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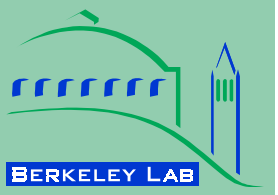

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Transacting Generation Attributes Across Market Boundaries:

Compatible Information Systems and the Treatment of Imports and Exports

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Disclaimer

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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.

1 Introduction

As electricity markets in many regions have migrated from monopolies to competition, reliance upon central planning for achieving generation resource diversity and environmental objectives is being supplanted by some combination of markets and market-shaping policies. One result of this transition is the differentiation of retail electricity sales by the ***attributes*** of the generator. Generation attributes are all of the relevant characteristics of a power plant such as the fuel source, location, vintage, pollutant emissions and direct or indirect impacts or benefits. This differentiation is most commonly associated with either voluntary market demand for "green" power or policies common in retail electric choice environments such as fuel source and/or emissions disclosure requirements, renewable portfolio standards (RPS), and emission performance standards (EPS).

To respond to these policy and market drivers, several electricity markets at the state, provincial or regional/ISO level are now (or soon will be) devising accounting and verification systems that seek to associate generation attributes with a retail supplier's purchases or sales in a verifiable manner. Such accounting and verification systems will be critical for verifying compliance with market mandates, creating accurate fuel mix labels for disclosure systems, and for substantiating green power claims. Market participants can rely on these systems for efficient trading of attributes, reducing the ultimate costs of market-shaping policies.

Along with these policy and market drivers comes a growing interest in transacting generation attributes across market borders. Wind, geothermal, biomass, hydroelectric, and ocean power generators must locate where their resources are available, which may be remote from their potential customers. For purposes of disclosure, RPS, EPS, and standards regarding the environmental marketing of electricity, environmental or economic benefits might result if the retail electricity providers (REPs) subject to these requirements were able to tap resources located beyond the state or power pool in which their retail customers are located.

For these reasons, approaches to defining valid transaction structures and accounting treatments for cross-border transactions must be identified. These approaches must meet the needs of policymakers and markets for verification, credibility, and compatibility, and must simultaneously remain consistent with state laws and regulations. In addressing cross-border attribute transactions, each accounting and verification system is struggling with two sets of boundary issues. First, electricity is regularly transacted across market boundaries with well-established systems to account for such transactions. But, with disclosure, RPS and EPS rules established in the absence of 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[5] (see discussion of "green-washing" in Text Box 3).
These challenges are compounded by the fact that even in adjacent markets, accounting and verification systems are evolving independently, driven by differing state regulations or

[5] 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.

legislative direction, different stages of wholesale or retail restructuring, or independent processes taking different directions or developing at different paces. As a result, regulators often seek to apply default values to imported attributes, regardless of their source, which can impede economical, environmentally beneficial, verifiable and credible transactions. Additionally, the desire by policymakers to achieve local environmental and/or economic benefits often drives them to limit the eligibility of cross-border attribute transactions under policies and attribute accounting systems, yet environmental benefits in particular refuse to recognize political borders. In response to these challenges**,** the notion of a *compatible information system* in a neighboring market has sometimes been mentioned as a basic requirement to allow the identification of specific attributes associated with imports and exports. Yet the features that would allow conceptually different systems to be considered compatible remain poorly defined.

1.1 Project Objectives and Scope

The generation sources of greatest interest to this report are those that rely on renewable energy: wind, solar, hydroelectric, tidal, wave, biomass, or geothermal.[6] 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. It delineates options available to generation attribute accounting administrators and regulators for accounting for and verifying cross-border attribute transactions (both imports and exports) consistent with the needs of policymakers and market participants. It also explores the minimum requirements for the compatibility of adjacent generation attribute accounting and verification systems. [7]

Stakeholders in New York, the PJM Power Pool, New England, and Ontario are actively engaged in establishing market rules, accounting protocols and information systems that must address the role of generation attribute imports and exports. In addition, several states throughout the Western United States are attempting to develop a common system to address disclosure throughout the region. This makes our analysis particularly relevant and timely in those regions. In fact, the principle audience for this report includes the market participants and regulators in these regions, as well as independent system operators or others tasked with accounting for and verifying generation attribute transactions. In addressing these issues generically and attempting to draw widely applicable conclusions, we draw upon specific markets in the Northeastern United States and Eastern Canada for illustrative purposes.

The importance of resolving import-export treatment will be clear to market participants and policymakers working in this area. Perhaps most importantly, resolution of these issues may be critical to successfully achieving the underlying goals of market mandates, disclosure

[6] It is important to note, however, that the examples and conclusions raised in this paper are broadly applicable to any generation resource that might be used to meet customer demands and government requirements due to desirable environmental or other characteristics.

[7] The evolving role of tradable renewable credits (TRCs) transacted in a separate financial transaction from commodity electricity sales, factors in the topic at hand. While we touch on many aspects of TRCs in this paper, we only peripherally address the disaggregation of generation attributes from one another or direct retail sales of TRCs from generators to end-use customers.

requirements and green power marketing: increased investment in environmentally preferable generation sources. A lack of clarity as to what generation can and cannot be recognized in various markets can paralyze investment in renewable generation. Investment risks are significantly compounded when generators or wholesale marketers cannot easily evaluate whether the market for a plant's attributes is a single state or a broader region, or whether it will have to compete head-on against generation from remote regions with more abundant and cost effective resources. Likewise, retail suppliers may be reticent to enter long term contracts for environmentally preferable generation or to differentiate their power supply offerings when it is not clear whether or not they will have access to less costly alternatives. Clarifying the treatment of imports and exports will reduce these critical investment uncertainties.

1.2 Approach

This report was developed with broad stakeholder input. An initial scoping outline was distributed to a cross-section of stakeholders, including regulators, retail and wholesale electricity marketers, renewable generation developers and owners, power exchanges, and agencies responsible for administering accounting and verification systems. A dozen interviews with a cross-section of stakeholders were then conducted to assess issues and options for inclusion in the analysis, and to solicit specific comments on the scoping outline. Further input was sought through distribution of a review draft of the report to a broad peer group of several dozen stakeholders, a dozen of which provided detailed comments. In addition to stakeholder input, we also examined relevant literature, including evolving market rules from the illustrative market areas. This analysis takes existing regulatory requirements and market structures as a starting point and (with very few exceptions) does not recommend alterations to these existing rules. Existing rules exemplify the differing regional priorities and conditions that may apply, and help determine the degree to which "seams" issues can arise when attributes of generators located in one market are targeted for another market.

1.3 Roadmap

This report is organized as follows:

- In Chapter 2 we provide background information on the various sources of demand for generation attributes, and we identify and describe the different accounting and verification approaches that might be used to track these attributes. We then examine the policy implications of cross-border generation attribute transactions.

- In Chapter 3 we identify three broad categories of alternative approaches to account for transactions between market areas – geographic eligibility, benefits-driven eligibility, and delivered energy eligibility. We also identify several variations to these approaches, and briefly describe their respective advantages and disadvantages for meeting a variety of objectives.

- In Chapter 4 we analyze the suitability of these alternatives and develop recommendations for treating attribute imports and exports under a variety of circumstances. We also address the limitations imposed by common practical constraints.

- In Chapter 5 we explore the "compatibility" of generation information accounting and verification systems. We attempt to develop criteria for sufficient technical compatibility to allow for the recognition of imports, and we use the criteria to add meaning to several undefined concepts that have been adopted by states to govern the movement of attributes across market area borders: compatible and equivalent accounting and verification systems, and compatible disclosure requirements.

- In Chapter 6 we offer some final conclusions and recommendations.

- In Appendix A we examine the current treatment of imports and exports in the northeastern United States and Canada.

Throughout this document several examples of contemplated import and export transactions between market areas are used to illustrate specific concepts. Each example uses a wind project in a source region that wishes to sell attributes to a retail supplier or end-use customer in a sink region. While the concepts addressed by these examples hold for any type of generation, a wind transaction is ideal for illustrating issues that will be common to many renewable generation installations. This is because the characteristics of wind generation – including intermittency, small generator size, and limited locational discretion – are typical of some other types of renewable generation as well. One important caveat is that some of the difficulties and costs referred to throughout the report are far more substantial for intermittent generators such as wind than for base load or dispatchable generation types such as landfill gas, biomass, or geothermal.

2 Background

To set the stage for the analysis that follows, in this chapter we summarize the basic concepts and drivers associated with cross-border transactions of generation attributes, as well as introduce terminology to be used throughout this report. First, we explore the idea of a "market area," which defines a border over which generation attributes might be transacted. Next we highlight the nature of cross-border energy transactions occurring in the market today, and the constraints to those transactions. We then describe the drivers of demand for differentiated generation attributes; these drivers create the need for generation attribute accounting and verification systems. Different approaches available for attribute accounting and verification are then presented. Finally, we explore the advantages and disadvantages of restricting import eligibility from both policy and practical perspectives.

2.1 What Constitutes a "Market Area?"

A central concept of this report is that of an electrical market area, the boundaries of which, when crossed, would define an import or export of generation attributes. Yet, such a market area is difficult to define with precision. While electrical markets tend to be regional in nature they are not self-contained, as the electrical grid connects the majority of the North American continent. Confounding precise definition are the facts that neither market areas nor the air pollution benefits of renewable energy coincide with or respect political boundaries.

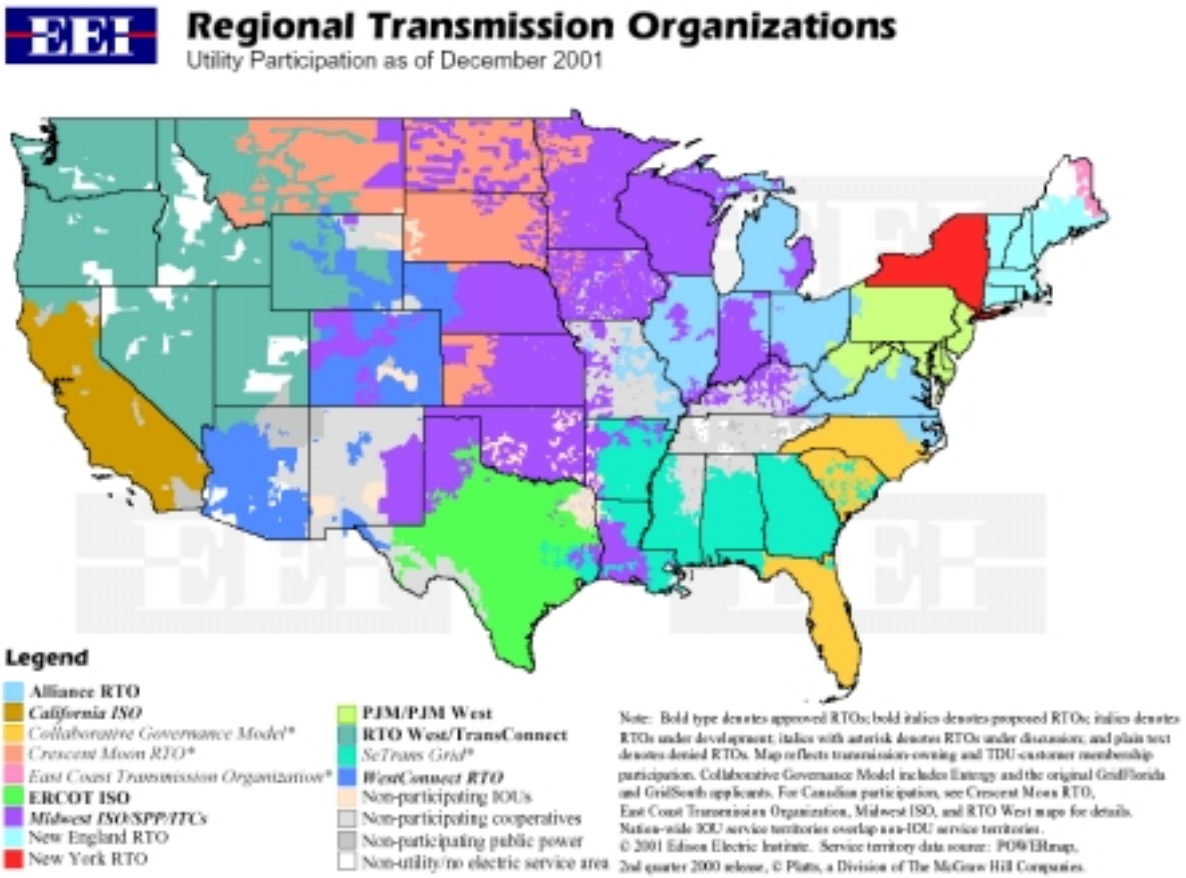
Despite these complexities, market areas tend to be somewhat apparent from the perspective of practical constraints. For purposes of this report, a market area can be thought of as sharing many of the following features:

- geographical areas between which there are transmission constraints or barriers, with relatively small flow between these areas relative to the volume of electricity generated and consumed within a market area;
- areas over which there is a centralized dispatch; and
- areas between which significant seams issues exist (distinct governance, protocols, systems).

