Final Report
Best Practices for Effective Renewable Energy Credit Programs
A Report to the Great Lakes Renewable Energy Association

Clean Energy States Alliance
December 2008

Pursuant to a contract with the Great Lakes Renewable Energy Association, the Clean Energy States Alliance (CESA) provides the following report to identify key best practices to facilitate use of renewable energy credits (RECs) in state RPS programs.

CESA was asked to research and analyze current state RPS policies and REC trading programs, including energy efficiency standards and "white tag" policies. The scope of the research included assessment of accepted methods of defining, monitoring, measuring, and verifying RECs used by states across the country. The specific issues that CESA was asked to examine:

- The degree to which RECs are allowed under existing state RPS programs
- Definitions of renewable energy attributes that should be included in RECs to meet RPS obligations
- The major elements of existing REC trading systems
- How RECs from voluntary green power programs are treated in mandatory RPS programs

Based on this research, CESA was asked to develop "best practice" recommendations and key components to facilitate trading of RECs.

The following report provides CESA's recommendations on "best practices" for REC trading, based on the experience and program elements of existing state RPS laws.[1]

1. Use of RECs for Compliance with Renewable Energy Requirements

Twenty six states and the District of Columbia have adopted RPS policies. The vast majority of these programs allow the use of renewable energy certificates or credits as a mechanism to facilitate markets for renewable energy. The ability to separate the electricity commodity from the renewable attributes gives load-serving entities (LSE) with limited access to renewable energy resources the ability to purchase RECs to be applied to the RPS obligations, regardless of where the generator is located or where the

[1] The recommendations in this report do not represent the position of any particular state member of CESA.

Clean Energy States Alliance • 50 State Street • Montpelier, VT 05602
(802) 223-2554 • fax (802) 223-4967
Email: MSinclair@cleanegroup.org
www.cleanenergystates.org

energy is delivered. This allows an LSE to avoid the costs associated with accommodating the physical delivery of the energy. By removing these costs, utilities have greater flexibility in terms of how and what resources to rely on to achieve RPS goals, reducing compliance costs.

RECs have many advantages:

- The use of RECs frees renewable energy sellers from the need to deliver renewable electricity in real time to users.
- RECs provide an accurate, durable record of what was produced and a fungible commodity that can traded among suppliers.
- The use of RECs can reduce the cost of compliance by providing access to a larger quantity and geographic scope of resource options. Use of RECs allows utilities to seek the lowest cost renewable energy attributes regardless of where the RECs are generated.
- RECs provide compliance flexibility, facilitating market trading and increasing market liquidity.
- RECs provide verification of compliance with an RPS.
- RECs facilitate transactions across regional boundaries, because they are not subject to the same geographic constraints as commodity electricity.
- RECs can reduce transmission costs.
- RECs eliminate the temporal mismatch between generation profile and demand profile, because RECs are separate from electricity.
- RECs usually can be banked for a period of time, thereby helping to avoid issues of generation intermittency and load-matching between seller and buyer.

For these reasons, RECs have become the dominate mechanism for RPS compliance. See Figure 13. Most of the states with RPS mandates allow RECs to be used for compliance purposes. In fact, only four states, California, Iowa, Hawaii and Arizona, do not allow the use of unbundled RECS for RPS compliance.[2]

A majority of states go further and *require* use of RECs for RPS compliance demonstration.[3] In these states, electricity suppliers may choose to use RECs on a bundled or unbundled basis, but compliance is proven by virtue of REC ownership.

Some of the states that allow use of RECs address the preference for in-state benefits by requiring that imported RECs have an equivalent amount of electricity delivered into the region to displace in-region dirtier generation.

Best Practice Recommendation:

CESA recommends that state RPS programs require the use of RECs because they offer

---

[2] California is considering use of unbundled and tradable RECS and under recent legislation, the Public Utilities Commission is explicitly allowed to authorize the use of RECs once it determines that a tracking system is operational.

[3] Colorado, CT, DE, MD, MA, MT, NJ, NM, PA, RI and DC.

the most common and effective method to track compliance in existing RPS structures. RECs also encourage renewable generation by providing an additional revenue source. To ensure an effective REC trading program, a state should establish a legal mechanism to authorize a formal and legally recognized transfer of ownership of RECs. To that end, a state should establish RPS rules that specify the following:

- An obligated utility may transfer the REC to another party and may acquire RECs from another party.
- A REC is owned by the owner of the eligible renewable energy resource from which it was derived unless specifically transferred.
- All transfers of RECS shall be appropriately documented to demonstrate that the energy associated with the REC meets the eligibility requirements of the RPS.
- Any contract by a LSE for purchase or sale of RECs to meet the RPS shall explicitly describe the transfer of rights concerning the RECs.

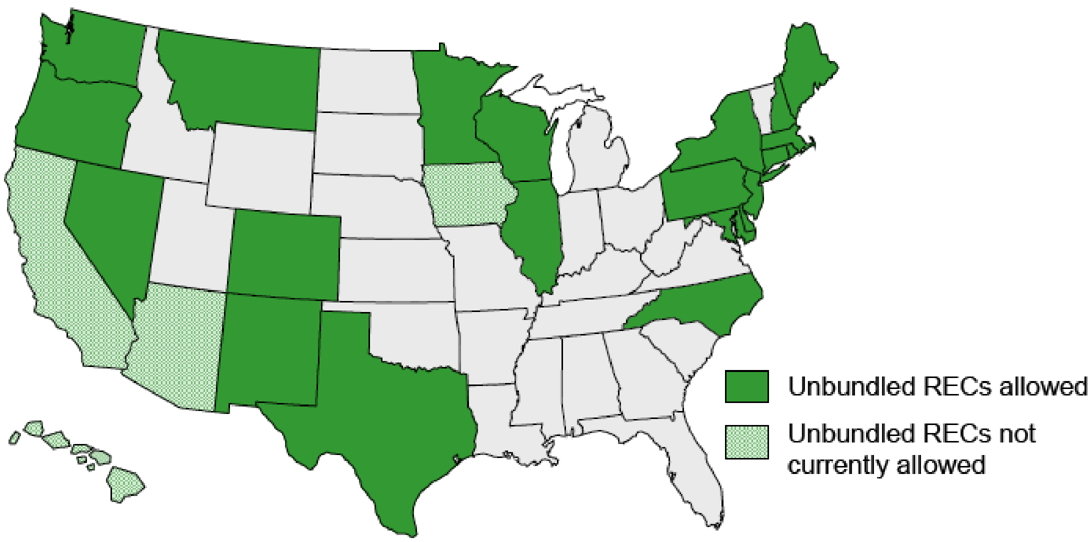


Figure 1. . **Treatment of Unbundled RECs for State RPS Compliance**

Table 1. REC Recognition and Renewable Attribute Tracking for State RPS Policies

RPS State	Unbundled RECs Currently Allowed?	Attributes Tracking Currently Used	Comments
AZ	No*	manual	WREGIS expected operational in 2007
CA	No**	manual	May allow unbundled RECs after WREGIS is operational
CO	Yes (RECs required)	manual	WREGIS expected operational in 2007
CT	Yes (RECs required)	NEPOOL GIS	Electronic tracking system operational
DE	Yes (RECs required)	PJM-EIS GATS	Electronic tracking system operational
DC	Yes (RECs required)	PJM-EIS GATS	Electronic tracking system operational
HI	Not determined	manual	Rules not developed
IA	No	manual	RPS requirements completed
ME	Yes	NEPOOL GIS	Electronic tracking system operational
MD	Yes (RECs required)	PJM-EIS GATS	Electronic tracking system operational
MA	Yes (RECs required)	NEPOOL GIS	Electronic tracking system operational
MN	No	manual	New legislation calls for REC program by January 1, 2008
MT	Yes (RECs required)	manual	WREGIS expected operational in 2007
NV	Yes	manual	WREGIS expected operational in 2007
NJ	Yes (RECs required)	PJM-EIS GATS SREC	Electronic tracking system operational
NM	Yes (RECs required)	manual	Anticipates regional tracking system by 1/1/2009 at the latest (WREGIS)
NY	Yes	manual	Planning for new tracking system
PA	Yes (RECs required)	PJM-EIS GATS	Electronic tracking system operational
RI	Yes (RECs required)	NEPOOL GIS	Electronic tracking system operational
TX	Yes	ERCOT RECs Program	Electronic tracking system operational
WA	Yes	manual	WREGIS expected operational in 2007
WI	Yes	WIRRC	Electronic tracking system operational

* By Arizona's definition, RECs bundled with electricity are required. By our definition of a REC that *may be* unbundled from electricity, Arizona does not allow RECs.
** California regulators may choose to allow unbundled RECs in the future, once a tracking system is operational. California's current RPS rules allow some flexibility in electricity delivery, and therefore do allow a certain amount of implicit use of RECs unbundling already.

