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Tracking Energy Savings and Emissions Reductions From Energy Efficiency Under the Proposed Clean Power Plan

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Introduction

Traditional air regulation has generally focused on solutions at individual generation plants responsible for air emissions, such as combustion modifications, installation of pollution control technologies, or fuel switching within the power plant.

The US Environmental Protection Agency's (EPA) Clean Power Plan (CPP) takes a more flexible approach by allowing states to create a plan that will meet emissions targets using a variety of measures, all of which affect the electric grid. The EPA describes four "building blocks" it used to determine the targets, but states may propose other measures that will help meet their compliance obligations. The EPA's four building blocks are:

1. Reducing the carbon intensity of generation at individual affected generation units through heat rate improvements.
2. Substituting generation from less carbon-intensive affected units for the most carbon-intensive affected generating units.
3. Expanding low- or zero-carbon generation (e.g., renewable energy) for generation from affected units.
4. Displacing generation and emissions from affected units by increased use of demand-side energy efficiency.

States are required to submit plans to the EPA showing how they will meet the targets. Because the EPA highlights energy efficiency as one of the building blocks, and because most states have experience with energy efficiency policies and programs, energy efficiency could be a commonly proposed element of state compliance plans.

To achieve plan approval, states that rely on energy efficiency as a compliance resource will need to measure the energy savings that energy efficiency programs produce, convert those savings to avoided emissions or an avoided emissions rate, and track ownership of the emissions reductions to ensure that they are not double counted.

This paper focuses on that last step, tracking ownership of the emissions reductions, in order to help regulators understand how energy efficiency can be incorporated into state compliance plans. Part I examines how tracking energy efficiency can easily be accomplished using existing state and regional infrastructure already developed for issuing and tracking renewable energy certificates (RECs). Part I also discusses how energy efficiency savings could be registered and how avoided emissions could be calculated and recorded. It describes the steps in the operation of

1 The EPA's CPP approach is grounded in Section 111(d) of the Clean Air Act, which provides greater opportunity for regulatory flexibility than provided for und er Section 110 of the Act. For additional information, see: James, C., & Colburn, K. (2015, February). *It's Not a SIP: Opportunities and Implications for State 111(d) Compliance Planning.* Montpelier, VT: The Regulatory Assistance Project. Retrieved from www.raponline.org/document/download/id/7491

Background: Energy Efficiency Under the Clean Power Plan

The June 2014 proposed Clean Power Plan sets out rate-based emissions goals (lb/MWh) for states to meet by 2030, but the EPA has made it clear that states can instead choose to meet these goals using an equivalent mass-based approach (tons/year). The EPA calls these two approaches "pathways."

The EPA has indicated that, in demonstrating achievement of the requisite emissions performance level in its plan, a state could reflect the effects of energy efficiency measures in various ways: in an individual generator's demonstrated carbon dioxide (CO_2) emissions rate, the CO_2 emissions rate of a fleet of generators, or in various programs and measures that avoid emissions. This flexibility provides states with the ability to reflect emissions changes broadly ranging from a specific generating unit, a power pool, an "identified region," or "elsewhere in the interconnected electric system…."

States can achieve their goals by putting the emissions reduction responsibility entirely on affected generators, or by adopting a "portfolio approach," whereby the state specifies a variety of measures, including renewable energy and energy efficiency, that share in achieving the goal and are collectively enforceable. The EPA suggests that a portfolio approach could be state or utility run.

How a state can use energy efficiency for compliance will depend in part on the pathway (rate or mass) and the framework (traditional or portfolio) it chooses.

a tracking system that are necessary to enable unique, verifiable claims about emissions reductions, and explores how the right to claim emissions reductions for CPP compliance might be transferred from one jurisdiction to another.

Part II is more exploratory in nature. It posits a new tradable instrument that could be used in CPP compliance. If such an instrument were adopted or approved by the EPA to facilitate the use of energy efficiency in CPP compliance, how might it be issued and tracked? Could existing tracking systems accommodate it? Because the EPA has not yet adopted a final rule, of course, much uncertainty remains. Not all scenarios can be anticipated, so the purpose of Part II is to advance the discussion, not to answer every possible question.

Part I. Tracking Emissions Reductions With Energy Efficiency Certificates

Claiming Energy Savings and Emissions Reductions From Energy Efficiency

To achieve plan approval, states that rely on energy efficiency as a compliance resource will first need to account for the energy savings that energy efficiency programs produce, and must do so in a way acceptable to the EPA.

States will then have to convert these MWh energy savings to emissions reductions — either a reduction in the emissions rate, or a reduction in mass emissions. And finally, states will have to track "ownership" of saved MWhs and the associated emissions reductions to ensure that claims on them are unique, in order to avoid double counting.

Fortunately we know how to do each of these steps, so we don't have to reinvent the wheel. Energy efficiency programs have been around for decades, and evaluation, measurement, and verification (EM&V) methods for assessing MWh savings are highly developed, if not standardized. Sound EM&V protocols have been developed, for example, by the Regional Technical Forum of the Northwest Power and Conservation Council, Northeast Energy Efficiency Partnerships, California Public Utilities Commission, State and Local Energy Efficiency Action Network (SEE Action), and others.[2] Moreover, the EPA can be expected to provide further guidance regarding EM&V in the final rule.