In summary, a market area is analogous to cultural and language distinctions, reflecting how individuals tend to aggregate and organize themselves. Sometimes a market area will coincide with state or provincial boundaries, more often with an electric control area, power pool or regional transmission organization. In the Northeast, for example, currently recognized market areas include the PJM Interconnection, the New York ISO, and ISO-New England, as shown below.

A couple of important observations about market areas deserve mention. Market areas can change, and such changes can occur suddenly as a result of a vote or a FERC order. For example, if power pools merge, what was once "over there" may suddenly be "over here" (Note that the map, as shown below, is already obsolete after just one year in print!) Transactions that had previously been considered imports or exports will no longer cross market boundaries. The FERC is driving the creation of "seamless" electricity markets and broader market areas through its Regional Transmission Organization (RTO) proceedings and orders. Efforts to resolve

"seams" issues result in more synchronized markets, which appear to be precursors to further market integration and an evolution towards larger and more integrated market areas. If market areas are defined by institutions with distinct governance performing central dispatch, a renewable generator will influence dispatch over a broader area as these institutions merge (e.g. into RTOs).



Source: Edison Electric Institute: http://www.setransgrid.com/docs/map_usa.pdf

Figure 1: Regional Transmission Organizations

Yet there is also an evolutionary trend towards smaller sub-markets within market areas, with the advent of locational pricing regimes in wholesale markets. Markets are increasingly making new distinctions, with the recognition of internal constraints and the development of price signals to replace socialization of reliability-related costs such as out-of-merit dispatch. As market areas get larger, they will undoubtedly resolve into a greater number of zones or sub-markets with constraints between them. The result may effectively be the creation of imports and exports *within* a market area.

The implications of these trends confound the definition of a market area. First, despite the trend towards using political boundaries or institutional jurisdiction to define market areas, neither of these approaches (nor any others) is wholly satisfying. Second, whatever solutions are

developed to address imports and exports, one must consider their resiliency in the event that market area-defining institutions evolve.

2.2 Cross-Border Energy Transactions

Electricity is frequently transacted across the borders between electrically connected market areas. Transactions are scheduled via OASIS bulletin boards between transacting parties and between control area operators as either firm or non-firm. Whether energy *actually* flows is a function of available transmission capacity, a variety of generation and transmission contingencies, and the presence of offsetting transactions in the opposite direction.[8]

The practical constraints on energy transactions across market boundaries have two important implications for this analysis.

- First, scheduling transactions that depend upon the production of a specific generation unit is more cumbersome and costly than entering into a financial obligation to deliver undifferentiated system power as scheduled. "Seams" issues resulting from different market rules in adjacent markets can exacerbate the situation. This is particularly true for intermittent and/or low capacity-factor generation such as wind, which may experience far higher effective per-kWh transmission costs than system power transactions when transmission must be purchased for maximum throughput, paid for whether or not the unit is generating. In addition, transmission pancaking – the assessment of multiple layers of transmission charges unrelated to the actual costs imposed on the system by the transaction – can occur, although this situation is likely to diminish as a result of Federal Energy Regulatory Commission (FERC) policy over the next several years.

- Second, an energy transaction may be successfully executed without an actual flow of energy in the direction of the transaction. This can occur when the transaction is scheduled against the prevailing electricity flow at the market border.[9] An individual market participant has no control over whether there are offsetting flows, and in fact offsetting flows can increase the ability to schedule such counter-flows. As we discuss in Section 3.3.4, while the actual flow of energy is the *net* of all successfully scheduled transactions, the *gross* successfully scheduled transaction may be more relevant to our analysis.

As we describe in the following sections, energy transactions are related to, but not necessarily the only way to affect, attribute transactions.

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[8] When energy is moved across market areas, it carries in control area records a designation of the originating electrical system, according to a North American Electric Reliability Council (NERC) tags protocol. NERC tags can serve as documentation of energy that flowed on contract paths between control areas. In most cases, however, the NERC tag does not indicate the originating generator and therefore is of limited, if any, use in following generation from specific generators (exceptions include the systems of some transmission providers including Commonwealth Edison, Entergy and Southern).

[9] While the same party could schedule transactions in the opposite direction to alleviate the need to actually deliver energy, such round-trip "wash" energy transactions are currently under fire and may be banned in upcoming Federal legislation.

2.3 Demand for Differentiated Generation Attributes

Generation attributes, as referred to in this report, are all of the relevant characteristics of electricity production from a given generator that differentiate it from, and may cause it to have a value different from, undifferentiated (or "commodity") electricity. These attributes include the descriptive characteristics of an electricity generation source – resource or fuel type, pollutant emissions (or lack thereof), location or vintage, certification status – as well as indirect impacts associated with the generator, such as air emissions deemed to be displaced by virtue of its operation, or emission reduction credits granted to the owner by a regulatory body as a result of that displacement. Transactions for generation attributes from renewable generators are contemplated to result from generation attribute requirements, customer driven demand for renewable energy, and other drivers, each of which is described in turn below.

2.3.1 Generation Attribute Requirements

Retail electric providers (REPs) in competitive markets may be required to comply with up to three types of regulatory mandates, which we will refer to collectively as *generation attribute requirements*, typically applied at the state (or provincial) level. These generation attribute requirements rely on information about a REP's generation supply sources, and each requires a basis for accounting for such characteristics. The generation attribute requirements of most interest here include:

- Disclosure requirements, which pertain to the mix of all generation used by a REP to serve customers within a particular jurisdiction. What is disclosed about generation sources varies by jurisdiction. The most common form of disclosure is for generation type or fuel source. Some disclosure requirements also include air pollutant emissions or even nuclear wastes, and a few require other characteristics (such as union labor in Massachusetts). Disclosure rules vary in the settlement period over which load and generation are matched. Approaches to disclosure requirements break down into a few distinct options:

    - **Claims-based** disclosure requires only those suppliers that make marketing claims regarding sources or benefits of generation to disclose the characteristics of the generation for which claims are made.
    - **Claims or proxy** disclosure is a comprehensive requirement applying to all retail suppliers, requiring those making marketing claims about sources or benefits of generation to disclose their source characteristics, while all others use a regional proxy or residual mix.
    - **Known or proxy** disclosure is also a comprehensive approach, requiring all retail suppliers to disclose all generation sources that are known (such as owned generation, or unit-specific contracts), while all other generation is characterized by a regional proxy or residual mix.
    - **Comprehensive uniform** disclosure relies on a central entity to characterize the attributes of all generation sold at retail including interchange with spot markets and undifferentiated energy sales, without the use of proxies.

As a practical manner, the approach taken to disclosure requirements often dictates the nature of the accounting and verification protocol used, and that choice in turn may limit how attributes transacted between market areas can be accounted for.

- Renewables Portfolio Standards (RPS) are requirements placed on REPs to purchase, for their retail load, a minimum percentage of eligible renewable energy.

- Emission performance standards (EPS), also known as generation performance standards, are requirements placed on REPs to serve load within a jurisdiction using electricity resources that, in aggregate, meet or beat specific emissions thresholds.

Some generation attribute requirements may anticipate or encourage electricity and/or attribute imports, while others may be indifferent or exclusionary. Either way, compliance with these requirements typically requires an accounting and verification system that can account for both "in market" and import/export transactions.

2.3.2 Consumer-Driven Demand for Renewable Energy

Electricity from renewable generation sources will be marketed and purchased beyond the level required by mandates. Market research and experience demonstrate that given a viable choice, a moderate fraction of customers may select and be willing to pay a premium for "green" power supply (Farhar and Houston 1996). Others may be attracted by the potential of renewable energy to serve as a price hedge against volatile electricity market prices. In some cases, customers have expressed a preference for local resources. In other cases, marketers (such as Sterling Planet) and generators (such as PG&E National Energy Group's Madison Wind plant) have demonstrated interest in marketing renewable attributes to customers in market areas beyond the location of the generation sources.

2.3.3 Other Drivers

Other drivers for transactions of generation attributes across market borders include environmental mandates or voluntary actions at the local, regional, national and global levels. Concerns about global climate change are driving a small, worldwide market for renewable energy credits. Cap and trade programs drive NO_X sources such as fossil generators to seek offsets or emission reduction credits (ERCs). In jurisdictions that include industrial customers in these cap and trade programs, end users may demand the benefits associated with renewable energy. Depending on the mandatory or voluntary driver, these demands may be effectively met either by local generation (NO_X), or generation anywhere on the planet (greenhouse gases causing global climate change).

2.4 Generation Attribute Accounting and Verification Approaches

The intangible nature of electricity dictates that compliance with generation attribute requirements or environmental marketing claims rely on some form of substantiation. An

attribute accounting and verification system is a mechanism for uniquely associating attributes of energy production from specific generators with the sales of specific suppliers. Laws of physics present a practical barrier to uniquely associating a generator's production with a supplier or end-use customer, because identification and tracking of attributes associated with a retail sale by virtue of physical electron flow is impossible. Property rights or title to the attributes (and the associated flow of money) therefore form the basis of all attribute accounting and verification approaches. In addition, an examination of a single supplier's contracts cannot uncover attributes also claimed by another supplier. One of the primary purposes of an accounting and verification system, then, is to assure that the same attributes are used exactly once.

Distinguishing features of attribute accounting and verification approaches include:

- Are rights to attributes bundled with rights to energy? In a bundled approach, a supplier's right to claim attributes comes with the payments for and title to energy purchased. An unbundled approach assumes that the attributes are unbundled from energy transactions, and title to the attributes is transferred in a separate financial transaction.[10] The remaining energy can be thought of as commodity or *null energy*[11] that is sold and purchased *without attributes*, carrying no rights to make claims about associated generation sources.