Table from Holt & Wiser, *The Treatment of Renewable Energy Certificates, Emission Allowances, and Green Power Programs in State RPS* (April 2007).

2. **<u>Tracking System Requirements under REC Programs</u>**

CESA's first recommendation – that states require RECs as an effective generation attribute accounting mechanism and RPS compliance demonstration – requires establishment of an effective tracking system. A REC-based compliance system must require certification of renewable generators and employ a robust REC tracking system. A proper REC tracking system acts as an accounting and verification mechanism and ensures that RECs are not double counted.

The most reliable method to prevent double-counting and ensure transparency is to establish a single certificate accounting system in a geographic area. The system should be responsible for creating RECs and tracking transfers of ownership until final retirement. Individual renewable generators should first be registered, or certified, as eligible in order for their RECs to qualify for compliance under the state RPS. Formal recording mechanisms should be designed to accomplish three purposes: (1) create a REC and document its attributes, (2) transfer title of the REC from inception through the commercial transaction chain, and (3) retire the REC.

A REC tracking system should be designed to provide a straightforward means of determining who has claim to renewable attributes. This should be achieved through a system of accounts, with an account for each eligible entity, whether utility, generator, or third-party intermediary. Every time a REC transaction occurs, the traded RECs should be removed from the account of the seller and into the account of the buyer, contingent on confirmation by the buyer and seller that the transaction occurred.

At a minimum, a tracking system must be able to:

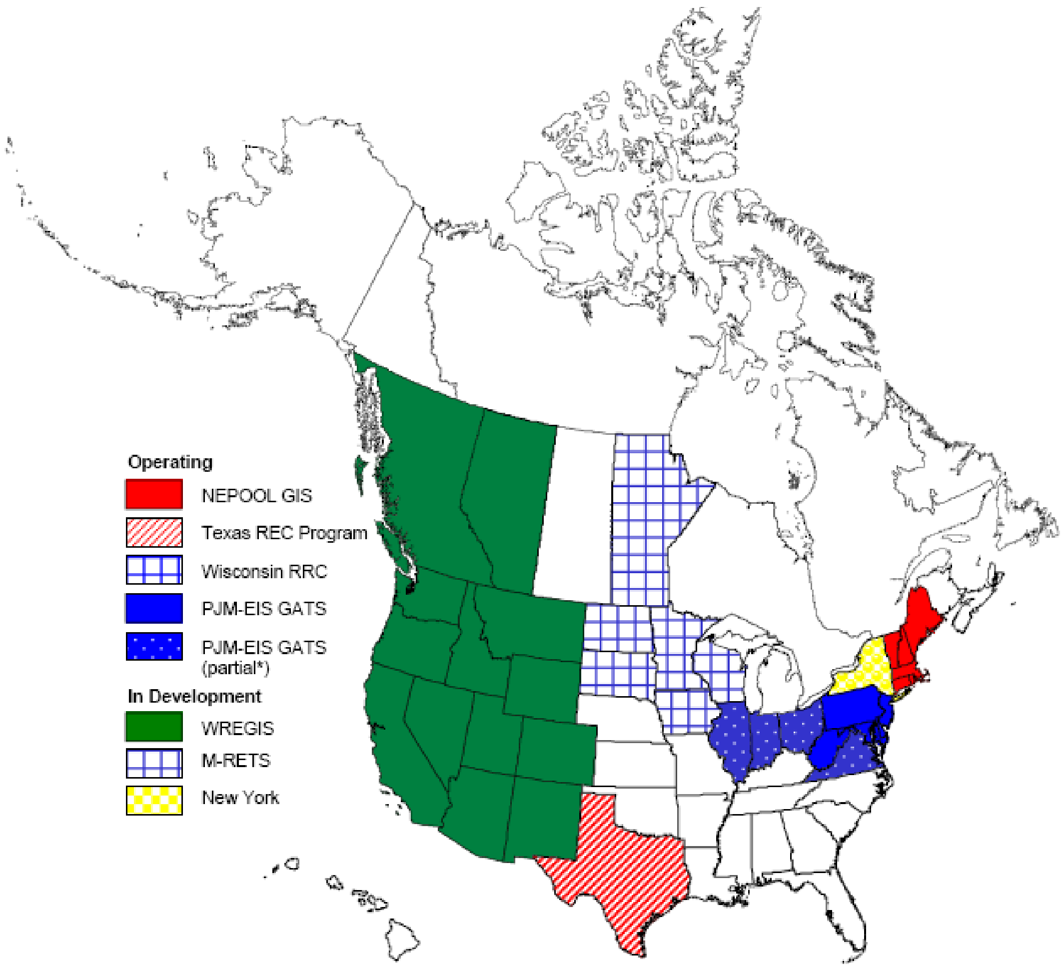
1. issue RECS based on a determination of how much energy is generated and by whom, consistent with generator eligibility criteria
2. support various rules governing REC eligibility for additional trading
3. track REC transactions by providing a channel through which trades are confirmed by both buyer and seller, and REC ownership is transferred.

The appropriate venue for REC tracking also must be selected. REC tracking can be performed by a state agency, a third party, or by the obligated utilities. However, regional REC tracking systems provide the best, most economic mechanism for states in a common region to easily verify and trace REC ownership.

Regional and multi-state tracking systems have advantages over single state systems. The primary benefits of a larger geographic scope are increased competition, greater market liquidity, increased REC fungibility, and minimization of seams issues (i.e., REC import and export between tracking systems). To be effective, however, a regional tracking system must be able to track RECs to encompass the environmental attributes referenced by the *most comprehensive* state RPS and market definitions in order to meet the needs of all state RPS and voluntary market programs using the system.

REC tracking systems are now operating in Texas/ERCOT, New Jersey (solar only), New England, PJM, the Midwest, and Western grid regions. An additional REC trading system is under development in New York. See Figures 1 and 12.

It should be noted that these systems do not have the capability to separate certificates for each attribute that can be sold and tracked on a disaggregated basis. Any attribute that is sold necessarily involves the sale of the entire REC, and embodies all underlying attributes (see description below).



* GATS (partial) indicates that portions of these states, and others not similarly indicated, are within the PJM footprint.

** New Jersey also supports a separate Solar RECs tracking system.

Figure 2. . **Web-based Certificate Tracking Systems in North America**

Figure from Holt & Wiser, *The Treatment of Renewable Energy Certificates, Emission Allowances, and Green Power Programs in State RPS* (April 2007).

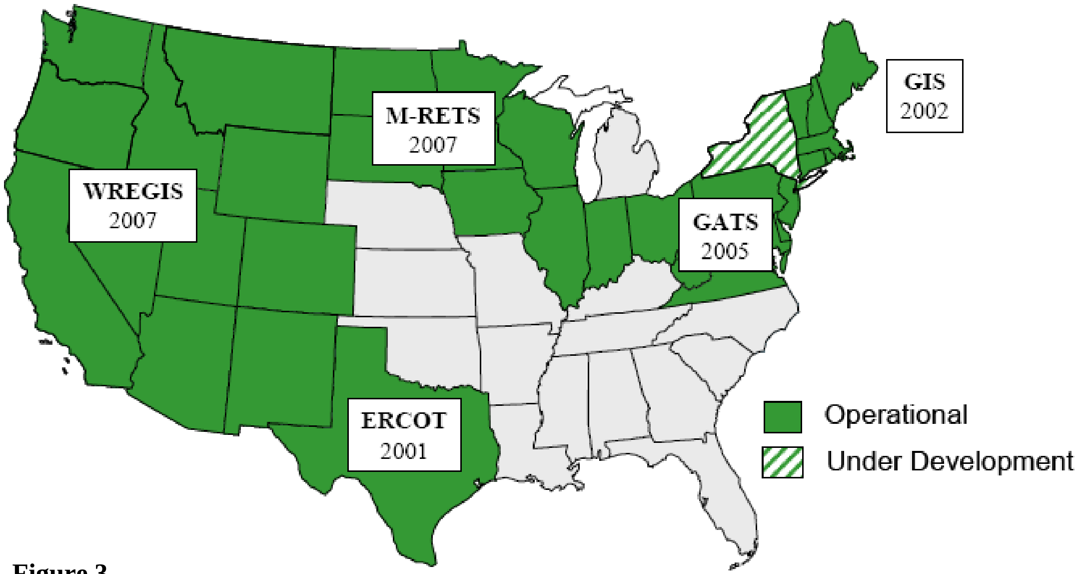


Figure 3. Electronic Certificate Tracking Systems and Year of Initiation

Best Practice Recommendation:

Use of RECS for RPS compliance requires establishment of a functioning, robust, transparent tracking system. A single certificate accounting system covering a geographic region that is responsible for creating RECs and tracking transfers of ownership until final retirement provides a reliable method of ensuring that RECs are not double-counted.