For converting energy savings to avoided emissions, it is necessary to understand what generation was displaced on the grid by the energy efficiency measures. Several methods are available[3], including:

- **Average Emissions.** Every MWh of energy saved is credited with avoiding the average emissions rate (lb/MWh) in a defined grid or control area. The average emissions rate is determined by dividing total emissions (tons) by all generation (MWh) in the area. Average annual emissions rates are provided by eGRID, as discussed in the Calculation Tools text box.
- **Marginal Emissions.** Every MWh of energy saved is credited with the emissions avoided by displacing those electric generating units (EGUs) that are likely to operate less because of lower demand. These EGUs are referred to as operating "on the margin" or as "marginal units." The EPA's eGRID also provides average annual marginal emissions, called "non-baseload" emissions because baseload generation is assumed to operate most all the time, whereas non-baseload generation fluctuates to meet demand. Another EPA tool, AVERT (see Calculation Tools, p.4), calculates marginal emissions based on the timing of the energy savings.
- **Dispatch Modeling.** Every MWh of energy saved is credited with the emissions avoided by modeling what generators would be likely to run (i.e., to be displaced) given certain assumptions about fuel costs, operating costs, and energy demand. Dispatch modeling is a more sophisticated — and much more resource intensive — marginal analysis that focuses on future grid operation rather than historical data.

The avoided emissions estimated by any of these methods could then be applied toward the state's emissions rate target or mass-based compliance obligation under the CPP, depending on which compliance pathway the state chooses.

States or their designated agents (e.g., utilities, energy efficiency program administrators, or public utility commissions) routinely collect EM&V data on energy savings. They can provide these data to the state agency responsible for CPP compliance — typically the Department of Environmental Protection (DEP) — and the DEP should be able to rely on this data in determining

2 Shenot, J. (2013, August). *Quantifying the Air Quality Impacts of Energy Efficiency Policies and Programs.* Montpelier, VT: The Regulatory Assistance Project. Retrieved from www.raponline.org/document/download/id/6680

3 Ibid.

Calculation Tools: eGRID and AVERT

The EPA has developed two tools to help calculate emissions avoided by displacing emitting generation. The first is the *Emissions & Generation Resource Integrated Database* (eGRID), a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States. (See: http://epa.gov/cleanenergy/energy-resources/egrid/index.html.) These environmental characteristics include CO_2 and other air emissions. Emissions will vary depending on the mix of emitting resources within the power control area (PCA). Therefore, the location of energy efficiency energy savings is important in estimating the avoided emissions. eGRID provides emissions data by North American Electric Reliability Corporation (NERC) region as well as 26 subregions or PCAs.

The EPA also developed the *AVoided Emissions and geneRation Tool* (AVERT). (See: http://epa.gov/avert/.) AVERT can be used to evaluate county, state, and regional emissions displaced at electric power plants by energy efficiency and renewable energy policies and programs. It offers greater locational detail than eGRID. Furthermore, it supports greater temporal granularity. To take advantage of this feature, users should have not only an estimate of annual energy efficiency savings (MWh or MW), but also an understanding of an energy efficiency measure's temporal profile (e.g., whether the energy savings occur during peak periods, or equally through the year).

and reporting state compliance. The emissions reductions attributable to these energy savings should be calculated by the appropriate agency, using one of the calculation tools already available or new tools approved by the EPA.[4]

In concept, this practice should all work smoothly, but in reality, energy efficiency in one state sometimes displaces generation in another state, or multiple parties may want to claim the same energy savings — for example, the home or business owner who bought new lighting, the third-party vendor who installed it, or the utility whose generation declined as a result of it.

To demonstrate compliance unambiguously, states need to establish who has the right to claim energy savings and associated emissions reductions, and a way to track those claims. States must also be able to ensure that these energy savings and their avoided emissions are not double counted. And they need a clear, simple way to report this information.

One approach for demonstrating compliance with the CPP might be for a state to consolidate all of the results for every energy efficiency program under its auspices into one big annual report including findings of EM&V studies, calculations of avoided emissions, emissions targets, and a characterization of progress made toward those targets. In this case, the state DEP could forward its raw data and all of its documentation to the EPA.

The results of this approach, however, would be difficult to verify. It would be even more difficult to prove that no other entity is claiming any of the same energy savings or emissions reductions. This approach also imposes a substantial administrative burden on the state to assemble the submission, and on the EPA to review and approve it. Furthermore, under this approach energy savings and emissions reductions would not be fungible. This would hinder states if, for example, they wished to share energy savings or emissions reductions as part of a multistate plan, or if one state were to achieve more energy savings or emissions reductions than it needed and wanted to transfer or sell them to another state.

Tracking State Results

Another approach — one commonly used for renewable energy and to a lesser extent for energy efficiency — would be for states to report EM&V data to a central tracking system that would issue an electronic certificate for each MWh saved. Adhering to the current standard practice for renewable energy certificates (RECs), an analogous energy efficiency certificate (EEC) could represent the attributes of the saved energy. These attributes might be comprised of data describing where the energy was saved, when the energy savings occurred, direct emissions (typically zero),

4 Shenot, J. (2014, August). *Calculating Avoided Emissions Should Be a Standard Part of EM&V and Potential Studies.* Montpelier, VT: The Regulatory Assistance Project. Retrieved from http://www.raponline.org/document/download/id/7270

emissions avoided, and any other information essential to identifying the EEC's origin, uniqueness, and eligibility for claiming progress toward one or more compliance obligations.

A tracking system's main functions are to:

- Issue certificates based on measured renewable generation or reported energy savings;
- Track ownership when certificates are transferred from one party to another; and
- Retire certificates from further use when the owner uses them for regulatory compliance purposes (or to support voluntary claims like green power purchase commitments).

Each certificate is issued with a unique serial number and deposited into the owner's tracking system account. This allows the tracking system to ensure that no certificate can reside in more than one account at any time. In this fashion, the tracking system would act as a repository for the EECs; they would reside in the tracking system's user accounts, much like individual depositors' money resides in bank accounts. To prevent double counting, certificates can be transferred from one account holder to another only when both parties agree.

Building from existing REC tracking systems, states could readily track and report energy savings and emissions reductions from energy efficiency as well. Tracking for CPP compliance would warrant only two significant modifications. First, in consultation with state regulators, the tracking systems would need to calculate avoided emissions attributable to the energy savings, and attach that information to the EEC. The EEC would be issued only after energy savings are verified and reported to the tracking system. The tracking system would then issue the EECs and deposit them into the accounts of the registered account holders that produced the EM&V results, be they a state agency, utilities, or other entities conducting energy efficiency programs. States could rely upon tracking system reports to demonstrate to the EPA their progress toward meeting required emissions reduction goals.

