Increasing Harmonization among State RPS Programs

Prepared for the Clean Energy States Alliance
and the Northeast and Mid-Atlantic RPS Collaborative

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Executive Summary

Each state renewable portfolio standard (RPS) is unique because each state has its own policy objectives, political processes and constituencies. As a result, RPS policies vary by eligibility, RPS structure and program administration. For examples, state policies differ as to resource eligibility, generator vintage, treatment of customer-sited generation, geographic eligibility, single or multiple tiers and the definition of those tiers, resource credit multipliers, compliance mechanisms, renewable energy certificate (REC) definitions, REC banking and borrowing, and cost caps, among other things.

It is the premise of this paper that harmonizing these differences among states may yield benefits—particularly in larger and more competitive markets for renewable energy or RECs—and consequent cost savings. Therefore, the purpose of this analysis is to examine and evaluate mechanisms and approaches to increase harmonization among state RPS programs. By identifying opportunities for harmonization, the intent is to stimulate discussion and consideration.

This paper was undertaken on behalf of the Northeast and Mid-Atlantic RPS Collaborative. Established by the Clean Energy Group in 2007, the Collaborative's goal is to advance interstate dialogue and cooperation regarding common RPS issues and challenges. A National RPS Collaborative was also established in 2008, expanding the geographic scope of the dialogue.

One of the objectives of the Northeast and Mid-Atlantic RPS Collaborative is to explore the relative merits of increasing harmonization across state RPS programs in the region. To that end, the Collaborative commissioned this report to provide an assessment of the advantages and disadvantages of advancing greater state consistency in RPS policies and to examine the opportunities for increased state cooperation. The Collaborative members hope that this report will help to inform future multi-state discussions and actions aimed at building stronger renewable energy markets.

Harmonization can occur on a regional or on a broader, more national basis. It may make the most sense to focus harmonization efforts among states within each electricity trading market, or matched to areas covered by regional certificate tracking systems, because integrated electricity markets are also important to achieving cost-efficiency.

The stated goals of many RPS policies are to increase energy security, diversify the resource mix, stimulate economic development and improve environmental quality. The principle effect of harmonization, however, is to increase the economic efficiency of RPS policies. Presuming that economic efficiency and reducing the cost of compliance is also important to policy-makers, the focus of this analysis is on harmonizing differences that affect market size, REC fungibility and the price of RECs, because these most directly affect the cost of RPS compliance.

Using these criteria, the RPS design options shown in the left column of Table ES-1 appear to have the potential to affect the cost of compliance most directly. The column on the right shows a qualitative assessment of the impact of policy differences among states. This impact assessment is subjective, based on the relative degree of the negative effect of the respective RPS policy difference on market size (volume of trading), market liquidity (number of sellers and buyers), REC fungibility, and price transparency.

In general, increased harmonization would help overcome small state-by-state markets (an issue for some resources but not all), which would provide more options for selling the output from renewable generators, simplify portfolio management for providers that serve load in more than one state, and lower costs to ratepayers and society.

Table ES-1. Assessment of Impacts

Eligibility	Impact Assessment
• Definition of resource eligibility, including multi-fuel facilities	• High
• Generator vintage requirements	• Medium
• Eligibility and definition of incremental renewable generation	• Low or medium
• Treatment of customer-sited facilities	• Low or medium
• Geographic area of generator eligibility and requirements for energy delivery to ISO	• High
Structure	
• Single tiers or multiple tiers	• Medium
• Credit multipliers	• Low
Administration	
• Compliance mechanism: RECs or no RECs	• Medium
• REC definition of environmental attributes	• Medium
• Flexibility mechanisms (REC banking, borrowing)	• Low
• Cost caps and alternative compliance payments	• Medium or high

The paper then suggests options for how state RPS policies might be harmonized. Table ES-2 lists each option described, and for each shows the qualitative estimated benefit to expanded and more liquid markets, and a qualitative assessment of the political difficulty of tackling and accomplishing the change in policy.

There is no lack of opportunities to harmonize state RPS policies and in the process to broaden renewable energy markets. Those policy options that could have the strongest impact on creating larger, more competitive markets, however, tend to be politically difficult to accomplish because they require legislative changes in policy and may run counter to individual state interests. There are relatively few policy adjustments that might be easy, and those that may be judged easy tend to have less impact on creating larger markets, though they may offer other administrative benefits.

If states want to address options with potentially big effects, they might start by examining RPS eligibility criteria, geographic eligibility, or cost caps and ACPs. On the other hand, if they are inclined to start with easier steps first, they could consider standardizing M&V protocols for customer-sited generation, credit multipliers, or REC banking and borrowing rules.

Table ES-2. Assessment of Policy Change Options

Topic / Option	Description	Benefit to Markets	Political Difficulty
3.1	Eligibility: resource, vintage and incremental generation		
Option 1	Revise eligibility criteria	Medium	High
Option 2	Accept Class I generation eligible in another state	High	High
Option 3	Discount Class I generation from other states	Medium	High
3.2	Customer-sited facilities		
Option 1	Seek multi-state consensus on measurement and verification	Low	Low
3.3	Geographic eligibility		
Option 1	Broaden facility geographic eligibility	High	High
Option 2	Relax energy delivery requirements	High	High
Option 3	Use geographic eligibility as a flexibility mechanism	Medium	Medium
3.4	RPS structure		
Option 1	Standardize resource categories	Medium	High
3.5	Credit multipliers		
Option 1	Limit credit multipliers to in-state resources	Low	Low-Med.
Option 2	Standardize credit multipliers within market region	Low	Medium
3.6	Compliance mechanism: RECs or no RECs		
Option 1	Require greater REC price transparency	Medium	Low-Med.
Option 2	Encourage a common REC trading platform	Medium	Low-Med.
3.7	REC definitions		
Option 1	Define whether emission reduction attributes are included	Medium	Low
Option 2	Standardize to a model REC definition	High	Medium
3.8	Flexibility mechanisms (REC banking and borrowing)		
Option 1	Standardize banking and borrowing across states	Low	Medium
3.9	Cost caps and Alternative Compliance Payments		
Option 1	Standardize cost caps within market region	High	High

This analysis has been undertaken on the assumption that broader markets have economic value and are worth exploring, but it is not intended to suggest that state policies that favor local markets are flawed or wrong. Instead, if states see value in harmonizing RPS policies, or are convinced that broader markets are important to the further development of renewable resources and lower cost of RPS implementation, then the areas identified in Table ES-2 may be where it makes the most sense to focus and seek coordination.

Short of existing RPS states making major changes to their RPS rules, states considering the adoption of RPS laws, or developing RPS rules, would do well to consider the effects of their policies on larger markets, with particular attention to the RPS policies of their neighbors in their electricity region. Attention to these details prior to RPS adoption could make their entry into RPS markets smoother and less costly.

1. Introduction

In 2007, Clean Energy Group established a multi-state collaborative of state RPS administrators in the Northeast and Mid-Atlantic states to advance interstate dialogue and cooperation regarding common RPS issues and challenges. The members of this Collaborative are listed in Appendix A. One of the initiative's objectives is to explore the relative merits of increasing harmonization across state RPS programs in the region. To that end, the Collaborative commissioned this report to provide an assessment of the advantages and disadvantages of advancing greater state consistency in RPS policies and to examine the opportunities for increased state cooperation. The Collaborative members hope that this report will help to inform future multi-state discussions and actions aimed at building stronger renewable energy markets.

The Northeast and Mid-Atlantic regions have been early leaders in the use of the RPS as a mechanism to support renewable energy projects. Today, 26 states and the District of Columbia have adopted a mandatory renewable portfolio standard (RPS). In the Northeast, the first states to adopt RPS policies were Maine and Massachusetts (1997), Connecticut and Pennsylvania (1998), and New Jersey (1999). These were adopted as part of legislation restructuring electricity markets. Later, Maryland, New York and Rhode Island (2004) and Delaware and the District of Columbia (2005) adopted an RPS. New Hampshire adopted an RPS in 2007. Several of these states have updated their RPS policies since the first laws were enacted (Wiser and Barbose 2008).

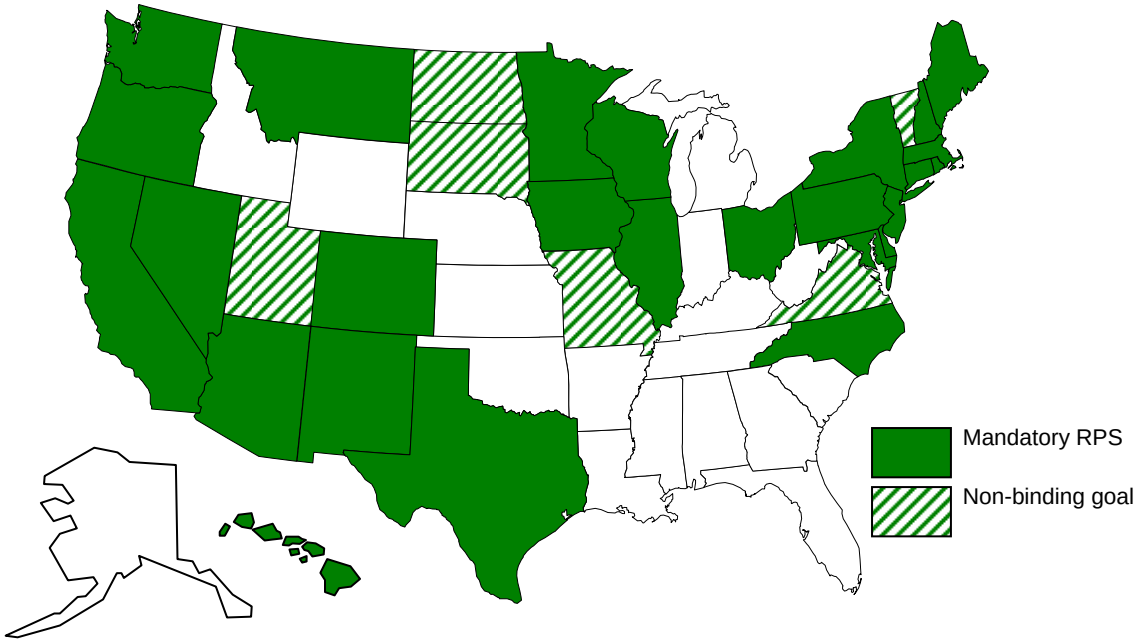

Figure 1. States with RPS Policies and Non-Binding Renewable Energy Goals

Each RPS is unique, in either small or large ways, and therefore each state provides a mini-laboratory testing individual policies. Because this approach to encouraging renewable resource development is still relatively new, and long-term results are yet to be known, there are real advantages to states experimenting with different policies. Variations also reflect differing state interests. Finally, this experience will also prove valuable should the federal government adopt a national RPS.

The variety of state approaches can also have disadvantages, however. To the extent that state policies and rules differ from each other, they may hinder the development of new renewable energy projects in unexpected ways. For example, different definitions of eligible resources means that some generators can sell output for compliance in one state but not another. Different definitions of a renewable energy certificate can mean the difference between a limited number of potential buyers (a restricted market) and a more robust number of potential buyers. More generally, different compliance mechanisms can distort the market by making some states more lucrative to sell into than others, while different eligibility rules for the geographic location of a renewable generator may affect the liquidity of the RECs market and increase the aggregate cost of renewable energy development.