The existing regional tracking systems – M-RETs or PJM GATS – can provide a good platform for states in the Great Lakes region to support a regional REC issuing and accounting system.[4] While CESA was not asked to investigate how to advance or establish a single regional tracking system to serve the Great Lakes states, both M-RETs and PJM GATS systems should be able to mitigate seams issues between the adjoining markets to allow trading and tracking of certificates across the entire Great Lakes region.

The MRETS and GATS systems also both define a REC as encompassing "all of the attributes" of renewable generation and should accommodate the most comprehensive state RPS REC definitions. [5]

---

[4] M-RETS tracks renewable generation located within the state and provincial boundaries of Minnesota, Iowa, North Dakota, South Dakota, Wisconsin, Illinois and Manitoba.
[5] See Midwest Renewable Energy Tracking System Operating Procedures, July 2, 2007, www.mrets.net/resources/M-RETS-**Operating-Procedures**-07.0**2.2007**.pdf ;
Generation Attribute Tracking System (GATS) Operating Rules, May 10, 2006, http://www.pjm-eis.com/documents/documents.html

3. Preventing Double Counting

To ensure an effective REC trading program, many RPS states have developed clear rules and a mechanism to effectuate the retirement of RECs. Specifically, state RPS rules should provide that once a REC is used for compliance with an RPS, the REC must be retired and cannot be sold again or used for future compliance, to mitigate the potential for double counting.

To be effective, RPS administrative rules should expressly state the circumstances under which a REC is no longer valid for use in the program and effectively permanently retire the REC from use. This should occur in four situations: (1) the certificate is used to meet retail load of a utility, (2) the certificate is used to meet an RPS, (3) the certificate is sold as part of a REC-only product, and (4) the REC reaches the end of its regulatory defined life.

States such as Massachusetts and California have addressed this issue through precise, effective regulatory language.

Massachusetts has established a general ban on the double use of RECs: “a retail electricity supplier shall demonstrate to the satisfaction of [the state agency] that new renewable generation attributes used for compliance [with the RPS] have not otherwise been, nor will be, sold, retired, claimed or represented as part of electrical energy output or sales, or used to satisfy obligations in jurisdictions other than Massachusetts.” 225 CMR 14.08(1); www.state.ma.us/doer/rps/regs.htm.

The California Legislature enacted California Public Utilities Code, Section 399.16(a)(2) to prevent REC double-counting: “a renewable energy credit shall be counted only once for compliance with the renewables portfolio standard of this state or any other state, or for verifying retail product claims in this or any other state.” Id.

Best Practice Recommendation:

It is critical to the integrity of a REC market that renewable energy be counted once and only once. To ensure this, a state should establish an RPS rule to the effect that a renewable energy credit shall be counted only once for compliance with the renewables portfolio standard of this state or any other state, or for verifying retail product claims in this or any other state.

4. Treatment of Green Power Sales

Obviously, if a state allows voluntary purchases for RPS compliance, suppliers will have an easier time meeting RPS requirements. However, the majority of states have determined that counting voluntary market sales toward RPS compliance undermines a key objective of green markets – that an individual consumer’s voluntary purchase supports renewable energy development over and above that which would occur in the absence of such choice as a result of state mandates, for which all customers share the cost.

Therefore, the majority of RPS states *explicitly disallow* voluntary renewable energy sales for use towards RPS compliance purposes, instead requiring that green power sales are supplemental to state RPS mandates. In fact, more than a dozen states and the District of Columbia explicitly prohibit voluntary purchases of renewable energy from fulfilling RPS mandates.[6] Only the states of Arizona, Texas, and Wisconsin expressly allow such voluntary transactions to be used for RPS compliance.

A few states, however, provide exceptions to this no double-counting rule. In Delaware, Maine, and Rhode Island, the RPS legislation allows a percentage (up to the state mandate level) of individual, voluntary, green power purchases to count toward fulfillment of the RPS. Therefore, if a customer purchases 100% renewable energy, in Maine where the RPS requirement is 30%, 30% of the voluntary purchase can count toward the RPS.

In Maryland, renewable energy that is sold in the voluntary market is deducted from the baseline electricity sales used to determine the amount of sales necessary to fulfill the state RPS – so suppliers can reduce their absolute RPS obligation by increasing voluntary sales.

In Colorado, RECs sold in the voluntary market can be counted toward the RPS if the Public Utilities Commission provides approval.

The major arguments against and for allowing voluntary green power sales to be used for RPS compliance are as follows:

Against:

- Consumers who voluntarily pay more for renewable energy expect to promote additional development above legal requirements. To protect these consumers, voluntary green power sales should be prohibited to satisfy separate RPS mandates.

- If consumers are aware that the renewable energy they are buying is required by law and would be generated without their contributions, participation in voluntary demand programs will be undercut and harmed.

- Allowing voluntary RE sales to count towards RPS compliance shifts the costs of RPS compliance to those willing to pay more rather than distributing the costs equitably to all energy users.

For:

- Promoting green power products is merely another tool for a utility to achieve the same portfolio goal.

---

[6] Representative of the rationale for this prohibition is the determination by the Minnesota Public Utility Commission that counting green pricing sales toward the RPS requirements is not consistent with the public interest or with other state energy policies to encourage renewable energy development.

- If green sales can be counted towards the RPS, it lowers the cost of compliance to other ratepayers.

CESA believes that the more credible and equitable policy approach is to explicitly disallow voluntary energy sales to be used for RPS compliance purposes. Among the states that take this position, there are a number of variations and exceptions in approach. The most noteworthy state practices follow:

- New York State splits its RPS component into two distinct components: 24% mandatory RPS and 1% voluntary goal.

- The D.C. district's prohibition rule is simple and direct: "An electricity supplier shall not apply any renewable energy credits derived from voluntary purchases of energy from qualified renewable sources toward its mandatory compliance requirements." *See* Chapter 29 Rules and Regulations governing the Renewable Energy Portfolio Standard as provided in D.C. Official Code §§ 34-1431 -34-1439.

- California adopted an express statutory prohibition to the effect that: a renewable energy credit shall be counted only once for compliance with the renewable portfolio standard of this state or any other state, or for verifying retail product claims in this state or any other state. *See* California Public Utilities Code, Section 399.16(a)(2).

- In New Mexico, a regulation has been adopted that states that renewable energy sold to customers through a premium-priced renewable energy tariff shall not be counted in determining compliance with the RPS rule.

- Washington's RPS statute states that an obligated utility may not count (i) eligible renewable resources or distributed generation where the associated renewable energy credits are owned by a separate entity or (ii) eligible renewable resources or renewable energy credits obtained for or used in an optional green pricing program.

- Massachusetts has established a general ban on the double use of RECs: "a retail electricity supplier shall demonstrate … that new renewable generation attributes used for compliance [with the RPS] have not otherwise been, nor will be, sold, retired, claimed or represented as part of electrical energy output or sales, or used to satisfy obligations in jurisdictions other than Massachusetts." 225 CMR 14.08(1)

Best Practice Recommendation:

Since the primary purpose of an RPS is to stimulate renewable energy development and enable a wider market – not to limit total demand for renewable energy – states should prevent the use of a REC for both a voluntary market and for the RPS obligation. A simple, best state practice approach to serve this objective is to explicitly state that the same renewable energy shall not be used for more than one of the following: (1) compliance with the renewable portfolio standard of this state or any other state, or (2) for any voluntary clean electricity market or program in this state or any other state.

5. Renewable Energy Certificate Definitions

RECs represent the attributes of electricity generated by renewable energy sources. That is, a REC represents more than just the environmental benefits of renewables; it is the sum of all the benefits of renewable energy, known as attributes, even if there is not a market for some of the benefits.

