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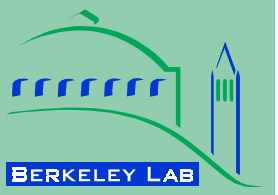

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Transacting Generation Attributes Across Market Boundaries:

Compatible Information Systems and the Treatment of Imports and Exports

Executive Summary

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Disclaimer

Abstract

Voluntary markets for "green" power, and mandatory policies such as fuel source disclosure requirements and renewables portfolio standards, each rely on the ability to differentiate electricity by the "attributes" of the generation. Throughout North America, electricity markets are devising accounting and verification systems for generation "attributes": those characteristics of a power plant's production such as fuel source and emissions that differentiate it from undifferentiated (or "commodity") electricity. These accounting and verification systems are intended to verify compliance with market mandates, create accurate disclosure labels, substantiate green power claims, and support emissions markets.

Simultaneously, interest is growing in transacting (importing or exporting) generation attributes across electricity market borders, with or without associated electricity. Cross-border renewable attribute transactions have advantages and disadvantages. Broad access to markets may encourage more renewable generation at lower cost, but this result may conflict with desires to assure that at least some renewable resources are built locally to achieve either local policy goals or purchaser objectives.

This report is intended to serve as a resource document for those interested in and struggling with cross-border renewable attribute transactions. The report assesses the circumstances under which renewable generation attributes from a "source" region might be recognized in a "sink" region. The report identifies several distinct approaches that might be used to account for and verify attribute import and export transactions, and assesses the suitability of these alternative approaches. Because policymakers have often made systems "compatibility" between market areas a pre-requisite to allowing cross-border renewable transactions, this report develops criteria for "compatible information systems." Where fully compatible information systems do not exist, certain cross-border attribute transactions may still be deemed suitably credible and verifiable to be recognized; this report also identifies possible criteria for such "compatible transactions."

The importance of credibly addressing imports and exports of renewable energy attributes should be evident. A lack of clarity as to what generation can and cannot be recognized in various markets can paralyze investment in and contracting for renewable generation. The development of rules for imports and exports will also minimize the potential for "double counting" of renewable energy attributes, will help define where and at what cost renewable plants will be built, and will directly impact the location of the benefits that renewable generation provides.

This report ultimately concludes that the "correct" approach to treating renewable energy imports and exports depends on the context and motivations behind the transaction or the mandate, and that the presence of practical constraints or multiple objectives often make selecting the best approach difficult. That said, the report urges those creating market rules to move quickly in defining valid cross-border transaction structures and to consider the implications of their decisions on the creation of viable markets for new renewable generation.

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Executive Summary

A number of U.S. states have recently established policies and markets intended to increase the supply of renewable energy generation from wind, solar, biomass, hydroelectric, geothermal, wave or tidal energy. Many of these efforts have occurred simultaneous with the introduction of competition in wholesale and retail electricity markets. The markets and policies of most interest to this paper include: (1) voluntary markets for "green" power, (2) generation source disclosure requirements, (3) renewable energy portfolio standards (RPS), and (4) emission performance standards (EPS).

Each of these efforts relies on the ability to differentiate electricity by the "attributes" of the generation. Generation attributes include all of the characteristics of a power plant's production that differentiate it from undifferentiated (or "commodity") electricity, for example, fuel type, air pollutant emissions, location or vintage. Throughout North America, electricity markets are devising accounting and verification systems for generation attributes to verify compliance with market mandates, create accurate disclosure labels, and substantiate green power claims. Emissions markets are looking to these systems to support their purposes as well.

As these policy and market drivers gain momentum, there is growing interest in transacting (importing or exporting) generation attributes across electricity market borders, with or without associated electricity.

- **Benefits of Cross-Border Attribute Transactions**. There are a number of economic and environmental benefits to a broadly defined geographic scope of eligibility for generation attributes. That is, there are circumstances in which leniency towards cross-border renewable attribute transactions might be warranted, especially to encourage least-cost compliance with renewables purchase mandates. In particular, most renewable generators must locate where the resource is available, often remote from their potential customers. Likewise, electricity suppliers and end-use customers may wish to rely on renewables where they are most cost-effective, especially when comparable plants are not available locally or are only available at high costs. These circumstances often lead to heightened interest in cross-border transactions.

- **Disadvantages of Cross-Border Attribute Transactions**. On the other hand, renewable plants located in markets distant from the attribute purchaser often do not bring the same level of local benefits as plants located in greater proximity to the local market area. Policymakers and others that seek to achieve local environmental and/or economic benefits may therefore wish to be more stringent and create barriers to certain kinds of cross-border transactions.

With increased interest in such cross-border transactions, approaches to defining valid transaction structures and accounting treatments must be devised that meet the needs of policymakers, regulators, and markets for verification, credibility, and compatibility. In the absence of established methods to properly account for such cross-border attribute sales, it will be challenging for regulators to verify unique attribute claims. It will also be challenging for regulators to limit transactions that *appear* to achieve compliance but that in reality do not meet

the underlying policy objectives[1] (see discussion of "green-washing" in Text Box 3). Further complicating matters, accounting and verification systems are evolving independently and at a different pace in different regions, states, and provinces.

