricultural operations, including animal and crop wastes. This reflects the strong merits of this renewable resource and its consistency with state environmental, local generation, climate change and fuel diversity goals. Of particular importance, methane-based facilities significantly reduce emissions that contribute to climate change. Methane is a potent greenhouse gas, with a heat-trapping capacity of about 21 times that of carbon dioxide. An inclusive definition of methane gas resources does not raise any air emission, public health, hazardous substance, or sustainability issues of consequence (as compared to other biomass resources discussed above).

The model definition further addresses the eligibility of mixed-fuel facilities (co-firing), such as coal facilities that also burn biomass fuels. The definition allows only the energy generated from the qualifying biomass fuels to benefit under an RPS. Rather than ban the eligibility of such facilities altogether, the definition allows for efficient combinations of fuel usage while providing benefits for the use of biomass-based eligible fuels.

Finally, to address air quality concerns, rather than using a qualitative term such as "low-emission," the model definition refers more specifically to emission rates as specifically defined by the state which is receiving out-of-state-generation, or the federal EPA standard, whichever is more protective of human health and the environment. This acknowledges the regional nature of air pollution and respects the legitimate efforts of states to protect their air quality.

Resource

Hydropower

Definition

Electricity generated by a hydroelectric facility that:

a) operates as a run-of-river facility, or has been repowered without the use of new impoundments,*

b) has a maximum design capacity of 30 megawatts or less,

c) uses flowing water as the primary energy resource, with or without a dam structure or

other means of regulating water flow,

d) is not located at a facility that uses mechanical or electrical energy to pump water into a storage facility, and

e) meets all relevant environmental standards as determined by the state environment department.

** "Run-of-river" refers to a hydropower facility that releases water at the same rate as the natural flow of the river—outflow equals inflow.*

Rationale

The unique characteristics of hydropower, such as its technological maturity and extensive development, many states have restricted the RPS eligibility of hydropower. Taking these characteristics into account, the proposed definition incorporates the most common elements of state definitions on hydropower eligibility. The definition allows for RPS economic support for small-scale hydropower facilities that have operational characteristics designed to address the major environmental concerns associated with hydropower dam operation—damage to watersheds and fisheries.

The recommended definition avoids the use of vague terms and restrictions such as requiring certification as a "low-impact" hydropower facility, which would require a time-consuming case-by-case review for environmental acceptability. Instead, the definition relies on compliance with established state environmental standards to ensure that RPS-supported hydropower projects are environmentally acceptable.

The most significant feature of the recommended definition is that it is designed only to support small-scale hydropower, by establishing an eligibility ceiling of 30 MW or less of aggregate capacity. This capacity cap was selected because it is the most common limit used by states. The small hydro eligibility focus also is designed to provide financial support to those projects that are likely to be less economically stable. Furthermore, the small-scale hydro focus is designed to avoid the environmental drawbacks associated with larger hydropower facilities with impoundments, as compared to smaller dams that operate under run-of river conditions.

Finally, the definition establishes RPS eligibility for incremental hydropower repowering at existing small-scale hydro sites to provide support to additional generation achieved through increased efficiency or use of new equipment that will further a state's technology advancement goals.

ENDNOTES

1 Renewable portfolio standards (RPS) require utilities to use renewable energy generation or renewable energy credits (RECs) to account for a certain percentage of their retail electricity sales—or a certain amount of generating capacity—within a specified timeframe. (Renewable portfolio goals are similar to RPS policies, but renewable portfolio goals are not legally binding.)

2 Public benefit funds (PBF) are state-level programs typically developed during electric utility restructuring by some states in the late 1990s to ensure continued support for renewable energy resources, energy efficiency initiatives and low-income energy programs. Seven of the ten states and the District of Columbia participating in the Collaborative have a public benefit fund. These funds are most commonly supported through a very small surcharge on electricity consumption (e.g., $0.002/kWh), but other funding sources include merger settlements and on-site nuclear waste storage fees. This charge is sometimes referred to as a system benefits charge (SBC). PBF renewable energy programs commonly support rebate programs for renewable energy systems, loan programs, research and development, and renewable energy education programs.

3 This report's discussion of these funds solely focuses on the use of these funds to support renewable energy, not energy efficiency, programs administered by public benefits funds.

4 All funds are supported by a system benefits charge unless otherwise noted.

5 Other programs include, but are not limited to, convertible debt, equity investments, energy production incentives, bill credits, training programs, and education programs.