Second, it might be advisable to have the tracking systems issue certificates for "all generation," not only renewable MWh generated or MWh saved through energy efficiency measures. Because CPP compliance concerns statewide CO_2 emissions from all EGU sources, capturing the generation information associated with renewable generation and energy efficiency alone could be insufficient. State regulators already have extensive experience with state and regional tracking systems that serve REC markets, some of which issue "all generation" certificates in order to provide the data for environmental disclosure labeling of electricity use.[6,7] In all, ten tracking systems now cover the United States and Canada, as shown in Figure 1. In several cases, they reflect the same footprint served by Regional Transmission Organizations (RTOs) — ERCOT, NEPOOL GIS, NYGATS, PJM GATS, M-RETS — or a wider electric interconnection (WREGIS). This is because the cooperation of the RTOs or other control area operators is essential in providing the reliable generation data upon which certificate issuance must be based.

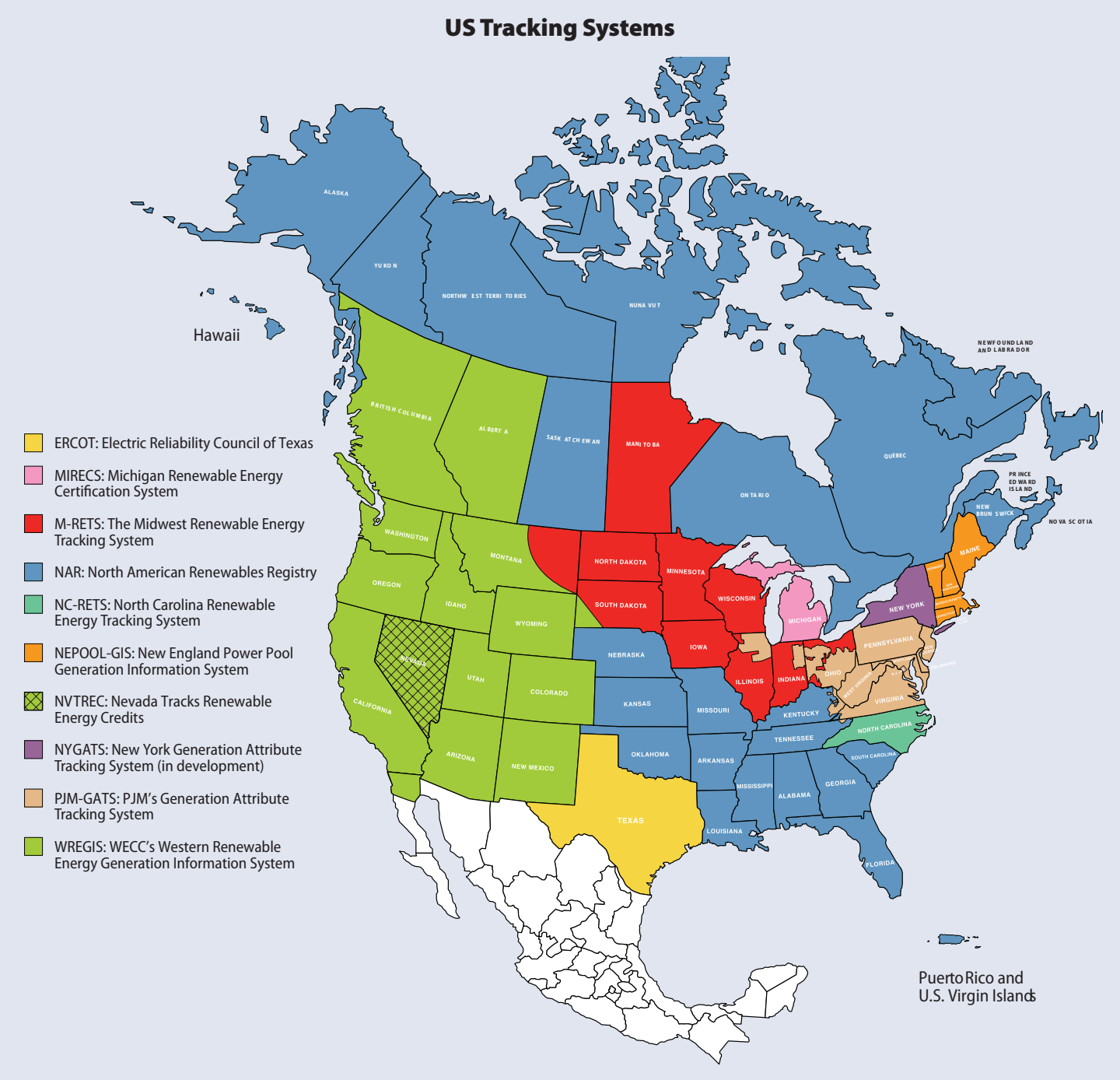
The use of certificate tracking systems has spread because they are an effective and efficient way to track the attributes of electricity generation. Individual certificates can reside in only one account at a time, so it is easy to verify who has the right to claim their attributes. This ensures market integrity and prevents double counting. Accounting for certificates in a tracking system, separate from the sale of electricity, makes sense, because physical electricity can't readily be tracked from point to point. Certificates help overcome barriers that would hinder the buying and selling of renewable energy attributes were they bundled with the electricity itself, barriers such as transmission access and pricing, resource variability, mismatches between the timing of generation and demand for the attributes, and lack of market liquidity.