Research Objectives

This report is intended to serve as a resource document for those interested in and struggling with cross-border attribute transactions. The principle audience for the report includes the market participants and regulators in regions grappling with these issues, as well as independent system operators or others tasked with accounting for and verifying generation attribute transactions. Our focus is on renewable generation, but the findings are also applicable to other generation sources that are transacted across market boundaries. Many of our examples, and much of our thinking, relates to evolving markets and policies in the Northeastern U.S. and Eastern Canada; rules for cross-border renewable energy transactions are being heavily debated in these regions.

This report assesses the circumstances under which renewable energy generation attributes generated in a "source" region might be recognized in a "sink" region for various purposes, and the underlying accounting structures that could be used to verify such transactions. The report's organization and content is as follows:

- **Chapter 2** provides an overview of the various sources of demand for generation attributes, identifies different accounting and verification approaches used to track generation attributes, and examines the policy implications of cross-border transactions.
- **Chapter 3** identifies several distinct approaches that might be used to account for and verify attribute import and export transactions.
- **Chapter 4** analyzes the suitability of the alternative approaches identified in the previous chapter, and develops recommendations for treating attribute imports and exports under a variety of circumstances and practical constraints.
- **Chapter 5** develops criteria for a "compatible information system" in a neighboring market; policymakers have often made system compatibility a pre-requisite to allowing cross-border renewable energy transactions. This chapter also develops criteria for a "compatible transaction" that, in the absence of a compatible information system, might still be recognized as being suitably credible and verifiable so as to be recognized.
- **Appendix A** examines the current treatment of imports and exports in the Northeastern U.S. and Eastern Canada.

This executive summary offers a reasonably complete description and summary of the major points of the report. For those readers seeking a basic understanding of the issues at hand, and our major conclusions, the executive summary should suffice. The full report should be consulted by those seeking more detail or clarification than can be offered in the executive summary.

[1] The fear of disclosure and EPS requirements being completely undermined by gaming transactions at system borders has caused many regulators to implement restrictive practices and limit cross-border attribute transactions.

The importance of credibly addressing imports and exports of renewable energy attributes should be evident. A lack of clarity as to what generation can and cannot be recognized in various markets can paralyze investment in and contracting for renewable generation. Resolution of these issues may therefore be critical to successfully increasing investment in renewable generation sources – the underlying goal of market mandates, disclosure requirements, and green power marketing. The development of rules for imports and exports will also minimize the potential for "double counting" of renewable energy attributes, will help define where and at what cost renewable plants will be built, and will directly impact the location of the benefits that renewable generation provides.

The issues addressed in this report are both complex and contentious. As such, this report was developed with input from a broad range of stakeholders to ensure that the full range of issues and options were considered. Stakeholder input revealed a range of often-conflicting positions that required us to distinguish reasoned policy positions from those based on competing commercial interests. In particular, our research highlights a pervasive tension between: (1) a policy desire for broader access to markets that will encourage more renewable energy generation at lower costs, and (2) a competing desire to assure that at least some renewable resources are built locally to achieve either local policy goals or purchaser objectives. Of course, the commercial interests of specific market participants on different sides of a market boundary also come into play. In this report we have therefore attempted to develop a logical framework for addressing these issues and aligning the treatment of cross-border attribute transactions with the specific circumstances and objectives of a policy or contemplated transaction.

Basic Concepts

Accounting and Verification Methods for Generation Attributes

The need to demonstrate compliance with generation attribute requirements (RPS, EPS, and source disclosure) and substantiate green marketing claims has led to the development of attribute accounting and verification systems. These systems help to uniquely associate the attributes of energy production from specific generators with the sales of specific electricity suppliers. As discussed in more depth in Chapter 2, a variety of accounting and verification approaches are feasible and are in use:

- **Contract path tracking** relies on the assumption that generation attributes are "bundled" with and therefore follow electricity transactions. A retail electricity provider (REP) therefore substantiates its claim to particular attributes by tracking energy transactions through all intermediaries back to the generator. [2]
- **Certificate verification** allows generation attributes to be "unbundled" from and transacted independently from energy transactions, in a manner that encourages price transparency and liquidity. This is accomplished through instruments that establish clear property rights and title to unbundled attributes, referred to as tradable renewable certificates (TRCs) or

[2] A variant to this is an accounting and verification framework that simply requires retail suppliers to document "control of generation" without accounting for system power transactions. The practical use of this approach is limited to states in which retail electricity suppliers are required to describe their generation mixes without detailed requirements on how to calculate that mix.

renewable energy credits (RECs), or more generally as certificates when applying to all generation types within a market.

- **Hybrid approaches** rely on contract path tracking but allow some degree of unbundling without distinct secondary markets for certificates, such as the "conversion transaction" approach adopted in New York (described in Appendix A-3).