However, across state RPS programs, there is a significant debate about the definition of a REC and its associated attributes, driven by the interaction between RECs and emissions markets. This definitional issue can lead to fragmentation of and less liquidity in REC markets, and reduce the value of RECs.

RECs include both primary attributes and derived attributes. "Primary" attributes include:

- Energy source
- Generation technology
- Facility location
- Vintage (when certificate created)
- Direct emissions from the facility

"Derived" attributes are the avoided emissions from fossil fuel facilities displaced by renewable generation, including CO2, CH4, nitrous oxide, CO and particulate matter.

States have defined REC and their associated attributes for purposes of state RPS policy in differing ways. In fact, many of the RPS states have somewhat ambiguous REC definitions that prevent more liquid markets. An overview of the various state approaches follows:

- Several states, including NY and California, have established detailed definitions of a REC, including clear direction that a REC includes all renewable and environmental attributes, including derived attributes such as avoided emissions.

- Seven states (CT, MA, MT, NJ, NJ, RI, and TX) define RECs as including all the environmental and renewable attributes of generation, but are not clear as to whether derived attributes are included.

- Wisconsin, Nevada and DC define a REC simply as a unit of production.

- Iowa, Hawaii, and Minnesota do not define RECs.

- Maine and Maryland refer to RECs as representing attributes of generation but do not define them.[7]

Despite the state variation, the concept that a REC incorporates all environmental

[7] ETNNA, Treatment of Environmental Attributes Across Tracking Systems (July, 2008).

attributes as well as the resource type, location, and vintage of the generator is generally agreed upon and supported by the major tracking systems and leading RPS states. The leading RPS states, including states such as Texas, California, NY, and New Jersey, define RECs as including all the environmental attributes of the renewable generator. California and New York's definitions are the most inclusive and specific, with clear inclusion of derived attributes.

The major regional REC tracking systems – the PJM GATS, ERCOT, WREGIS, and M-RETS – also have working definitions that a REC includes all environmental attributes (e.g., "all of the attributes", "all of the renewable attributes" or "all renewable and environmental attributes"). Although NEPOOL GIS does not have a definition, the participating states generally use similar language.[8]

Best Practice Recommendation:

Harmonizing and clarifying state REC definitions will create more liquid markets and reduce confusion and the potential for fraud.

A REC definition that includes all environmental attributes (direct and derived) is the more credible and more practical practice, given policy precedent, the difficulties in tracking separate attributes, and the fact that REC markets have been operating for many years under a definition that assumes all environmental attributes are included. It also is important that renewable energy credits have no relationship to other credit trading programs to avoid disaggregating the attributes associated with renewable energy generation and reducing the value of a REC.

CESA recommends use of the California's Public Utility Commission's (CPUC) definition of a REC as a comprehensive and clear definition that includes all attributes, both direct and derived. In California, a REC includes all renewable and environmental attributes associated with the production of electricity from the eligible renewable energy resource.[9]

<u>CPUC definition of RECs</u>:

"Environmental Attributes" means any and all credits, benefits, emissions reductions, offsets, and allowances, howsoever entitled, directly attributable to the generation from the Unit(s). Environmental Attributes include but are not limited to: (1) any avoided emissions of pollutants to the air, soil or water such as sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO) and other pollutants; (2) any avoided emissions of carbon dioxide (CO2), methane (CH4) and other greenhouse gases (GHGs) that have been determined by the United Nations Intergovernmental Panel on Climate Change to contribute to the actual or potential threat of altering the Earth's climate by trapping

[8] ETNNA, Treatment of Environmental Attributes Across Tracking Systems (July, 2008).
[9] (except for an emissions reduction credit issued pursuant to Section 40709 of the Health and Safety Code and any credits or payments associated with the reduction of solid waste and treatment benefits created by the utilization of biomass or biogas fuels).

heat in the atmosphere; and (3) the reporting rights to these avoided emissions such as Green Tag Reporting Rights. Green Tag Reporting Rights are the right of a Green Tag Purchaser to report the ownership of accumulated Green Tags in compliance with federal or state law, if applicable, and to a federal or state agency or any other party at the Green Tag Purchaser's discretion, and include without limitation those Green Tag Reporting Rights accruing under Section 1605(b) of The Energy Policy Act of 1992 and any present or future federal, state, or local law, regulation or bill, and international or foreign emissions trading program. Green Tags are accumulated on kWh basis and one Green Tag represents the Environmental Attributes associated with one (1) MWh of energy. Environmental Attributes do not include (i) any energy, capacity, reliability or other power attributes from the Unit(s),(ii) production tax credits associated with the construction or operation of the energy projects and other financial incentives in the form of credits, reductions, or allowances associated with the project that are applicable to a state or federal income taxation obligation, (iii) fuel-related subsidies or "tipping fees" that may be paid to Seller to accept certain fuels, or local subsidies received by the generator for the destruction of particular pre-existing pollutants or the promotion of local environmental benefits, or (iv) emission reduction credits encumbered or used by the Unit(s) for compliance with local, state, or federal operating and/or air quality permits. If Seller's Unit(s) is a biomass or landfill gas facility and Seller receives any tradable Environmental Attributes based on the greenhouse gas reduction benefits attributed to its fuel usage, it shall provide Buyer with sufficient Environmental Attributes to ensure that there are zero net GHGs associated with the production of electricity from such facility."

New York State’s REC definition is similar to that of California and also serves as a best practice.

New York State’s definition of attributes includes all environmental attributes, as specified in NYSERDA’s solicitations of renewable energy attributes for compliance with its RPS:

“RPS-eligible Attributes shall mean all environmental characteristics, claims, credits, benefits, emissions reductions, offsets, allowances, allocations, howsoever characterized, denominated, measured or entitled, attributable to the generation of actual eligible production by a facility. One RPS-eligible attribute shall be created upon the generation by a facility of one MWh of actual eligible production. RPS-eligible attributes include but are not limited to: (i) any direct emissions of pollutants to the air, soil or water; (ii) any avoided emissions of pollutants to the air, soil or water including but not limited to sulfur oxides (SOx), nitrogen oxides (NO), carbon monoxide (CO), particulate matter and other pollutants; (iii) any avoided emissions of carbon dioxide (CO2), methane (CH4) and other greenhouse gases (GHGs) that have been or may be determined by the United Nations Intergovernmental Panel on Climate Change to contribute to the actual or potential threat of altering the Earth’s climate by trapping heat in the atmosphere; (iv) all set-aside allowances and/or allocations from emissions trading programs, including but not limited to allocations available under 6 NYCRR §§ 204, 237 and 238; and (v) all credits, certificates, registrations, recordations, or other memorializations of whatever

type or sort, representing any of the above. If the bid facility is a biomass or landfill gas facility and the seller receives any tradable credits, benefits, emissions reductions, offsets, and allowances based on the greenhouse gas reduction benefits attributed not to the production of electricity but rather to its fuel production, collection, conversion or usage, it shall provide NYSERDA or its designee with sufficient credits, benefits, emissions reductions, offsets, and allowances to ensure that there are zero net GHGs associated with the production of electricity from such facility.

RPS-eligible attributes do not include (i) any energy, capacity, reliability or other power products, such as ancillary services; (ii) production tax credits associated with the construction or operation of the facility or other financial incentives in the form of credits, reductions, or allowances associated with the facility that are applicable to a state or federal income taxation obligation; (iii) fuel-related subsidies or "tipping fees" that may be paid to the Seller to accept certain fuels, or local subsidies received by the generator for the destruction of particular pre-existing pollutants or the promotion of local environmental benefits; or (iv) emission reduction credits encumbered or used by the facility for compliance with local, state, or federal operating and/or air quality permits."

6. Shelf Life of RECs & Banking

Shelf Life

Another important element of a REC regime is the rules dictating when RECs can be traded, relative to the date of creation. A state's RPS rules must specify the time period in which a REC remain viable for compliance purpose, known as the REC shelf life. Among existing RPS structures, the shelf life ranges from as little as three months to as long as three years. Because renewable generation can vary on a seasonal and annual basis, longer REC life increases the ability of the market to reach equilibrium. However, expanding the shelf life of a REC will tend to lower the price of RECs, potentially reducing the incentive to invest in the state.

Several states have established a three year shelf life to RECs (e.g., Texas, Washington D.C.). This provides utilities that have the majority of RECs under long-term contract with a strong incentive to sell their RECs, thereby encouraging market liquidity.