5 Tracking systems are also designed to support energy source disclosure laws. See: Farnsworth, D., & Terada, R. (2013, April). *Tracking Emissions Associated With Energy Serving Load in the Regional Greenhouse Gas Initiative (RGGI) States: A Feasibility Study.* Montpelier, VT: The Regulatory Assistance Project. Retrieved from www.raponline.org/document/download/id/6509

6 Quarrier, R., & Farnsworth, D. (2014, June). *Tracking Renewable Energy for the U.S. EPA's Clean Power Plan: Guidelines for States to Use Existing REC Tracking Systems to Comply With 111(d).* Center for Resource Solutions and The Regulatory Assistance Project. Retrieved from www.resource-solutions.org/pub_pdfs/Tracking%20Renewable%20Energy.pdf

7 Most systems to date have been designed to track renewable energy generation, but three tracking systems (NEPOOL GIS, NYGATS, and PJM GATS) issue certificates reflecting all-generation MWh as well.

Figure 1



The focus of most tracking experience to date has been on renewable electricity generation (MWh), and has not included emissions (tons). Some tracking systems issue EECs based on MWh saved but do not calculate avoided emissions. The examples summarized in Table 1 show that tracking systems can and already do support energy efficiency tracking today and that states allow compliance to be demonstrated using EECs.

In general, tracking systems require approval of EM&V results by the public utilities commission, or proof that EM&V was conducted according to agreed state standards; the tracking system typically does not judge energy savings claims. For example, before it will issue conservation certificates, New England's GIS requires that the appropriate energy regulatory agency confirm that the conservation and load management or demand-side management resource has

Table 1

Tracking System Support for Energy Efficiency Certificates

System Name	Service Area	State RPS Policy	Tracking System Action
NEPOOL Generation Information System (GIS)	Six New England states	• CT RPS Class III (conservation and load management resources, curtailment-based demand response, and CHP) • MA Alternative Portfolio Standard (CHP) • NH RPS Class I (thermal resources)	GIS issues "conservation certificates" for eligible resources in these states
NC-Renewable Energy Tracking System (NC-RETS)	North Carolina	• Up to 25 percent of North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard (REPS) may be met with energy efficiency, including CHP	NC-RETS issues "Energy Efficiency Certificates" for each MWh of energy saved by a utility-sponsored energy efficiency or demand-side management program
North American Renewables Registry (NAR)	States not covered by other existing regional tracking systems	• None of the states that rely on NAR for tracking RECs and RPS compliance (KS, IL, MO, PR) have an energy efficiency requirement, but the capability exists to support origination of EECs	NAR will issue Energy Efficiency Certificates based on documented EM&V data that include independent certification of the energy savings
PJM Generation Attribute Tracking System (GATS)	All or parts of 13 states	• PA Alternative Energy Portfolio Standard, Tier II (demand-side management, including energy efficiency and load management)	GATS issues "Alternative Energy Credits" for DSM and other resources eligible for AEPS compliance

met that agency's criteria for certification and has committed to submit an annual report to the agency with respect to the data it provides to the GIS.[8]

Practical Steps to Issuing and Tracking EECs With Avoided Emissions

Tracking system users would need to have confidence in the reliability and accuracy of energy savings, and all relevant information about the savings, before the tracking system could be used to calculate the avoided emissions attributable to energy efficiency. To determine avoided emissions, states and tracking system users would follow an approved process. Parts of this process would likely be manual, whereas other parts could probably be automated. States wishing to issue certificates for energy efficiency that incorporate avoided emissions would first establish EM&V protocols to meet their own needs, and these protocols would need to be acceptable to the EPA in order for the avoided emissions to be used toward CPP compliance.

As mentioned previously, some tracking systems already issue and track certificates for energy efficiency for states that require them as part of an RPS or Energy Efficiency Portfolio Standard (EEPS) compliance obligation. States without such a requirement would first have to designate the agency (e.g., the public utility commission, environmental regulator, or both) responsible for reviewing EM&V claims before they can be reported to the tracking system. Other tracking systems could readily modify their

8 New England Power Pool Generation Information System, Operating Rules, Rule 2.1(a)(iv). NC-RETS requires a list of planned or implemented energy efficiency measures, including a brief description of each measure, its projected impacts, and a measurement and verification plan. Pennsylvania specifies regulations governing the verification and tracking of energy efficiency and demand-side management measures. See: Pennsylvania Public Utilities Commission. (2005, September 29). *Docket No. M-00051865, Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources.*

protocols to incorporate this functionality.[9]

States (or sources within states) would open an account within a designated tracking system. The operator of any energy efficiency program (e.g., state agency, utility, or energy performance contractor) recognized by or under the auspices of the state could also open its own account. If the same operator does business in multiple states, it would have to designate to which state specific energy savings and avoided emissions are to be credited (or operators could establish subaccounts if they operate the same program over a multistate territory).

All account holders creating energy savings would get their MWh savings estimates approved by whatever state authority governs their programs before reporting the savings to the tracking system. The state authority would certify that the estimated energy savings are accurate and have been produced in a manner consistent with the state's approved EM&V protocol. Tracking systems, in consultation with the states they serve, would establish at least annual reporting deadlines so that EECs could be issued in a timely manner.

Tracking systems would automatically calculate avoided emissions for each MWh of savings using a standard approach, algorithm, or tool based on the location of the energy savings, the timing of the energy savings, and marginal plant emissions.[10] States would consult with the designated tracking system (and possibly with the EPA directly) about the avoided emissions calculation method or tool that they wish to use in order to ensure that it is acceptable for CPP compliance. Ideally, states served by a multistate tracking system would coordinate and use a single emissions calculation method rather than expecting the tracking system to apply a different methodology for each state. The resulting amount of avoided emissions (in pounds or tons) would be stored along with the other data tracked by the tracking system and associated with each serial-numbered certificate.

Tracking systems would then issue certificates on a regular cycle. EECs would be separately identified from RECs and would contain, at a minimum, the following information:

- EEC serial number;
- Date and time of energy savings;
- Date of EEC creation (for eligibility and vintage);
- State in which the energy savings occurred;
- Direct emissions (zero); and
- Calculated avoided emissions.