6 The day-ahead market is for energy for the following day, or more specifically, the market for energy 24 hours in advance of a given time in any day. A day in this context may be more or less than 24 hours. For example, a utility may purchase the next morning's energy in the afternoon (less than 24 hours ahead) or purchase the next afternoon's energy the previous morning (more than 24 hours ahead). Energy producers offer energy on this market based on their ability to produce energy for a specific time period on the following day.

7 The locational marginal price (LMP) is a market-pricing approach used to manage the efficient use of the transmission system when congestion occurs on the bulk power grid. Marginal pricing is based on the idea that the market price of any commodity should be the cost of bringing the last unit of that commodity—the one that balances supply and demand—to market. In the electricity sector, the LMP recognizes that the marginal price may vary at different times and locations based on transmission congestion, and provides market participants a clear and accurate signal of the price of electricity at every location on the grid. These prices then help reveal the value of locating new generation, upgrading transmission, or reducing electricity consumption—the necessary elements in a well-functioning market to alleviate constraints, increase competition and improve the systems' ability to meet power demand.

8 ISO New England and PJM can also offer annual incremental forward market auctions as well.

9 Wiser, Ryan and Galen Barbose. Renewable Portfolio Standards in the United States. Lawrence Berkeley National Laboratory, April 2008.

10 Ed Holt. Increasing Harmonization Among State RPS Programs. Report prepared for the Clean Energy States Alliance, December, 2008.

11 The actual requirement is 27-percent, however, 4-percent is from Class III resources, which are not classified as renewable for purposes of this report.

12 Connecticut HB 7432, Public Act No. 07-242.

13 Delaware Senate bill 19, 2007.

14 Maine Public Law, Chapter 403.

15 Maine Public Law, Chapter 661.

16 Maryland Senate bill 595, 2007.

17 Maryland Senate bill 348, 2008.

18 Massachusetts Senate bill 2768, 2008.

19 New Jersey BPU ACP Board Order, Docket No. EO06100744.

20 New York Public Service Commission. Express Terms – SAPA No.: 03-E-0188SA19. http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/25f0de7d747422a1852574da0050c31b/$FILE/Express_Terms_03-E-0188SA19.pdf (accessed October 14, 2008).

21 Pennsylvania House bill 1203, 2007.

22 New York State RPS Performance Report, NYSERDA, September 2008.

23 In New Jersey, the energy year runs from June 1 to May 31st. The last SRECs for the energy year are deposited into accounts on June 5th.

24 N.J. Admin. Code §14:8-2.8, 2008.

25 Mike Winka, "Transforming Energy Policies – Solar Needs to Look Like Any Other Energy Industry", Presentation at Solar Power 2007, Long Beach, CA, September 25, 2007.

26 N.J. Board of Public Utilities, "In the Matter of the Renewable Portfolio Standard", Docket No. EO06100744, July 30, 2008.

27 Robert Sanders and Roger Clark. The 2007 Annual Report of the Sustainable Development Fund. February 26, 2008. http://www.trfund.com/sdf/documents/SDF_annual_report_2007.pdf

28 Evolution Markets. "Evolution Markets Completes Auction of Massachusetts and Connecticut Renewable Certificates for Massachusetts Renewable Energy Trust." October 8, 2008. http://new.evomarkets.com/pdf_documents/MRET%20Mass%20REC%20Auction%20Results,%20Oct.%2007.pdf (accessed October 11, 2008).

29 Evolution Markets. "Evolution Markets Completes Auction of Massachusetts Renewable Certificates for Massachusetts Technology Collaborative." May 9, 2008. http://new.evomarkets.com/pdf_documents/MTC%20Mass%20REC%20Auction%20Results.pdf (accessed October 11, 2008).

30 Only the states that have had RPS compliance filings are included in this table. Delaware, Rhode Island, New Hampshire, Vermont and the District of Columbia are still early on in the implementation process and do not yet have compliance information available for inclusion in this table.

31 In 2003, the RPS requirement in Massachusetts was met using 255,069 MWH of Early Compliance certificates generated in 2002, 304,112 MWH of new 2003 renewable generation, and 181 MWh from Alternative Compliance Payments.

32 New York's Central Procurement method results in alternative methods for compliance. This will be explained in greater detail later in the paper.

33 This is what was contracted for to be online by January 1, 2008.

34 The successful bidders for the Third Main Tier Solicitation are expected to build 310 MW of new renewable capacity from which NYSERDA will provide production incentives for the first 824,550 MWh generated each year.

35 Ryan Wiser and Mark Bolinger. Annual Report on U.S. Wind Power Installation, Cost and Performance 2007. U.S. Department of Energy, May 2008. http://eetd.lbl.gov/EA/EMP/reports/lbnl-275e.pdf. (accessed September 5, 2008).