Banking

Banking is a tool that states may use to give utilities flexibility in compliance with RPS mandates. Banking is the ability of utilities to apply RECs purchased in a given compliance period in excess of their RPS obligations in that period to future compliance periods. For example, a utility might be allowed to purchase RECs in 2008 to be applied toward their RPS obligation in 2009. The converse, borrowing, is also sometimes allowed to facilitate compliance (e.g. applying 2008 purchases toward a 2007 obligation).

Some period of banking is justified to overcome problems created by the seasonality of some renewable energy generation and the need to maintain a competitive and liquid REC market. Some renewables, such as wind, solar, and hydro, experience seasonal output fluctuations. Allowing banking helps utilities meet their obligations by allowing RECs to be banked in periods of high output and applied to periods of low output.

The advantage of banking is to give utilities the ability to purchase excess RECs when they are low cost, and apply them toward their compliance goals when they are high cost. These inter-temporal trades moderate price swings in the market by decoupling the timing of compliance purchases from when RECs are generated. The ability to bank reduces the risk of substantial price volatility in REC markets.

Most states impose time limits on the amount of time that RECs can be banked, as a way to reduce the extent to which banked RECs compete with new RECs generated during a given compliance period. Limiting the time for banking RECs helps to maintain market liquidity, by giving holders of excess RECs a strong incentive to sell prior to the end of the authorized banking period.

States have established varying rules on the allowable banking period. Banking periods of the existing RPS programs vary from 3 months to several years. Short banking periods defeat the purpose of banking by limiting compliance flexibility and not allowing enough of a bridge between times of high and low seasonal output. Short banking periods also create artificial shortage within a compliance period, driving up prices. Conversely, extensive banking periods can allow market players to exercise market power by hoarding RECs.

Massachusetts, Delaware, Maryland and D.C. all allow a three year banking period, while California allows indefinite banking.

Best Practice Recommendation:

Whether a state adopts a longer REC shelf life or banking, it is important to place some finite limit on REC life, or an oversupply of vintage RECS could reduce demand for new production.

CESA recommends that states establish a three year shelf life. Recommended language:

A REC shall be valid for a three-year period from the date of generation beginning January l, of each calendar year, except where precluded by statute. The last business day of January of each year shall be the deadline for the creation of RECs for the previous year, subject to further changes in regional tracking system's provisions.

Banking also should be allowed but for a finite duration to encourage market liquidity and ensure that the RPS provides ongoing demand for renewable generation. Limits to the share of an obligation in any compliance period that can be met through use of banked RECs also should be considered as a means to promote market liquidity and continuous demand for renewable energy.

For these reasons, the Massachusetts RPS approach to REC banking has merit. Utilities are allowed to bank RECs procured in excess of compliance needs for up to three years. However, the number of RECs that a utility is allowed to bank is limited to a maximum of 30% of the number of RECs they are required to hold in the compliance period in which the RECs were created. Once banked, the RECs cannot be resold. Further, the ability to bank RECs for use in future compliance periods is limited to the utility exclusively, not to aggregators or brokers.

This approach appears reasonable for several reasons. First, prohibiting the resale of banked RECs limits opportunities to hoard RECs for purposes of driving up REC prices. Second, the 30% limitation prevents a utility from procuring the entire amount of RECs if needs to achieve its RPS goals in multiple years in a single compliance period, resulting in uneven demand for RECs and renewable energy.

7. Various REC Ownership Issues

REC markets can be hampered by issues over ownership. For example, REC ownership is often not specified in many PURPA contracts between utilities and qualifying facilities, in most state net-metering laws, and in situations where generators receive financial incentives from public funds. To reduce market uncertainty, states should clearly address REC property rights in RPS rules.

Contract Recommendation:

State RPS rules should require that all renewable energy contracts entered into for RPS compliance purposes stipulate the exact disposition of the renewable attributes or RECs.

PURPA Contracts

PURPA requires utilities to purchase the output from certain Qualifying Facilities (QF), including renewable energy generators, at the utility's avoided cost. Because power purchase agreements did not contemplate RECs until recently, older PURPA contracts are silent regarding which party owns the RECs. FERC has ruled that, under PURPA, QF power purchase contracts do not automatically convey RECs to the purchasing utility, absent an express contract provision, and leaves this ownership issue to states to decide under state law. *See* 105 FERC ¶ 61,002 (2003). Since the FERC decision, most of the states that have ruled on this issue have determined that renewable QF project attributes are conveyed to the power purchaser, thereby allowing a utility to own the associated RECs.

PURPA REC Ownership Recommendation:

CESA recommends that states establish that RECs associated with renewable power under PURPA contracts be retired on behalf of utility ratepayers. If this position is adopted, then neither the utility nor the facility owner has the right to sell RECs from energy purchased under PURPA contracts (barring contract language to the contrary).

This prevents either party from receiving a windfall that was not contemplated in the PURPA contracting process.

REC Ownership under Net Metering

Most net metering laws are silent on who owns the RECs that result from customer-owned systems. However, in general, states have determined that RECs from a net-metered system belong to the generator unless the utility is paying a renewable premium for the electricity.

New Jersey has perhaps the best approach to this issue with clear rules that state that net-metered customers own the RECs and may participate in New Jersey's Solar REC program, which provides a means for solar certificates to be created and verified. New Jersey's program also allows the certificates to be sold to electric suppliers to meet their solar RPS requirement. This approach has facilitated the development of small solar PV systems and provided an effective means to finance customer-owned PV systems

Net Metering REC Recommendation:

RECs from net-metered generation should flow to the owner of the generation unit for all the electricity that is generated and used on-site. If, however, a utility is paying the customer an above-market rate for electricity generated in excess of the customer's on-site usage, the RECs should flow to the utility.

REC Ownership for Systems Receiving Subsidies

Some states claim ownership of the RECs from customer-sited and owned systems for which they have provided grants or rebates. This makes sense from a public policy perspective as the public is subsidizing the renewable system. However, the legal transfer of a REC to the state should be established in rule or statute and the system owner should be informed clearly that the transfer of RECs is a condition of receiving funding from the state.

REC Ownership Recommendation for Publicly Subsidized Projects

A state best practice here is the approach employed by the Energy Trust of Oregon, a nonprofit administrator of public funding for renewable energy, with funding provided from a system benefit charge. The Trust subsidizes the above-market costs of renewable energy systems through its grant program. In exchange, the Trust takes ownership of the publicly-subsidized proportion of the RECs that the systems produce over the life of the system. The Trust may retain, transfer or sell the RECs it owns to further the goals of the Trust and ratepayers. Through this approach, the Trust is able to leverage its public funding to support more renewable energy system deployment.

8. Greater Harmonization of State RPS Resource Eligibility Definitions

Although RECs are now widely used as the preferred means to demonstrate RPS compliance, REC definitions are not uniform. For example, states define REC differently based on various eligible resource definitions and limitations on generator location and electricity delivery. As a result, there are multiple state and regional markets for RECS and fungibility of these markets is limited.

In particular, state definitions of resource eligibility vary widely among states, hindering REC trading and fragmenting wider REC markets. The use by states in a region of common RPS resource eligibility definitions has merit for several reasons and could lead to more robust REC trading and markets.

First, use of common eligibility definitions by states serves a primary 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 regions 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.

Second, use of common definitions allows 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.

Third, the use of common and clear definitions reduces 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.

Fourth, common state resource eligibility definitions will advance the development of a larger spot market for renewable energy attributes. Spot markets are valuable to provide more efficient market operation by providing publicly available pricing information to help inform market participant. Without adequate market volume, a spot market is unlikely to develop. The result today is that the majority of REC sales are bilateral.

Finally, use of common definitions by states allows 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.

Best Practice Recommendation:

While there is no single, ideal way to define eligible RPS resources, there is merit in states considering the use of clear, common definitions of renewable resources. To that end, in 2007, ten states in the Northeast/Mid-Atlantic region developed a set of model resource eligibility definitions. In developing these definitions, the states 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 where warranted and consistent with the major RPS policy objectives; and considered special issues associated with specific technologies and fuels (i.e. unique characteristics of hydropower and biomass).

The definitions listed in Appendix A are recommended by CESA as a way to provide a common RPS eligibility foundation while maintaining 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 make case-specific rulings on the forms of technology that should receive market preference or to continuously revise the mandate to include new technologies that may be developed.

9. Geographic Eligibility

Differing geographic eligibility requirements by states hinder REC trading and markets. Today, geographic eligibility and electricity delivery rules differ greatly among RPS states. Some RPS policies require that an eligible facility be located in-state or directly connected to the state grid. Other states are less restrictive, requiring only that energy be delivered to a regional control area or regional transmission organization.