Tracking systems would deposit the certificates into the accounts of the registered account holders that conducted the energy efficiency programs. Utilities or other entities that are obligated to meet state EEPS or RPS targets using energy efficiency may need to use these certificates to satisfy their obligation, but could also use them simultaneously for CPP compliance.[11]

Trading of EECs could readily occur if desired, according to rules that states would adopt, and subject to EPA approval, as discussed further below.

Even if a state doesn't have an energy efficiency requirement (an EEPS or RPS), it would still need to retire EECs as proof of energy savings and emissions avoided for CPP compliance. States could require that any EECs not purposefully retired (for EEPS/RPS compliance) prior to an annual settlement date would automatically be retired and credited to the state — at least those that were issued for designated state programs.

States should develop explicit rules regarding energy efficiency savings and avoided emissions claims. For example, all the EECs created for state-sponsored energy efficiency programs could belong to the state unless utilities or other entities are obligated to comply with an EEPS or an RPS for which energy efficiency counts. In that case, they could potentially be used by the utilities to demonstrate

9 APX. (2014, October). *Using Tracking Systems With the Implementation of Section 111(d) State Plans.* Retrieved from http://www.apx.com/wp-content/uploads/sites/9/2014/10/APXAnalytics_1_Section111d.pdf

10 The algorithm should be reviewed and adjusted as needed, based on changes to the regional generation mix and consequently to the marginal emissions rate, and should be used for all reported energy savings, regardless of whether the state is pursuing a mass-based or a rate-based target.

11 The EPA has indicated that "An emission standard is non-duplicative with respect to an affected entity if it is not already incorporated in another state plan, except in instances where incorporated in another state as part of a multi-state plan." The Guidelines provide an example of a non-duplicative standard: where "a state wished to take credit for CO_2 emissions avoided due to electric generation from a new wind farm, those avoided emissions could be considered non-duplicative and included for purposes of CAA section 111(d), even if electric generation from that wind farm was also being used to generate renewable energy certificates (RECs) to comply with the state's RPS requirements." Guidelines 79 FR 34918-34919, 34913.

compliance with state requirements, and also used by the state to demonstrate compliance with the CPP.

Tracking system reports of EECs retired for each state could provide a basis for state submittals to the EPA for CPP compliance. Tracking system reports would show both total MWh savings and total emissions avoided by energy efficiency. This would allow a state with a rate-based target to adjust its emissions rate or a mass-based state to adjust its mass emissions, in a manner approved by the EPA, in order to demonstrate compliance with the CPP.[12]

Tradability of Energy Efficiency Certificates

A significant value of tracking systems is their capacity to ensure that ownership of EECs, and the right to claim their attributes, is clearly established in order to avoid double counting. The tracking function is potentially less important, however, if EECs cannot be exchanged between account holders. Double counting is less of a concern if EECs are not tradable.

In that case, a tracking system would be essentially a "registry" of the energy savings and avoided emissions reductions from energy efficiency investments — that is, simply a consolidated place to report and reference. Certificates wouldn't even need to be issued (except for state policies like an EEPS/RPS for which EECs are used to verify compliance); for CPP compliance, it would just be necessary to know what accounts are associated with what states.

Prohibitions or limitations on trading have a significant downside, however. Compliance costs are likely to be higher for states if they are unable to purchase less expensive energy efficiency savings needed for compliance or to sell excess energy efficiency savings that they do not need. Limitations on trading could also constrain states in multistate plans from fully sharing — and benefitting from — their energy efficiency investments.

If EECs are tradable, it is important to emphasize that avoided emissions should be calculated based on the geographic location (i.e., the state or electricity grid *where the energy savings occurred*) rather than based on where ownership of the EECs is ultimately claimed. This is because the avoided emissions depend on the EGUs affected by the reduction in demand caused by the energy efficiency measures, and which EGUs were backed off would depend on the state or power control region where the reduction in demand occurred.[13]

The EPA may establish additional limits to energy efficiency trading, although it seems more probable that the scope of such trading will ultimately be determined by states' implementation plans and EPA approval of those plans.[14] The EPA encourages multistate plans, so at a minimum it is likely to support trading (or allocation) of EECs among participating states. For states that do not wish to enter into a comprehensive multistate compliance plan, EEC trading might still be used as a plan element if several states want to collaborate on energy efficiency in a more limited or modular manner.[15]

For EECs to serve a compliance role for states, it is important to understand how EECs could be traded between states, and to what degree any impediments to trading might arise. As described previously, rate-based programs using EECs have the option to reflect energy efficiency savings in their emissions rates in two ways,

12 US Environmental Protection Agency. (2014, June 18). *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule.* 79 FR 34894, 34919.

13 Note that this issue would already be taken care of if the tracking system calculates the emissions reductions before it issues EECs, as recommended earlier in this paper.

14 Pending finalization of the Clean Power Plan requirements, trading of energy efficiency savings may be limited by the amount of credit states can take for their efficiency investments. The EPA has proposed that a "state may take into account in its plan only those CO_2 emission reductions occurring in the state that result from demand-side energy efficiency programs and measures implemented in the state." US Environmental Protection Agency. (2014, June). *Technical Support Document (TSD) for Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units.* Docket ID No. EPA-HQ-OAR-2013-0602; US Environmental Protection Agency Office of Air and Radiation State Plan Considerations. (2014, June), p. 87.

15 Some states, for example, may develop individual compliance plans but with portions of those state plans developed in voluntary collaboration with other states. Such a coordinated, "modular" approach has the potential to facilitate lower-cost compliance solutions tailored to the specific circumstances of the collaborating states, while allowing the states to retain most or all of the regulatory autonomy they would have if they did not collaborate. See, e.g.: Western Interstate Energy Board and the State-Provincial Steering Committee Request for Proposal Exploring the Modular Approach to Multi-State Compliance With EPA's Proposed Rule Under CAA 111(d) in the West. Issued 2014, November 4.

either as avoided MWhs (added to the denominator of the rate) or as avoided pounds of CO_2 (subtracted from the numerator of the rate).