- Is there a separate secondary market for attributes? Secondary market transactions are those that use a certificate or credit to represent the attributes associated with a unit of energy generated at a particular time by a specific generator. After creation, they can be traded freely, completely independent of any energy transaction. Note that unbundling does not require a secondary market.

- How are attributes associated with system power transactions and spot market interchange? Many wholesale electric transactions are either bilateral system power transactions (representing financial contracts to buy and sell power distinct from the production of any specific unit), or spot market energy transactions. In accounting approaches that do not allow full unbundling, how attributes are associated with these transactions has a major influence on how the title to those attributes flows from generator to supplier.[12]

Given these design choices, alternative approaches to associating generation attributes with specific suppliers or end-use customers range in scope from demonstration of a contract path for electricity to a comprehensive certificates system. The basic accounting and verification approaches in use at present are described below (Grace et al., 2000).

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[10] Our use of the term "unbundling" refers to the separation of energy from the complete set of attributes, not the disaggregation of individual attributes – such as generation technology and emission impacts - from one another.

[11] Null energy is electricity without attributes that results when attributes are unbundled and then split from an energy transaction.

[12] Options include: supplier discretion or prioritization (i.e., the contract can specify which attributes are associated with the energy transacted); pro-rata allocation of attributes from different resources in the supplier's portfolio (sales) or the average of all sales into the spot market (purchases); treating such attributes as unknown and applying a proxy for the associated attributes; or purchasing rights to specific attributes associated with generation sold into the spot market via attribute-only contracts (see discussion of conversion transactions below).

2.4.1 By Control of Generation without Accounting for System Power Transactions

In states such as Pennsylvania where retail suppliers are required to describe their generation mixes (in this case to their regulators or upon customer request) without detailed requirements on how to calculate that mix, suppliers sometimes simply count up the production from all sources they own or purchase under long-term contract, ignoring any shorter-term wholesale transactions via system power and spot markets. Accounting is typically accomplished via self-reporting, with verification eased by reliance on generation quantities that can often be corroborated with audited public documents such as the FERC Form 1.

The proportions of different resource types (e.g. for disclosure) determined in this manner may provide a reasonable approximation of the fuel mix, especially for large integrated entities where generation and load are in approximate proportion or in markets where the majority of transactions occur through bilateral contracts instead of the spot market. However, the lack of treatment of undifferentiated wholesale market transactions can cause wide variation in accuracy. This approach may therefore not prove useful for new entrants, entities with rapidly changing market shares, or entities that do not own or control the majority of their own resources. The approach produces unsatisfying results in regions with significant divestiture of generation, where suppliers of electricity at retail tend to be different than owners of generation, and for transactions between parties that are dominated by undifferentiated system power sales. Finally, this approach is not precise when it comes to assuring that resources have not been double-counted. While this approach may be sufficient for supporting disclosure compliance for suppliers not seeking to differentiate their power supply, the lack of precision makes it inadequate for supporting compliance with standards such as RPS.

2.4.2 "Contract-Path" Financial Settlement of All Energy Transactions

This approach relies on the assumption that attributes follow, and are "bundled" with, energy transactions. A retail supplier must track energy transactions through all intermediaries back to the generator, hence the term "contract-path tracking." The PJM system operator currently uses a variation on this approach for New Jersey's interim disclosure rules.

This approach requires a concerted effort by those wishing to make renewable energy claims to contract for energy in a manner that establishes a clear path back to desired generators. In addition, this approach often requires that assumptions be made about transactions through wholesale supply intermediaries (e.g., generation companies, power marketers, or power exchanges) regarding either discretional allocations of resource attributes or treatment of system power and spot market transactions (as discussed above). If these assumptions are not consistent for all market participants, the sum of all suppliers' calculated generation might not equal the total amount of actual generation in the market.

Substantiation is accomplished by the compilation of documentation of the contract path. A supplier may be required to have this documentation audited, or may retain it or file it subject to audit. Generally, a central authority will determine the treatment of generation not tracked

directly back to the source generator by calculating a proxy system mix or determining pro-rata allocations to the extent applicable.

2.4.3 Unbundled Transactions with TRCs

Trading in secondary markets can be facilitated by the separation of attributes from energy. This can happen in both a comprehensive framework covering *all* generation attributes, or in many cases for just renewables. Separation of energy from attributes can also help establish clear property rights and title. With Tradable Renewable Certificates (TRCs, otherwise knows as Renewable Energy Credits – RECs – or green tags), certain generators are allotted a certified credit or certificate for each unit of energy produced. The purchase of a TRC confers the right to claim the attributes of the renewable generation. TRCs could in theory be purchased directly from a local or distant generator, or through intermediaries. Typically, this approach requires registration in an independent registry (mandatory or voluntary) to assure that attributes are properly tracked (e.g. not double counted), although in immature markets other mechanisms may be relied upon. A more comprehensive tradable certificate system (full unbundling) can constitute the accounting and verification protocol for *all* generation within a market, not just renewables. New England has adopted such an approach and is using a central administrator that is positioned to assure unique claims to resource attributes.

TRCs come into play as an attractive transactional structure in several situations, including:

- When buyers and sellers wish to make a transaction for renewable attributes in a market that has no accounting system in place and no market rules that would interfere with such a transaction.
- When a renewable generator wants to sell attributes wherever willing customers may be located but does not want to deliver electricity to these customers.
- When a retail supplier is seeking to offer, or an end-use customer is seeking to purchase renewable generation, and either (i) there is no viable or economic local green power option available from regulated utilities, or (ii) market rules are not conducive to viable retail choice (e.g. the price to compare options are set below the competitive cost to procure).
- Where wholesale market rules are onerous for small, distributed or intermittent generation, or transmission constraints impede bundled bilateral delivery.

TRCs are increasingly being offered directly to end-use customers. Recent examples include offerings by PG&E National Energy Group, SunPower Electric, Native Energy, Sterling Planet, and Bonneville Environmental Foundation. These private transactions may occur within or outside the formally approved transaction structures and attribute accounting systems that are typically geared to wholesale electricity transactions. These TRC-only sales are discussed further in Section 2.5.

2.4.4 Hybrid Systems – Unbundling Without Distinct Secondary Markets

Many accounting and verification approaches are hybrids of the bundled and unbundled approaches, for at least some portion (e.g. renewables) of the supply mix. These hybrids typically rely on the contract-path approach, but allow for some degree of unbundling between generator and end-use customer, subject to subsequent re-bundling of attributes with null energy at some stage before sale to the end-use customer. Examples include *conversion transactions* (established in New York and discussed further in Appendix A.3) and renewable power exchanges that serve as trading hubs (such as that developed by Automated Power Exchange in California). Where unbundling occurs, substantiation is accomplished by documenting of an allocation of attributes to energy (see discussion of conservation of attributes in Section 2.6.3).

2.5 Relationship of Generation Attributes Transactions to Retail Electricity Sales

Generation attribute transactions can be distinguished by the degree to which they are bundled with or sold separately from the retail sale of electricity by a REP. There are three broad categories of transactions for renewable attributes:

- Transactions in which attributes are associated with and have a nexus to the sale of electricity by a retail supplier;
- Attribute transactions distinct from the sale of electricity by a retail supplier; and
- Distinct attribute transactions coupled with retail electricity sales.

In the last case, the attributes are from generators distant enough that despite the coupled sale, they are most logically interpreted as two distinct transactions: TRC and commodity electricity.[13] This is the approach recommended by a working group on the certification of TRCs convened by the Center for Resource Solutions (CRS 2001). For the purposes of this report, this **distinct energy-TRC transaction** approach can be treated the same as the TRC-only transactions described below. In Chapter 3, we return to these transaction structures as they relate to the appropriate treatment of imports and exports in generation attribute requirements and accounting and verification protocols.

2.5.1 Nexus Between Attributes and Retail Electricity Sales

When a REP offers attributes associated with its retail electricity sale, such a transaction suggests a definite nexus to retail sales, and is consistent with a retailer claim that "this is where the supply that I purchase to serve your needs comes from" as well as "this is where your money goes". While there is some gray area, most generation attribute requirements and much of the traditional green power marketing efforts of REPs fall into this category.

These conditions suggest a requirement for some degree of electricity deliverability from generator to the local market area, as discussed further in Section 4.6. Consider, for example, comprehensive uniform source disclosure (see discussion in Section 2.3.1) or EPS requirements that apply to characteristics of a supplier's whole resource mix. Compliance requires a

[13] The same logic would apply to attribute transactions that are sufficiently divorced in time from energy flow.

conservation of attributes: a correspondence of generation attributes in proportion (adjusted for losses) to energy sales to end-users. Within some defined scope the quantity of energy and the quantity of attributes must be equal. Introduction of cross-border attributes without corresponding energy could confound a meaningful calculation of the source proportions and average characteristics of a supply mix.

2.5.2 Independent from Retail Electricity Sales

Attribute transactions that are distinct from the retail REP-customer relationship can fall into two categories: sales of attributes-only (if all renewables, TRC-only) directly to the purchaser, and financial compliance with attribute mandates.

TRC-Only Transactions

TRC-only transactions are financial transactions (rather than energy transactions) that support renewables without geographic boundaries – sources could be anywhere in the country or the world. A buyer may or may not care where the impact occurs. Rather, they are engaging in a TRC transaction for a result. Unlike the nexus transaction described above, the seller can only claim that "this is where your money goes." The most obvious transactions are end-user purchases of renewable attributes outside of the customer-REP relationship, using TRCs as a tracking and accounting mechanism. Examples include market offerings such as PG&E National Energy Group's sales of PureWind certificates, or similar offerings by other companies such as Sterling Planet, Conservation Services Group or Native Energy.

These transactions can be verified via self-certification/audit by the generator or marketer, or through the retirement of duly registered TRCs. The credibility and tractability of this approach is difficult to establish without one or more registries or integrated accounting systems of similar scope. Such transactions are sometimes not captured by (or even visible to) sink-area regional accounting and verification system. While this may not be a fatal flaw for an educated buyer, the source area's local accounting and verification system would have to be aware of such transactions and carve them out to assure no double-counting.[14]

Financial Compliance with Mandates

In some cases, an RPS or similar purchase mandate might allow compliance to be demonstrated through a financial compliance mechanism. While this is similar to the TRC-only transaction in many respects, the 'buyer" can claim compliance by paying someone else to acquire the attributes and fulfill its obligation, rather than doing so directly. Compliance would be demonstrated by paying a third party to procure renewables, or contributing to a renewable energy trust fund.[15] Such compliance could take place in such a way that no TRC is directly

[14] The New England GIS system allows generators to inform the administrator of such transactions, so that certificates can be "reserved" for use outside the system without being double counted. In contrast, the New York environmental disclosure system administered by the Department of Public Service has not provided the ability to carve out TRC-only transactions from its own accounting, preventing sellers of TRCs from New York generators from being able to provide assurances that such attributes are not also sold to other customers.

[15] For example, the Massachusetts RPS provides REPs with the option of paying 5¢/kwh to a trust fund instead of procuring a renewable certificate to meet their obligations. The funds would then be reinvested in new renewable energy. (Massachusetts Division of Energy Resources, 2002)

transferred in the transaction. In addition, several variations of a National RPS have been included in Federal legislation over the past several years, all of which would rely on or allow TRCs for compliance. While TRCs would be used in this case, often from distant resources unrelated to electric supply, the TRC would serve as documentation of financial compliance.