Table 3. Geographic Eligibility and Electricity Delivery Requirements (Main Tier of Each State's RPS)

Geographic Eligibility and Delivery Requirements	States	Notes
In-state generation requirement	HI, IA	IA: also allows location in broader utility service area
In-region generation requirement	MN, OR, PA	MN: RECs originating within M-RETS; OR: WECC for unbundled RECs, U.S. portion of WECC and delivered to LSE for renewable electricity; PA: PJM projects for all LSEs, MISO projects for some LSEs
Electricity delivery required to state or to LSE		
Direct transmission inter-tie between generators and state	NV, TX	NV: allows limited sharing of transmission inter-tie with other generators; TX disallows such sharing
Broader delivery requirements to state or to LSE	AZ, CA, MT, NM, NY, WI	CA: relaxed scheduling allows shaped/firmed products; NY: strict hourly scheduling to state and strong preference for in-state resources in solicitation process; WI: projects must be owned by or under contract to LSE
Electricity delivery required to broader region		
Generators anywhere outside region must deliver electricity to region	DE, ME, NJ, WA	DE: also provides credit multipliers for in-state wind installed before 2013; NJ: resources outside PJM must be "new"; WA: if outside Pacific Northwest, requires delivery to state
Generators in limited areas outside region must deliver electricity to region	CT, DC, MA, MD, NH, RI	All: renewable facilities must be located in control areas adjacent to state's ISO; DC & MD: LSEs may also purchase unbundled RECs (without electricity delivery) from states that are adjacent to PJM
In-state generation encouragement		
In-state multipliers	CO	No restriction on location of RECs creation, but credit multiplier for in-state projects (DE also provides in-state encouragement through multipliers)
Cost-effectiveness test	IL	In-state unless insufficient cost-effective resources, then from adjoining states, then from other regions; after 2011, equal preference to in-state and adjoining states
Limit on RECs from out-of-state generators	NC	Up to 25% compliance can be met with unbundled RECs from outside state (no limit for one LSE, Dominion); remainder must be in-state or delivered to LSE

Wiser & Barbose, *Renewables Portfolio Standards in the United States: A Status Report with Data Through 2007* (April 2008).

From a policy perspective, there are several benefits from a broadly defined REC market or geographic scope of eligibility for generation attributes. The policy considerations, however, are complicated by the fact that many of the benefits of renewable generation are regional or global while some are local.

The advantages of broader geographic eligibility are:

- Developing renewable resources where the all-in costs and relative environmental impacts from siting are lowest is the most effective means to maximize renewable generation.
- Renewable generation provides climate change benefits and reduces fuel prices, regardless of location.
- Regional development of renewable resources can reduce compliance costs for state ratepayers.

- Broader geographic eligibility is less subject to legal challenge under the interstate commerce clause of the U.S. Constitution.

Unconstrained geographic eligibility is best suited to meeting global or national environmental objectives. For example, a REC transaction will be more effective if the RE generator can be located in a region in which the relative incremental cost of the renewable energy is lowest and/or the CO2 emissions displacement per unit of energy is proportionately highest.

On the other hand, if local or regional objectives drive an RPS, such as in-state development, a state may want to limit geographic eligibility, while foregoing some cost savings that could be achieved if regional resources could be tapped.

Best Practice Recommendation:

States should consider allowing unbundled RECs to satisfy an RPS without geographic constraint or an electricity delivery requirement. Short of this, states should consider use of larger geographic area eligibility definitions within which utilities can purchase and trade RECs from a broad region to apply against their RPS obligations. This will lower the overall costs of compliance because an expanded set of low cost renewable resources can be developed under an unbundled REC structure. In addition, by expanding the number of potential suppliers, broader geographic eligibility reduces the ability of any participant to corner the market or otherwise exert market power.

10. Treatment of Energy Efficiency in RPS Programs

An energy efficiency portfolio standard (EEPS) (also known as an energy efficiency resource standard or EERS) is a state policy which requires electricity providers to offset a specific portion of their electricity demands with energy efficiency measures. An EEPS sets an electric and/or gas energy savings target for utilities, sometimes with flexibility to achieve the target through a market-based trading system. [10]

Currently, 13 states have established an energy efficiency portfolio standard or other energy efficiency requirement and there are proposals being considered by New York State and New Jersey. In the Great Lakes region, the state of Ohio recently passed a combined RPS/EEPS.

Under an EERS, utilities are required to implement energy efficiency programs sufficient to reduce annual load by a certain percentage below the prior year. These laws also give utilities the right to recover the cost of implementing these programs subject to various prudency tests and rate caps. A summary of these programs is in Table 1. Several other states (IA, MN, OR, WI, etc.) have ratepayer-funded efficiency programs but they do not have mandated energy savings requirements.

---

[10] Sometimes distribution system efficiency improvements and combined heat and power systems and other high-efficiency distributed generation systems are included in the EEPS.

Table 3a. Energy Efficiency Portfolio Standards Policies of the States

State	EE Savings Requirement	Can Purchase Energy Efficiency Credits?	Combined with RPS?
Texas	20% of demand growth	No	No
Hawaii	Under 20% RPS by 2020, energy efficiency is allowed to qualify up to 50%. No EE minimums or maximums	No	Yes
Nevada	Energy efficiency allowed to meet up to 25% of 20% RPS	Yes	Yes
Connecticut	RPS modified to include efficiency, 2% of load in 2008, rising to 4% by 2010 from Class III resources, such as energy efficiency and CHP	Yes, through auction or can purchase credits from PUC if necessary.	Yes
California	Energy savings goal of 23,000 GWh by 2013, 4885 MW peak	No	No
Vermont	1% of prior year demand	No	No
Pennsylvania	Energy efficiency is eligible resource in Tier II of alternative energy portfolio standard (AEP = 4% rising to 10% by 2021). No minimum efficiency target	No	Yes.
Illinois	0.2% of prior year demand rising to 2.0% by 2015.	No.	No.
New Jersey (pending)	Utility efficiency goals still under development. The Board of Public Utilities authorized to adopt electric and gas energy efficiency portfolio standard, with goals as high as 20% savings by 2020 relative to predicted consumption	Yes as proposed -- can purchase certificates from 3rd parties upon approval of BPU	No.
Colorado	Per settlement agreement, Xcel Energy to deploy 40 MW/year (cumulative to 320 MW demand	No	No

	reduction and 800 GWh of electricity savings by 2013; equal to 0.4% of current annual demand). In 2007, CO legislature requires PUC to establish energy savings goals for all utilities		
Ohio	25% RPS; Tier 2 includes energy efficiency (and advanced nuclear and clean coal) up to 12.5%; also established separate EEPS requiring 22.5% demand reduction by 2025	No	Yes. Portion of RPS can be met with energy efficiency; but also separate EEPS
North Carolina	Utilities must obtain renewable energy and energy efficiency savings of 3% of prior year sales in 2012, rising to 12.5% in 2021. Energy efficiency is capped at 25% of 2012-2018 targets and at 40% of 2021 target	No	Yes
Minnesota	Legislation enacted in 2007 to achieve 1.5% annual energy savings of electric and gas sales, 1% from energy efficiency	No	No
Virginia	2007 legislation sets 10% energy savings target for utilities by 2022.	No	No
New York (pending)	Governor announced electricity savings of 15% of total forecast sales in 2015. PSC is developing implementation plans	?	No

Among the states with mandatory RPS policies, four – Ohio, Hawaii, Nevada, and North Carolina – allow demand-side energy efficiency to qualify for a portion of the states RPS requirement, enabling utilities to substitute energy efficiency for renewable energy as a portion of the RPS compliance. See Table 4 below (Ohio not included).

Table 4: States with Demand-Side Energy Efficiency Included in Mandatory RPS Requirements

State	Proportion of RPS that Can Be Met with Energy Efficiency	Notes
HI	Up to 50%	Heat pump water heating, ice storage, ratepayer-funded efficiency programs, and use of rejected heat from cogeneration and combined heat and power systems
NV	Up to 25%	Utility-subsidized efficiency measures installed after 1/1/05, and district heating powered by geothermal hot water; at least 50% of savings must come from the residential sector; utilities can purchase energy savings credits from third parties; energy efficiency receives standard multiplier of 1.05, and 2.0 for peak savings
NC	IOUs: Up to 25%; up to 40% after 2021 POUs: Unlimited for main RPS target	Efficiency measures after 1/1/07, including waste heat from combined heat and power systems powered by non-renewable fuels; POUs may also rely on demand-management/load-shifting

Wiser & Barbose, *Renewables Portfolio Standards in the United States: A Status Report with Data Through 2007* (April 2008)

Connecticut and Pennsylvania have combined RPS and EE programs with separate targets for renewable resources and for other resources including energy efficiency.