36 Massachusetts Department of Energy Resources and Executive Office of Energy and Environmental Affairs. Potential for Renewable Energy Development in Massachusetts. September 2008. http://www.mass.gov/Eoeea/docs/doer/renewables/renew_potential_summary.pdf (accessed October 12, 2008).

37 Wiser, Ryan and Galen Barbose. Renewable Portfolio Standards in the United States. Lawrence Berkeley National Laboratory. April 2008.

38 In Pennsylvania, PJM projects qualify for all LSEs, while MISO projects qualify for some LSEs.

39 New York requires strict hourly scheduling to the state and provides a strong preference for in-state resources in its solicitation process.

40 In New Jersey, resources located outside of the PJM region must be "new".

41 For all of the states with this requirement, renewable facilities must be located in control areas adjacent to the state's ISO. In the District of Columbia the LSEs may also purchase unbundled RECs (without electricity delivery) from states that are adjacent to PJM in addition to those within PJM.

42 New York did have two additional out of state projects—Maryland and New Jersey—awarded contracts during their first Main Tier RPS solicitation. The facilities failed to come on-line and as a result, their contracts were terminated.

43 New York is not in PJM and only small areas of Illinois and Michigan fall within the PJM region.

44 35-A Maine Rev. Stat. Ann. § 3401, et seq.

45 "Northeast Transmission Projects Embody Arguments About Who Should Pay for What." Electric Utility Week, August 18, 2008, pp. 6-7.

46 Vt. PSB Rule 4.300§4.308 (2006)

47 UPC Wind is now First Wind.

48 Cory, Karlynn; Nils Bolgen, and Barry Sheingold. "Long-Term Revenue Support to Help Developers Secure Project Financing." Presented to the Global Wind power 2004 Conference, March 28-31, 2004, Chicago. http://www.mtpc.org/renewableenergy/green_power/MGPPpaperAWEA.pdf. (accessed January 18, 2007).

49 Massachusetts Renewable Energy Trust. "Massachusetts Green Power Partnership." http://www.mtpc.org/renewableenergy/mgpp.htm. (accessed March 12, 2007).

50 Cory, Karlynn; Nils Bolgen, and Barry Sheingold. "Long-Term Revenue Support to Help Developers Secure Project Financing." Presented to the Global Wind power 2004 Conference, March 28-31, 2004, Chicago. http://www.mtpc.org/renewableenergy/green_power/MGPPpaperAWEA.pdf. (accessed January 18, 2007).

51 The Connecticut Clean Energy Fund (CCEF) was established by the Connecticut General Assembly in 1998. CCEF is funded from a surcharge on Connecticut ratepayer's electric bills. Connecticut Innovations, Inc administers the fund. CCEF invests in clean energy technologies such as biomass, landfill gas, fuel cells, solar, wave and wind and other initiatives consistent with legislative mandates.

52 The members of the Northeast and Mid-Atlantic States Collaborative on RPS Implementation developed a set of model definitions that may be found in Appendix B. The definitions are technology and fuel inclusive and attempt to avoid discrimination against any one renewable resource. The definitions also are crafted to minimize the need for policymakers to determine the forms of technology that should receive market preference or to continuously revise the mandate to include new technologies that may be developed. Each definition begins with the phrase "Electricity derived from…" because, unless specified by a state as electricity generation, renewable resources can mean energy from eligible resources that have not been converted to electricity. Such energy, for example, could come from geothermal heat pumps, solar water heating systems, biomass used as a heating fuel, and landfill gas that is supplied in a gas pipeline.

CLEAN ENERGY. LET'S MAKE MORE.

Clean Energy States Alliance (CESA) is a national nonprofit coalition of state clean energy funds and programs working together to develop and promote clean energy technologies and markets. CESA provides information sharing, technical assistance services and a collaborative network for its members by coordinating multi-state efforts, leveraging funding for projects and research, and assisting members with program development and evaluation.

Many states across the U.S. have established public benefit funds to support the deployment and commercialization of clean energy technologies. Eighteen states make up the core base of CESA membership. Though these clean energy funds, states are investing hundreds of millions of public dollars each year to stimulate the technology innovation process, moving wind, solar, biomass, and hydrogen technologies out of the laboratory and toward wider use and application in business, residential, agricultural, community and industrial settings. State clean energy funds are pioneering new investment models and demonstrating leadership to create practical clean energy solutions for the 21st century.

www.cleanenergystates.org

Clean Energy States Alliance

50 State Street, Suite 1
Montpelier, VT 05602
Phone 802.223.2554
Fax 802.223.4967
Email cesa@cleanegroup.org
Web www.cleanenergystates.org