

Introduction

In achieving the goals for a clean energy economy, many western states are considering or have already adopted statutory requirements that focus on broad range of topics such as energy efficiency, low carbon fuels, transportation electrification, and reducing emissions from the electricity sector. The electricity sector has two primary, yet parallel policy approaches that states are implementing to reduce emissions: (1) transition to renewable and non-emitting resources and (2) direct regulation of greenhouse gas emissions. While these two programmatic approaches are rooted in the same purpose—to reduce greenhouse gas emissions and ultimately decarbonize the electric grid—they focus on different ways to achieve this goal:

- Renewable portfolio standards (RPS) and clean energy standards (CES) are designed to increase and incentivize the development of and procurement from specific types of resource technologies;
- Greenhouse gas reduction programs are primarily focused on reducing emissions from emitting sources, often through a cap or a price on greenhouse gases.

To ensure that state policies are achieved and implemented effectively, systems for accounting, tracking and demonstrating compliance are needed. Depending upon the program and state preferences, accounting may be needed for electricity and/or emissions produced or consumed. There are two factors specific to the electric grid that make accurate and consistent accounting and tracking challenging:

- Due to the cross-jurisdictional nature of where electricity is produced and where it is consumed, inconsistent accounting methodologies can result in an incomplete regional assessment and undermine policy objectives;
- The lack of an empirical method or agreed upon method for accurately identifying which resources served which load across an interconnected electric system spanning multiple jurisdictions.

Because of this, challenges or inconsistencies are particularly likely to arise where different states or individual state programs create different frameworks for accounting for emissions and renewable production and use.

This paper sets forth principles and design elements for consideration by policymakers for the development of accounting and compliance frameworks for electricity sector programs that require: 1) accounting of electricity from certain types of resources and assignment of electricity from those resources to specific entities for program compliance; and 2) accounting of greenhouse gas emissions, such as a cap-and-trade or emissions reporting program, and assignment of responsibility for those emissions to specific entities for program compliance. While there are principles that apply across accounting frameworks for the two broad policy approaches, the purpose when accounting for fuel types is distinct in certain respects from the accounting of

emissions: an RPS or CES accounting framework must support the development and procurement of renewable and/or clean resources whereas greenhouse gas emissions accounting should drive how existing and future resources are utilized to reduce greenhouse gas emissions.

In addition, the design of any accounting framework for the electricity sector must consider interaction with interstate bilateral and organized wholesale electricity markets. Electricity markets play a critical role in enabling utilities to reduce costs and serve load reliably by accessing resource and load diversity. Electricity markets will also play a critical role in the transformation of the electric sector to renewable and non-emitting resources. In particular the diversity of an expansive organized wholesale electricity market in the West can enable the deployment of high levels of renewable energy at lower cost to consumers. The advantages of balancing the region's vast solar, wind, geothermal, and hydroelectric resources are readily apparent. Accounting frameworks designed to further state-specific policy objectives should support and be consistent with efforts to enhance the access to and scope of existing and potential future electricity markets.

The below principles, elements, and discussion are intended to guide states in developing accounting frameworks that further state policy objectives and ensure that compliance is met while also allowing for continued, and potentially greater, reliance on existing and future electricity markets.

General Principles for Accounting and Tracking Frameworks

- Advance and support measurement and achievement of state or regional goals and enable compliance with state policies
- To the extent consistent with state policy objectives, reduce barriers to the development of renewable and/or non-emitting generation as well as barriers to reductions of greenhouse emissions from emitting resources
- Balance the rigor and accuracy of accounting with the incentives to increase renewable energy production, reduce greenhouse gas emissions, or lower overall compliance costs
- Reflect individual state policy objectives and state policy decisions regarding locational benefits for customers and communities while also supporting a more complete and accurate accounting of electricity and emissions across the western region
- Harmonize with electricity market design and operation
- Use simple, cost-effective solutions where possible; avoid administratively burdensome, complex accounting approaches unless they are likely to achieve demonstrably better outcomes
- Support or be compatible with related policies or programs that affect sectors other than the electricity sector
- Consider any existing legal or contractual limitations in design and implementation

Elements of Accounting and Tracking Frameworks for Renewable Portfolio or Clean Energy Standards