Defining "Market Areas" for Cross-Border Transactions

Regardless of the accounting and verification system used, the system will need to define rules for cross-border transactions. Accordingly, this report addresses cross-border renewable energy transactions from one "market area" to another. For our purposes, an electrical market area reflects how stakeholders aggregate and organize themselves, most often within an electric control area or power pool. Examples in the Northeast include the PJM Interconnection, the New York ISO, ISO-New England, or the Ontario IMO.

While electricity is frequently transacted between electrically connected market areas, scheduling energy transactions that depend on a specific generation unit's production is far more cumbersome and costly than entering into a financial obligation to deliver undifferentiated system power. This is especially true for wind power because wind-generated electricity is intermittent in nature, and cannot be scheduled in advance with precision. As a result, there is increasing interest in supporting renewable energy financially, by paying for attributes, without the need to specifically transmit that electricity across borders.

Nexus to Retail Sales

An important distinction identified in Chapter 2 of this report is the degree to which generation attributes are bundled with or sold separately from the retail sale of electricity by a REP. Two broad categories of transactions for renewable attributes include: (1) transactions in which generation attributes are associated with, and have a nexus to (or connection with), the sale of electricity by a retail supplier, and (2) purely financial transactions distinct from the sale of electricity by a retail supplier.

Most state RPS, EPS, and disclosure requirements, as well as traditional retail green power marketing efforts, fall into the first category. In these cases, retail electricity suppliers must meet their compliance obligations or marketing claims by "delivering" renewable energy as a portion of their retail electricity supply – there is a close nexus between renewable generation and retail electricity sales. In the second category are tradable renewable certificate (TRC) products sold directly to customers by third-party TRC marketers. In these cases, there is no nexus to retail electricity sales per se as the product (TRCs) is entirely separate from end-use electricity sales.

This distinction is important because it relates to the level of "electricity delivery" that need be required by regulators for cross-border renewable attribute transactions. If there is no nexus to retail electricity sales, for example with pure TRC transactions, renewable energy attributes might easily be transacted across market boundaries without an associated electricity flow. When generation attribute requirements are associated with all retail electricity sales (such as comprehensive uniform source disclosure or EPS mandates), however, the quantity of energy and the quantity of attributes in a market area must be roughly equal. Accordingly, the introduction of cross-border attributes without corresponding energy could confound a

meaningful calculation of the source proportions and average characteristics of a supply mix. For an attribute import under such circumstances, some degree of electricity deliverability from the source market may therefore be required to achieve a nexus to retail sales and sustain a "conservation" of attributes.

Identifying Alternative Approaches to Addressing Imports and Exports

An important contribution of this report is in its identification of several discrete options for treating cross-border attribute transactions in generation attribute requirements (RPS, EPS, and disclosure), and in accounting and verification systems that track those requirements. The three categories of discrete options identified in Chapter 3 of this report are: geographic eligibility, benefits-driven eligibility, and delivered energy eligibility. Each of these approaches can be used by accounting and verification systems and by regulators to define eligible resources and the types of cross-border transactions that they will recognize.

Geographic Eligibility

Under the geographic eligibility approach, attributes from generators located within the eligible region are recognized, all internal borders are ignored, and all generation outside the eligibility region is not eligible. When extended beyond the basic market area (e.g., the PJM, ISO-NE, or NYISO), this approach effectively supports some degree of attribute unbundling from energy, since energy transactions are not required to flow between market areas in any particular manner. Four variations to this approach include:

- **Unconstrained.** The accounting system or market rules could recognize attributes from anywhere in the nation, the continent, or perhaps even the world. (Example: generators located anywhere in the United States would be eligible to meet the Massachusetts RPS through the sale of their generation attributes to Massachusetts retail electricity suppliers.)
- **Super-Market Area**. Generation is recognized, or considered eligible, if the generator is located anywhere within a defined region spanning two or more contiguous market areas. Such market areas might be selected based on environmental benefits or transmission feasibility. (Example: generators located anywhere in ISO-NE or the NYISO territories would be eligible to meet the Massachusetts RPS through the sale of their generation attributes to Massachusetts retail electricity suppliers.)
- **Market Area**. This approach limits eligibility to any resource within the load's market area, effectively precluding recognition of all source-specific attributes from generation outside of the load's market area. (Example: only generators located in ISO-NE would be eligible to meet the Massachusetts RPS.)
- **Sub-Market Area**. Geographic eligibility could be established within a smaller footprint than the market area, based on state boundaries or internal transmission constraints, effectively creating borders and cross-border attribute transactions within a market area itself. (Example: only generators located in Massachusetts would be eligible to meet the Massachusetts RPS.)

Benefits-Driven Eligibility

Benefits-driven eligibility is the philosophical opposite of geographic eligibility: the eligibility of a generator is dictated by a case-by-case demonstration of benefits to the sink-area load, regardless of generator location or to whom the generator sells its power. This approach

recognizes that neither electricity flow nor environmental benefits are entirely dependent on the location of the eligible generator or to whom the electricity is sold. Accordingly, under this system, generator eligibility is more likely to be defined by dispatch protocols and pollutant air-sheds than geopolitical boundaries.