2.6 Policy Rationales for the Treatment of Attribute Imports and Exports

Regardless of the source of demand for renewable energy attributes and what accounting and verification approach is used, the desire for transacting renewable generation attributes across market-area borders is typically driven by gradients of differing renewable energy resources or potential, relative to the potential demand. For example, renewable generators located in market areas where renewables have relatively low all-in costs may want to sell their attributes to neighboring markets that have demands for renewable energy but limited in-market renewable energy supply.

From a policy perspective, there are several benefits to a broadly defined market, or geographic scope of eligibility for generation attributes. However, there is also justification for locating renewable generation close to those customers paying for it, thereby assuring a confluence of costs and benefits. These policy arguments are complicated by the fact that some of the benefits of renewable energy generation are local while others are regional or global.

2.6.1 Advantages of Cross-Border Generation Attribute Transactions

Transactions of renewable energy attributes from one market area to another can in many cases have both policy and economic advantages. Most importantly, it may not be possible (or even desirable) to locate the desired resources where the demand exists or the benefits are sought. Renewable resources are not distributed uniformly – some regions are far richer in wind, hydroelectric, biomass, or solar resources than others. There are also numerous other constraints to locating environmentally preferable resources. For any resource type, some regions are natural importers or exporters due to resource availability and cost, fuel supply, environmental sensitivity, land use compatibility, regulatory stringency, or transmission issues.

There are other advantages as well. First, it may be argued that building renewable resources where their all-in costs are lowest relative to the market value of their production and/or where they cause the least relative environmental impact may be the most effective means of maximizing renewable generation. To some customers, making the greatest bang-for-the-buck may outweigh local benefits. Regardless of location, the reduction in fossil fuel use provides climate change benefits and, in the case of reduced demand for natural gas, may lead to lower fuel prices for consumers across a broad area. In addition, the fact that environmental benefits may transcend market boundaries also suggests a rationale for some cross-border transactions. For example, a customer in the northeastern U.S. may benefit his or her air quality more by paying for renewables to be added to an up-wind market area than to pay for renewables in (or delivered to) the local market area where displaced emissions might be downwind. Finally, there may be economic benefits to both exporting (revenues, jobs) and importing regions (lower cost, less land-use impact than building locally).

2.6.2 Disadvantages of Cross-Border Generation Attribute Transactions

Despite the cost advantages of building renewables where they are most cost-effective, resources located in markets distant from a customer often do not bring the same benefits as resources within a customer's market area. Policymakers may establish generation attribute requirements for the purpose of creating local benefits, and customers buying green power often have a desire for local environmental benefits.

Benefits that are more effectively delivered by proximate renewables may include reductions in smog, particulates, hazardous emissions, and thermal pollution; diversity of local electricity supply infrastructure and reduced dependence on imported energy sources; electric system reliability provided by operable capacity within a control area; and protection and growth of indigenous industries. To many customers, the purchase of renewable generation from specific local sources ("my electric supply comes from…") may matter. In fact, some retail electricity providers that we interviewed suggested that inclusion of local resources may make for a more compelling retail offering, and is absolutely essential if making claims of local benefits.

2.6.3 Practical Constraints in Cross-Border Generation Transactions

Even if the policy or economic advantages to remote renewable generation outweigh the lower level of local benefits, there are a number of practical constraints to cross-border attribute transactions. These include:

- Double-counting. It may be difficult to assure a unique use and sale of the attributes (i.e., that the attributes have not been counted or sold to customers in both the source and sink markets), unless there is an accounting and verification protocol or system in the source market that can communicate with the accounting and verification system in the sink market.

- Fairness. Competition is best served with a level playing field, which might not be present if generation outside of a market receives preferential treatment over in-market generation. Policymakers may therefore wish to hold out-of-market resources to hurdles at least as high as applied to generators within-market. The result may be subjecting out-of-market generation to the highest common-denominator settlement period (the period over which load and generation are matched), limiting the ability for generation to be carried over into subsequent time period. It may influence whether generators get full credit for production measured at the plant busbar or have busbar production reduced to reflect line losses. A level playing field may not exist if there are disparate repercussions for similar transactions in the source versus sink markets. For example, a sale of existing in-market renewable generation to a new customer might have the repercussion of making the customer disclosure label of the original buyer look less appealing, while the market in which another generator is located may have no disclosure rules or no retail choice, and thus have no similar repercussions. Finally, the concept of reciprocity has been raised by some stakeholders, who contest the fairness of a system that would force renewable generators in Market X to compete against imports from Market Y, if generators within Market X cannot compete in Market Y. To the extent allowed by law, policymakers may therefore impose limitations on imports in the name of fairness for any of these reasons.

- Transactional costs and constraints. A requirement that energy be delivered to the sink market for the associated attributes to be recognized may be complex, costly, and risky (e.g. exposed to interruption) to arrange. Transmission between the source area and sink area may be unavailable, unreliable, or costly. In addition, "seams" issues such as different scheduling protocols between markets may impose operational barriers. This is a particular risk for intermittent generation, which may be required to reserve and pay for a firm transmission path that might only be used a fraction of the time.

- Enforcement: If there is no effective control of, or accounting for, flow over market boundaries, policymakers may be unable to effectively enforce mandates or prevent gaming or "green-washing" for EPS, RPS or disclosure purposes, due to a lack of jurisdiction or access to information.

- Efficacy of meeting policy objectives. Large-scale imports from other market areas may render a policy mandate designed to encourage or increase renewable generation within a market area ineffective at attaining its objective. A fear of such market swamping may lead policymakers to erect barriers to attribute imports. Policy objectives of nearby jurisdictions might conflict, where one jurisdiction encourages exports (for economic development reasons, perhaps) while a neighboring jurisdiction discourages imports, seeking instead to establish a more diverse local generation infrastructure.

We will return to many of these issues in the following chapters.

3 Alternative Approaches to the Treatment of Attribute Imports and Exports

All attribute accounting and verification systems will have to address the treatment of imports and exports in some manner. Likewise, the rules for implementing generation attribute requirements must address the basis for associating generation attributes with imports, and renewables purchase mandates must address the limits to generator eligibility and the transactional basis for compliance.

In this chapter we identify the variety of approaches that can be taken to address cross-border attribute transactions within the context of generation attribute requirements and accounting system design.[16] The approaches include:

- geographic eligibility (Section 3.1),
- benefits-driven eligibility (Section 3.2), and
- delivered energy eligibility (Section 3.3).

Each of these approaches may be used by accounting systems and regulators responsible for RPS, EPS, and disclosure to define what cross-border transactions are recognized or "eligible" for their respective purposes. Within Geographic Eligibility, several variations are possible based on the footprint of the eligible region. A number of variations are also possible within the Delivered Energy Eligibility category. Whether the basic eligibility screen is based on geography, benefits or energy delivery, attribute laws and regulations in some market areas may layer reciprocity conditions, designed to further limit imports, upon either the source market area or the generator itself. This issue is discussed in Section 3.4.

In this chapter we simply describe the nature and functioning of these three alternative approaches to treating cross-border transactions. In the following chapter we analyze the approaches, identify the advantages and disadvantages of each, and offer our recommendations for the application of these approaches.

3.1 Geographic Eligibility

In this approach, attributes from generators located within the eligible region are recognized, all internal borders are ignored, and all generators located outside the eligibility region are not eligible. The eligibility region could be the market area, or a broader aggregation of regional market areas with compatible accounting systems. It could be unconstrained, or recognize either constraints within a market area or specific policy drivers (e.g., the driving policy limits eligibility to in-state generation). When extended beyond the basic market area, this approach

[16] We have distilled and categorized the possible approaches from the existing literature on accounting systems and regulatory rules, and from our stakeholder interviews. Most of the approaches are developed from the perspective of the importing or sink region, whose rules may dictate recognition of the transaction. However, the demands of comprehensive source disclosure to balance the books, and a desire to assure that double counting has not occurred, press policymakers to implement protocols for exports as well.

effectively supports some degree of attribute unbundling from energy, since energy transactions are not required to flow in any particular manner. In fact, where inter-market constraints exist, some unbundling is implied even if eligibility is restricted to generators located within the market area. Four variations, from broadest to narrowest in scope, are depicted in Figure 2 and described below:

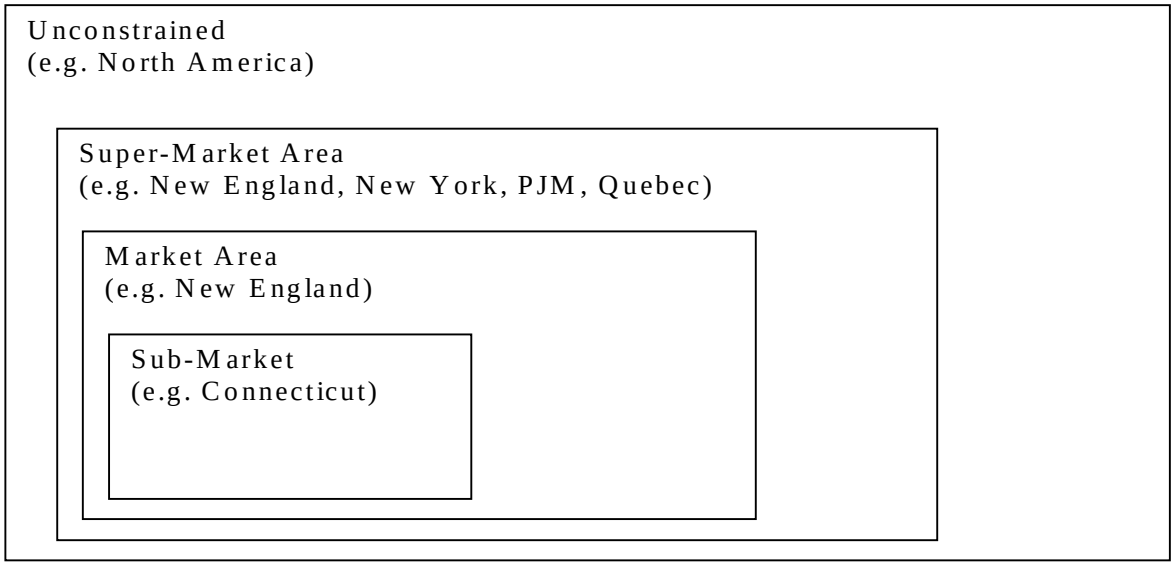

Figure 2: Geographic Eligibility Alternatives

- Unconstrained. Generators or other sellers of renewable generation attributes may seek the broadest possible markets, particularly if their plant is far from potential markets. In this broadest case of geographic eligibility, the accounting system or market rules could recognize attributes from anywhere in the nation, the continent or perhaps even the world. This approach supports wide unbundling of attributes from energy transactions.

- Super-Market Area, or Among Nearby Compatible Market Areas. In this approach, perhaps most appropriate when regional environmental benefits are a primary motivating factor, generation is considered eligible if located anywhere within a defined region that spans more than one market area. For example, eligibility rules for a mandate might span several market areas that are deemed compatible with one another. Alternatively, several market areas could either share a single administrator, or adopt rules, capabilities and data exchange protocols that establish a larger effective attribute market size with multiple administrators. An approach suggested by some stakeholders would designate an appropriately broad geographic eligibility definition based on what is likely to be credibly "deliverable" – for instance within a feasible transmission distance, or 1 or 2 "wheels" away – without imposing the difficulties and costs of actual delivery (such as scheduling and transmission reservation, deliverability risk, or imposition of allocated losses).