- Unit of measurement is one megawatt-hour
- Resource-specific verification of required quantities from eligible resources
- Accurate accounting of the quantity of renewable and/or non-emitting energy produced
- Supports unique assignment of resource-specific megawatt-hours

Elements of Accounting and Tracking Frameworks for GHG Reduction Policies

- Unit of measurement is one ton of carbon dioxide equivalent
- Accurate accounting of greenhouse gases emitted into the atmosphere associated with electricity produced
- Resource specific accounting is preferred; if resource-specific accounting is not possible or practical, an appropriate or average emissions factor may be applied

Discussion

Potential Accounting Frameworks

1. Attribute-Based Accounting

The development of an accounting system or systems that meets the elements set forth above is challenged by the complexity of transactions in the wholesale electricity market and the difficulty in tracking transactions in a manner comparable to other physical commodities. For RPS and CES programs, this has traditionally been resolved by separating the renewable or non-emitting “attribute” of the resource from the underlying transaction and physical load service. The “attribute,” is most commonly in the form of a Renewable Energy Certificate (“REC”), and typically comprehensively includes all of the non-power attributes associated with the renewable or non-emitting energy. This can include: fuel type, geographic location, vintage, direct emissions (or lack thereof), and avoided emissions. The attribute certificate represents the contractual right to claim these attributes. The attribute-based system separates the non-power attributes from the underlying energy and avoids the complexity of a reconciliation with physical load service or electricity transactions. Certificates can similarly be created for all generating resources (emitting and non-emitting) for the purposes of tracking and accounting for emissions, however this is not currently common practice in the West. In a purely attribute-based system, the disposition of the attribute is completely separated from underlying energy transactions and load service. For compliance purposes, entities must solely demonstrate creation or acquisition of the required quantity of eligible attributes.

Attribute-based systems are also used in what is referred to as the voluntary market—which allows consumers to directly purchase and claim renewable attributes without negotiating a separate supply agreement with the local electric utility. Over time, the nature and types of products offered as voluntary programs have expanded as more large consumers, including large industrial and municipal customers, have adopted their own renewable and/or clean energy goals. Attribute-based systems allow these consumers the ability to claim the attributes associated with renewable energy separate from underlying energy transactions.

Attribute-based systems are used widely across the country, including in the Western Interconnection where the Western Renewable Energy Information System (WREGIS) is used to track RECs for many RPS compliance programs and voluntary market transactions. In many east-coast organized markets similar systems are used to account for both fuel type and emissions. In these systems, the transactional and dispatch aspects of the electricity market is considered separately from the assignment of attributes to load. Each MWh generated and its associated attributes and emissions is captured in the system. Entities then put a claim on the attributes and emissions and only one claim can be made for each MWh. This assures no double counting and allows for the attribute management to happen outside the transactional and dispatch aspects of the market. This is the case even where a cap-and-trade program is in place (the Regional Greenhouse Gas Initiative) that imposes a greenhouse gas cost on emitting resources and therefore impacts the resource dispatch. A number of Regional Transmission Organizations (RTO) in the east have established Generation Attribute Tracking Systems (GATS) to track fuel type and emissions attributes of resources within each RTO footprint.

The benefits of this system are rooted in its simplicity and because it can reflect the regional benefits of renewable and non-emitting electricity without attempting to physically or contractually allocate or deliver those benefits to a specific jurisdiction or load. This approach also gives the greatest amount of flexibility to entities with compliance obligations because they are able to seek out and acquire the least-cost attributes, regardless of physical location or physical or contractual nexus to load service.

2. Attribute-Based Accounting With Eligibility Criteria

The potential drawbacks to a purely attribute-based approach is that it may not reflect individual state preferences regarding the location of renewable or non-emitting energy, additionality, or desire to have a more concrete link between compliance and physical or contractual load service. In addition, some view attribute-based accounting as a way to “mask” or paper over a lack of actual renewable procurement or emissions reductions at the utility- or state-specific level. Because of this, states have typically imposed additional requirements on the types of attributes that are eligible for compliance with a particular standard. This may come in the form of geographical restrictions for eligible resources, deliverability requirements, a requirement that a certain portion of attributes be acquired at the same time as the underlying energy, or timeframe restrictions on the vintage of attributes that are eligible for compliance. These additional parameters can serve to increase the link between the acquisition of the attributes and the electricity used to serve the load or paid for by the customers in a particular jurisdiction.