Though philosophically appealing, even the proponents of this approach admit that it may be too complex or too burdensome for regulators to implement completely on a case-by-case basis. To simplify its implementation, default rules might be established (e.g., geographic eligibility or delivered energy eligibility), with case-by-case determination of eligibility only for transactions that fall outside of the default rules.

Delivered Energy Eligibility

The most common approach for treating cross-border attribute transactions is to use delivered energy eligibility. This approach expands on market-area geographic eligibility by recognizing generation both within the eligible market area, as well as attributes associated with physical and/or contractual energy deliveries across market area interfaces. That is, unlike market-area geographic eligibility, attributes from out-of-market generation would be recognized, but only if an associated energy flow was also scheduled across the market boundary.

Variations to this approach are distinguished by (1) whether retail or wholesale matching is required, and (2) whether strict or related energy delivery is used. These features dictate how cross-border attribute transactions can be arranged under delivered energy eligibility, the role of intermediaries, and whether an attribute transaction must be arranged prior to the cross-border energy transaction, or can be associated with a matching energy transaction after the fact.

1. Retail vs. Wholesale Matching: Retail matching requires that a retail electricity provider seeking to utilize imported attributes within a given settlement period also import energy – either directly or via a wholesale supplier on its behalf – from the corresponding source market. The limitation to this approach is that a REP may only purchase attributes from out-of-market generators if it has associated electricity imports in its settlement account; full unbundling in the sink area of energy and attributes from out-of-market generators is not allowed. Wholesale matching, on the other hand, expands upon retail matching by also allowing a wholesale market participant to purchase generation attributes and associated electricity from out-of-market generators. The wholesale participant is then allowed to directly sell the attributes from the out-of-market generators to REPs, regardless of whether the REP has electricity imports in its settlement account. In this more flexible approach, full unbundling of the attributes from out-of-market generators is allowed within the sink area and the ultimate REP procuring the attributes is not limited to the quantity of imported energy in its settlement account.

2. Strict vs. Relaxed Energy Delivery: Under strict energy delivery, attributes may only be imported via an energy import from a specific generator, with energy and attributes scheduled across the border into the sink region via a unit-contingent contract. The energy import must match the generator's production profile in real time, necessitating an hourly

settlement.[3] Under relaxed energy delivery, on the other hand, the attributes delivered across a market area boundary must simply match in quantity a scheduled energy flow over a broader monthly, quarterly, or even annual settlement period. In effect, wind attributes could be transferred to the sink area along with a corresponding energy flow, but that energy flow need not (contractually) be the real-time electric output of the wind generator.

Combinations of these design details give rise to four variations of delivered energy eligibility, listed from least to most flexible as follows:

- **Strict energy delivery with retail matching** requires that a REP wishing to buy out-of-market renewable attributes procure attributes from the source market via a pre-arranged bilateral contract of bundled energy and attributes across the market boundary.
- **Relaxed energy delivery with retail matching** requires that a REP wishing to buy out-of-market renewable attributes arrange energy imports from the renewable generator's source market, which may be matched with attributes (procured together, or independently) over a broader settlement period (perhaps quarterly). The transaction for attributes could be arranged prospectively or after the energy transaction flowed, as long as it matched a successfully scheduled cross-border energy transaction by that REP within the same settlement period.
- **Strict energy delivery with wholesale matching** allows full unbundling of energy and attributes within the *sink* market area, but attributes from outside the market area must arrive in a bundled fashion and match the unit's production on an hourly basis.
- **Relaxed energy delivery with wholesale matching** also allows full unbundling of energy and attributes within the sink market area, but the importer may match the attribute transaction to an energy flow over a broader settlement period, with the attribute transaction arranged either prospectively or retrospectively.

Additional Requirements for Reciprocity

In addition to the three basic approaches described above (geographic, benefits-driven, and delivered energy eligibility), some laws and regulations add additional "reciprocity" conditions on the source market area or the generator itself. These are intended to level the playing field by holding imported attributes to a standard similar to that applied to local generators. The effect is specific exclusions of attributes from out-of-market generators failing the reciprocity test. For example, for disclosure purposes, New Jersey could disallow attribute imports from generators located in states that are not open to retail competition. Alternatively, generators eligible for the New Jersey RPS could be required to be located in states with similar RPS mandates. Stakeholders that we interviewed during our research expressed divergent views on such reciprocity restrictions, with some strongly in favor and others concerned about the legality of such requirements.

Analysis of Alternative Approaches to Addressing Imports and Exports

[3] "Dedicated extension eligibility" is the most extreme form of expanding geographic eligibility via strict delivered energy eligibility. It requires generators to be either located within a defined market area, or connected into that market area via a dedicated radial line without being intermingled with electricity not physically metered by that grid's administrators. This approach has been taken for the Texas RPS.