1.1 Purpose of Report

This report examines how these differences may be eliminated or reduced—what is referred to here as "harmonization." At a recent U.S. Department of Energy workshop on renewable energy certificate markets, it was suggested that a national dialogue on RPS harmonization is needed (Keystone and NREL 2007). This report may contribute to that dialogue.

This analysis builds on earlier work by the Clean Energy States Alliance (CESA 2005), which examined opportunities to advance the trading of renewable energy certificates for RPS compliance in northeastern states. That study—though dated—provides a thorough review of the policies in each of the northeastern RPS states. A more recent study updates RPS policies for the Northeast and Mid-Atlantic states (Exeter 2008). This study, in contrast, uses selective states to illustrate points rather than documenting each state policy in a comprehensive manner.

The purpose of this analysis is to examine and evaluate mechanisms and approaches to increase harmonization among state RPS programs. Examples are largely drawn from RPS policies in the Northeast and Mid-Atlantic region, but could be applied nationally.

It is clear that harmonization is not easy because each state is independent, with its own needs, policy objectives and constituencies. By identifying opportunities for harmonization, the report's intent is to stimulate discussion and consideration. While predictability and stability in RPS program design is important, each state from time to time considers revisions and re-authorizations of its RPS, either legislatively or

administratively. These program reviews provide the states with opportunities to make changes in RPS design to advance interstate cooperation.

This analysis has been undertaken on the assumption that broader markets have economic value and are worth exploring, but it is not intended to suggest that state policies that favor local markets are flawed or wrong. Instead, if states see value in harmonizing RPS policies, or are convinced that broader markets are important to the further development of renewable resources, then these are the areas where it may make the most sense to focus and seek coordination.

Before examining opportunities to harmonize RPS policies, however, it is important to identify both the pros and the cons to such harmonization.

1.2 Advantages of Harmonization

RPS harmonization and broader markets for renewables can offer a number of advantages:

- Resource development in harmonized markets is more cost-efficient than in markets with policy differences. In fact, the main idea behind harmonized RPS systems is to exploit cost differences across states (Sölderholm 2008).
- RPS harmonization can lead to broader markets, with more buyers and sellers able to transact either electricity or renewable energy certificates (RECs). Renewable generators have more opportunities to sell their products because more buyers have access to them, reducing the political risk associated with changes to the legislation or rules of any single state's RPS.
- If the renewable energy commodity is fungible, meaning it is identical in specifications and therefore easily substituted, more buyers and sellers create more competition and should lead to lower prices.[1]
- Lower prices are beneficial to the obligated entities that must comply with the RPS—the utilities, energy service providers or load-serving entities—and these lower costs redound to the consumers or ratepayers that ultimately pay for the cost of compliance.
- With a greater volume of trading, broader markets may lead to better price disclosure through price indices and forward price curves. The latter are especially important to financial investment decisions regarding new renewable energy projects.
- One goal of a number of RPS programs is to reduce climate change by increasing the number of non-carbon-emitting generation sources, and the greenhouse effect knows no boundaries. In fact, it may be cheaper to reduce greenhouse gas emissions by supporting new renewable plants in another jurisdiction (where the resource may be more cost-effective) than it is to do so closer to home.

[1] On the other hand, states with lower cost renewable resources (for example, a good wind resource) could see their costs increase as their lower cost generation is sold to neighboring buyers.

- RPS rules that limit resource eligibility to certain states may be a violation of the interstate commerce clause prohibiting states from erecting barriers to trade. Although no one has brought a legal challenge against a state RPS policy for this reason to date, broadening eligibility would allay the concern.
- For load serving entities that serve multiple states, increased harmonization may reduce administrative costs and complexities associated with the RPS. The same is true for renewable energy developers that serve multiple state RPS programs.

1.3 Disadvantages of Harmonization

In contrast, there are several potential disadvantages to harmonization. Harmonization and resulting broader markets means that projects can be sited farther away from the state responsible for the RPS policy. More remote development can reduce in-state benefits in several ways.

- Harmonization reduces the ability of states to develop tailored RPS policies that respond to state-specific policy goals, interests, and stakeholders.
- Harmonizing state policies by broadening the location of new generation eligible to satisfy the RPS could undermine the goal of encouraging in-state economic development.
- To the extent that harmonization reduces in-state development of renewable resources, it may also reduce local environmental benefits from the decrease of SO2, NOx, mercury and particulate emissions.
- In-state development of new resources generally has a positive benefit in terms of public education about renewable energy. This can lead towards greater acceptance of siting new projects (e.g., siting new wind projects in western Pennsylvania helped create support for new wind and other renewable development). This benefit could be lost if harmonization leads to development in more distant states.
- Increased competition may reduce the price that renewable generators can get for their products, given the loss of a protected market, thereby reducing renewable energy development in locations with low-moderate renewable resource potential and leading to more concentrated renewable energy development.
- Harmonization may reduce the degree to which experimentations with alternative RPS policy designs is occurring at the state level, and thereby limit the extent to which wide-ranging experiences are producing lesson learned for future RPS design.
- The changes to RPS legislation and rules envisioned through harmonization may – in the near term – de-stabilize renewable energy markets as developers and LSEs are uncertain about the ultimate design of the RPS, and investments plans by both developers and LSE made under the previous RPS rules may need to be revisited.

It should be noted that increasing harmonization can occur on a regional or on a broader, more national basis, with the size of the resulting market dependent on the geographic scope of harmonization. In the case of harmonization in a region, such as the Northeast,

many of the “local benefits” discussed above – education, environmental, and development – will still result, with no significant disadvantage resulting from a regional perspective.

1.4 Outline of Report

Section 2 of this paper identifies RPS-related market barriers with a discussion of their effects on broader markets. Section 3 then suggests opportunities for increased interstate cooperation and harmonization, with an assessment of each option. Finally, Section 4 presents conclusions and recommendations for pursuing more fluid and effective regional and national REC markets.

2. RPS Policy Variations Affecting Markets

RPS policies can vary in a large number of ways. Some of the numerous types of policy variations in RPS program design, as identified by Wiser et al. (2007), are shown in Table 1. CESA (2005) also identifies certificate tracking systems as a variation to consider; this may be included in "compliance verification" listed in Table 1.

Table 1. RPS Policy Design Options

Structure, Size, and Application	Eligibility	Administration
• Basis (energy vs. capacity obligation) • Purchase obligations over time • Structure (single tier or multiple tiers) • Resource diversity requirements or incentives • Start date • Duration of obligation (sunset provisions) • Application to retail suppliers, and exemptions from obligation • Product- or company-based application	• Geographic eligibility • Resource eligibility • Eligibility of existing renewable generation • Definition of new/incremental generation • Treatment of multi-fuel facilities • Treatment of off-grid and customer-sited facilities	• Regulatory oversight body(ies) • Compliance verification (RECs, or otherwise) • Certification of eligible generators • Compliance filing requirements • Enforcement mechanisms • Cost caps and alternative compliance payments • Flexibility mechanisms (banking, borrowing, etc.) • Contracting standards for regulated retail suppliers • Cost recovery for regulated retail suppliers • Interactions with other energy and environmental policies

Not all of these policy variations affect the ability of states to coordinate for the purpose of market development. For example, most of the structure, size and application options listed in the first column of Table 1 would not affect the operation of larger markets or the fungibility of RECs. Certain aspects of the administration options listed in the third column—such as the regulatory oversight body, enforcement mechanisms, cost recovery rules, and most of the compliance filing requirements—would not affect market operation. These are individual state choices that, even if different in every state, would not impede the operation of a common market for RECs.

On the other hand, all questions of resource and generator eligibility directly affect harmonization because they can expand or constrain the number of interested buyers and sellers in the market. That is not to say that markets cannot function with some differences from state to state, but if hydro with a capacity of 30 MW is eligible in one state but not another, the market is diminished for that particular generator. Similarly, if generators that began operation after 1998 are eligible in one state but another state only allows generators that began operation after 2002, then again the market is diminished.

These policy variations have been screened as to their potential effect on broader markets using the following criteria:

- Will the design option affect the number of market participants?
- Will the design option affect the fungibility of RECs?
- Will the design option affect the price of RECs?

Using these criteria, the RPS design options shown in Table 2 appear to have the potential to affect broader markets for renewables.

Table 2. Design Options Affecting Broader Markets

Eligibility	Structure	Administration
• Definition of resource eligibility, including multi-fuel facilities • Generator vintage requirements • Eligibility and definition of incremental renewable generation • Treatment of customer-sited facilities • Geographic area of generator eligibility • Requirements for energy delivery to ISO	• Single tier or multiple tiers • Resource diversity requirements or incentives (credit multipliers)	• Compliance mechanism: RECs or no RECs • REC definition of environmental attributes • Flexibility mechanisms (REC banking, borrowing) • Cost caps and alternative compliance payments

There are several areas where RPS administration and compliance might benefit from RPS harmonization but which would not have much effect on enlarging markets or increasing competition in RPS markets. These are mentioned here only briefly because our primary focus is on measures that could affect market size, REC fungibility, or the price of renewable energy or RECs. Examples include each state's approach to certifying eligible generators, compliance periods, and contracting standards.

Certification of Eligible Generators

As part of RPS rules, each state must determine whether a particular generator meets its eligibility criteria. A generator in Maine, for example, must apply to Maine, Massachusetts, New Hampshire, Connecticut and Rhode Island if it wants to be able to sell its certificates for compliance in each of those states, and each state must separately make an administrative determination of eligibility. The reason for this is that each state has somewhat different eligibility criteria. To reduce this duplication of effort, states could jointly assign to or contract with a single institution that does all certification in the region. Alternatively, states could agree to assign responsibility for certification to the state in which the generator is located, even if criteria differ. Of course, if the eligibility criteria were harmonized, it would be easier for state regulators or RPS program administrators to rely on their counterparts to certify the generators in their state.

Compliance Periods

Each state has established annual compliance periods, but states define the year differently. For example, Delaware, New Jersey and Pennsylvania have a compliance

year that begins June 1, while the compliance year for Maryland and the District of Columbia begins and ends with the calendar year. The date by which obligated entities must file their reports also varies from state to state. Harmonizing the compliance year and reporting date, at least within a region, would simplify the administrative burden on providers serving load in multiple jurisdictions.

Contracting Standards

A number of states require long-term contracts as part of their RPS. Such requirements may be technology-specific, such as Maryland's requirement of 15 year contracts for solar, or they may be limited in scale, such as Connecticut's requirement of long-term contracts for 100 MW. New York, through its central procurement agency NYSERDA, enters long-term contracts for RPS attributes, and Massachusetts electric distribution companies are required, subject to limitations, to enter into contracts of 10 to 15 years for renewable energy or RECs beginning July 1, 2009 and continuing for five years.