Energy Efficiency Trading Systems

In most of the states with energy efficiency portfolio standards, the requirements apply to utilities only and there is no trading or use of third parties to procure savings. Utilities are required to deliver and verify the energy savings; industrial and commercial customers cannot currently "sell" energy savings from energy efficiency investments to the applicable utility. The utility has to be directly or indirectly (through contractors) involved in the energy efficiency upgrade by offering either an incentive or technical assistance.

However, it may be advantageous for a state to allow independent efficiency providers to procure savings so that the market is not limited to utilities to maximize the opportunity for lowest cost savings. Today, three states – Connecticut, Nevada, and New Jersey (draft program) – allow trading energy efficiency savings that can be procured through third parties. For example, the Nevada program makes explicit provisions for energy service companies and other independent efficiency providers. New Jersey's draft proposal includes extensive provisions for third party procurement and trading.

In a trading system, the energy efficiency "white tag" represents the "energy efficiency attributes" of a commercial or industrial energy efficiency project. The tags can be sold to utilities as a market-based way to meet utilities' energy efficiency demand reduction requirements. If operating smoothly, this process is somewhat akin to a reverse auction for the acquisition of verified energy savings. Essentially, the market price of the tags will reflect the value of those energy efficiency savings relative to the cost of attaining those savings through utility-sponsored efficiency programs. The revenue can then go back to the industrial or commercial customer and act as an incentive to bring down the cost of the energy efficiency investment.

While these market-based mechanisms have worked well in other pollution markets, white tags have one major shortcoming. There may be a high degree of “free riders”, represented by industrial/commercial customers. In other words, customers are likely to have undertaken the efficiency measures based on their own positive economic benefit but are now be receiving ratepayer funds to further buy down the cost of these measures. However, despite this problem, based on the advantages of trading and third party providers, CESA recommends that provisions for trading be included in a state EERS programs.

Under a white certificate program, a credit amount must determined (e.g., 1 million kWh of savings) and credits awarded by the program administrator, once savings are verified. The size of one credit should be large enough so that only serious market participants are included but small enough that many commercial and industrial customers can participate. A larger commercial or industrial customer should be able to earn a credit from the improvements to its facility. While it is too cumbersome to allow individual residential customers to participate in this market, an energy provider, ESCO, or other third party should be allowed to aggregate many residential customers to earn credits.

Best Practice Recommendation:
Energy Efficiency Credits

CESA recommends that an EERS allow for trading to maximize the opportunity to achieve lower cost savings. Connecticut has the most advanced trading system for energy efficiency credits (called Class III credits in Connecticut). The basic elements of the Connecticut program represent the best practices in the U.S. to date. Here are the key elements:

- Any conservation and load management measure installed after January 1, 2006 within a commercial or industrial facility in CT is eligible for certification and issuance of Class III credits, provided the installation is verified and that savings are determined using state-approved Monitoring & Evaluation (M&V) protocols. Eligible activities include measures installed by publicly funded programs as well as those installed by customers without public funding assistance – provided the measures can be demonstrated to save electricity by state-approved M&V protocols.

- Measures that save energy through changes in operation and management of facilities are also eligible for Class III credits (e.g., reprogramming energy management systems, retro-commissioning, instituting energy saving preventive maintenance programs) provided the installation is verified and the savings determined using approved M&V protocols and the credits are annually re-certified. O&M measures that do not involve physical changes (signage, newsletters, policies to change behavior) are not eligible for credits.

- Energy savings from demand reduction measures, including load management, are eligible for Class III credits if registered and participating in the ISO-NE Demand Reduction program. The credits are issued based on the MWh reductions metered in response to the ISO-NE program.

- Currently, residential customer savings are not eligible for the Class III program or credits because of the administrative burden and challenge involved to trace energy conservation measures of individual residential customers.

- A Class III credit is a tradable instrument that represents all attributes associated with one MWh of eligible electricity savings and/or combined heat & power (CHP) electrical generation. Title to any emission allowances or credits associated with the project cannot be conveyed with the Class III credit. However, such allowances and credits may not be sold or used by the initial recipient of the credit or transferred to others for use or sale. These credits and allowances may be donated to the nonprofit or government agency, however. Class III credits must be from installations in the State of CT.

- The credits are valid only for the portfolio standard compliance year in which it is issued. Class III credits used to satisfy the CT standard may not be used to satisfy the requirements of any other portfolio standard or similar requirement in the state or other jurisdiction. Class III credits may not be banked for use in future compliance years and are retired once they are used to comply with the Class III portfolio standard or otherwise used, such as for a voluntary green market purchase. The state public utility commission is solely responsible for issuance of the credits and recording them in a suitable tracking system.

- Credits are issued upon submission and approval of a complete and accurate M&V inspection report from the utility fund program administrator or an approved third party certifier. Developers of non-funded measures are responsible for engaging an approved independent third party certifies.

- Class III credits are awarded quarterly beginning on the first day of the calendar quarter following submission of the M&V report. Credits are automatically renewed quarterly for the remainder of the discounted credit life. A discounted credit life accounts for early removals, building demolition and saving deterioration over time. For example, suppose a measure saving 12 MWh per year with a 6 year discounted credit life is installed in September. For the initial year, the project would receive 3 credits for the calendar year beginning October 1. Subsequently, the project would receive 3 credits for each quarter through the 3rd quarter of the 6th year. If the measure is removed, destroyed, disabled, or abandoned during its discounted credit life, the owner is required to notify the state commission and the state may cancel the remaining credits. Small projects may bank kWh of generation until the 1 MWh threshold is reached to qualify for one Class III credit.

- The Class III credit registration, tracking and transfer capabilities are to be fully integrated into the NEPOOL GIS system.

- Applicants have the option to select state financial incentives (from the conservation and load management fund – a public benefit fund) or retain the rights to the Class III RPS credits. Most parties opt for the public benefit funding and avoid having to deal with trading Class III credits in the marketplace. If they take the financial incentives from the fund, they must give the rights to the credits to the state fund administrators, who sell the credits to load-serving utilities who have to comply with the RPS.

- Class III credits generated by the measures installed with public benefit funding program will be allocated 25% to the customer or customer's agents (ESCO and contractors) and 75% allocated to the state fund for conservation and load management. Credits generated from independently funded measures are awarded 100% to the customer (or agent) less a small portion assigned to a state fund to defray administrative costs.

- There is an alternative compliance of $0.031 for each kWh of electricity that the utility is deficient in meeting the Class III percentage requirement in any given year. This is based on the budgeted utility cost of acquiring energy conservation through the utility funded programs using a discount rate of 8.2 percent – to be reviewed at least every two years to ensure it creates support for conservation resource development.

- Applicant projects must be certified by administrators of the conservation and load management fund. Non-fund project savings must be verified by an independent 3rd party. Aggregation of project savings is allowed.

See:
www.dpuc.state.ct.us/FINALDEC.NSF/2b40c6ef76b67c438525644800692943/ca768d3295e3fcd085257117006c81f8/$FILE/050719-021606.doc

Monitoring & Verification

A key issue for white tags is to ensure their certification through an accurate and acceptable Measurement & Verification (M&V) process. Unlike RECs, which can be measured directly from metering of renewable energy production, white tags must be determined through calculations of energy reduction from conservation projects. These calculations require the establishment of a baseline for energy use in order to enable a comparison with the actual energy use to determine the resulting savings.

White Tags created by energy conservation projects can be certified by
4 different methods:

- Prescriptive – applicable to purchase of specific technology & assumes savings are independent of operations (with a pre-set amount and lifetime), suitable for direct replacement and retrofit situations
- Metered – applicable to installation of generation and operationally independent sub-metered loads (expensive); suitable to CHP and cogeneration
- Modeled – applicable to any technology, either new installation or retrofit, as well as for operational changes (low cost, scalable, no time limit)
- Design – applicable to new buildings (LEED)

M&V typically means periodically evaluating a sample of installations using established evaluation measures and regular reporting of results. For measures such as CFLs, monitoring may mean statistical studies of electric bills before and after measure installation across a large sample of facilities or engineering estimates backed up with data on instantaneous power use reductions and logging of annual operating hours.