Chapter 4 provides a detailed assessment of the effectiveness of each of the alternative approaches for addressing cross-border attribute transactions. It concludes that there is no single, optimal solution in all cases. Instead, we find that the appropriate treatment of cross-border renewable attribute transactions depends critically on:

1. whether transactions are driven by compliance with mandates or by consumer demand,
2. whether there is a requirement for a "nexus" to retail sales, and
3. the driving policy objectives or market motivations, for example, whether environmental objectives are driven by local, regional or global environmental concerns.

Given these considerations, it is not possible to identify ideal solutions for addressing cross-border transactions in all cases. The best we can do is to identify potential alternatives and describe in what circumstances these alternatives may be put to best use. Below we briefly summarize some of the key advantages and disadvantages of each approach (more detail can be found in Chapter 4), while the following section of the executive summary highlights our recommendations.

- **Geographic Eligibility** has several generic advantages including simplicity, and low transaction and administration costs. In addition, this approach avoids the need to schedule specialized energy transactions and arrange and pay for transmission. However, this approach is potentially difficult to implement without being susceptible to legal challenge under NAFTA or the Interstate Commerce Clause. Each variation also has its own pros and cons:

    - ***Unconstrained Geographic Eligibility*** has one primary advantage: this approach allows global or national environmental objectives to be met at least cost. However, this approach cannot assure local benefits. Additionally, this approach cannot assure a "nexus" to retail sales of electricity, so it is poorly suited to disclosure or other state mandates that relate to a local supplier's sources of electric supply.
    - ***Super-Market Geographic Eligibility*** is superior to market-area geographic eligibility at recognizing that environmental impacts do not stop at political borders, and can thus take into account the regional transport of pollutants. It is not well suited for situations in which a nexus to retail electricity sales is required, however, or when there are very local objectives and market areas are large.
    - ***Market Area Geographic Eligibility*** is well suited to mandates or purchases aimed at local objectives. It also creates a more credible nexus to retail electricity sales than broader eligibility regions. However, it forecloses access to lower-cost renewable options that could be otherwise delivered from outside the geographic eligibility zone, and that may have the same local benefits as an in-market generator.
    - ***Sub-Market Area Geographic Eligibility*** can target very local objectives (e.g. at the state level, within a larger market area). Its disadvantages are the same as for market area geographic eligibility, but more severe. It clearly forecloses access to lower-cost renewable options that could be otherwise delivered from outside the geographic eligibility zone, and that may have the same local benefits.

- **Benefits-Driven Eligibility** is the most accurate approach at tying eligibility to specific

benefits. However, compliance and administration are expected to be complex and burdensome, requiring case-by-case determinations of generator eligibility. In addition, as benefits may be independent of electricity sales, this approach is not well suited to situations where a nexus to retail electric sales is required.

- **Delivered Energy Eligibility** has certain general advantages over most geographic eligibility approaches. Specifically, delivered energy eligibility may provide access to lower cost renewable resources located just outside of the eligible geographic region without sacrificing a nexus to retail electric sales. Imported resources may have the same local environmental benefits as local resources (especially if there is local "displacement" of conventional power), and because of the associated transfer of energy across market boundaries, it is broadly applicable to mandates placed on REPs where a "nexus" to retail sales is required. Relative to expanded geographic eligibility, however, delivered energy eligibility adds complexity and cost to generators located outside of the defined market area because of its requirements for energy delivery across market boundaries. Furthermore, it is not well suited for meeting global objectives at least cost, and may also not be preferable when the objective is local economic development that cannot be delivered by generators in other market areas.

    - An import under the ***Strict Energy Delivery*** approach will have a virtually identical environmental impact as a generator located within the sink area. This is because in both cases conventional electricity generation in the sink area is displaced. This approach creates the most credible nexus to retail electricity sales, and is particularly well suited to achieving local environmental benefits. However, the requirement to schedule cross-border energy transactions to precisely reflect the generator's production profile may add transactional costs and operational burdens on transacting parties. Under strict energy delivery, a ***Retail Matching*** requirement assures that the REP is actually importing renewable energy, but because many REPs may not have the operational sophistication to schedule power across market boundaries, it may create barriers to renewable energy transactions. ***Wholesale Matching*** provides the same precision in the timing, location, and size of the benefits as provided under retail matching, but with added flexibility by allowing attributes to be unbundled from energy in the sink area.

    - With ***Relaxed Energy Delivery***, the transactional costs and complexities encountered under Strict Energy Delivery are reduced, and cross-border renewables attribute transactions can be supported even in the presence of some transmission constraints. However, unlike under strict energy delivery, the sink-area local environmental benefits associated with an import will not be precisely representative of similar local generation. This is because there is a broader settlement period in which to import energy, and therefore no requirement for unit-contingent, real time energy imports. Some transactions may therefore be viewed as less credible, especially if energy import delivery schedules depart materially from out-of-market generator production profiles. With ***Retail Matching***, there is a greater assurance that an attribute import will cause a change in the sink-area dispatch and provide the associated incremental local environmental benefits. However, as with retail matching under strict energy delivery, many REPs may not have the operational sophistication to schedule power

across market boundaries. The ***Wholesale Matching*** approach alleviates this concern and thereby allows both REPs and generators to conduct their core businesses more effectively. The ability of intermediaries under wholesale matching to schedule attribute transactions prospectively or retrospectively adds significant flexibility in the face of market uncertainty; buyers for generation can be sought after the generation has occurred as long as corresponding energy was moved across market boundaries. However, the ability to transact attributes retrospectively and associate such transactions with pre-existing energy transactions creates the possibility that there will be no incremental sink-area displacement or local environmental benefit.