Contracting standards provide support for financing new renewable projects, and long-term commitments can help reduce uncertainty and help build stronger forward price curves for RECs (Keystone and NREL 2007). Requiring long-term contracts can be difficult, however, in states that have restructured electricity markets because competitive providers, unlike regulated utilities, have uncertain loads and may not be sufficiently credit-worthy. Contracting requirements and consequent support for project finance may increase the number of suppliers, improving market liquidity, but long-term contracting may also restrict short-term trading in RECs and thereby reduce market liquidity.

Contracting standards need not be harmonized to a uniform requirement; what works in a regulated market may not be easily transferable to a restructured market. However, states could share their experiences, and lessons learned could be evaluated for identification of a best practice to be considered by states.

2.1 State variations on selected design options and potential market barriers

2.1.1 Definition of resource eligibility

In most states, renewable resource eligibility extends to solar, wind, geothermal, biomass, hydro and ocean energy resources. Some states do not include geothermal or ocean energy resources because these are not indigenous or are not cost-effective with the resources available in state.

Specific renewable energy categories, especially hydro and biomass, often are defined differently. Some of these definitional differences are established by statute and sometimes by regulation, or a combination of statute elaborated on in regulatory rules.

The treatment of hydropower eligibility is particularly varied and leads to extremely balkanized RPS markets for hydro projects. In New England, Maine allows hydro of 100 MW capacity or less, while Rhode Island allows hydro with an aggregate capacity of 30 MW of less, and to be eligible as "new" it must not involve "any new impoundment or diversion of water with an average salinity of twenty (20) parts per thousand or less." New Hampshire Class IV sources include hydro facilities with a capacity of 5 MW or less that "have installed FERC-required and approved upstream and downstream diadromous fish passages and, when required, have met state water quality certification…"

Connecticut defines hydro as a run-of-the-river facility with a capacity of 5 MW or less that does not cause an appreciable change in the river flow, while Massachusetts legislation includes "naturally flowing water and hydroelectric" among its eligible resources, without further qualification.

Biomass definitions also vary significantly. New Jersey and Maryland take a more inclusive approach, detailing the different qualifying fuel types, and in the case of New Jersey, requiring a biomass sustainability determination by the Department of Environmental Protection. In those states that do list the eligible biomass fuel sources, no two fuel lists are the same.

Delaware uses a more concise, statutory definition: "Electricity generated from the combustion of biomass that has been cultivated and harvested in a sustainable manner as determined by DNREC, and is not combusted to produce energy in a waste to energy facility or in an incinerator, as that term is defined in Title 7."

These differences in the definitions of eligible resources illustrate how widely eligibility can vary. How they affect markets and market participants is illustrated here. A 35 MW hydro generator eligible in Maine is not eligible in Rhode Island, New Hampshire or Connecticut. A 15 MW hydro facility eligible in Rhode Island is not eligible in New Hampshire or Connecticut. A 3 MW hydro facility eligible in New Hampshire may or may not be eligible in Connecticut, depending on whether it is run-of river with no appreciable change in river flow. If the facility qualifies in Connecticut it will probably qualify in any of the other New England states, but if it qualifies in Maine there is a good chance it will not qualify elsewhere in New England. The larger facilities have a smaller market. Their certificates will not be accepted for compliance in other states, consequently there is less demand for their certificates and their certificate prices will be lower. Each certificate must include information about which states will accept it for compliance, and buyers must be careful to ensure that the certificates they purchase are eligible in the state where they need certificates for compliance.

Biomass eligibility presents a trickier hurdle because eligibility may depend on the content of the fuel input and how the resource is managed—it is not just a matter of the nameplate capacity or other objective criteria such as whether water is impounded or fish passage is enabled. As with hydro, biomass facilities that qualify in only one or two states

but not others face smaller markets, lower demand and lower prices. Certificates from different biomass facilities are not interchangeable unless they have been independently certified by each state according to that state's criteria.

The Northeast and Mid-Atlantic RPS Collaborative has taken a step towards harmonization by developing some standard resource eligibility definitions, but no further steps have been taken to adopt them. Appendix A has the model resource definitions.

Increased harmonization of resource eligibility definitions would help overcome small state-by-state markets (an issue for some resources but not all), which would provide more options for selling the output from renewable generators, simplify portfolio management for providers that serve load in more than one state, and lower costs to ratepayers and society.

2.1.2 Generator vintage requirements

A number of states include a requirement that eligible renewable generators began operation on or after a specified date. This type of vintage requirement is generally intended to support newer facilities that are still amortizing costs, or to stimulate the development of new capacity. However, states with such vintage requirements usually choose different dates that define eligibility.

For example, Massachusetts defines qualifying new resources as systems installed after December 31, 1997 (with an exception). New York requires eligible facilities to have begun operation on or after January 1, 2003. Maine Class I facilities must have begun commercial operation on or after September 1, 2005; New Hampshire new resources for Class I and II must have begun operation after January 1, 2006.

Vintage eligibility definitions may be a function of the state's policy goals (i.e., focus on stimulating new resource development), the date when the RPS was adopted, whether the state has a significant amount of renewable generation in operation prior to the adoption of the RPS (i.e., a desire to support existing resources), or another key date in legislative or renewable policy history.

Such a variety of vintage eligibility definitions, however, can make it difficult for a particular facility to qualify in multiple states unless it began operation quite recently. A facility that began operation in 2002, for example, will be eligible in Massachusetts but not in New York, and although it may be eligible for Class II in Maine (which has no vintage requirement) or Classes III and IV in New Hampshire (allowing certain existing biomass projects or small hydro that commenced operation prior to January 1, 2006), its market is smaller. Even if the facility conforms to several state resource eligibility definitions, it may find its market constrained by the vintage eligibility requirement.

Different vintage requirements also mean that obligated entities have to manage their portfolios more closely, making sure that the RECs they buy meet the vintage

requirements as well as the resource requirements. To the extent that this constrains market size, it means higher compliance costs passed on to ratepayers and society.

2.1.3 Incremental renewable generation

In some states, incremental power production at an existing renewable facility may qualify as new renewable energy if certain conditions are met. In Maine, for example, incremental generation resulting from capacity added to an existing facility after September 1, 2005 is eligible for the Class I RPS. New Hampshire allows incremental new production (meaning the difference between the annual calendar year output and its historical generation baseline) to count towards its Class I requirement if the incremental new production is directly attributable to capital investments made after January 1, 2006. This is distinct from repowered existing biomass or hydro facilities that add to existing capacity, which is also eligible. Massachusetts allows the incremental output that is greater than the average generation rate from 1995 to1997 to count as new generation under its "vintage waiver" provision.

Other states have different definitions for eligible incremental generation, while some states do not acknowledge the issue at all, suggesting that incremental output is not eligible.

These examples illustrate that facility eligibility can depend on meeting a combination of criteria, including resource type, generator vintage and incremental generation. When layering resource type, vintage and incremental generation requirements, those generators eligible on all counts have access to a very small market, probably in a single state.

2.1.4 Customer-sited facilities

Grid-connected customer-sited generation is eligible for the RPS in most states.[2] In fact, several states, including (but not limited to) Delaware, Maryland, New Hampshire, New Jersey, New York and Pennsylvania, have adopted special tiers or set-asides for solar (often customer-sited) or more generally distributed generation. The presence of a set-aside target for these systems may affect market size and liquidity (see discussion of market structure in Section 2.1.6), but here the focus is on the differences in measurement and verification of the output from such facilities, and to geographic eligibility for these facilities (discussed further below).

Measurement and verification of customer-sited generation varies from state to state. For example:

- Because it offers performance incentives for customer-sited systems, New York requires monitoring and data acquisition from on-site sensors and meters approved by NYSERDA to confirm the amount of energy production.

[2] Some states credit the output of off-grid facilities, while others do not. Harmonizing rules to accept off-grid generation would be beneficial to the owners of such systems but would not have much impact on the size and competitiveness of certificate markets.

- For net metered systems, Pennsylvania requires that customer-generators that want to claim the certificates install additional metering at their own expense. If the utility is to receive the certificates, then it must pay for the additional metering.
- Delaware and Maryland do not specify measurement and verification, but rather leave it to the tracking system rules to govern whether certificates will be issued. In that case, the Generation Attribute Tracking System (GATS) requires a revenue quality meter read on a month-end basis.
- New Jersey requires "periodic" meter readings, but for solar systems with a capacity of less than 10 kW, annual engineering estimates or monitoring protocols may be accepted.

If these customer-sited generators are only eligible for in-state certificate use, then the different approaches to measurement and verification do not affect markets much except to the extent that system designers and installers, REC aggregators, working in a multi-state region would find it easier to conform to a common set of rules. On the other hand, if one state accepts customer-sited certificates from another state, then the market is limited if the customer-generator has complied with the rules of its home state but not with the rules of the neighboring state.

2.1.5 Geographic eligibility and energy delivery requirements

In addition to resource type and vintage eligibility requirements, most RPS states require that energy be delivered to a specified state or region. In the northeast, RPS states generally require that eligible systems be located within the region (either NEPOOL, New York, or PJM), or that energy from eligible systems be delivered into the region. In Pennsylvania, an eligible generator must be located in one of two control areas (PJM and MISO) serving the state, and MISO-located generators are eligible only to meet the RPS of those utilities served by MISO. Both of these control areas are large, however, so Pennsylvania can draw upon eligible generators located in a number of other states.

Connecticut, Massachusetts, New Hampshire and Rhode Island, all of which are served by a single control area (ISO-New England) allow eligible generators if they are located in a control area adjacent to ISO-New England, as long as those generators deliver electricity into ISO-New England. Delaware, Maine, Maryland and New Jersey allow eligible generators to be located anywhere (not restricted to an adjacent control area) as long as energy is delivered to their regional control area. The District of Columbia is the only jurisdiction in the northeast that allows unbundled RECs (without electricity delivery) from generators located in states that are adjacent to the PJM Interconnection.

Looking outside the northeast, several states encourage in-state generation for complying with their RPS, but do not require specific geographic locations. For example:

- Colorado has no restriction on generator location but provides credit multipliers for in-state projects.[3]
- Illinois requires in-state resources unless insufficient cost-effective resources are available. In that case, obligated entities may procure from adjoining states, and if still there are insufficient cost-effective resources, they may be procured from other regions. After 2011, however, equal preference may be given to in-state and adjoining states.
- North Carolina allows up to 25% of compliance with the RPS to be met with unbundled RECs from outside the state (and one load serving entity is granted no such limit), but the remainder must be from facilities located in-state or from facilities that deliver energy into the state.

Customer-sited systems may be subject to further geographic restrictions. These systems are sometimes required to be located within the state, as in New Hampshire. This tends to be the case if the state has a separate RPS tier that focuses on customer-sited solar or distributed generation, and is certainly true if the state provides incentives for the installation of customer-sited generation.

New Jersey requires that the generator be interconnected with a New Jersey electric distribution system to qualify for issuance of a Solar REC (SREC), but rules state that the BPU may waive this requirement if it adopts a regional tracking system for SRECs. Delaware merely requires that SRECs be created and supplied by PJM-EIS GATS, suggesting that solar generators may be located outside Delaware, but the state will give a credit multiplier towards RPS compliance if the eligible customer-sited generation is located in-state and installed prior to 2015.