Because of the ways compliance could be demonstrated in a mass-based state, trading EECs in that context is less clear at this time. Typically a mass-based state's CPP program would capture all emissions reductions from covered plants in that state regardless of the reasons for those reductions, so there may not be a need to develop a crediting mechanism such as EECs to reflect those reductions.[16] In the Regional Greenhouse Gas Initiative (RGGI), for example, the mass-based approach automatically recognizes reduced generation due to energy efficiency because the program is structured — and compliance is demonstrated — through a showing of total emissions produced by covered facilities, rather than specific effects of individual policies that may have contributed to achievement of the goal.[17]

Some mass-based states may wish to pursue modular energy efficiency approaches rather than the comprehensive approach used by the RGGI states, however. And some of those states may encounter interstate effects, such as circumstances in which energy efficiency programs in one state reduce generation from EGUs — and hence mass emissions — in another state. It is not yet clear how these two states would avoid double counting — ensuring that only one of them claims the avoided emissions associated with the energy savings — or what the EPA would approve in this regard. Even if additional accounting or administrative steps are necessary to maintain program integrity in such circumstances, however, these are policy considerations that require clear operating rules to be determined by the states. Such steps would not pose a challenge for tracking systems themselves, which can support transactions and substantiate ownership regardless of programmatic rules.[18]

The key point is that whatever broader trading policies are adopted, they can be supported by established tracking systems. Trading policies and operating rules need not (and should not) be developed by the tracking systems; their purpose is limited to providing policy-neutral administration and support for compliance transactions associated with specific state policies and requirements. Trading policies and operating rules would be established by the states involved and approved by the EPA.

Transacting EECs

The process of buying and selling EECs would be quite similar to the practices established over the last 15 years in REC markets. For example, utilities or other obligated entities under an RPS that must demonstrate REC ownership and retirement can acquire RECs in a number of ways, all of which are readily transferable to EECs. They are summarized in Table 2.

When a transaction is agreed to, the two parties, who must both have accounts in the tracking system, effect the transfer with the tracking system administrator, and the change in ownership is recorded. Although these

16 This assertion applies to CPP *compliance*. Where applicable, states with EEPS that adopt mass-based programs can still expect to use their energy efficiency standard as part of their planning and demonstration to the EPA that their plan will produce the results they expect.

17 This was noted by the Regional Greenhouse Gas Initiative (RGGI) states — the only currently operating multistate-only, mass-based CO_2 program in the United States — in their November 2014 comments to the EPA:

> The proposal suggests that the mass-based state could adjust the overall CO_2 emissions from the affected fleet to account for the "export" of avoided CO_2 emission credits. However, *RE and EE benefits are automatically accounted for under a mass-based program,* as the existence of RE generation and EE "negawatts" displaces the state's or region's reliance on fossil fuel-fired generation (emphasis added).
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> Docket ID No. EPA-HQ-OAR-2013-0602 — RGGI States' Comments on Proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 FR 34830 (2014, June 18). (RGGI Comments) at p 11. Retrieved from http://www.rggi.org/docs/PressReleases/PR110714_CPP_Joint_Comments.pdf

18 For a discussion of this challenge in the context of counting certain renewable energy sales, see: Farnsworth, D. (2015, January). *Navigating EPA's Clean Power Plan for Compliance With Renewable Energy.* The Regulatory Assistance Project and Center for Resource Solutions. To avoid double counting of avoided CO_2 emissions related to sales of renewable resources in voluntary markets, the Regional Greenhouse Gas Initiative states and California have set aside emissions allowances in special administrative accounts, whereby voluntary purchases of renewable electricity may be converted to avoided emissions and used as the basis for retiring equivalent allowances. These allowances are therefore unavailable to emitters and have the effect of lowering the cap on emissions.

Table 2

REC and EEC Acquisition Methods

Acquisition Option	Renewable Energy	Energy Efficiency
Build and own energy resources	States do not usually own generating resources, although state or municipal utilities may do so, and may retain the RECs.	A state agency may be directly responsible for an energy efficiency program and would register MWh savings, and EECs would be deposited into state-owned accounts. EECs from privately delivered energy savings would be deposited into privately owned accounts.
Contract for energy resources	States, or state-regulated utilities, may enter into contracts with renewable energy generators for electricity and RECs. This is sometimes done via competitive bidding for long-term contracts.	State-regulated utilities or other contracted third parties acting under the auspices of these utilities or the state would conduct energy efficiency programs with the requirement to register energy savings with the tracking system for EECs and to retire EECs assigned to the benefit of the state. Private entities could similarly undertake energy savings performance contracts and register for EECs.
Use tracking system bulletin board	Buyers post interest in buying RECs, and sellers post interest in selling RECs, with contact info.	Same for EECs
Contact known developers and energy resource owners	The world of energy resources is not large; utilities (or other parties) contact renewable energy generators to ask if RECs are available and at what volume and price.	Same for EECs
Contact environmental commodity brokers	Many brokers use their in-depth knowledge of REC markets to bring willing buyers and sellers together for a fee.	Same for EECs

acquisition options work well for the quantities and frequency of REC trading, there are also some private market exchanges that are trying to make a business of automated trading.[19] Their advantage is that the parties are anonymous and the transactions can be done online at a market clearing price. Their challenge is that the variety of certificate definitions and eligibility requirements may hinder commoditization of certificates. This can make it difficult to build enough volume and liquidity to make such trading platforms feasible. It should be noted that none of the existing REC tracking systems currently supports an automated trading platform, they simply record changes of certificate ownership resulting from direct bilateral agreements or broker-assisted trades.