Recommended Approach to Imports and Exports

Based on our analysis (and ignoring the impact of policy coordination challenges), the following table identifies our recommended approaches to account for cross-border attribute transactions, given different objectives and attribute demands. The table also identifies approaches that we deem suitable – these second tier options may be viable when multiple or conflicting objectives are in play. In creating this table, we have primarily considered:

- the consistency of the approach with the specific objectives of the policy,
- the need (or lack thereof) for a nexus to retail sales,
- the tradeoffs in accuracy and costs between strict and relaxed energy delivery; and
- the tradeoff between the theoretical attractiveness and complexity of the benefits-driven approach.

We have not, in this table, considered potential constraints resulting from the Interstate Commerce Clause or NAFTA. As discussed in the body of this report, such considerations – if binding – would greatly affect one's decision on how to account for cross-border transactions, and would presumably lead one away from narrower geographic eligibility approaches.

As shown in the table and as described in more detail in Chapter 4, we believe that unconstrained geographic eligibility is the best approach for green power TRC transactions and financial compliance with RPS requirements that have global or national objectives. This is because TRCs' independence from energy delivery allows the purchase of renewable attributes wherever they are least expensive within the designated market area. For customer-driven demand for TRCs, there is also little policy justification for constraining where the generators can be located, as long as there are sufficiently clear representations that it is a financial transaction, that the customer is paying for results (e.g. via TRCs), and that the customer is not mislead as to the benefits (local versus global).

This approach is not suited to situations that require local or regional benefits, however, or that require a direct nexus to retail electricity sales. Attribute demands that require a nexus to retail electricity sales (e.g., source disclosure and EPS) also require that attribute imports create repercussions or displacement in the sink market. We recommend strict or relaxed energy delivery in these circumstances. As can be seen, a number of specific design alternatives are available that may be suitable depending on policy objectives and practical constraints.

Recommended Approaches to Attribute Import/Export Treatment		
Situation	**Recommended Approaches**	**Suitable Approaches**
RPS and Emission Performance Standards, Local Objectives	Strict Energy Delivery (Wholesale or Retail matching) Relaxed Energy Delivery with Retail Matching	Relaxed Energy Delivery with Wholesale Matching Market-Area (or Sub-Market) Geographic Eligibility Benefits-Driven Eligibility
RPS and Emission Performance Standards, Regional Objectives	Relaxed Energy Delivery with Wholesale or Retail Matching Super-Market Geographic Eligibility	Benefits-Driven Eligibility Strict Energy Delivery (Wholesale or Retail matching) Market-Area Geographic Eligibility
RPS and Emission Performance Standards, National or Global Objectives	Unconstrained Geographic Eligibility	
Fuel Source Disclosure[4]	Strict Energy Delivery (Wholesale or Retail) Relaxed Energy Delivery with Retail Matching	Relaxed Energy Delivery with Wholesale Matching Market-Area (or Sub-Market) Geographic Eligibility
Green Power Transaction (from REP or TRC), Local Objectives, no Fuel Source Disclosure	Relaxed Energy Delivery with Retail Matching Strict Energy Delivery (Wholesale or Retail) Market-Area (or Sub-Market) Geographic Eligibility	Benefits-Driven Eligibility Relaxed Energy Delivery with Wholesale Matching
Green Power Transaction (from REP or TRC), Regional Objectives, no Fuel Source Disclosure	Benefits-Driven Eligibility Relaxed Energy Delivery (Retail or Wholesale Matching) Super-Market Geographic Eligibility	Strict Energy Delivery (Wholesale or Retail) Market-Area Geographic Eligibility
Green Power Transaction (from REP or TRC), National/Global Objectives, no Fuel Source Disclosure	Unconstrained Geographic Eligibility	

Practical Constraints

Applying the approaches recommended above is often confounded by practical constraints. In Chapter 4 we find that the most common constraints include:

- **Policy Coordination.** Many market areas contain multiple attribute policies (e.g., RPS, disclosure and/or EPS requirements in some or all New England states). If each policy uses

[4] We assume that comprehensive fuel source disclosure requires a nexus to retail sales.

different standards for accounting for imports and exports, a serious risk of confusion, complexity, and double counting may arise. The presence of comprehensive source disclosure and/or EPS requirements, in particular, creates a need for a nexus of attributes to the retail sale of electricity. Assuming that a singular approach to accounting for imports and exports in a region is preferable, this nexus requirement limits the available import/export eligibility approaches that might be used for other purposes (e.g., an RPS).