These geographic restrictions have multiple effects. Narrower geographic restrictions provide support to local generation, and ensure primarily local economic and environmental benefits. A more expansive requirement for energy delivery to a broader regional control area ensures that generation within the region is displaced, and to the extent that polluting fossil-fired generators are displaced, that will improve air quality both locally and in the broader region, and contribute to regional development. No requirement for energy delivery would provide a lower cost of compliance, because RECs could be sourced from a much wider area, but would provide no certainty of local or even regional economic and environmental benefits.

It is clear that limiting the location of eligible generators to certain geographic areas places constraints on the size of the market. Where the eligible region is large, this may not have a significant effect, but even in a geographically large area the constraints may have a downside if the cumulative RPS demand in states within the region is high relative to available supply.

[3] A credit multiplier allows the obligated entity to count each eligible REC as one times the multiplier. Just as some favored technologies may receive extra credit, in-state generation may receive extra credit (in Colorado's case, 1.25 for each MWh generated in-state). Tracking systems do not issue multiple certificates for each MWh, but a state with a credit-multiplier policy counts each eligible certificate as worth more for compliance purposes.

Another related factor that can hinder broader renewable energy facility markets is the requirement for energy delivery. Where energy delivery is required to a state or region, it usually follows the applicable rules of the respective Independent System Operators (ISOs). In general, ISOs require any generators importing energy into their system to schedule generation for each hour in day ahead or real-time markets, and to meet those schedules as closely as possible. This is necessary for grid operators to control the system and match supply with demand. So when a state program requires energy delivery to an ISO, even without mentioning hourly matching, hourly matching is often a *de facto* result unless the state specifies otherwise.

Certificate tracking systems sometimes hardwire this requirement into their operating rules, which may require evidence of a transmission reservation, a NERC tag, proof of generation, and settling the energy in the importing ISO.

The effect of these specific energy delivery requirements is particularly challenging for intermittent resources such as wind and utility-scale solar that are more difficult to schedule. The GIS, for example, will issue certificates (for imports) that are the lesser of scheduled energy delivery and the actual delivery. If a wind generator produces less than scheduled, it (or the importer) will receive certificates equal to actual generation delivered; if the generator produces more than scheduled, it will receive certificates equal to the scheduled delivery.

Beyond RPS markets, tracking system rules that hardwire RPS policy (or ISO scheduling rules) requiring energy delivery ignore the needs of voluntary REC markets. These markets rely to a large extent on unbundled RECs that are purchased without energy. As such they are wide-ranging, even national markets, but purchasers cannot always rely on their regional tracking system to record and verify their REC purchases if the RECs were issued by a tracking system far away, or if their REC purchases were from an adjacent control area but lack an accompanying energy delivery.

While geographic limitations and delivery requirements have an obvious impact on generators, they also affect the number of market participants and market size, which translates into higher compliance costs for obligated entities, ratepayers and society.

2.1.6 RPS structure

Many RPS policies establish different classes or tiers of eligible resources. For example, some differentiate between “existing” and “new” eligible resources (those built before or after a specific date), or between specific resource types such a solar or less demonstrably renewable resources. These separate categories have their purposes in public policy—to encourage the development of new solar, for example, or to provide support to existing generators.

The effect of these different categories, however, is to segment the market. Some states have as many as four different classes of eligible resources; each class stands alone as a separate requirement.

Although the tiered structure of many RPS designs does not affect the number of obligated entities, or buyers in the market, there are fewer generators that fit each category. As a result, markets are smaller and there is less competition.

The different categories have an impact on REC fungibility too. Although in some cases "new" resources may be used to satisfy a second tier of "existing" resources, in general certificates are not interchangeable between resource categories.

Because each class establishes its own market, there are fewer market participants, and because REC fungibility is limited, there may be less trading in each category. Both of these effects can affect both the price level and price transparency. Price levels themselves will be different—not necessarily in one particular direction—because supply and demand are different within each category. The market segmentation also means that load serving entities must manage their resource portfolios more closely—the more categories, the more subportfolios they must manage to compliance standards.

2.1.7 Credit multipliers

Some states offer credit multipliers that magnify the value of RECs from specific resource types. For example, Delaware offers a 300% credit for each MWh or REC generated by customer-sited photovoltaic systems located in the state, and by fuel cells powered by renewable fuels, both of which must be installed before 2015; it also offers a 150% credit for wind energy generated by an installation sited in Delaware before 2013. Until December 31, 2008, Maryland offers 120% credit for wind, and 110% credit for methane from a landfill or wastewater treatment plant. Until December 31, 2009, the District of Columbia offers 110% credit for wind and solar, and until December 31, 2010 it offers 110% credit for methane from a landfill or wastewater treatment plant.

The interaction of credit multipliers with markets can be complex and depends on other RPS rules as well as the supply-demand balance. The multiplier itself is intended to stimulate additional supply, or to accelerate supply, and if successful it could have the effect of pumping more RECs into the market, which would tend to lower the price overall, but the efficacy of the policy is not in question here, only the effect of the differences among states.

One effect of some states offering credit multipliers and others offering no multipliers, or of states offering different multipliers, is to lower regional demand for eligible resources in the class where the extra credit is offered. Assuming the states being compared are in the same REC market region, such that the actual supply is unchanged, the multiplier reduces the actual RECs that must be purchased for compliance in the region.

It might be thought that obligated entities would pay more for RECs that are eligible for a credit multiplier, but as long as the obligated entities in states with a multiplier are buying from the same supply as everyone else in the region, it is unlikely that RECs would gravitate towards the states with the multipliers unless demand exceeds supply in the region. In that case, for example, if a state with an alternative compliance payment (ACP) of $50/MWh offers a 200% credit multiplier, then the obligated entity in that state would be willing to pay up to $100 for that REC. Thus, in a supply limited market, the obligated entity should be willing to pay more than an entity in a different state with the same ACP but no credit multiplier. But if the ACP in the state with the credit multiplier is $25/MWh, then the obligated entity would be willing to pay up to $50, the same as a state with a $50 ACP but no multiplier, with no resulting market distortion.

Further, if credit multipliers are restricted to in-state generation, as they sometimes are, then the credit multiplier would have little effect because cross-state trade in RECs from such facilities is already limited—those RECs are going to stay home.

In summary, the presence of credit multipliers in some states and not others will not affect the number of market participants and will not affect the fungibility of RECs, but it could distort the price of RECs in a region where supply is short.

2.1.8 Compliance mechanism: RECs or no RECs

States rely on the acquisition of RECs and/or the purchase of renewable electricity for compliance with their RPS. A few states allow only the purchase of electricity bundled with attributes (or RECs), while most states allow both for compliance. In many states, RECs issued and tracked by the regional tracking system are required for compliance (Holt and Wiser 2007). This is true for example in Delaware, New Jersey and Pennsylvania. This is also true for the New England states except that Maine allows either RECs from the NEPOOL GIS or renewable electricity not tracked by the GIS but purchased in that part of the state not served by the GIS.

New York is different from other states because of its “central procurement” approach to RPS compliance. The New York RPS is satisfied by procurement of “RPS attributes” by the New York Energy Research and Development Authority. Although RPS attributes are the functional equivalent of unbundled RECs, the state does not formally recognize RECs at this time.

States such as Arizona that require attributes bundled with energy for RPS compliance have a similar effect on markets as import rules that require an accompanying unit-specific energy delivery—but in Arizona’s case it is constraining internal trading, not just imports. California requires RECs bundled with energy for imports but allows more flexibility in electricity delivery. Even though both states are supported by the Western Renewable Energy Generation Information System (WREGIS), their markets are smaller and less liquid than if unbundled REC trading were allowed among all WREGIS states.

The market impact of states within a control area differing in their treatment of unbundled REC trading is fairly significant because the market size is bifurcated into states that allow unbundling and states that do not. Each market is smaller than if RECs traded freely within the region. Renewable generators within the region would be more likely to sell to states with greater flexibility and would be inclined to pick and choose based on the buyer's location, internal market transmission constraints, and prices determined by supply and demand. The more restricted market would likely be less well served than the more flexible market.

2.1.9 REC definitions

REC definitions are important because if they are too dissimilar, the RECs may not be readily fungible or interchangeable, even if the generators meet other eligibility criteria. In fact, most states define RECs differently, but the definitions fall into five categories (Holt and Wiser 2007):

1) A detailed definition specifying which attributes must be included for purposes of RPS compliance;
2) A statement that the REC includes all renewable and environmental attributes, without specifying just what those attributes might be;
3) A statement that the REC includes all the environmental attributes;
4) A statement that the REC includes unspecified attributes; or
5) A definition that a REC represents a unit of production (attributes not mentioned).

Perhaps the most significant set of attributes to address are related to emissions. Each generator has direct, on-site emissions characteristics or attributes. If the generator uses renewable resources, the direct emissions may be zero. If the emissions are zero, and the generator displaces fossil generation, an emission reduction is created. Depending on what emissions regulations are in force where the generator is located, these emissions reductions may have value in environmental markets. Because RECs may have value for both RPS compliance and emissions markets, it is important to specify exactly what is intended.

Detailed definitions help clarify what is included with a REC. For example, New York (through the NYSERDA competitive procurements of RPS attributes) states that the attributes include "the exclusive rights to claim…that New York State and/or the RPS Program is responsible for the reductions in emissions and/or other pollution resulting from the generation of the Bid Facility's energy and its delivery into the [New York Control Area]." Arizona, California, Colorado and Washington have similar definitions.

Even if a state provides a detailed definition, the definitions vary in what a REC includes. Pennsylvania, Delaware and North Carolina have detailed definitions, but in contrast to the previously named states they reach the opposite conclusion: derived emissions benefits or allowances are not required to be retired for compliance with the RPS.

Clearly, a REC that is eligible for Pennsylvania and Delaware would not be automatically eligible for RPS compliance in New York. If a generator in Pennsylvania or Delaware wanted to sell to NYSERDA for RPS compliance in New York, it would have to include any emission reductions it is entitled to in the sale.[4]

Trading in RECs that lack a clear and precise definition of included attributes can lead to ambiguity and uncertainty, which markets dislike. Different REC definitions, particularly with respect to the inclusion or omission of emission reduction attributes, probably mean that the RECs are not fungible, reducing market liquidity. But it should be noted that certificate tracking systems may not even record the information about emission reductions, much less track them separately from other REC attributes, so there is at present no way to know whether or not emission reductions are in fact included with the sale of a REC. This can present a problem for obligated entities that try to comply but have no way, other than an attestation, to determine whether the attributes have been traded separately.

However, some tracking systems provide certificate definitions that in effect bind system users to a harmonized definition. For example, some tracking systems define a certificate or REC as including "any and all credits, benefits, emissions reductions, offsets, and allowances, howsoever entitled, directly attributable to the generation from the Generating Unit(s)." Account holders with the tracking system agree to abide by these rules and definitions. Although this provides standardization, it may not serve the needs of states that adopt a different policy.

2.1.10 Flexibility mechanisms (REC banking and borrowing)

Some RPS designs allow obligated entities to bank or borrow renewable energy or RECs to provide flexibility in complying with the standard. Banking is fairly common in state rules. This allows obligated entities to save RECs for use in a subsequent period. For example, Massachusetts and Rhode Island allow banking for two additional compliance years, but banking is only allowed if the obligated entities have excess RECs beyond their compliance needs, and then only to the extent of 30% of their total obligation. In some states, RECs are given a multi-year shelf life that has the same effect as allowing compliance banking. Delaware, the District of Columbia and Maryland, for example, establish a REC lifetime of three years. The shelf life of a Pennsylvania REC is two years, but the REC does not start aging until the utility has purchased it.