This discussion demonstrates that there is a robust infrastructure in place today to manage RECs for electricity generation, and that some of this infrastructure already supports state needs for issuing and tracking EECs. It would be relatively easy to expand existing tracking systems to track energy savings and avoided emissions to fulfill state needs for reporting and accounting for CPP compliance. Tradable instruments are familiar to many in the energy sector; they are widely used, and the principal addition to each certificate would be the calculation and recording of the avoided emissions attributable to the energy savings.

19 See, for example: Hernandez, S., Carbon Trade Exchange. *Emerging & Existing Trading Platforms;* McComb, S., Intercontinental Exchange, Inc. *REC Markets on ICE;* and Mohindra, K., Skystream Markets. *Emerging and Existing Trading Platforms;* all presentations at Renewable Energy Markets Conference, Sacramento, CA, December 3, 2014. Retrieved from http://www.renewableenergymarkets.com/rem2014/

Part II. Tracking Emission Reductions With Separate Credits

The previous description has assumed that EECs are the commodity or currency carrying the right to claim avoided emissions from energy efficiency. Like RECs for renewable MWh, EECs would reflect the full bundle of attributes for each MWh of energy efficiency savings. The life cycle of an EEC (issuing, tracking ownership, retirement, and use in compliance) would be the same as for that for a REC, with which we have considerable experience and infrastructure. Therefore, only fairly simple modifications to tracking systems would be required to accommodate the use of EECs.

An alternative CPP compliance scenario may also warrant consideration, however. Some have suggested establishing a new tradable commodity — called here "emission reduction credits" (ERCs) — that would be separate and distinct from RECs and EECs, although derived from them. The idea is that ERCs could represent a simple means for demonstrating a state's progress toward its carbon emissions reduction obligations.[20] This would require some additional work to implement, and a number of questions would have to be addressed first.

What are some possible benefits of establishing and using ERCs? A separate ERC, in use across the country, could be more fungible than EECs or RECs. The main purpose of RECs and EECs to date has been to fulfill state EEPS/RPS compliance obligations, and they often differ slightly from state to state and are restricted in their geographic application.[21] ERCs could support market standardization and lead to greater liquidity and market efficiency, and would therefore be conducive to electronic trading platforms, which in turn would reduce transaction costs.

What are some possible downsides of ERCs? Most states with RPS define RECs (and presumably would also define EECs) as including all attributes, and several explicitly include the avoided emissions. The establishment of ERCs could create a conflict with this approach by producing both a REC (or an EEC) purporting to convey avoided emissions attributes, and a separate ERC representing the same avoided emissions — potentially double counting the emissions reduction. Creating ERCs could also potentially undermine existing and planned financial agreements based on RECs (or EECs). As noted below, double counting concerns could be readily addressed by retiring the underlying REC (or EEC) when ERCs are issued, but the conceptual departure from RECs being all-inclusive would still exist. Also, if states limited the use or trading of ERCs by, say, geographic restrictions, then ERC markets would be less liquid.

What would be the basis for creating ERCs? One way it could work is that states would register energy efficiency programs with the state-designated tracking systems, determine energy savings according to approved EM&V protocols, and request issuance of EECs, as described previously. The tracking systems could calculate avoided emissions — also as described earlier — but instead of attaching that information as an attribute embodied in an EEC, the tracking system would simultaneously issue two commodities: an EEC representing the usual MWh attributes, including the direct emissions of the energy

20 See, e.g.: Hile, S. (2014, November). *Cross-State Electricity Load Reductions Under EPA's Proposed Clean Power Plan.* Center for Climate and Energy Solutions. Retrieved from http://www.c2es.org/publications/cross-state-electricity-load-reductions-under-epas-proposed-clean-power-plan. "States could engage in a … trading market for credits based on reductions from RE and demand-side EE actions. EE/RE programs that meet certain requirements would be allowed to generate credits, denoted in avoided tons of CO_2, within the covered region" (p. 10).

21 Note this statement assumes that, for CPP purposes, trading of RECs would continue to be limited as it has been for use in state renewable portfolio standards. This paper does not argue that RECs or EECs need necessarily be limited in that manner.

efficiency resources (but not including the avoided emissions, state definitions notwithstanding), and an ERC that represents only the calculated emissions avoided by the energy efficiency (in tons, or as lb/MWh).[22] These two commodities would both exist in the same time and space but would have two different purposes. A state that has no RPS/EEPS may have no need for EECs, for example, and could forego (or ignore) the issuance of EECs, but it would still have to report EM&V energy savings to the tracking system before an ERC could be issued, in order to ensure no double counting of the energy savings. It would then use the ERCs received toward its compliance with the CPP (EECs could not be used, lest double counting occur; ERCs would be the currency for energy efficiency compliance with the CPP).

Another way it could work is that EECs could be issued first, including the calculated avoided emissions attribute, and ERCs would be issued later, based on the avoided emissions, only when the EECs are retired.[23] EECs would be automatically retired at the end of the year (if not purposefully retired for RPS/EEPS compliance), similar to certificate retirement in the NEPOOL GIS. The ERCs would then be applied toward state CPP compliance.

If ERCs were used for all emissions reductions, including those at affected electric generating units, then states and the EPA would need to consider how to prevent double counting between EEC and REC avoided emissions, on the one hand, and emissions reductions claimed at the EGUs that reduced their generation because of energy savings or additional renewable energy on the grid, on the other. Without an explicit agreement (or policy requirement) between the energy efficiency activity and the EGUs, it may be problematic to determine who owns the unique right to claim the emission reductions. This issue requires a policy decision (by states, multistate groups, or the EPA), so more discussion and consideration of ERCs is necessary. The process to avoid double counting should not be difficult to implement, however, once that policy decision is made.