Examples of attribute-based accounting systems with eligibility criteria include RPS programs adopted in California, Oregon, and Washington. Each of these programs require that a resource-specific REC be retired for compliance but the REC must also meet other criteria. In California, the resource must be eligible and fall into one of three buckets: 1) the resource must be capable of directly delivering to California load i.e., interconnected to a California balancing area; 2) substitute energy must be “delivered” to California balancing area simultaneously with the purchase of a REC from an eligible resource; and 3) any other REC that is not eligible for the first two buckets. In Oregon, there is a geographic restriction for resource eligibility and 80% of procurement must be “bundled” meaning that the REC and the underlying energy must be acquired at the same time. In addition, under both California and Washington programs, RECs must be retired within a specific timeframe to remain eligible for compliance.

Washington is currently undergoing a rulemaking process where some stakeholders have suggested that a REC continues to be required but only “counts” for compliance when the underlying electricity is also delivered to the utility load within the state. This approach has not been employed by other programs and creating a direct tie to underlying electricity transactions and load service presents unique challenges compared to other types of eligibility criteria. Particular challenges with such an approach are: 1) the method under which electricity is identified as delivered to a specific utility load in Washington; 2) as RPS or CES requirements are higher and higher, how to ensure that all or a substantial portion of energy delivered to the state is done on a resource-specific basis; and 3) unintended impacts on the participation of utilities in organized markets.

There are many potential forms of eligibility criteria that may be adopted to meet specific state preferences without compromising the overall benefits of an attribute-based accounting system. However, generally, more stringent requirements, in particular geographic limitations or delivery-to-load requirements, have the potential to erode some of the regional and simplicity benefits associated with attribute-based accounting.

3. Source-Based Accounting

Another method of accounting, referred to as source- or production-based accounting, looks solely at electricity production at the source and does not consider the non-energy attributes of a resource separately. A source-based approach would typically assign fuel type and emissions to an entity based on resource ownership or to a state based on geographic location. This very straightforward approach accounts for the electricity and emissions produced within a state or through the long-term assets of a particular entity. Electricity transactions and deliveries to load are not considered or are considered separately. An example of a source-based approach is how utilities report in the FERC Form 1 or to the Energy Information Administration. This approach is simple and useful for understanding the resource profile of a particular entity or state but may be ill-suited for compliance with state-specific programs that address electricity imports. Programs such as RGGI and California’s cap-and-trade program are considered source-based because they regulate greenhouse gas emissions at their source i.e., at the power plant level. In contrast to an attribute-based system, these types of source-based emissions programs typically use allowances as a compliance instrument. An allowance is a term used for a certificate or permit that represents the legal right to emit one metric ton of carbon dioxide equivalent. Allowances are

created and issued based on the cap set by the jurisdiction administering the program. While RECs and allowances are distinct in terms of what they represent, they are related to the extent the avoided emissions attribute associated with a REC is counted toward reducing emissions under the cap. This is a challenge because emissions reductions associated with RECs are difficult to quantify and verify. In California, CARB does not allow the use of RECs as compliance instruments under the cap-and-trade program and the California Public Utilities Commission has found that California RPS RECs do not have avoided emissions value.¹ In this way, renewable energy used for RPS or CES compliance has no incremental effect on reducing emissions below the cap, but makes achieving the cap simpler and less expensive. Generally, allowances and RECs are also distinct in that attribute certificates have value for load-based entities or a consumer while allowances are valuable for entities who are operating emitting resources.

4. Source-Based Accounting For Electricity Imports

For a state-specific source-based system, such as California's cap-and-trade program, a challenge arises with respect to how to quantify and assign responsibility for emissions associated with imported electricity. To address this, CARB developed a methodology that identifies electricity as imported to California based on electricity transactions, resource dispatches, and/or entity resource portfolios. There are a variety of potential ways to develop an importer-based approach, from an annual system emissions factor calculation (as CARB applies to multi-jurisdictional entities) to more granular, even hourly, algorithmic solutions (as is applied in the EIM). To date, although multiple states apply an importer-based approach for emissions accounting, no RPS or CES programs have employed such a methodology for compliance purposes. Importer-based approaches, particularly more granular ones, are complex given the high volume of transactions, the large quantities of energy that are transacted on a system to system basis and are not resource-specific, and the difficulty in tracking specific resources to specific loads, either on a contract or dispatch basis. Very granular importer-based approaches also run a greater risk of being inaccurate or imprecise due to the level of complexity and assumptions that must be made.