Borrowing allows an obligated entity to be short of the necessary RECs in a compliance year by promising to make up the difference in a future year. Some states allow an obligated entity to purchase additional RECs for compliance during a true-up or reconciliation period. This may be three to six months after the close of the compliance year.

[4] Whether this would have any price implications would depend on whether the generator has other options to sell emissions reductions separately from the REC.

One of the reasons for banking and borrowing is to ameliorate REC prices fluctuations (Chupka 2003). By banking excess RECs, they are not forced onto the market when prices may be low. By borrowing RECs, compliance may be achieved at no effect on prices in the current year, which might make sense if a lot of RECs from a new generator were expected on the market the following year. The effect of banking and borrowing on market size and REC fungibility, however, may be limited. Even if different states have different banking and borrowing rules, the cumulative effect in a larger regional market is to relieve pressure on regional demand, but it does not seem likely to impede interstate trading to any great extent.

2.1.11 Cost caps and alternative compliance mechanisms

Most states include a way to limit the cost of RPS compliance. The following list outlines the various cost cap approaches employed by states (Wiser and Barbose 2008).

1) A cap on retail rates or utility revenue requirements
2) A price cap on renewable energy contracts
3) A per customer cost cap
4) A cap on how much revenue may be taken in by a renewable energy fund used to subsidize renewable energy purchases
5) A financial penalty for non compliance
6) An alternative compliance payment that may be made in lieu of acquiring RECs

Within New England, RPS states are mostly coordinated in their cost control mechanism. Massachusetts, Maine, New Hampshire and Rhode Island all use an alternative compliance payment (ACP), and the first of these, Massachusetts, has indirectly influenced the others to adopt the same payment levels, currently $57.12 per MWh. This is important because they are all sourcing RECs from the same market. If one state set its ACP lower than the rest, the REC market would be distorted as obligated entities in the other states will pay more to ensure compliance when supply is short. If REC demand in the region exceeds supply, the state with the lower ACP might be the last served—if it is served at all. Connecticut, the fifth state in the region with a mandatory RPS, uses a fixed payment of $55 per MWh as a penalty for non-compliance. Although this is not the same approach and the payment level is not identical to the ACP in other New England states, the penalty serves a similar function to the ACP, and the difference is small enough to have only a minor effect. It should be emphasized that this distortion would occur only when REC demand exceeds available supply, causing REC prices float to the ACP level.

This similarity did not come about by accident. With the adoption of Maine's Class I RPS in 2007, renewable energy developers urged that the ACP match other states in the region, calling the implications of different ACPs within the same regional market of greater importance than all other policy differences.

> "If a lower-than-regional [ACP] could undermine compliance and be the driving cause of delays in the scheduled RPS target increases, and if a higher-than-regional [ACP] saddles Maine with the highest burden in the region in the event of insufficient

> REC supply, then the only reasonable set-point for [ACPs] is in line with the other states in the regional New England market. Such a choice will also aid in price transparency and liquidity required to develop a well-functioning market that can ultimately strive to meet the RPS targets at minimum cost to ratepayers."[5]

Similar arguments were made in early 2008 when New Hampshire was adopting its RPS law.

Delaware, the District of Columbia, Maryland, New Jersey and Pennsylvania are all part of the PJM market, but compliance fees in each state are different, sometimes significantly so. In New Jersey, the ACP may be set each year by the BPU, but is currently $50 per MWh for Class I resources, and $300 per MWh for solar. Pennsylvania has a non-compliance penalty for Class I of $45 per MWh, and for solar of 200% of the market price for solar. On the other end of the range, Maryland has an ACP of $20 per MWh for Tier 1; this will become $40 in 2011. Maryland's solar ACP is $450 per MWh in 2008, declining to $400 in 2009, and declining by $5 every other year until it reaches $50 in 2023. Delaware is in the middle of the range, and uses a different approach to ACP. The initial ACP is $25 per MWh, but having relied on the ACP in one year, a provider will face an ACP of $50 in the next year, and then $80 if they must resort to the ACP in a third year. Delaware's solar ACP begins at $250 per MWh and increases to $300 if the electricity supplier has opted for the ACP in any previous year. The ACP then increases to $350 with subsequent uses.

These differences may not matter if supply exceeds demand because there is less chance that obligated entities will resort to use of the ACP. But if REC demand exceeds supply, these differences matter within a given market where renewable generators are RPS-eligible in a number of different states. In this case, if different states within the same market rely on different types of cost caps or different levels of ACPs, then suppliers (generators or REC providers) will gravitate towards states with the more severe consequences of non-compliance because the obligated entities in those states will pay more for RECs. Furthermore, such market balkanization may lead to a lack of price transparency, which itself can be a barrier to investment, because smaller markets would mean fewer trades. Of course, if geographic boundaries for eligible generators are enlarged, harmonization may be even more challenging because of the greater diversity of cost control options that would bring.

2.2 Assessment of Market Barriers

The above discussion of potential barriers to expanded markets for renewable energy incorporated some assessment of how markets would be affected by state policy differences on each design option. In this section, those impacts are assigned a simple rating of high, medium or low, assuming that the issue pertains to a given state. If there

[5] Maine PUC Docket No. 2007-391 (Chapter 311, Portfolio Requirements Rulemaking), Comments of Horizon Wind Energy, Iberdrola Renewable Energies USA, Noble Environmental Power, and UPC Wind Management. September 27, 2007.

are no differences among states in a region on the particular issue, then the impact would be rated low.

This assessment is based on the analysis above and the review by members of the Northeast/Mid-Atlantic RPS collaborative, informed by the author's judgment, and supplemented by informal interviews with a few load serving entities and generators that are active in multi-state markets. The assessment is intended apply to any RPS state—it is generic and is not intended to reflect conditions in any specific group of states.

Any assessment of high, medium or low impacts is obviously not quantitative, but these ratings are based on the relative degree of the negative effect of the respective RPS policy difference on market size (volume of trading), market liquidity (number of sellers and buyers), REC fungibility, and price transparency. The results are summarized in Table 3.

Table 3. Assessment of Impacts

Eligibility	Impact Assessment
• Definition of resource eligibility, including multi-fuel facilities	• High
• Generator vintage requirements	• Medium
• Eligibility and definition of incremental renewable generation	• Low or medium
• Treatment of customer-sited facilities	• Low or medium
• Geographic area of generator eligibility and requirements for energy delivery to ISO	• High
Structure	
• Single tiers or multiple tiers	• Medium
• Credit multipliers	• Low
Administration	
• Compliance mechanism: RECs or no RECs	• Medium
• REC definition of environmental attributes	• Medium
• Flexibility mechanisms (REC banking, borrowing)	• Low
• Cost caps and alternative compliance payments	• Medium or high

As a qualitative assessment, these ratings are intended only to suggest where states might concentrate their efforts towards increasing harmonization. In the next section, we look at possible steps that states could take towards harmonization in each area.

3. Strategies to Increase Harmonization

The options described below require, as a prerequisite, that states determine that increased harmonization is desirable. As discussed in Section 1, some states may prefer to contain or control their renewable energy markets. This review, especially the assessment of advantages and disadvantages, is based on the premise that REC fungibility, increased competition, broader markets and price transparency are beneficial from a public policy perspective.

Several studies of electricity markets have demonstrated the benefits of larger markets. For example, one study stated that a larger number of market participants and trading volume are important indicators of market liquidity. "A broader diversity of market participants dilutes market power opportunities and increases the universe of natural sellers and buyers as well as market makers." (ESAI 2007). Another study, assessing the expansion of PJM, concluded that the benefits of broader markets include increased trade, more diversity of supply, increased price transparency, better opportunities to hedge risks, increased liquidity, reduced transaction costs, and cost savings to wholesale customers and retail consumers (Krapels and Flemming 2005).

Even if states acknowledge these benefits, however, it must be recognized that most of these options would be politically challenging and come with substantive trade-offs. The feasibility of obtaining multi-state consensus on implementing these harmonization opportunities, and achieving regulatory or in many cases legislative approval, should not be underestimated.[6] It should be noted, however, that increased harmonization is not an "all or nothing" proposition. Increasing coordination among just a handful of states in a region and on just one or two policy issues can lead to stronger markets and demonstrate the merits of such harmonization to other jurisdictions.

Platform for considering harmonization

There are several means by which harmonization of RPS policies could be pursued. The first is the group for which this paper was undertaken. The Clean Energy States Alliance (CESA) is a nonprofit organization comprised of members from 16 clean energy funds and two state agencies. Its purpose is to provide information and technical services to its members and works with them to build and expand clean energy markets in the United States. Within CESA, Northeast and Mid-Atlantic states with RPS policies agreed in 2005 to share information about what is working in different states; to evaluate opportunities for regional cooperation, data sharing and coordinated fund support for RPS infrastructure; and to facilitate a means to pursue these designs or regional cooperation opportunities.

[6] Although it is understood why renewable energy is required to be built within a specific region, other energy resources are not similarly constrained by regulation. Traditional energy resource procurement is typically based on least-cost criteria with some recognition of environmental costs.

Beginning in 2008, CESA initiated a State-Federal RPS Collaborative. The primary purpose of the National RPS Collaborative is to establish a national dialogue and collaborative among state policy leaders, the U.S. Department of Energy, and other major RPS stakeholders to share information and examine opportunities for multi-state and federal cooperation in successful deployment of RPS programs.

Either of these collaboratives could provide a forum for this RPS harmonization discussion to take place.[7]

A third possible platform is available through the Environmental Tracking Network of North America (ETNNA).[8] Its purpose is to create a forum for the coordination and cooperation of systems issuing and tracking certificates of generation in North America.

ETNNA is a voluntary association of certificate tracking systems, regulators and interested market participants that are vested in preventing double-counting and promoting harmonization among certificate tracking systems in North America. Such harmonization will encourage trade, create a common currency for certificates of generation, prevent double counting, and support new and emerging markets. Although its focus is on tracking system operation, many of the harmonization issues it wants to address are similar to those facing state RPS administrators.

A final model that could be considered for states to pursue harmonization is the Regional Greenhouse Gas Initiative (RGGI).[9] States in the Northeast and Mid-Atlantic regions agreed to a memorandum of understanding, and hammered out a model rule to reduce carbon emissions from the power sector; implementation was still under the control of the individual states. Most of the ten states that are now participating required enabling legislation, and all of them are implementing through regulation. Although states have stayed close to the model rule, the process allows for some individual state tailoring, and broad stakeholder comment through the legislative and rule-making processes.

Applied to RPS harmonization, this approach would require a more formal commitment from each state to propose model RPS policies and rules, and a commitment to seek approval from their state legislature or regulators. This level of commitment and cooperation could lead to true regional RPSs.