- Market Area. This approach limits eligibility to any resource within the load's market area. For example, the Massachusetts disclosure rules require any generation associated with imports to New England to be called "imports" for disclosure purposes,[17] effectively precluding recognition of all source-specific attributes from generation outside of New England. Of course, if a market rule or accounting protocol started with the market area eligibility approach, and markets merged, policymakers would be confronted with the decision to either adopt the super-market or the sub-market area approach.

- 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. A new renewables purchase mandate using such an approach could assure both local economic benefits and displacement of local fossil generation.

3.2 Benefits-Driven Eligibility

At the other end of the spectrum from Geographic Eligibility, the eligibility of a generator could be determined based on a case-by-case demonstration of benefits to the sink-area load, regardless of generator location or to whom the generator sells its power.

Rader and Hempling (2001) argue that such an approach would be both efficacious and potentially less vulnerable to challenge based on the Interstate Commerce Clause (ICC) and the North American Free Trade Agreement (NAFTA) than would Geographic Eligibility approaches. Other stakeholders that we interviewed did not believe that ICC or NAFTA provide a basis for challenge to Geographic Eligibility. See Text Box 1 for a discussion of ICC and NAFTA considerations.

Compared to Delivered Energy Eligibility regimes (described below), such an approach also potentially avoids the need to demonstrate a contract-path between generators and sink-area consumers or retailers, preserving one of the benefits of an RPS obligation that can be satisfied by purchasing tradable credits. The 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. The implication is that other eligibility approaches cannot ensure sink-area benefits as effectively as could Benefits-Driven Eligibility.

Even the proponents of this approach, however, admit that a default may be necessary to minimize complexity (Rader and Hempling 2001). Applying a default rule effectively makes this approach into one of the other options that is adaptable on a case-by-case basis.

[17] 220 CMR 11.06.

3.3 Delivered Energy Eligibility

Perhaps the most common approach is Delivered Energy Eligibility. This approach, depicted in Figure 3, recognizes that an energy flow with matching renewable attributes delivered from a source market area can also bring benefits to the sink area by displacing fossil generation within the sink area. It 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.

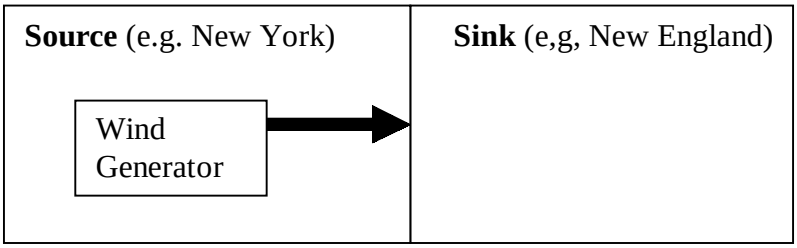

Figure 3: Delivered Energy Eligibility

Under this approach, accounting system administrators will be faced with the challenge of accounting for cross-border attribute transactions in the presence of offsetting energy flows. As discussed further in Section 3.3.4 below, the quantity of attributes that can be recognized as moved across the border, as well as who can import or export attributes, will depend on whether net or gross energy flows are used to calculate how much energy has flowed between market areas.

Another question that must be addressed is the required destination of energy delivery necessary for associated attributes to be eligible for use. At one extreme, delivery to the geographically eligible market area is sufficient. At the opposite extreme is a requirement to deliver the energy serving all the way to the local zone where the associated load is located.

There are several variations of Delivered Energy Eligibility. The most important distinguishing features include (a) retail versus wholesale matching of energy and attributes, and (b) what settlement period is used to match generation and load. These features dictate how cross-border attribute transactions can be arranged, the role of intermediaries, and whether attribute transactions must be arranged prior to the cross-border energy transactions, or can be associated with a matching energy transaction after the fact. The alternatives to these features are discussed in the next two subsections.[18]

[18] In any Delivered Energy Eligibility regime, transmission losses must be addressed in the underlying accounting system, and depending upon that treatment, if the energy available into the sink market area is reduced due to losses, the associated benefit may be proportionately less. If imports are reduced to account for losses, then local and imported generation can be put on equal footing with respect to local benefits.

3.3.1 Retail vs. Wholesale Matching of Energy with Attributes

From the perspective of the importing market area, approaches to matching attributes with energy imports fall into two categories of **who** can be involved in the energy and attribute transactions and **how** such transactions can be implemented. We refer to these approaches as *retail matching* and *wholesale matching*.

- **Retail Matching**. Consider a disclosure protocol that requires a contract path to delivered energy as the basis for identifying the attributes of all sources in a REP's mix. Such a requirement implies that energy and attributes may need to arrive bundled to the REP for settlement purposes. Similarly, *retail matching* requires that a REP seeking to utilize imported attributes within a given settlement period must also import energy – either directly (as shown in **Error! Reference source not found.**4) or via a wholesale supplier on its behalf – from the corresponding source market. This has important implications because the manner in which many REPs source their power supply may preclude them from utilizing out-of-market generation under this regime.

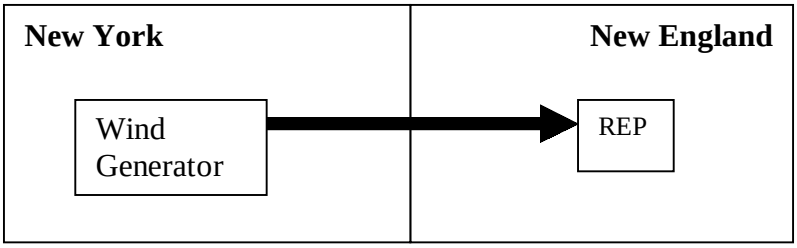

Figure 4: Retail Matching

- **Wholesale Matching**. As shown in Figure 5, the *wholesale matching* approach expands upon retail matching to also allow a wholesale market participant that has successfully scheduled an energy transaction over a market-area boundary to associate specific generation attributes from the source area to move with that energy. This approach would be most suited to an accounting and verification protocol that supports unbundling (e.g. like the New England Generation Information System, described in Appendix A), where the attributes once imported could be sold freely. Under this approach, the ultimate REP procuring the attributes is not limited to the quantity of imported energy associated with its settlement account. Attributes could be imported by a wholesaler up to its total imported energy transactions from (or through) a source market, and then sold in secondary markets to REPs and others separate from electricity.[19]

[19] If the source market is not adjacent to the sink market, the importer of attributes would be required to arrange an equivalent import of energy through each intervening market area, either in one step (e.g. PJM to NE with a NY through-wheel) or in separate transactions (from PJM to NY, and then NY to NE).

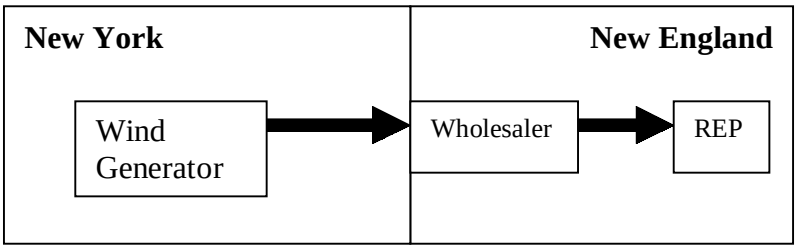

Figure 5: Wholesale Matching

3.3.2 Choice of Settlement Period: Strict vs. Relaxed Delivered Energy Eligibility

Under either the retail or wholesale matching approach, the choice of settlement period will dictate whether the regime requires *strict energy delivery* or *relaxed energy delivery*.

- **Strict Energy Delivery.** Under strict energy delivery, attributes may only be imported via an energy import from a specific generator. Energy and attributes must be scheduled into the sink region, and across the border, in a manner that matches the generator's production profile in real time, necessitating an hourly settlement. In effect, importing a wind power "attribute" would also require the scheduling of wind-generated energy under some form of unit-contingent contract (an energy transaction that flows in a pattern mirroring the generator's actual production) from the source to the sink area market.[20]

- **Relaxed Energy Delivery.** Under the relaxed energy delivery regime, the attributes delivered across a market area boundary must simply match in quantity a scheduled energy flow over a broader settlement period, which could be monthly, quarterly, or even annual. In effect, wind "attributes" could be transferred to the sink area along with a corresponding energy flow, but that energy flow need not be (contractually) the real-time electric output of the wind generator. Wind "attributes" could simply be matched with either a transaction entered into explicitly for the purpose of "carrying" the attributes, or to a new or pre-existing undifferentiated electricity transaction scheduled across the border for other purposes.

Dedicated extension eligibility is the most extreme form of expanding Geographic Eligibility via Strict Delivered Energy Eligibility. It requires generation 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.[21] The effect of this rule is equivalent to geographic eligibility within Texas, but also allows a generator physically located outside of Texas that has a dedicated interconnection to the Texas grid.

[20] Strict energy delivery does not require scheduling firm energy transactions or the transfer of unit-specific capacity across market boundaries. The effect of a curtailment of such a transfer – whether due to insufficient transmission or a call on capacity in the source market – would not undermine the effect or credibility of this approach. Rather it would simply reduce the amount of energy and attributes transferred between markets.

[21] Public Utility Commission of Texas rule §25.173.(e)(4).

3.3.3 Delivered Energy Eligibility Variations

These design details give rise to four variations of Delivered Energy Eligibility that we have identified, listed from least to most flexible as follows:

- Strict delivered energy eligibility with retail matching. This regime requires that a REP wishing to source from renewable generators outside of its market area must procure attributes from the source market via a bilateral contract path of bundled energy and attributes across market boundaries. For such transactions to be implemented in most cases would require that both a bundled bilateral contract and a transmission path be arranged beforehand. If the source market area is not adjacent, then a contract path would be required through any intervening markets. This approach appears to describe the New York environmental disclosure treatment of imports.[22]

- Relaxed delivered energy eligibility with retail matching. Under this approach, a REP wishing to source out-of-market renewable generation must be able to demonstrate energy imports from the renewable generator's source market, but is allowed to match energy and attributes over a broader settlement period (perhaps quarterly). This regime would allow a transaction for attributes generated during a given settlement period to be arranged either before or after the settlement period, so long as it matched an actual cross-border energy transaction by that REP of sufficient quantity during that same period.[23]

- Strict delivered energy eligibility with wholesale matching. Under this regime, full unbundling of energy and attributes is allowed within the local market area, but attributes from outside the market area must arrive bundled with electricity and match hourly. For example, both the final proposed Massachusetts RPS regulation and the NEPOOL Generation Information System (GIS) operating rules require that in order to import attributes, the associated energy must be imported by means of external transaction unit contracts, with a demonstrated transmission path to the New England border.

- Relaxed delivered energy eligibility with wholesale matching. In this regime, full unbundling of energy and attributes is allowed within the market area, and the importer may match the attribute transaction to an energy flow over a defined settlement period (e.g. monthly, quarterly or annual.). The authors anticipate that the Ontario accounting and verification system being developed may take this form.

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[22] If energy is sold from a neighboring market area into the New York spot market, then New York's conversion transaction mechanism could be used. Such a case would constitute strict delivered energy eligibility with wholesale matching.

[23] This could work if the REP procures its own sources and imports undifferentiated energy across market boundaries; or buys all-requirements from a wholesaler that imports sufficient quantities of energy from the source market. This tactic may not always be practical, since most REPs do not normally engage in inter-market energy arbitrage (a traditionally wholesale function). So, for many REPs, this regime effectively demands that energy import transactions be pre-scheduled.