Consistent with the source-based program, the importer-based approach, as designed by CARB, does not consider the disposition of the REC—an import must be reported based on its emissions characteristics regardless of whether or not the electricity has been delivered with the REC.

Double Counting

A central tenet of RPS and CES programs is the prohibition on the double-counting of attributes, renewable or clean megawatt-hours, or emissions. This prohibition enables accuracy in accounting and preserves the integrity of the procurement policies by ensuring that the required quantity of renewable or clean energy has actually been acquired. At its most basic, no double-counting means that a single REC cannot be used for compliance twice for a single program or used for compliance in multiple states.

Greater complexity in double-counting involves: 1) the interaction between attribute-based accounting systems, such as are used for RPS and CES programs, with programs that directly

¹ D.08-08-028 at 24.

regulate emissions; and 2) the relationship between attributes owned and claimed by electricity consumers and those needed by utilities for RPS and CES compliance.

With respect to the interaction between RPS and CES programs and emissions programs, a concern regarding double-counting most often comes up specifically in the context of reconciling between an importer-based approach and an attribute-based approach. As an example, under the program adopted by CARB, the attributes are not considered. When non-emitting electricity is reported as delivered to California, the disposition of the attributes are not allowed to be considered so a circumstance may occur where a single megawatt-hour is reported as non-emitting and delivered to California while the associated attributes are used for compliance with an RPS or CES program in a different state. While not settled in statute or rule, many argue that this amounts to a double-count of the non-emitting attribute of that electricity. As noted above, California has concluded that California RPS RECs do not have avoided emissions value so it is not considered double-counting if a REC used for California RPS compliance is also reported as non-emitting under CARB's program. However, this issue is less clear where renewable energy is imported to California from a state without an emissions cap in place.

The combined application of these approaches can result in the same megawatt-hour of electricity, including any associated attributes, being assigned to two different states through two different methods. This same circumstance has the potential to occur, and would likely be expounded, if multiple states adopted different methodologies.

With respect to the relationship between attributes owned and claimed by electricity consumers and those needed by utilities for RPS and CES compliance, a challenge is created where customers are imposing higher and higher renewable goals for themselves while the state is imposing the same on the utility serving those customers. An untenable situation may ultimately be created if a customer cannot "count" attributes toward meeting their own goals if those same attributes are also used for RPS or CES compliance.

Leakage

One of the greatest challenges for greenhouse gas accounting systems is the potential lack of complete production information across the regional electric system. Regional grids inherently seek to transfer the most economical energy across sub-regions and these respective imports and exports may reflect differing greenhouse gas approaches. One result of varying greenhouse gas approaches across the region is the introduction of leakage. Leakage occurs when energy from higher emitting resources displaces the energy from more efficient, lower emitting resources and the overall emissions increase. For a global emission like greenhouse gases, this could undermine the environmental policies by reducing the efficacy of a tracking and accounting framework.

Leakage is created when energy transfers are occurring between two areas in the region where one sub-region is accounting for emissions and their intrinsic price while the other is either not established or pricing carbon differently. This drives changes in generator dispatch decisions as the offer prices from some resources reflect the cost of carbon and others do not thus giving the appearance that the lower cost resource is also lower in its emission profile. Leakage may undermine greenhouse gas reduction policies when energy imported to a carbon pricing region has

higher emissions than energy from internal resources and without mitigation, may impact investment decisions and consumer costs in regions with and without carbon pricing.

The topic of leakage is a well-established issue where electric grids have broad regional transactions and the greenhouse gas policies establish significant differences in the respective accounting frameworks. However, an important distinction exists between an accounting or reporting program and a program that establishes prices that create market incentives to alter behavior. A reporting program, in and of itself, does not necessarily create leakage but allows for greater transparency in terms of understanding where leakage may be occurring.