Should an ERC be created simultaneously with or sequentially to an EEC (or REC)? Simultaneous issuance of two tradable instruments from the same MWh could be confusing, and would contradict how states typically view REC attributes, that is, as including all the attributes of the renewable resource that produced them. Sequential issuance of an ERC after EECs/RECs have been retired might allay some of that confusion. On the other hand, sequential issuance means that the availability of ERCs would lag EECs/RECs, perhaps by as much as a year. That might impede market liquidity. Ready solutions exist, however. For instance, the EPA or the states could commence eligibility of energy savings some time period ahead (e.g., a year) of the CPP compliance window in order to ensure that EECs would be retired in time to create ERCs for the first year of CPP compliance.[24]

Could existing tracking systems be used to issue and track ERCs separate from EECs and RECs? Doing so would involve a more substantial change to tracking systems' functionality, compared to simply issuing and tracking RECs and EECs, but it is certainly possible. And doing so would also reinforce the use and importance of the existing tracking infrastructure. Another option, of course, would be to create a separate ERC tracking system that is national in scope. This choice would be made clearer once the EPA's and the states' intent with respect to the geographic eligibility of actions, or the geographic scope of trading, for compliance is known. If the EPA or the states want compliance to come from within the state or region, then the existing regional tracking systems would accommodate the need. If the EPA or the states intend to allow compliance to be satisfied by actions (e.g., energy efficiency measures) from a broader region, supported by interregional if not national trading, then a new national

22 If it were necessary to retain information about the location and timing of the actions on which the ERCs are based, it could create confusion, because the ERC would potentially be another multi-attribute instrument with some attributes overlapping with those of the EEC.

23 The avoided emissions could be attached to the EEC because some states (e.g., AZ, CA, CO, NY, OH, and WA) require that emissions reductions, avoided emissions, or emissions allowances, if any are associated with the energy generation, be part of a REC for RPS compliance, and they presumably would apply a similar requirement to EECs.

24 In fact, in its proposed rule, the EPA indicated that "measures that a state takes after the date of this proposal, and that result in CO2 emission reductions during the plan period, would apply toward achievement of the state's CO_2 goal." That would seem to give states a chance to create ERCs well in advance of the need for trading. *Federal Register* / Vol. 79, No. 117 / Wednesday, June 18, 2014 / Proposed Rules, pp. 34839, 34851.

tracking system for ERCs might be a more compelling option (or existing tracking systems could enhance their import/export capabilities). This again is a case in which the technology and software largely exists and could readily be modified to meet the need — once the underlying policy decisions are finalized.

Another notable consideration is the cost to users of duplicate registration and account management with both a certificate tracking system and a separate ERC tracking system. From this perspective, utilization of existing tracking systems would reduce the cost and resource burden on states and others, as well as transaction fees associated with the use of two systems.

Would the compliance instrument have to be the same for all states? If a group of states proposed to use EECs embodying avoided emissions attributes, then that might be acceptable to the EPA. Within a single grid region, however, it might be difficult (not to mention confusing) for the tracking system to issue EECs or RECs with avoided emissions attributes for some states, while also issuing separate ERCs for other states. Would the two instruments be interchangeable for CPP compliance? Collaboration and agreement among the states in a region would clearly be important in establishing such ground rules.

Furthermore, some existing multistate agreements such as the RGGI have already created their own instrument (i.e., a "RGGI allowance") that represents mass emissions and is tradable. The EPA would likely approve this multistate plan, and the use of this compliance instrument, for the RGGI states. If the EPA prefers to use ERCs for compliance, RGGI allowances retired for each state could readily provide the basis for issuing or crediting ERCs.

Conclusions

States will have a lot of choices to make in formulating their responses to the EPA's Clean Power Plan. The permutations may seem mind-boggling, but tracking systems can certainly make their job easier.

For demonstrating accountability, states should keep in mind that certificate tracking systems already exist for issuing, tracking, and retiring RECs. These systems could be easily modified to support the tracking of energy efficiency savings in the form of EECs as well. Some tracking systems are already doing so in support of specific state policies.

States that seek to credit energy efficiency savings in their CPP compliance plans will need to adopt an acceptable EM&V protocol for verifying those energy savings. This would be the basis for issuing EECs or, perhaps, ERCs, if creation of this new currency is warranted. Once energy savings are reported to each state and approved by the appropriate state energy authorities, they can be reported to the designated tracking system. The tracking system could then determine avoided emissions using an approved protocol, and issue EECs that include values for avoided emissions. These steps are important in order to establish unique EEC ownership (i.e., the right to make energy savings and avoided emissions claims) and prevent double counting.

Because tracking system infrastructure already exists, it would be cost-effective for states to designate appropriate tracking system(s) and work with them to build out the additional functionality and operating rules necessary to support accounting for energy savings and avoided emissions attributable to energy efficiency.

One of the issues central to reliance on certificates (EECs or RECs) is the question of whether states will impose limits on the geographic origin of the certificates they will accept as evidence of compliance. To encourage consistency, the EPA may provide guidance on this question in its final rule, but states will likely still have flexibility. The answer to this question also has implications for the geographic scope of any trading that tracking systems must support, or whether tracking systems will need to strengthen their import/export capabilities.

It would be very helpful for states within a region to agree on the precise instrument to use for tracking energy efficiency savings for compliance purposes — certificates or separate emissions reduction credits. Issuing and tracking emissions reduction credits separate from certificates would require a more significant modification to existing tracking systems, but is technically feasible and, if adopted nationally, could increase fungibility and perhaps reduce compliance costs. Consistency in tradable instruments used for tracking would also reduce double counting risk. Removal of geographic limits to trading EECs and RECs would also help address concerns over limited fungibility of existing certificate programs. The EPA may provide stronger guidance on this issue in its final rule.

Once the EPA adopts a final rule, states should sit down with tracking system managers to identify and align their respective needs. Tracking systems exist to serve the needs of their participating states, so system managers will surely listen carefully.

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