Detailed rules for monitoring and verification of savings have been developed in states such as Texas, PA, and Nevada. California also has issued extensive guidance. Generally, the state utility commission develops rules for monitoring and verification.

Table 5. Method of Measurement and Evaluation

State	Measurement and Evaluation
California	M&E protocols established, based on International Performance Measurement and Verification Protocol (IMPVP). See www.calmac.org.
Colorado	Assumptions about free riders and spillover are made by utility and contractors; a third-party independent evaluator conducts field surveys and adjusts savings at the end of the DSM commitment period.
Connecticut	Estimated savings are based on deemed[11] (stipulated) savings. Impact evaluations later verify and true-up savings.
Nevada	A third-party independent evaluator conducts field studies and adjusts Nevada Power's gross savings estimates. Will now be looking at free riders and reporting net savings.
Pennsylvania	Savings estimates are based on (1) deemed savings or (2) metered savings.

[11] Deemed savings values are precalculated savings amounts that providers can use for calculating savings for commonly used efficiency measures. Deemed savings are generally based on previous field evaluations of different measures. These values should be periodically reviewed and revised. Deemed savings are only appropriate for commonly used measures for which savings are well understood. A good source is the International Performance and Verification Protocol (www.ipmvp.org) and ASHRAE Guideline 14 (www. Ashrae.org).

Texas	Savings estimates are based on (1) deemed savings or (2) in-field measurements based on IPMVP
Vermont	Savings are deemed (estimated) and reviewed by PUC. Adjustments are made based on evaluation results; custom calculations done for custom measures. Independent evaluations verify savings every 3 years.

Source: Hamrin et al. 2007. *The Potential for Energy Savings Certificates as a Major Tool in GHG Reduction Programs*.

Best Practice Recommendation for M&V of Energy Efficiency Credits

Connecticut's verification protocol represents a best practice for calculating white tag credits.

- In Connecticut, the public utility commission has developed a technical reference manual which must be used as a basis to calculate energy efficiency that qualify for Class III credits. The manual provides detailed, comprehensive documentation of all claimed resource costs and savings corresponding to individual C&LM technologies. The manual is reviewed annually and updated to reflect changes in technology, baselines, measured savings, evaluation work, and impact factors. In projects which require more comprehensive calculations, third-party engineering consultants are contracted to calculate savings but those calculations are still reviewed for reasonableness. According to the manual, electrical savings are measured at the point of use and are assumed to be savings that would occur at the customer's meter.

- Each measure's credit value is determined using:

  1. The calculations of from the technical reference manual. If a measure is not identified in the manual, the sponsor may submit savings calculations to a program administrator or approved third party certifier for review an approval as a custom measure.

  2. A net-to-gross factor to account for free-riders and other factors that cause the savings from an installed measure to differ from nominal or measured savings.

  3. A discounted measure life that accounts for early removals, building demolition, and savings deterioration over time. Using discounted measure life produces a result consistent with using depreciation factors, but is much easier administratively. The discount factor is set by type of measure and end-use to produce a whole year discounted measure life.

  4. A consolidated credit life. Measures with discounted measure life greater than 10 ears will be assigned a consolidated credit life of ten years, with the value of the credits equal to the discounted net present value of the energy savings

over the discounted measure life, distributed evenly over a ten year term. For measures with discounted measure life ten years or less, the consolidated credit life is equal to the discounted measure life.

- Credits are issued at the time when the M&V inspection report has been submitted to the public utility commission. The report must be endorsed by an approved certifier.

See: www.ctenergyinfo.org/dpuc_technical_reference_manual.htm

Best Practice Recommendation:
Whether to Integrate Energy Efficiency in a Renewable Portfolio Standard?

Energy efficiency is integrated into an RPS requirement in six states—North Carolina, Hawaii, Nevada, Pennsylvania, Connecticut and, most recently, Ohio. One can argue that from both an economic development and environmental improvement perspective, energy efficiency and renewable energy are equally valuable. Combining efficiency and renewable energy targets can broaden public support for mandatory targets and address concerns by some legislators that there are not sufficient viable renewable energy projects in a state to make an RPS practical.

However, there are several principal reasons why CESA believes that energy efficiency should *not* be integrated into an RPS:

- Since energy efficiency is almost always a lower-cost resource than renewable energy, integrating the two into a single RPS would tend to slow the growth of renewable energy unless energy efficiency was placed in a separate tier from renewables and there is a defined minimum renewable energy requirement. However, in this case, there would be little benefit to combining the two into a single RPS.

- Renewable energy resources face different and more difficult challenges to deployment than energy efficiency measures, including regulatory and market barriers, high costs, lack of ready financing mechanisms, long pay-back periods, lack of public understanding, etc. An RPS is a critical tool to support these promising RE technologies with valuable characteristics that might otherwise be shut out of the market because of higher costs and other market barriers. Many states have decided that their RPS policies should be designed specifically to benefit and provide differential support to these promising but currently higher cost renewable technologies, rather than diluting the policy framework with a competing focus on energy efficiency procurement.

- Energy efficiency requires an entirely different tracking system and measurement methodology than renewable energy to measure and verify savings. With renewables, it is relatively easy and straightforward to directly measure energy produced and sold by qualified projects. Energy efficiency savings are distributed across thousands of individual households and businesses and require sophisticated estimation methodologies to verify savings.

11. <u>REC Purchases and REC Price Insurance</u>

Renewable energy technologies are capital-intensive and generally require long-term contracts to facilitate financing needed for project implementation. In restructured electric markets, long-term contracts are relatively scarce, making renewable energy project development more difficult.

Best Practice Recommendation:

To address REC contracting issues, states can consider employing auctions for long-term purchases of RECs. Under this approach, RECs are purchased in advance of a project becoming operational, or a form of REC price insurance is provided over time. The latter helps provide some degree of long-term price stability for RECs and attempts to encourage long-term contracting for RECs or generation, which is generally necessary for renewable energy projects to become operational. A state can consider committing some system benefit charge funds towards conducting an auction for entering into long-term (ten years or more) REC contracts for new renewable energy projects that are eligible for the RPS.

The Massachusetts Renewable Energy Trust (MRET) is the pioneer of this approach. The basic arrangement is that MRET conducts an RFP for RECs, and the winning bidders submit a proposed product, price and contract term to MRET (the arrangement does not have to start in the first year). MRET and the proposer enter into a contract, and MRET escrows funds to cover its obligation. The renewable energy facility receives financing and is constructed, and MRET guarantees the REC prices. Escrowed funds are released if the renewable energy project is not built or financed.

References:

Holt & Bird, *Emerging Markets for Renewable Energy Certificates: Opportunities and Challenges*, NREL/TP-62—37388 (2005)

Holt & Wiser, *The Treatment of Renewable Energy Attributes and Green Power Programs in State Renewable Portfolio Standards*, LBNL-62574 (2007)

Holt, Wiser, & Bolinger, *Who Owns Renewable Energy Certificates? An Exploration of Policy Options and Practices*, LBNL-59965 (2006)

Grace & Wiser, *Transacting Generation Attributes Across Market Boundaries: Compatible Information Systems and the Treatment of Imports and Exports*, LBNL-517-3 (2002)

Hamrin et al, *The Potential for Energy Savings Certificates as a Major Tool in GHG Reduction Programs* (2007)

Wiser & Barbose, *Renewables Portfolio Standards in the United States: A Status Report with Data Through 2007* (April 2008)

Nadel, *Energy Efficiency Resource Standards: Experience and Recommendations* (ACEEE Report E063) (2006)

Cory & Swezey, *Renewable Portfolio Standards in the States: Balancing Goals and Implementation Strategies*, NREL/TP-670-41409 (2007)

Hamrin & Wingate, *Regulator's Handbook on Tradable Renewable Certificates* (2003)

Appendix A

Recommended Model State RPS Resource Eligibility Definitions
Northeast/Mid-Atlantic RPS Collaborative
Winter 2008

While there is no single, ideal way to define eligible RPS resources, there is merit in states establishing some clear, common definitions of renewable resources. To that end, in 2007, several states in the Northeast/Mid-Atlantic region worked collaboratively to develop a set of model recommended resource eligibility definitions. In developing these definitions, the states 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 states involved included representatives from the RPS programs of New Jersey, New York, Pennslyvania, Connecticut, Massachusetts, Vermont, Maryland, and Delaware.

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.

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.

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*
- *a) 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.