Potential Market Impacts

Choices made regarding how to account for fuel type and emissions are highly consequential for the future development of more efficient wholesale electricity markets. Whether and how electricity may be “counted” for compliance or whether a benefit is accessible under a particular program will create both short- and long-term incentives for the development, integration, and operation of renewable and non-emitting resources. On a short-term basis, if a particular transaction doesn’t “count” for state compliance or is otherwise penalized, a disincentive is created for that entity to enter in to that transaction, even if the transaction may reduce renewable curtailment or displace emitting generation. On a long-term basis, the type of electricity and resources that will “count” for compliance has implications for the location of new renewable resources, whether extensive transmission builds are needed, and whether substantial renewable over-build may be required.

1. *Inconsistent Accounting Methodologies Across States*

There are a number of ways in which inconsistent accounting methodologies across states can create disincentives for: 1) otherwise efficient and environmentally beneficial transactions; or 2) participation in organized wholesale markets. As noted above, the attributes associated with energy reported as imported to California as non-emitting may not be eligible for compliance with other state RPS or CES programs. This may create a disincentive for the sale of non-emitting electricity to California. There is debate among stakeholder communities as to whether this is to be viewed as driving market inefficiency and unnecessary over-build or whether this helps to maximize renewable energy development.

Another example of this may occur where one or more states adopt attribute-based eligibility criteria based on the contractual or physical delivery of electricity to load. In this scenario, if the attribute must accompany delivery to load to “count,” entities may be disincentivized from transacting if the energy purchase is not resource-specific or accompanied with the associated attributes. This is a particularly important issue during periods of renewable over-supply and for the future of organized wholesale markets.

If entities within a state are keeping attributes and selling the underlying electricity, the underlying electricity may not “count” in a prospective buyer’s state because it is not being delivered with the REC. A real-world example of this occurs during periods of California renewable over-supply—if there is no interested buyer in that electricity because it is not being sold with RECs (California’s RPS program is attribute-based), the renewables may be curtailed. This may also create a need for

the entity in the buyer's state to procure additional renewable resources that may not have otherwise been needed.

Participation in organized wholesale markets may also be challenged if substantial portions of underlying electricity transactions must be resource-specific. By design, organized markets employ a centralized dispatch that increases efficiency by reducing the friction and inefficiencies created by bilateral transactions. An accounting framework that introduces the need for bilateral tracking of sources and loads between all participating states or entities is likely to erode the efficiencies associated with a centralized dispatch of resources. If entities are required to make all or a substantial portion of their energy purchases on a resource-specific basis, they may not be able to participate in an organized market that does not accommodate specified-resource transactions.

2. Longer-Term Consequences

The issues described in the prior section become increasingly important as more and more states adopt very high RPS and CES standards and as efficient electricity markets become a more and more critical aspect of meeting these standards. While it may be tenable for one or even two states to adopt accounting methodologies that are rooted in underlying electricity transactions, or for one or two states to adopt different methodologies for fuel type accounting versus emissions accounting, it is likely entirely unworkable if many states across the West adopt incompatible methodologies. Such an outcome has the potential result in significant inaccuracy, double-counting, over-and under-counting, as well as potentially interfering with the ability to harness the benefits of more efficient electricity markets.

Recommendations

The following recommendations are designed to ensure that the principles and elements set forth in this paper are met in such a way that is able to be harmonized with continued and future operation of both bilateral and wholesale electricity markets.

- Agreement by Governors' to direct coordination and collaboration across states and their designated agencies consistent with the principles and elements articulated in this paper as well as a commitment to align and harmonize accounting methods across states where possible.
- While accounting methodologies need not be identical, consistent basic methodologies should be adopted across states.
- Attribute-based systems are recommended for compliance with RPS and CES programs and renewable and non-emitting fuel type accounting; states should seek to meet individual preferences and goals through establishing resource and program eligibility criteria without attempting to precisely match accounting to underlying energy transactions or load service.
- States should work collectively and with WREGIS to consider whether a regional attribute-based system may be developed for emissions accounting; this may be similar to other all-generation tracking systems adopted in other regions of the country with organized markets.

- Issues of market design, resource dispatch, and wholesale price signals should be considered separately from issues of fuel type and emissions accounting accuracy and attribute assignment to specific states or entities;
- Market design should reflect or support state policy where appropriate and should not undermine state policy objectives; state policy should be informed by market design to avoid unintended consequences that could undermine the operation of wholesale electricity markets.
- States should work collectively to develop a common understanding of double-counting of both emissions and non-power attributes and which attributes are commonly incorporated into attribute certificates.