- **Multiple or Imprecise Objectives.** When renewable energy mandates or purchases are driven by multiple or imprecise objectives, it blurs the ability to apply our recommendations. In such cases, compromises and tradeoffs are inevitable. The best that can be done is to select an import/export approach that aligns reasonably well with as many of the specified or assumed objectives as possible.
- **Availability of Renewable Generation.** Renewable generators must be built where the resources are, and some regions are resource-poor. Several stakeholders suggested that overly-rigid rules designed to assure precise local displacement, nexus to retail sales, and/or comprehensive information run the risk of imposing barriers and costs that hamper the ultimate goal of many of the policies: increasing renewable energy generation.

Finally, of course, the perceived or actual administrative and systems costs associated with implementing the approaches recommended above will influence their application.

Information System Compatibility

When generator eligibility beyond a market area is allowed, several renewable energy attribute laws and market rules have declared that recognizing such generators' attributes may be contingent on the presence of a "compatible information system," or the presence of "compatible disclosure requirements" in the source market. Still others require "equivalent" accounting and verification systems.

A compatible information system in a source market area might be defined as one that is sufficiently compatible with the sink area's system to:

- ensure the veracity and uniqueness of generation source claims,
- avoid the potential for evading the policy's intent through sham transactions, and
- assure a level playing field for out-of-market generation and in-market generation.

Unfortunately, the concepts of "compatible accounting and verification systems," "equivalent accounting and verification systems," and "compatible disclosure requirements" have yet to be specifically defined in any jurisdiction. This lack of clarity creates substantial uncertainty for renewable energy developers and investors interested in understanding the possible markets for their electricity and attributes.

To contribute to the creation of such definitions, Chapter 5 identifies a series of criteria that might be required to ensure the compatibility of accounting and verification systems or disclosure standards. Specifically, the table below summarizes our findings on the criteria that might need to be met to allow conceptually different systems to be considered *fully compatible*, from the perspective of the sink area system.

We note that systems or requirements may be considered fully compatible, substantially compatible, or clearly incompatible. In the latter two cases, while the *systems* may not be fully compatible, one may be able to identify specific cross-border *transactions* that are compatible and that therefore deserve recognition. The issue of compatible transactions is discussed in the next section of this executive summary. The focus in this section, and the table below, is only on defining fully compatible systems and requirements. For definitions of the terms used in the table, see Section 5.3 of the report.

Criteria	**Compatible Accounting & Verification System**	**Compatible Disclosure Requirement**
Verification and accuracy of generation quantity and type	Required	Required
Verifiability of transfer of title (attributes and energy) under delivered energy eligibility requirements	Required	Required
No direct double counting possible	Required	Required
No indirect double counting possible	Source standard at least as tight or specific as sink	Source standard at least as tight or specific as sink
Certification of transfer of attributes to specific sink area	Helpful but not required	Not required
Degree of unbundling or disaggregation	Source standard at least as tight or specific as sink for full compatibility	Source standard at least as tight or specific as sink for full compatibility, or source is capable of providing required data
Settlement period	n/a	Source standard at least as tight or specific as sink
Time of generation specificity	Capable of providing required data in required resolution	Capable of providing required data in required resolution
Plant specificity	Source standard at least as tight or specific as sink for full compatibility	Source standard at least as tight or specific as sink for full compatibility
Losses	Capable of providing required data in required resolution	Capable of providing required data in required resolution
Common data	Required for MWh output	Required for MWh output
Common level of data resolution	Capable of providing required data in required resolution	Capable of providing required data in required resolution
Terminology	Not required if plant-specific data	Capable of providing required data in required format
Synchronous reporting	Source system can provide data meeting sink area's specificity	Capable of providing required data in required format

As shown in the second column of the table and as detailed in Chapter 5, regardless of the accounting method chosen, meeting the standard of a *fully compatible accounting and verification system* requires that the source system be able to assure that:

- the generation actually occurred and was delivered to the grid during time increments at least as short as the sink area's settlement period;
- there has been no direct (or purposeful) double counting of the attributes, and that the potential for indirect (or inadvertent) double counting is no greater than that possible in the sink area;
- the granularity or specificity of the source system – that is, its degree of unbundling, its time specificity, and its plant specificity – is at least as fine as those of the sink system;
- in the case of a delivered energy eligibility requirement, the source system clearly must also be capable of verifying the transfer of title of both energy and attributes at the border from a particular market participant to the sink area (in other words, assuring that the attribute has left the source system);
- title to the aggregated package of attributes and the associated quantity of electric production is established so that, if the sink market area requires data on the emissions characteristics of the generator but the source market area does not track emissions, required data can still be cross-referenced;
- data are available that allows source area generation to be adjusted for electrical losses based on the sink area system requirements.

Accounting and verification systems that treat a number of other features differently – such as data resolution, terminology, the timing of data reporting, or requirements for emissions data or labor characteristics – need not be deemed fully incompatible. Rather, as long as data are maintained that associate attributes with specific generation units (e.g., generation ID numbers), data about a specific generating unit in the source area can be obtained independently even if those data are not collected directly by the source area accounting and verification system. As long as data can be obtained from some source via cross-referencing and in a form required by the sink area system, the source area need not be considered fully incompatible.