3.3.4 Treatment of Opposing Energy Flows

If energy must be delivered to a specific market area in order to qualify associated attributes for one of the purposes discussed in this report, the total quantity of imported attributes recognized in the importing market area will not be infinite. It may not be credible, for example, to have 10,000 GWh per year of wind from a neighboring market area be considered part of a market area's aggregate supply mix if the total transfer capability between the markets was only 2,000 GWh per year. There are two alternative approaches to addressing offsetting flows across market boundaries:

- Attribute imports could be limited to the *net energy flow* across an interface over some period of time. For practical purposes, attribute imports would therefore only be allowed in the direction of the prevailing electricity flow, and the quantity in the prevailing direction would be reduced to the extent of offsetting scheduled transactions in the opposite direction.

- Attribute imports could be limited to the *successfully scheduled transactions* across an interface. Such transactions are not curtailed and are considered to have flowed for purposes of financial settlement in the importing system, regardless of offsetting energy flows in the opposite direction. Under this approach, the attributes transferred in each direction would be limited in quantity to the *gross successfully scheduled energy transactions* in that direction. Such a quantity could exceed the net energy flow, or may even exceed the transfer capacity over an interface on a non-firm basis, to the extent there are offsetting energy transactions scheduled in the opposite direction.

Of these two approaches, basic fairness dictates that the successfully scheduled transaction must be used. After all, if a retailer and generator were to have a long-term bundled energy and attributes agreement scheduled over an interface, the later scheduling of a larger flow in the opposite direction should have no bearing.

3.4 Reciprocity-Driven Eligibility Exclusions

Whether the basic eligibility screen is based on geography, benefits or energy delivery, some attribute laws and regulations layer additional conditions on the source market area or the generator itself. These additional conditions provide a tool for leveling 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. Such exclusions could involve:

- Comparable exposure to competitive pressures: For example, the New Jersey RPS excludes Class II renewable sources that are located in areas without retail choice. This exclusion appears aimed at leveling the playing field between existing generators that are exposed to the market and generators whose costs are protected in a regulated rate base.

- Reciprocal access: If Market Area A generation were not eligible to have its attributes sold into Market Area B, then Market Area B attributes might be excluded from Market Area A. For example, Massachusetts' disclosure standards require any generation from outside of

New England to be labeled as "imports" with associated proxy attributes. This requirement arguably deprives generators from outside of New England access to retail "green" market revenues in Massachusetts regardless of the transaction structure. While the authors are unaware of any specific example in practice, an adjacent market might deny access to its disclosure label for voluntary market purchases to attributes from Massachusetts' generation due to a lack of reciprocal access.

- Comparable environmental standards: For example, New Jersey interim RPS Class II eligibility rules for resource recovery facilities require that out-of-state plants meet, at a minimum, New Jersey's own environmental standards.

- Reciprocal repercussions: If renewable attributes are sold from one REP to another within a market with comprehensive uniform disclosure requirements, there are clear repercussions: the disclosure label of the selling party will reflect a lower proportion of renewables and the buyer's label will show an increase in renewables. If the buyer instead purchases generation attributes from another market area where REPs are not subject to disclosure policies, then there may be no repercussions to the seller. As noted in Table 2 of Chapter 5, several jurisdictions require reciprocal repercussions. For instance, some disclosure rules require a compatible disclosure policy in the source market order to recognize source-specific imported attributes. Without comparable disclosure regulations, there is a greater risk that customers in both the source area and the sink area will end up paying the over-commodity-market costs for the same energy. This may be especially true if the source-market area remains regulated.

- Reciprocal markets: Some stakeholders that we interviewed argued for creating reciprocal *markets* through mandates, a step beyond simply reciprocal *access*. For example, they suggested that RPS requirements should restrict imported generation eligibility from states without a similar purchase mandate.

Some stakeholders interviewed argued strongly that reciprocity is an appropriate basis for eligibility exclusions. Others, while expressing sympathy for the rationale, questioned the legality of such exclusions.

4 Analysis of Alternative Approaches to Addressing Imports and Exports

In the previous chapter we identified alternative approaches to addressing attribute imports and exports in generation attribute requirement rules and accounting and verification protocols. This chapter focuses in more detail on the *policy* questions of *whether* to recognize an import or export transaction, *how* to recognize it, and *what* criteria might be used to distinguish a legitimate transaction that meets policy objectives. In contrast, the *technical* question of whether or not a transaction has sufficiently met the test to be recognized (if the driving policy dictates that it should be recognized) is addressed in Chapter 5 in terms of information system and transaction compatibility and consistency.

We have identified a range of situations in which attribute transactions may be undertaken. Attribute transactions may be voluntary and market-driven, or in response to a policy mandate. They may be associated with and have a nexus to a REP's electricity sales, or may be TRC transactions distinct from retail electricity sales altogether. We have also noted that customers and regulators may have different motivations for their renewable energy policies or market demands, which may include local, regional, national, and/or global objectives. As we will see, there is not one obvious solution for all situations. Rather, the appropriate treatment of imports and exports may differ depending on whether transactions are driven by compliance with mandates or by consumer demand, and depends critically on the driving policy or market motivation.

To evaluate the alternative approaches to addressing imports and exports identified in Chapter 3, we first explore in Section 4.1 the general relationship between a renewable generator's location, the impact of its production, and the nature and location of the resulting benefits. In Section 4.2 we then describe how the scope of one's objectives (local, regional, or global) can affect how one views different cross-border attribute transactions. While we focus on local, regional, and global environmental benefits, we also briefly address the other benefits of renewable energy. With these concepts as a foundation, in Sections 4.3 to 4.6 we assess the suitability of each of the eligibility approaches identified in the previous chapter in meeting different objectives (local, regional, or global). We also discuss how (a) a requirement for a nexus to retail sales and (b) the type of renewable attribute transaction (e.g., voluntary versus mandatory) affects the evaluation of these approaches. Section 4.7 summarizes our recommendations and conclusions, based on the previous analysis. Practical realities and policy coordination may dictate a different approach to cross-border transactions than those that we recommend in the ideal; these issues are addressed in Section 4.8.

4.1 Generator Location, Displacement, and Location of Benefits

Locating the environmental benefits of a renewable generator presents a challenge because neither the impacts nor the benefits (particularly in the case of a zero-emission resource) are centered at the generator itself. Two questions must therefore be asked. First, what are the impacts that result from adding the generator and where do they occur? Second, what are the benefits resulting from those impacts, and where do they occur? We focus here on the air shed

benefits of renewable generation because this is the most commonly valued benefit. Of course, one should recognize that there is a range of renewable generation attributes that could be recognized and valued by consumers, and these are not limited to pollution emissions.

4.1.1 Impacts

The first question can be answered through the concept of *displacement*. Physical electron flow dictates the location of the repercussions by dictating which specific generating plant(s) get backed down, that is the displacement that results from the added energy production from, for example, a wind power facility. Unfortunately, we cannot realistically track such physical electron flow. The actual displacement will be diffuse, occurring at one or more generators (in most cases fossil-fueled) at different times due to the nature of the integrated electricity system (dispatch) and the workings of competitive wholesale markets. Therefore, displacement cannot be directly measured but instead must be imputed by modeling or estimating what would have happened if not for the renewable generator's production.

To understand the location of displacement impacts, consider two market areas: Eastgrid and Westgrid. If a generator is located in Eastgrid, in the absence of an energy export from the generator to Westgrid, the generator's displacement is within Eastgrid (or a sub-market area, in the presence of binding transmission constraints). An energy export from Eastgrid into Westgrid that matches the generator's production profile in each hour, and is incremental to what otherwise would have been exported, can transpose the displacement into Westgrid, so that the emissions impact is the same as would be produced by an identical generator with an identical production profile located in Westgrid.

Now consider a loosening of the requirement that the energy export from Eastgrid to Westgrid precisely match the generator's generation profile. An incremental energy export from the source Eastgrid into the sink Westgrid that is the same in magnitude as the generator's quarterly or annual production, but does not match the actual output in each hour, will also transpose a displacement to Westgrid. However, this displacement may or may not cause the same emissions impact as if a generator with an identical production profile were located in Westgrid. It might be approximately the same, but it also could have a greater or lesser impact depending on the shape of the energy transaction. To the extent that the energy export profile has (on average) a similar temporal profile as the generator's production profile, it may represent a good approximation. Of course, if the energy export is not incremental in nature, then no additional displacement results.

4.1.2 Benefits

The environmental benefits associated with the displaced generation may or may not remain in the location of the displacement itself. Identifying the location of the benefits associated with renewable generation and the associated attribute transaction is therefore more complex than locating the impacts because: (a) renewable energy generation has local, regional, national, and global impacts, and (b) air sheds do not respect market area boundaries. Emissions displaced from distant upwind generators can sometimes benefit a receptor to a greater degree than emissions displaced from a generator nearer the receptor, and air quality impacts can shift with

the wind. It is therefore possible that a generator might displace energy in Eastgrid (e.g. no energy export), but create a greater environmental benefit for Westgrid than the same generator would produce if either located in Westgrid or if located in Eastgrid and exporting energy to Westgrid. This situation could result from either higher marginal emissions rates in Eastgrid than in Westgrid, or the effect of weather in transporting the environmental benefits downwind to Westgrid.

4.2 The Treatment of Cross-Border Transactions Depends on One's Objectives

As highlighted above, the similarity of an attribute import transaction's benefits with the benefits from an identical local generation source depends on the nature of the benefits sought. For purposes of this discussion, we assume that a generator in the same control area in which the load in question is served (or local zone if the control area is subdivided) would be considered local. In this section we first identify the impacts of a generator considered local by the buyer (if voluntary) or regulator (if mandate). Next, we discuss the local, regional, and global objectives that underlie energy attribute purchases and requirements, and the specific benefits provided by both a local generator and by different cross-border energy transactions.

4.2.1 Local Generator Impact

First consider the addition of a zero-emission wind generator[24] to a closed system, Eastgrid, with no internal transmission constraints. If both energy and attributes, bundled together, are sold by the generator to a REP to serve the REP's load within Eastgrid, then there are no imports or exports of either energy or attributes. In this situation, we conceptually know what will be displaced: adding a new renewable generator backs down production from the marginal generator(s)[25] in the market area in each hour. The marginal generator(s)' emissions are thus displaced, and the benefits to the REP's load are a function of specific emissions displaced.

4.2.2 Benefits from the Perspective of Local Objectives

Assume that the only objective of a mandate, or the only motivation of the buyer in a voluntary transaction, is to achieve local benefits in Eastgrid. The addition of a zero-emission generator in Eastgrid can bring these environmental benefits, such as reductions in smog, particulates, hazardous emissions, or thermal pollution.[26] It can also bring the economic and security benefits of resource diversity, and may bring economic benefits such as jobs and tax revenues.

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[24] For simplicity, we consider here a zero-emission generator and use the gross emission displacement. For a generator with its own stack-gas emissions (e.g. biomass), the net emission rates would apply.

[25] The marginal generator at any point in time is that generator with the highest marginal cost or highest bid price – whichever drives wholesale dispatch decisions – that will not run if new generation is injected into the system.

[26] If the REP's load is located downwind from all local fossil generators within the closed system, then the full benefits of the reduced emissions are experienced by the REP's customers.