Potential Effect of a National RPS

Efforts to harmonize RPS designs or rules across multiple states could be overwhelmed by the adoption of a national RPS. At a minimum, such a development in the near future would at least distract from this effort, and it is not unlikely that it could undermine the importance of regional cooperation altogether. It would also stretch regulatory staff resources at a time when states would have to focus on state-federal RPS interaction

[7] See http://www.cleanenergystates.org/jointprojects.html.
[8] This non-profit was recently incorporated after operating for several years as a program called the North American Association of Issuing Bodies. See http://www.resource-solutions.org/policy/etnna/
[9] See http://www.rggi.org.

3.1 Eligibility: resource, vintage and incremental generation

The first three design options described in Section 2 above are treated together in this section because the opportunities for harmonization are similar.

Option 1: Revise eligibility criteria

A group of interested states would agree to a voluntary process to achieve standardization of definitions of eligible resources, generator vintage, and treatment of incremental generation. It would make most sense initially to include just states that are served by a common electricity market, although other states might be invited to participate or observe. The Northeast and Mid-Atlantic RPS Collaborative has already developed draft model rules on resource eligibility, included as Appendix A.

To acknowledge the different resources and political realities of different states, perhaps this effort would focus only on the top class of renewable resources (sometimes referred to as Class I), ignoring the greater variety of resources supported by some states in other categories.[10] Another rationale for narrowing the focus in this way is that Class I standards typically encourage the development of new resources to which increased market liquidity and price transparency are more important for financing.

Advantages of the Option 1 Approach:

- Renewable energy and RECs become more fungible within the region
- Creates a wider market
- May create additional pricing transparency given greater trade
- Lowers compliance costs

Disadvantages of the Option 1 Approach:

- Politically challenging to pursue and no assurance of success
- Legislative action probably required
- Success in harmonization may require states to ignore certain state-specific concerns
- Changes to RPS rules, or even the risk of such changes, will create market instability
- Process may be administratively burdensome, consuming significant staff time, although as noted a model rule for resource eligibility has already been created by the Northeast and Mid-Atlantic states

Option 2: Accept Class I generation eligible in another state

If the process in Option 1 is viewed as too burdensome, states could negotiate reciprocity agreements among themselves. Accommodating the various differences in eligibility definitions, states would agree to accept Class I generation or RECs from each other for the good of new renewable development in general. Such agreements would preferably

[10] Many states refer to the group of new renewable resources as Class I or Tier 1, while existing resources (older generators) or non-renewable generators are labeled Class II, III or IV.

be multilateral to create larger markets, though bilateral agreements might be an easier first step if only two states can be found that agree on the benefits.

It may seem unlikely that states would accept generation that does not meet their specific eligibility criteria, but if compliance prices are high and the political pressure on the RPS is significant, it might be worth considering. On the other hand, reducing compliance prices can also be detrimental to new investment.

Advantages of the Option 2 Approach:

- May be quicker to achieve than actually revising and harmonizing eligibility criteria
- Reduces pressure on RPS compliance cost
- Certificates become more fungible within region
- Creates a wider market

Disadvantages of the Option 2 Approach:

- Lower prices reduce support for new renewable development
- Politically challenging to pursue and no assurance of success
- Legislative action probably required

Option 3: Discount generation from other states

This option is similar to Option 2 except that states would accept other state generation at a pre-determined discount instead of at par. As described by Berendt (2006), states would agree to recognize certain RECs eligible in other states on a reciprocal basis. Participating states would negotiate the value of the other state's RECs for compliance with the first state's RPS.

This negotiation is not based on the fact that a renewable generator may be certified for compliance in a given state even though it is located out of state. Instead, the negotiation is a matter of accepting RECs from generators that otherwise would not meet a state's eligibility criteria, due to differences in resource or vintage eligibility rules.

The result would be a schedule of conversion factors, posted by each participating state, that would be applied to generation or RECs within that state's RPS program. For example, a hydro plant eligible in Maine but ineligible in Connecticut because its capacity exceeds 5 MW might be accepted for compliance in Connecticut at a discount of 0.7. Fuel cells using non-renewable fuels are eligible in Connecticut but not in Maine, but because of the reciprocal agreement might be accepted in Maine at a different discount. Similarly, New Jersey, with a generator vintage requirement of 2003 or later, might accept, at a discount, energy or RECs eligible for Delaware's RPS with a vintage of 2000.

In negotiating these conversion factors or discounts, states might consider the degree of difference from a model rule or from their current resource and vintage eligibility definitions, and the degree to which the discounted criterion might contribute to in-state economic or environmental benefits.

Advantages of the Option 3 Approach:

- Certificates become more fungible within region
- Creates a wider market
- May be quicker to achieve than actually revising and harmonizing eligibility criteria
- Provides more flexibility for affected renewable generators
- Allows states to give preference to eligible resources while expanding options for compliance
- Reduces pressure on RPS compliance cost

Disadvantages of the Option 3 Approach:

- Politically challenging to pursue and no assurance of success
- Lower prices reduce support for new renewable development
- Negotiation among states may be challenging
- Difficulty of setting conversion factor schedule
- Legislative action probably required
- Undermines harmonization of alternative compliance payment levels (see Section 3.9), since REC values will vary depending on discount rules

3.2 Customer-sited facilities

Variations in the treatment of customer-sited facilities involve eligible criteria (resource type, vintage, size), geographic location, and measurement and verification. Possible ways to deal with eligibility criteria are described above, and geographic eligibility is discussed below. The assessment here is confined to measurement and verification, and only one option is presented.

Option 1: Seek multi-state consensus on measurement and verification

Working through the national and regional RPS collaboratives and the Clean Energy States Alliance, states would develop a model M&V protocol that each would endeavor to adopt.

M&V is also an issue for tracking systems, which have their own requirements for issuing certificates to small generation. For example, the North American Association of Issuing Bodies, now incorporated as the Environmental Tracking Network of North America (ETNNA), developed a best practices document for behind the meter generators (NAAIB 2006). As an example, their recommendations include the following:

- Generators that do not go through a control area settlements process should use a revenue-quality meter that meets the applicable ANSI C-12 standard.
- Generators less than 10 kW, however, may use engineering calculations to estimate generation output, but a standard estimation method is recommended. In addition, an independent verifier should spot-check these estimates.

- Generators 5 MW or larger should telemeter generation data to the control area operator or utility settlement system, or may use an independent third party to report their generation data to the tracking system operator.
- Generators under 5 MW may telemeter data, use a third party or self-report their generation to the tracking system operator, but the reporting protocol should be disclosed in the certificate data.

The collaborative could start by reviewing each state's requirements and points of difference, as well as the NAAIB/ETNNA document. The collaborative might also choose to include ETNNA or individual tracking system representatives in this discussion.

Advantages of the Option 1 Approach:

- Relatively easy place to start on harmonizing RPS policies
- Some groundwork already done by ETNNA
- Increases market size and trade for customer-sited generators

Disadvantages of the Option 1 Approach:

- The number of MWh generated by customer-sited systems is small relative to utility-scale generation used for RPS compliance
- Not a very big payoff in terms of broadening markets
- Changes in M&V requirements would in many cases require rulemaking with public comment, which could result in variants of the model rule

3.3 Geographic eligibility and energy delivery requirements

Typically, RPS legislation or regulation defines where generators must be sited to be compliance-eligible. This is usually within the region (where region is defined as coincident with an electricity control area, Independent System Operator or Regional Transmission Organization) or in an adjacent region that allows electricity to be imported to the region in which the RPS state is a part.[11]

For customer-sited generation, sometimes the same rules apply, and sometimes the customer-sited generation must be located in-state for eligibility. It is unlikely that customer-sited generation located in an adjacent region would attempt to be used for compliance in another region because the generating facility would be too small to schedule over transmission lines, and it would probably be too expensive for the small quantity of energy involved.

There are several options for broadening geographic eligibility, but none of them are easy to accomplish because geographic eligibility is directly linked to the relative priority of state RPS policies to support and encourage "local" (or at least regional) economic development.

[11] See Wiser and Barbose (2008) for a table summarizing state geographic eligibility rules.

Option 1: Broaden facility geographic eligibility

Broadening eligibility could entail a range of program changes in different states depending on where their eligibility rules now stand. For example, states with in-state requirements for customer-sited generation could broaden eligibility to include generators located in other states within the same control area.[12] And states that already have broader geographic eligibility, such as regional or adjacent region location requirements, could broaden eligibility to location anywhere in the United States—or further within free-trade countries.

In the interest of broadening markets, however, perhaps the most reasonable and effective measure would be to allow eligibility to any generator located in the ISO serving the state, or any ISO serving the state in cases where a state is served by more than one. This is already the case in New England, New York, and the Mid-Atlantic states, where there is general consistency for facility eligibility. It works in New England, and for the PJM states, because multiple states are served by common electricity markets.

RPS states in these regions already accept RECs from facilities in adjacent control areas if energy is also delivered into their own electricity market. If they want to broaden markets beyond that, they could consider a reciprocity agreement among RPS states served by PJM, New York and NEPOOL to accept RECs from facilities in any of these control areas without energy delivery (see Option 2).

Many areas of the country are not served by an ISO or integrated regional electricity markets. Instead there are sometimes numerous small control areas. In many cases, a control area operated by a utility is simply not sufficient to support a strong REC market. To enlarge renewable energy markets, RPS states in this situation could name adjacent control areas or states where eligible facilities may be located. They could require energy delivery to their state or more broadly to any of the named control areas or states.

Advantages of the Option 1 Approach:

- Provides more flexibility for compliance at less cost
- Could lead to larger and more liquid markets
- If states within an ISO or other large region were to agree to a common rule, it would help standardize eligibility and simplify trade within the region

Disadvantages of the Option 1 Approach:

- Politically difficult unless supply is very tight and not expected to grow much
- Lessens environmental and economic development benefits for states with low to modest renewable resource potential, while increasing benefits for other states with high potential
- If market size is expanded quickly, resulting lower prices could undercut investments made in expectation of high prices

[12] Many states offer financial incentives for the installation of customer-sited systems within the state, making it politically challenging to allow the RECs from those systems go out of state.

- Legislative action probably required

Option 2: Relax energy delivery requirements

Most states that accept renewable generation located in an adjacent region nevertheless require that energy be delivered from the adjacent region into the region serving the state. In this option, states would continue the same geographic location criteria but generators located in those adjacent regions would not be required to deliver energy into the region serving the state. The RECs from those generators in adjacent regions, however, would still count towards the state RPS. The receiving state would accept unbundled RECs from specified adjacent areas.

Though politically challenging, this could break down barriers to use of unbundled RECs throughout the country. The North Carolina RPS provides an example of allowing unbundled RECs from anywhere outside the state, but use of out of state unbundled RECs is limited to 25% of required compliance.[13] The remainder must be met using in-state generation or generation with energy delivered to the obligated entity.