As also shown in the table (in the third column), a *compatible disclosure requirement* would have many of the same features as a compatible accounting and verification system, but we conclude that the standard for compatible disclosure can be met more easily. As with compatible accounting and verification systems, compatible disclosure requirements surely require verifiability of the amount of electricity generated during the sink area's settlement period, assurances of no direct double counting, and comparable protection against indirect double counting.

Beyond the most basic purpose of a compatible disclosure requirement – to avoid direct double counting or double use of attributes – the next most important objective appears to be foreclosing the potential for market participants to hide "undesirable" attributes (e.g., nuclear, coal) by moving them to where they would not be seen (i.e., in regions with no disclosure requirements). Neither of these objectives appears to absolutely require consistent treatment of attribute unbundling across regions. Use of a common settlement period also appears to be unnecessary, as long as the basic conservation of attributes within the sink area settlement period is maintained. Finally, neither plant specificity, treatment of electrical losses, common data (such as emissions or union labor characteristics), nor the reporting period need be the same, as long as the data are available for cross-reference (via generation ID numbers) from a combination of verifiable sources to adjust to the sink area disclosure format.

Compatible Transactions

In many cases, a fully compatible information system or disclosure policy may be required by a sink area market to recognize an import, but such systems may not yet be in place in a source market area. Even in the absence of such *full compatibility*, in Chapter 5 we find that it may still be possible to recognize certain types of cross-border transactions (as long as those transactions meet appropriate standards for veracity and credibility, and are consistent with sink area policy objectives). We refer to such transactions as *compatible transactions*.

Defining compatible transactions is important for supporting renewables in the absence of, or before the establishment of, fully compatible information systems. There are a number of situations in which accounting and verification systems or disclosure requirements may not yet be deemed fully compatible, but in which recognition of specific cross-border attribute transactions may still be desirable. These situations include: when the source area system or policy has not yet been developed or implemented; is under development; has been established but not yet evaluated by sink area decision-makers; or has been found by sink area regulators to fall short of full compatibility due to some lacking feature for a subset of transaction or resource types.

Based on stakeholder input and our own analysis, in Chapter 5 we find that a compatible transaction for generation attributes from one market area to another would need (at a minimum) to meet a substantial burden of proof including:

- Verification of generation, title to the attributes, and unique claim to attributes.
- Strictness of energy deliverability that depends on the objectives of the policy at hand.
- A cross-border transaction structure that meets or exceeds the restrictions imposed on local generators, such that the settlement period, treatment of transmission losses, and/or degree of unbundling does not give distant generators favorable treatment over local generation.

We recommend that – in the absence of *full compatibility* – accounting and verification administrators and regulators consider allowing attribute transactions that provide desired benefits to proceed under limited circumstances. By relying on *compatible transactions*, administrators and regulators can be assured that their objectives will be met and that credibility will not be undermined. Because compatible transactions may be difficult to execute without the presence of an independent attribute registry, we encourage those that might provide such a service to proceed, with an eye towards meeting the criteria identified in this report.

Conclusion

Interest in renewable energy attribute transactions is being increasingly driven by mandates and consumer demands. The prospect of meeting these demands at lower cost, or increasing the environmental benefit achieved per dollar spent, is likely to cause attribute buyers to look beyond the local market area for renewable sources. Yet regulators require methods for addressing imports and exports of generation attributes in defining eligibility and in accounting

for and verifying compliance with their mandates. Buyers of attributes will also demand assurances that purchases are credible and achieve their objectives.

In this report we attempt to bring some definition to the issues associated with transacting generation attributes across market area boundaries. We also attempt to bring definition to the requirements that might be placed upon neighboring market areas in order to bring comfort that allowing attribute interchange with that market will meet local policy or market objectives.

In considering the conclusions and recommendations of this study, we particularly urge policymakers responsible for addressing cross-border transactions to carefully balance the objectives of clarity and flexibility, and consider the implications of their decisions for the creation of viable markets for new renewable generation. Flexibility is desirable in an immature market, providing leeway to see how markets develop without stifling innovation and risk-taking. Too much flexibility with respect to out-of-market generator eligibility, however, can create uncertainty and impose substantial regulatory risk on renewable energy generators.

Renewable projects often require years of development, and developers require clear market rules to attract the financing necessary to build new renewable plants. To a local generator, its potential revenues depend heavily upon whether it must compete only against other local sources, or also against generators from far away. Likewise, uncertainty about market access will cloud the viability of a project being developed where renewable resources are ample but across a market area boundary from a particular renewable energy purchase mandate. Unclear rules on the treatment of out-of-market generators will therefore undermine progress in building environmentally preferable generation, despite the presence of supportive mandates or consumer demands for green power. We therefore urge those drafting laws, regulations, and market rules to send clear signals on intent and direction with respect to cross-border transactions, even if some issues remain to be solved in the future.