If the generator was instead located in an adjacent Westgrid, many of the same or similar local environmental objectives (but not the jobs or tax benefits) could be reaped through the purchase of the generator's attributes in Eastgrid, but only if the generator's energy were also exported from Westgrid into Eastgrid. Whether the benefit in Eastgrid in this case is equivalent to or similar to that of a local generator depends in large part on whether the energy export matches production hour-by-hour or over a broader period, as discussed in Section 4.1.1. However, without a corresponding incremental energy import into Eastgrid, local benefits will not result in Eastgrid from the addition of the generator outside of Eastgrid because displacement occurs in Westgrid, not Eastgrid.

4.2.3 Benefits from the Perspective of Regional Objectives

Now, consider a situation in which the only objective of a mandate or attribute buyer in Eastgrid is to achieve regional environmental benefits. The addition of a zero-emission generator in Eastgrid can provide these environmental benefits, such as reductions in regional ozone and acid rain. As with local objectives, however, similar benefits can be reaped by purchasing the attributes of a similar generator in Westgrid provided that the generator's energy was also exported from Westgrid into Eastgrid. If prevailing atmospheric transport carries emissions from Westgrid to Eastgrid (and/or if the displaced generation units in Westgrid are more polluting than in Eastgrid), then it is also possible that a buyer in Eastgrid purchasing attributes from a generator in Westgrid will reap similar environmental benefits whether or not there is a corresponding export of energy from Westgrid to Eastgrid. In fact, if the same prevailing winds carry emissions within Eastgrid elsewhere, then it is possible that the environmental benefits to the buyer in Eastgrid could be greater without a corresponding energy export, keeping the emissions displacement in the upwind Westgrid. The benefits would then flow to the downwind Eastgrid.

4.2.4 Benefits from the Perspective of Global Objectives

Finally, consider a case in which the objective of a mandate or voluntary purchaser in Eastgrid is to achieve global benefits. The addition of a zero-emission generator in Eastgrid can bring reductions in greenhouse gas emissions and decreased reliance on exhaustible fossil fuels. Similar benefits can also be achieved by purchasing the attributes of an equivalent generator in Westgrid, accompanied with an export of the generator's energy from Westgrid into Eastgrid. However, there is no need to export energy from Westgrid into Eastgrid in this case, and this holds no matter how distant Westgrid is from Eastgrid. Depending on the carbon-intensity of marginal generation in Eastgrid and Westgrid, displacement will be most beneficial in the region in which the marginal carbon intensity of displaced generation is the highest.

4.3 Effectiveness of Eligibility Approaches in Different Circumstances

Given these complexities, there is no single "right way" to approach generation attribute transactions across market boundaries for all circumstances. Different reasons for entering into renewable attribute transactions imply different accounting protocols for imports and exports. Our analysis suggests that, *in the absence of confounding practical constraints*, the appropriate treatment of cross-border transactions depends in large part on the scope of the benefits that one

seeks (local, regional, and global). Once clarity on objectives is achieved, it is far easier to identify the most appropriate approaches for accounting for imports and exports. Consequently, if the transaction is mandate-driven, suitable approaches to treating cross-boundary attribute transactions depend on the mandate and its goals; if the transaction is market-driven, the approach depends on consumer desires and marketing claims.

In the following sections, we assess the ability of the various eligibility approaches identified in the previous chapter to effectively meet a range of likely objectives, ranging in scope from local to regional to global, and from environmental to reliability and economic. We initially perform this analysis without considering issues of policy coordination and the practical constraints that arise due to coordination challenges; we return to these issues later.

4.4 Geographic Eligibility

Geographic Eligibility at a market-area or sub-market area scope could be used for all forms of mandates applicable to REP electricity sales if the objectives are local, and a super-market or market-area scope might be adequate if the objective is regional benefits. Of course, the appropriate geographic scope depends on the size of the market area relative to local constraints and air pollution transport. What would work for New York may not be appropriate for the WSCC.

In general, the primary advantages of Geographic Eligibility approaches are their simplicity and low cost, for both market participants and administrators. They avoid the need to arrange and pay for transmission; in the presence of transmission constraints within the eligibility scope, these approaches can allow environmental benefits to occur that could not be achieved if energy needed to be scheduled and delivered directly to load.

4.4.1 Unconstrained Geographic Eligibility

Unconstrained Geographic Eligibility is best suited for mandates or voluntary purchases aimed at meeting global or national environmental objectives, as the benefit achieved might be the same or actually greater if the generator is *not* in the market area of the party paying for the benefit. A transaction could be most effective if the renewable energy generator is located in a region in which the relative incremental cost of renewable energy is low, and/or CO_2 emissions displacement per unit of energy is proportionally high.

On the other hand, this approach is poorly suited if local or regional objectives drive a transaction, or for transactions for which it is necessary to claim a "nexus" to retail sales, such as for inclusion in fuel source disclosure labels and compliance with regulatory mandates applying to a REP's electricity sales. Absent a transmission path and energy delivery into the sink region, this approach does not assure that local displacement and associated environmental benefits occur. A generator beyond the sub-market or market-area is unlikely to have a similar impact to a local generator, and there is no nexus to a REP's retail electricity sales.

Unconstrained Geographic Eligibility, or broadly defined Super-Market Geographic Eligibility (such as nationwide), are therefore most consistent with TRC-only transactions and mandates such as a national RPS that allow financial compliance without requiring a nexus to retail sales.

4.4.2 Super-Market Geographic Eligibility (Among Nearby Compatible Market Areas)

Air sheds do not follow market areas. A generator displaced in New York may provide as great or greater air quality or acid rain benefits to a Connecticut customer that is paying for the benefit than a generator displaced within its own market area (New England). Nor must the market areas be adjacent, as precursors to smog and acid rain influence the environment a great distance away. For this reason, Super-Market Geographic Eligibility may be a superior approach to meeting purely regional objectives.[27] Since this approach provides no nexus to electricity sales, as with Unconstrained Geographic Eligibility, this approach is not well suited to situations in which a nexus to retail electricity sales is required.

4.4.3 Market Area (and Sub-Market Area) Geographic Eligibility

Market Area Geographic Eligibility can be well suited for mandates or voluntary purchases that are aimed at meeting local objectives. It can also provide a credible nexus to retail electricity sales. However, as noted above, by limiting the eligibility to only resources within the market area, sources are excluded that might (with strict energy delivery) be able to provide the same level of local environmental benefits (although perhaps not the desired local economic benefits) more cost-effectively.

Within a market area that has internal transmission constraints (such as New England or New York), a generator in some locations within the market area may not provide local displacement benefits. For example, the impact of a Maine wind plant may be to displace Maine generation, and may not change the dispatch as seen by a Connecticut customer on the other side of a transmission bottleneck. Sub-Market Geographic Eligibility becomes an option when the objectives are very local and the market area is large.

The primary disadvantage of narrow Geographic Eligibility regimes is that they clearly foreclose access to lower-cost renewable options that could be otherwise delivered from outside the geographic eligibility zone to achieve comparable environmental benefit if an energy import was involved. Also, because of the lack of a clear nexus to retail electricity sales resulting from ignoring imports and exports, this approach is susceptible to some of the practical constraints discussed in Section 4.8 below.

Another difficulty with this approach results from the current trend of market consolidation. Market areas previously dispatched independently may merge and be dispatched collectively in

[27] This reasoning underlies a bill recently proposed in the Connecticut legislature that would revise the Connecticut RPS to use a super-regional eligibility approach, with New York and PJM generation eligible through the use of an approved renewable energy trading program in those jurisdictions (AN ACT CONCERNING RENEWABLE ENERGY AND ENERGY CONSERVATION, Connecticut General Assembly - Raised Bill No. 5712, February Session, 2002, Referred to Committee on Environment).

the future. A transaction that once required a scheduled energy delivery and transmission path could become recognized without such a path by virtue of an exogenous decision. FERC RTO orders make such future change more likely. This raises a practical question: how meaningful or wise is it to tie a definition of a legitimate or illegitimate cross-border attribute transaction to a market-area definition that could change, without the underlying transaction or resulting benefits changing?

A final issue that must be addressed with narrow Geographic Eligibility regimes is one of legality. As discussed in Text Box 1, below, some analysts feel that narrow Geographic Eligibility approaches may be particularly susceptible to legal challenge based on NAFTA and the Interstate Commerce Clause.

4.5 Benefits-Driven Eligibility

The primary advantage of Benefits-Driven Eligibility is its accuracy in tying eligibility to specific environmental or other benefits. Because air sheds do not follow market area definitions, it is the most accurate approach of those considered in this report if local or regional air benefits are the driving rationale for the mandate or purchase. For example, to a customer in Hartford, Connecticut, a zero-emission renewable plant added in Pennsylvania would bring more local smog and acid-rain benefits without energy delivery (so displacement is upwind of Hartford) than would the same plant in Maine (a downwind generator location within the same market area as the receptor). Benefits-Driven Eligibility therefore assures a direct link between the location of the benefit and those paying for the benefit. Indeed, Rader and Hempling (2001) argue that such an approach would be both efficacious and potentially less vulnerable to challenge based on the Interstate Commerce Clause and the North American Free Trade Agreement than would Geographic Eligibility approaches.

The primary disadvantages of this approach are, first, that its application is complex, especially if relying on a case-by-case determination. Because the impacts of adding a renewable generator to a market area are diffuse, and the resulting benefits are location- and even time-specific, this approach may create substantial uncertainty among renewable developers about their eligibility under different programs. To make the approach manageable, a set of default rules would likely need to apply (following one of the other approaches to dealing with imports and exports), with case-by-case review for only facilities that do not otherwise meet the default. Second, this approach is not well suited for situations where a nexus to retail sales is required because generators located outside of a region may benefit regions other than where their energy is delivered.

Given the advantages and disadvantages raised here, this approach appears most suitable for RPS mandates that are driven by specific local or regional benefits. It might also be suitably applied in support of marketing the benefits of renewable power in the context of claims-based disclosure. However, it is poorly suited for comprehensive disclosure requirements or emission performance standards because eligible generation could exceed or be less than total load.

Text Box 1.
Interstate Commerce Clause and NAFTA Considerations

Rulings on the applicability of the Interstate Commerce Clause or North American Free Trade Agreement could substantially affect the viability of some of the options presented in this report. Though we do not deal with this issue definitively in this report, this text box provides a flavor for the issues involved in the debate.

Interstate Commerce Clause (ICC)

Though the constitutionality of various electricity resource eligibility approaches has not been directly tested, some legal analysts believe that the ICC may impose significant restrictions on this choice – or at least pose a legal threat. Readers interested in this topic are urged to review Rader and Hemping (2001) and Engel (1999).

While not definitive, based on their analysis of the issue with respect to a state RPS, Rader and Hempling (2001) highlight the following points:

- Limiting RPS eligibility to generators located within a state (sub-market area geographic eligibility) is likely to violate the Commerce Clause because it is a facial discrimination against out-of-state goods.
- Limiting RPS eligibility to generators within a region that includes the enacting state (market area geographic eligibility) raises the same problem – the law still discriminates against all non-region states.

If correct, this analysis would clearly lead one away from the geographic eligibility regimes in the case of legal attribute requirements such as disclosure, EPS, or RPS policies. (Note that voluntary green power markets and TRC-only sales are, arguably, not subject to ICC restrictions). A pure geographic eligibility regime, whether sub-market to super-market, would be subject to legal challenge. Because of this, Rader and Hempling (2001) argue for RPS requirements that apply a benefits-driven eligibility approach, which they claim would be far more immune to legal attack. These analysts also believe that delivered energy eligibility approaches are also likely to escape effective legal challenge.