Another approach that states may wish to explore is the approach used by the Colorado RPS. It has no restriction on the location of eligible generation or RECs creation, but it encourages in-state generation by the use of a credit multiplier. Eligible electricity generated in Colorado receives 125% credit for RPS-compliance purposes.[14]

A less drastic relaxation of energy delivery requirements would be to address the requirements in many states (and tracking systems) for hourly matching of generation and energy delivery as the basis for importing RECs from an adjacent region. Although ISOs would still need energy imports to be scheduled hourly, and to show transmission system reservations, state RPS rules (and taking the lead from the states, certificate tracking system rules) could require more simply that certificates may be accepted if they match the number of MWh delivered into the region serving the state over the period of a month or a quarter, allowing for a true-up within the regular cycle used by tracking systems to create certificates. Thus, instead of issuing imported certificates based on the lesser of scheduled energy deliveries and actual deliveries within each hour, the tracking system would issue certificates only for the number of MWh imported during the monthly or quarterly issuing period. Rules could require delivery from the specific renewable generating unit at any time within the certificate issuing period of the importing tracking system, or, as in California, they could allow an energy import from another source as

[13] Obligated entities with fewer than 150,000 customers are not limited in the amount of out-of-state RECs they may use to meet the standard.

[14] This credit multiplier was part of the ballot initiative that was voted into law. In the first year of compliance (2007), most of the non-solar compliance is from in-state wind and hydro except for a small share of out-of-state wind that one utility already had under contract. The solar requirement was partially satisfied by a purchase of RECs from out of state because the utilities did not yet have their in-state solar projects up and running. Some observers feel that the political preference for in-state resources is a stronger motivator than the 125% credit multiplier (Mignogna 2008).

long as the amount of energy and the number of RECs produced from the two facilities match within the issuing period.

Relaxing energy delivery requirements could also be used in conjunction with Option 1, broadening geographic eligibility.

Advantages of the Option 2 Approach:

- Provides more flexibility for compliance at less cost
- Could lead to larger and more liquid markets
- Greenhouse gas emission reductions, even if created outside the region, would still be beneficial because the greenhouse effect is global, not just local

Disadvantages of the Option 2 Approach:

- Politically difficult unless supply is very tight and not expected to grow much
- If market size is expanded quickly, resulting lower prices could undercut investments made in expectation of high prices
- Additional energy would have to be imported to displace more environmentally damaging plants in region to create some of the desired environmental benefits
- Legislative action probably required

Option 3: Use geographic eligibility as a flexibility mechanism

States would expand geographic eligibility (Option 1) or relax energy delivery requirements (Option 2) only if certain supply conditions are demonstrated. For example, expanded geographic eligibility could be triggered if alternative compliance payments are used for 50% or more of the requirement (in aggregate, not for just one obligated entity) for three years in a row. For states that do not provide for alternative compliance payments or penalties, the threshold could be non-compliance for 50% or more of the requirement for three years in a row. The numbers 50% and three years are for illustration only—the higher the threshold, the less likely geographic eligibility would be expanded.

This approach is analogous to the Regional Greenhouse Gas Initiative rule that allows a specified percent of carbon offsets to be used for compliance in lieu of emission allowances if the price of carbon allowances exceeds a certain threshold, and the percent allowed rises if a higher threshold is exceeded.

This approach is also somewhat similar to the Illinois approach to geographic eligibility, which specifies first in-state resources unless there is insufficient eligible generation that is cost-effective, and then specifies resources from adjoining states, again unless there is insufficient cost-effective resources, and then allows generation from other regions. After 2011, equal preference is to be given to resources located in-state and in adjoining states.

Advantages of the Option 3 Approach:

- Provides more flexibility for compliance at less cost
- Could lead to larger and more liquid markets

- Might be more feasible than simply expanding geographic eligibility or removing energy delivery requirements across the board because the trigger set-points are known and the rationale is agreed upon in advance

Disadvantages of the Option 3 Approach:

- Somewhat complicated and uncertain whether it will have any effect
- Might be subject to gaming, whereby obligated entities purposefully don't comply because they hope to be granted the flexibility and access to (potentially) cheaper energy supply or unbundled RECs
- Legislative action probably required

3.4 RPS structure

Many states have established portfolio requirements for separate resource categories. This is a basic RPS policy design issue, essentially a foundation of the policy. It would not be easy to harmonize this aspect of RPS design across states when it is almost always established in legislation in response to various stakeholders and interest groups. It is difficult to tinker with a foundation; harmonization, if it is to be pursued, must be focused on the foundation itself. Thus there are few options to consider.

Option 1: Standardize resource categories

States would meet to develop a model policy design. They would have to agree on resource categories, including for example solar, other renewables, perhaps eligibility date for new resources, alternative (non-renewable) energy, energy efficiency—and let each state then adopt requirements for those categories they wish to support. States might adopt only one or two of the categories, or all of them, but whatever categories they adopt would be similar, and thus solar would be the same, other renewables would be the same, new renewables would be the same, etc.

Advantages of the Option 1 Approach:

- Renewable energy and RECs become more fungible within the region
- Creates a wider market
- May lower prices because of increased competition within each category
- May create additional pricing transparency given greater trade within category

Disadvantages of the Option 1 Approach:

- Politically challenging to pursue and no assurance of success
- Legislative action probably required
- Changes to RPS rules, or even the risk of such changes, will create market instability
- Process may be administratively burdensome, consuming significant staff time

3.5 Credit multipliers

Credit multipliers for preferred resources may distort REC markets in a region if RECs are in short supply. In that case, RECs may gravitate to states with the multipliers. As noted previously, the effect of credit multipliers can depend on the presence and level of an alternative compliance payment in neighboring states. The effect on markets may be modest, except to the extent that supply is lower than it would have been without the multipliers.

Option 1: Limit credit multipliers to in-state resources

If credit multipliers were limited to in-state generation, RECs from these eligible facilities would be likely to be used for RPS compliance in-state.

Advantages of the Option 1 Approach:

- Limits market distortion of REC gravitation away from other states towards the state with the credit multiplier

Disadvantages of the Option 1 Approach:

- Restricts the market size for a potentially small benefit
- Supply is marginally lower than it would have been
- Legislative action probably required
- Changes to RPS rules, or even the risk of such changes, will create market instability

Option 2: Standardize credit multipliers within market region

States within a region would agree on whether to offer credit multipliers, to what resources, and the size of the multipliers.

Advantages of the Option 1 Approach:

- Removes any market distortion by eliminating incentive for REC gravitation or different prices
- Creates a wider market
- May lower prices because of increased competition within each category
- May create additional pricing transparency given greater trade within category

Disadvantages of the Option 1 Approach:

- Politically challenging to pursue and no assurance of success
- Benefits are modest—market distortion is unlikely unless demand exceeds supply
- Legislative action probably required
- Changes to RPS rules, or even the risk of such changes, will create market instability
- Process may be administratively burdensome, consuming significant staff time

3.6 Compliance mechanism: RECs or no RECs

As described in Section 2.1.7, most states (especially in the Northeast) already allow unbundled RECs within a region to be used for RPS compliance. For those few states that do not allow RECs to be traded separately from electricity,[15] it is a binary choice: either they allow RECs to be traded, or they do not. Of course, there are ways of allowing REC trading while at the same time constraining it. For example, a state could allow unbundled REC trading within the state only if the electricity is generated within the state or, if the generator is out of state, after it is delivered into the state. In effect, that state would be saying that RECs are allowed, but would place a geographic constraint on their origin.

Since most states already allow RECs for RPS compliance, this paper here considers what could be done to facilitate trade and price discovery.

Option 1: Require greater REC price transparency

Currently, what we know about REC prices generally comes from two sources: trades reported by REC brokers, and the degree to which obligated entities turn to alternative compliance payments. Broker reporting, in fact, has been very important to analysts and regulators trying to understand REC markets. Brokered deals, however, cover only a portion of the market. By definition, they do not include bilateral deals struck without their assistance, and generally do not include long-term contracts.

To get a bigger picture, states could require that obligated entities report to the regulatory agency prices paid for RECs. A few states do this now. Maryland and the District of Columbia require electricity suppliers to report the price paid for RECs used for compliance, and Pennsylvania requires the RPS administrator to report the average cost of compliance. Other states that regulate the obligated entities typically allow utilities to recover costs of compliance; this would require that costs be reported at some point, so the question would be whether this information could be publicized in a timely way useful to market competition.

Prices for each transaction, of course, are sensitive, proprietary information, so regulators might require that each entity report not each transaction, but rather the total volume and cost for each month or for each quarter. To further protect confidentiality, regulators could then aggregate reports from all entities and publish average prices for the period. This would enable market participants to determine more easily price trends, and they would likely become more competitive.

Advantages of the Option 1 Approach:

- Price trends are more evident to regulators and to market participants
- Offered prices and bids would tend to be more competitive

[15] Even in these states, RECs are often purchased by businesses and organizations for voluntary purposes, but here the discussion is restricted to RECs used for RPS compliance.

- May support development of forward price curves, essential to project finance
- Likely to require only administrative changes

Disadvantages of the Option 1 Approach:

- Resistance by obligated entities and developers or generators to reporting requirements, despite confidentiality protections
- Concerns that transparent price reporting may actually increase renewable energy pricing when renewable energy demand exceeds supply

Option 2: Encourage a common REC trading platform

Most states that allow RECs have designated or established REC tracking systems as an efficient way to avoid double-counting by tracking the issuance and ownership of RECs, but they do not establish a trading platform. Generally they leave it to the trading parties to find each other and strike deals, either on their own or with the assistance of brokers.

Trading RECs in a central exchange or a trading floor would help reveal prices, help create a price index that could be tracked, and help develop future price curves. For example, the Green Exchange was created in early 2008 by the New York Mercantile Exchange (NYMEX) and Evolution Markets, an environmental products and energy brokerage.[16] It is currently trading EU carbon credits as well as U.S. NOx and SO2 emission allowances. A news report states that the Green Exchange will begin trading renewable energy credits and voluntary carbon credits later in 2008.

Since exchanges are competitive ventures and require a lot of volume to be profitable, it is unlikely that small regional exchanges would be viable, but states could encourage reliance on exchange trading to help provide greater price transparency. For an exchange to be liquid, greater harmonization of RPS policies may be prerequisites (see especially Sections 3.1, 3.2, 3.3, 3.6, and 3.7).

Advantages of the Option 2 Approach:

- Price trends are more evident to regulators and to market participants
- Offered prices and bids would tend to be more competitive
- May support development of forward price curves, which are essential to project finance

Disadvantages of the Option 2 Approach:

- Volume of each type of REC (by state, by class) may be insufficient to warrant significant levels of trading on the exchange
- To reach volume, states may need to pursue greater harmonization of eligibility criteria, REC definitions, among other policy options
- May be perceived as not being an appropriate state role

[16] See http://www.greenfutures.com. It is regulated by the U.S. Commodities Future Trading Commission.

3.7 REC definitions

State REC definitions vary considerably, and theoretically this can make it difficult to sell them interchangeably from one state to another. Tracking systems serving these diverse states, however, standardize all the information about various attributes specified by the most demanding state definition.

Thus, although a state may define a REC as simply a unit equivalent to a MWh, the RECs issued by the tracking system will include information about resource type, vintage, geographic location, etc. because this information is important to other states, and indeed may be important even to the state with the minimal definition.

REC definitions are especially important when it comes to attributes that have a market value if sold separately from the REC itself. In particular, there are markets for emission reductions, and a renewable plant entitled to an emissions reduction credit or allowance could sell that attribute separately from the REC and still use the REC for RPS compliance if the state where the REC is used does not include that attribute in its REC definition.

As described in Section 2.1.8, most states have not addressed whether a REC used for RPS compliance purposes must include any available emission reduction credits or allowances, and this leads directly to the first option for consideration.

Option 1: Define whether emission reduction credits or allowances are included

Regardless of whether or not a state decides to include emission reduction credits or allowances in a REC definition, states could address the question in rulemaking and remove any ambiguity about what is expected for compliance. States can look to the examples from Arizona, California, Colorado, New York and Washington (included), or from Delaware, North Carolina and Pennsylvania (not included).

Advantages of the Option 1 Approach:

- Removes uncertainty in the market whether a REC must include specified attributes
- Not particularly difficult to do since each state determines its own preference
- Likely to require only administrative changes

Disadvantages of the Option 1 Approach:

- Administrative rulemaking cost (but could be included with other RPS clarifications)
- Merely defining whether specific attributes are included with a REC provides no benefits in terms of harmonization and broader markets.

Option 2: Standardize to a model REC definition

States would work together to try to reach consensus on a model definition for RECs and the attributes that are part of a REC. As with standardizing resource eligibility criteria, it

may make most sense initially to focus discussion among states within a common electricity market, because that is where most REC trading occurs, but a national conversation would also be useful. States would discuss and evaluate what is the best practice for a REC definition, adopt a model rule, and pledge to work to advance adoption of the rule across states.

Most states (and tracking systems) do not disaggregate the individual attributes of a REC. This may be a starting point for a harmonization discussion, but most states are silent as to whether emission reduction credits or allowances must be included for RPS compliance (Holt and Wiser 2007). In resolving this question, states would need to consider whether they expect the RPS to reduce emissions (implying that credits or allowances must be included for compliance, if the renewable generators are entitled to them), or whether they expect the RPS to reduce the cost of compliance with the emission reduction program (implying that emission credits or allowances need not be included). It should be noted that under a cap-and-trade program, renewable generators may not be entitled to emission credits or allowances, and in the absence of a cap-and-trade program, there may be less market pressure to split off the emission reduction attribute.

The Regional Greenhouse Gas Initiative (RGGI) again provides an example of a framework and process for states to develop an agreement on REC definitions. States also could participate in the CESA regional and national RPS Collaboratives to further such a definition.

Advantages of the Option 2 Approach:

- Renewable energy and RECs become more fungible within region
- Creates wider, more competitive REC markets
- Reduces current ambiguity

Disadvantages of the Option 2 Approach:

- Politically challenging to pursue and no assurance of success
- Process may be administratively burdensome, consuming significant staff time

3.8 Flexibility mechanisms (REC banking and borrowing)

REC banking and borrowing is intended to provide obligated entities flexibility if RECs are plentiful or scarce, respectively. Banking and borrowing can also smooth out REC price fluctuations. Despite these benefits, the presence or absence of these flexibility mechanisms in RPS states may have little effect on larger and more liquid REC markets. Nevertheless, “banking/borrowing” harmonization across states may make it easier for obligated entities to manage their REC accounts, especially if they face RPS obligations in more than one state with different rules.

Option 1: Standardize banking and borrowing across states

States would meet to consider best practices for banking and borrowing (including a standardized REC lifespan), adopt a model rule or practice, and pledge to try to adopt it in rules. This could be one of several items on a harmonization agenda through the CESA national or regional RPS Collaboratives.

Advantages of the Option 1 Approach:

- May be easier than some other options because there is less parochial interest riding on this design option
- May have a modest effect on wider, more competitive REC markets

Disadvantages of the Option 1 Approach:

- May be a low priority because it will have modest effect on expanding markets
- May require legislative changes for something that provides a modest benefit

3.9 Cost caps and alternative compliance payments

If different states within the same market rely on different types of cost caps or different alternative compliance payment (ACP) levels, suppliers (generators or REC providers) will gravitate towards states with the more severe consequences of non-compliance. When renewable energy demands exceed available supply, the RPS in states with higher cost caps will be satisfied first, while the RPS in states with lower cost caps may not be satisfied and obligated entities may be forced to rely more frequently on the capping mechanism. States that think they are getting off cheaply because of their lower cost cap will find that their policies are less likely to motivate new investment in renewable generation.

Harmonized cost cap mechanisms will avoid distorting the market response to different RPS requirements and will provide a more effective signal for investment in new renewables if the cost of compliance is the same or nearly so across states and regions.

Option 1: Standardize cost caps within market region

To harmonize cost control mechanisms and ACP levels would require that RPS states within a region work towards a consensus on the preferred mechanism and cost control levels. They would have to agree on the approach—cap on retail rate increases, per customer cap, financial penalty or alternative compliance payment, etc. Then they would have to agree to eliminate or narrow differences between the cost control levels. For example, if reliance on an ACP is the preferred mechanism, the actual level of the ACP would have to be agreed among RPS states in the renewable supply region.
As with resource eligibility, it might be helpful to focus first on the top class of renewable resources (sometimes referred to as Class I), because other classes of resources generally have a greater variety of eligible resources, which could force different cost caps. Also, because these Class I resources tend to encourage the development of new

renewables, harmonization may be more important to send a clearer price signal for financing new projects.

Advantages of the Option 1 Approach:

- Reduces market distortion
- Avoids market balkanization
- Creates more liquid and competitive REC markets, and as a result improved price transparency
- Provides greater certainty for project investment decisions
- Might be achieved through administrative actions alone

Disadvantages of the Option 1 Approach:

- States have to be convinced that they would be better off, and their RPS goals would be more effectively met, if they adopt similar cost caps
- Politically challenging to pursue
- Process may be time-consuming of administrative resources

3.10 Summary

Table 4 summarizes the options discussed for harmonizing state RPS policies to benefit from larger markets. Table 4 lists each option for harmonization, and for each shows the estimated benefit to expanded and more liquid markets and the political difficulty of tackling and accomplishing the change in policy. The assessments shown in Table 4 are merely the author's judgment and are certainly arguable.

Table 4. Assessment of Policy Change Options

Topic / Option	Description	Benefit to Markets	Political Difficulty
3.1	Eligibility: resource, vintage and incremental generation		
Option 1	Revise eligibility criteria	Medium	High
Option 2	Accept Class I generation eligible in another state	High	High
Option 3	Discount Class I generation from other states	Medium	High
3.2	Customer-sited facilities		
Option 1	Seek multi-state consensus on measurement and verification	Low	Low
3.3	Geographic eligibility		
Option 1	Broaden facility geographic eligibility	High	High
Option 2	Relax energy delivery requirements	High	High
Option 3	Use geographic eligibility as a flexibility mechanism	Medium	Medium
3.4	RPS structure		
Option 1	Standardize resource categories	Medium	High
3.5	Credit multipliers		
Option 1	Limit credit multipliers to in-state resources	Low	Low-Med.
Option 2	Standardize credit multipliers within market region	Low	Medium
3.6	Compliance mechanism: RECs or no RECs		

Option 1	Require greater REC price transparency	Medium	Low-Med.
Option 2	Encourage a common REC trading platform	Medium	Low-Med.
3.7	REC definitions		
Option 1	Define whether emission reduction attributes are included	Medium	Low
Option 2	Standardize to a model REC definition	High	Medium
3.8	Flexibility mechanisms (REC banking and borrowing)		
Option 1	Standardize banking and borrowing across states	Low	Medium
3.9	Cost caps and Alternative Compliance Payments		
Option 1	Standardize cost caps within market region	High	High

4. Conclusions

There is no lack of opportunities to harmonize state RPS policies and in the process to broaden renewable energy markets. Those policy options that could have the strongest impact on creating larger, more competitive markets, however, tend to be politically difficult to accomplish because they require significant changes in policy and may run counter to individual state interests. There are relatively few policy adjustments that might be easy, and those that may be judged easy tend to have little impact on creating larger markets, though they may offer other administrative benefits.

If states are convinced that the benefits of increased RPS harmonization are worth the effort, they would do well to start by making their own assessment of the benefits and challenges of each option in Table 4 before deciding which areas to target for further work. If they want to address options with potentially big effects, they might start by examining RPS eligibility criteria, geographic eligibility, or cost caps and ACPs. On the other hand, if they are inclined to start with easier steps first, they could consider standardizing M&V protocols for customer-sited generation, credit multipliers, or REC banking and borrowing rules.

The CESA RPS Collaborative is well-positioned to consider these options as a group because its members consist of state RPS program administrators. The RPS Collaborative could agree first on the priority issues it will address, and the rationale for tackling these issues. If the issues can be addressed administratively, through a rule-making process for which the state utility commission has authority, then the RPS Collaborative may be sufficient to lead to greater harmonization.

In many instances, however, and in most instances that would lead to bigger and more competitive markets, legislative changes would be required. Seeking legislative approval for a collaborative approach will require significant political commitment from high levels of state governments, in the mold of the multi-state RGGI process. The RGGI process required roughly three years to see the states achieve legislation and harmonized rules. Of course, RGGI was breaking new ground in a number of ways. Perhaps adjustments to multiple RPS programs would not be so ground-breaking, and therefore not so lengthy, but nevertheless it would require the political support of governors, utility commissions, and state legislative leaders—a daunting task.

Short of existing RPS states making major changes to their RPS rules, states considering the adoption of RPS laws, or developing RPS rules, would do well to consider the effects of their policies on larger markets, with particular attention to the RPS policies of their neighbors in their electricity region. Attention to these details prior to RPS adoption could make their entry into RPS markets smoother and less costly.

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Appendix A: Northeast and Mid-Atlantic RPS Collaborative Members

Alaska · Alaska Energy Authority
Arizona · Arizona Department of Commerce-Energy Office
California · California Energy Commission
Colorado · Governor's Energy Office - Renewable Energy Programs
Connecticut · Connecticut Clean Energy Fund
Illinois · Illinois Clean Energy Community Foundation
Maryland · Maryland Energy Administration
Massachusetts · Massachusetts Technology Collaborative Renewable Energy Trust
Minnesota · Xcel Energy Renewable Development Fund
New Jersey · New Jersey BPU Clean Energy Program
New Mexico · New Mexico Energy, Minerals and Natural Resources Dept. Energy Conservation and Management Division
New York · New York State Energy Research and Development Authority (NYSERDA)
Ohio · Ohio Dept. of Development - Ohio Energy Office
Oregon · Energy Trust of Oregon
Pennsylvania · Pennsylvania Electric Company Sustainable Energy Fund of the Community Foundation for the Alleghenies
· Sustainable Development Fund of The Reinvestment Fund
· West Penn Power Sustainable Energy Fund
· Metropolitan Edison Company Sustainable Energy Fund of the Berks County Community Foundation
Rhode Island · Rhode Island Renewable Energy Fund
Vermont · Vermont Clean Energy Development Fund
Wisconsin · Wisconsin Focus on Energy

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.

Below is a suggested model definition of each renewable energy resource and the rationale for the definition.[1]

MODEL RESOURCE ELIGIBILITY DEFINITIONS

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.

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[1] These recommendations do not address other eligibility issues such as whether existing renewable facilities should be included, should generators be required to meet location requirements, should states establish resource tiers, etc.

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.