North American Free Trade Agreement (NAFTA)

While the legal requirements that NAFTA might apply to this area are less clear than the Commerce Clause, similar concerns arise. Related to the Commerce Clause, it appears that in-country geographic restrictions could violate NAFTA (it deserves note that such restrictions would *also* violate the U.S. Commerce Clause).

A more vague legal area relates to restrictions on energy sources, as opposed to origin. Some analysts, for example, claim that a U.S. RPS that deems hydropower an ineligible renewable energy source could be found illegal under NAFTA (CEC 2001). Others argue that such eligibility criteria would not violate NAFTA (Hempling and Rader 2002). Even more seriously, an argument has been made that the mere imposition of an RPS, regardless of source or origin eligibility requirements, could violate NAFTA. For more information on the ongoing debate on these issues, see Hempling and Rader (2002) and CEC (2001).

4.6 Delivered Energy Eligibility

As an expansion upon Market-Area Geographic Eligibility (or perhaps even Super-Market Area Eligibility), the Delivered Energy Eligibility approaches have most of the advantages of Geographic Eligibility within the area in which eligibility is automatic, while avoiding a key disadvantage of Geographic Eligibility. Specifically, Delivered Energy Eligibility can, in some cases, credibly bring benefits to the sink area via displacement of local fossil generation from generation outside of the market area that is imported into the sink area. In this manner, those paying for benefits are assured of achieving similar if not identical environmental benefits than would be delivered by a generator within their market area.

The four variations to the approach identified earlier – possible combinations of strict versus relaxed energy delivery and retail versus wholesale matching – are all suited to the same basic transaction structures, where attributes are associated with REP electricity sales. They can also all be used to satisfy either mandate- or customer-driven demand. As discussed in more detail below, the distinctions between these variations are found in the tradeoffs between lower cost and greater flexibility on the one hand, and less assurance of precisely the same environmental impacts as a local plant on the other (or for that matter any environmental impact at all).

Each of the Delivered Energy Eligibility approaches recognizes that there are some benefits to resources beyond the local region, as long as there is some local displacement of fossil generation. For this reason, we conclude that whenever Geographic Eligibility is being considered and the primary benefits sought are environmental in nature: (a) Strict Delivered Energy Eligibility to the market area in which generation is automatically eligible is preferable because it allows for lower costs while ensuring the same local environmental benefits, and (b) Relaxed Delivered Energy Eligibility should at least be considered to further reduce costs and enhance flexibility for market participants.[28] Relaxing the constraints on retail matching and/or strict (hourly) delivery decreases the probability that distant generators will have the same impact as a local source. Therefore, more relaxed eligibility requirements may be most appropriate when the desired benefits are regional in scope.

To reiterate, the major advantage of Delivered Energy Eligibility is that, unlike Geographic Eligibility (at least the narrower versions aimed at local benefits), it allows access to lower-cost renewable options just outside of the eligible geography. Unlike simply extending the eligible market region under a Super-Market-Area Eligibility approach, however, it adds complexity and cost for generators outside of the automatically eligible geographic region. The degree of added complexity and cost related to seams, transmission, and scheduling issues may or may not be significant depending on the degree to which delivery is strict or relaxed, and whether matching is at retail or wholesale. While these added complexities may result in higher costs for regulatory mandates and renewable energy products, they also serve a desirable purpose to the extent they

[28] It should be noted that a mandate or purchase aimed primarily at creating local economic or resource diversity benefits might not benefit from a delivered energy eligibility regime. We also note that strict energy delivery might not be superior if there are other reciprocity-related reasons that argue against recognizing imports.

can help assure local displacement and tilt the playing field somewhat towards local generation and the environmental and economic benefits they deliver.

4.6.1 Strict Energy Delivery

An import under the Strict Energy Delivery approach will have a virtually identical environmental impact as a generator within the sink area, and therefore this approach is particularly well suited to achieving local benefits and in situations with a requirement for a nexus to retail sales. It may also be a reasonable approach where the primary objectives are regional benefits, particularly if prospects are limited for displacement in an upwind region to benefit the sink region. This approach would also be appropriate for comprehensive disclosure, and may be well suited for RPS and EPS depending on the nature of the objectives.

The primary disadvantage of this approach comes in its requirement to schedule cross-border energy transactions to precisely reflect the generator's production profile, which can add substantial transactional costs and complexities. In some circumstances, this requirement may not be economically practical for a wind or other intermittent generator. Capacity-based transmission tariffs, exposure to basis risk between market zones which cannot be hedged, the inability to precisely schedule a transmission reservation and plan dispatch accordingly, and (potentially) the inability to schedule long-term firm transmission, might all present significant costs or barriers. It may also be economically challenging for a small generator if schedules for energy transactions and transmission reservations must be in units of whole megawatts. The desire for accuracy must be weighed against the desire for more renewable generation because this approach may to deter all but the largest out-of-pool generators.

Retail versus Wholesale Matching

Under Strict Energy Delivery, energy and attribute matching can take place at the wholesale or retail level. Consider as an example a wind generator in New York seeking to move its attributes to serve a REP's loads in PJM.

Under Strict Energy Delivery with Retail Matching, the REP would contract directly with the generator or an intermediary for energy and attributes under a unit-contingent contract. In the absence of transmission constraints, the wind generation would need to be scheduled across the interface instantaneously matching the amount generated in each hour, so that it is considered in the dispatch of the sink market and is not scheduled to meet New York loads. We would know that, in a physical sense, the same local fossil generation is displaced as if the wind generator was physically located in PJM, and the environmental benefits would mirror those of a similar wind generator in PJM. Many REPs, however, may not have the operational sophistication to schedule power across market boundaries. REPs that purchase all-requirements power supply (or similar wholesale products with load-following, "firm energy liquidated damages" characteristics) from a wholesaler and thus do not manage their own supply portfolio,[29] for example, may be unable to arrange or accommodate a unit-contingent contract across a market

[29] For example, the REP might purchase from a supply aggregator rather than contracting directly with generators and managing the portfolio for their load.

boundary, in some circumstances effectively foreclosing their ability to import renewable energy under this approach.

When Retail Matching is expanded to allow for Wholesale Matching as well, as described in Section 3.3.3, the location and size of the environmental benefit is equivalent to the situation when matching is limited to the retail level. The situation is far more flexible for the REP, however, because the REP could simply procure imported attributes from a wholesaler that itself imported the attributes bundled with electricity. Of the two options, this approach is also preferable from the perspective of the generator, in that they do not need to find many small REPs to which to sell power, or struggle to sell to willing buyers with insufficient sophistication to handle an energy import. Furthermore, resource intermittence is easier to manage in a larger portfolio, and wholesalers are positioned to provide arbitrage between markets, taking a position in imported attributes and then reselling them to REPs if attribute market values diverge between neighboring markets.

4.6.2 Relaxed Energy Delivery

Next consider an example of Relaxed Energy Delivery, in which the strict hourly settlement period is replaced by a requirement to schedule across a market-area boundary a quantity of energy matching the quantity of attributes transacted in each calendar quarter[30] or year. In relaxing the delivery requirement, the transactional costs and complexities encountered under Strict Energy Delivery are substantially reduced (especially for intermittent resources): precise and efficient transmission reservations can be arranged, energy can be moved when cost-optimal, and risk can be hedged. In addition, Relaxed Energy Delivery might allow attribute transactions to occur in the presence of transmission constraints that would otherwise thwart a transaction under Strict Energy Delivery, allowing environmental benefits to be achieved that would not otherwise be feasible or economic due to the lack of locational discretion available to most renewable generators.

While a transaction scheduled entirely during off-peak periods might be far more cost-effective to transmit over a market boundary than an intermittent profile, it would clearly displace a mix of generation unlikely to be representative of that displaced by a comparable local generator. Depending on the shape of the incremental cross-border energy transaction and its relationship to the actual production profile of the renewable generator, the impact (displaced generation) may result in either:

(a) A very close approximation to a local generator's displacement and associated benefits. For example, a firm base load block would be far more cost-effective to transmit over a market boundary than an intermittent profile, and the generation displaced might be similar to that displaced by an intermittent generator on average over the course of a quarter or year.

(b) Reduced benefits, for example, if the displaced generation was of the same fuel type but from more efficient generators.

[30] Such a system is inherent in New York disclosure rules.

(c) Increased benefits, for example, if the displaced generation was coal or oil rather than natural gas generation.

Some of the stakeholders interviewed for this report felt strongly that the possibility of transactions resulting in reduced benefits relative to an in-market generator undermined the credibility of this approach. If the displaced generation was similar, other stakeholders felt equally strongly that the practical and/or economic advantages gained by taking the relaxed approach may justify some sacrifice in absolute assurance of equivalent local benefits from a public policy perspective.

Retail versus Wholesale Matching

There is one important difference between retail and wholesale matching under Relaxed Energy Delivery. This difference relates to whether the associated cross-border import is truly *incremental* to what would have otherwise been imported. If the transaction is incremental in nature – the wholesaler or retailer explicitly arranges the energy transaction to enable the attribute transaction – and affects each market area's dispatch accordingly, it would seem to be a reasonable and legitimate substitute for an in-market generator. But if the same energy transaction would have occurred without the attribute transaction, then the direct environmental benefits stay in the source region, and the dispatch in the sink region is unchanged. Once again, some stakeholders interviewed for this report were troubled by this possible outcome.

Under Retail Matching, if the REP is contracting directly with a wind generator rather than purchasing all-requirements supply, the REP will typically need to schedule an incremental energy transaction to its settlement account in order to import wind power. In this case, there is clearly a change in the sink-area's dispatch.

Under Wholesale Matching, on the other hand, there is no requirement for energy imports at the REP level, and the wholesaler could accomplish the import of wind attributes by scheduling a wholesale energy import transaction either *prospectively* or *retrospectively* (the same could be true under retail matching if a retailer uses an all-requirements wholesale supplier). As a result, under Wholesale Matching (or certain transaction structures under Retail Matching) the transaction may or may not represent an incremental change to the sink area's dispatch. With a prospective energy transaction explicitly scheduled to accomplish the attribute transfer, there is clearly an incremental import transaction that affects each market area's dispatch. Under a retrospective transaction, however, a wholesaler could move energy across the market interface when it is most economic, and later combine it with an attribute from the source area and call the transaction a differentiated wind transaction, after the fact, without a truly incremental import.

More generally, the challenge of determining "incrementality" in any specific case is sizable: practically speaking, a long-term incremental renewable transaction scheduled to optimize economics (once in a steady state situation) may be indistinguishable from "what would have happened anyway." To tell the difference may require a subjective examination of intent, history, timing, and strategy, hardly a precise or efficient component of an information system.[31]

[31] It may be difficult to distinguish from any written record any of the following transactions entered into by a wholesaler: (a) a long-term attribute transaction prior to making short-term energy transactions, or (b) hitching

Nonetheless, we conclude that, under Relaxed Energy Delivery, the likelihood of actual impacts within the sink market area is greater with retail matching than wholesale matching.

4.7 Recommended Approach for Specific Circumstances

The preceding discussion demonstrates that the appropriate treatment of imports and exports will depend on the objectives of the policy or market in question. At opposite ends of a spectrum, we have identified two internally consistent but philosophically opposite approaches for dealing with imports and exports. A Strict Energy Delivery with Retail Matching approach requires that incremental electron flow (and its resulting displacement) accompany an attribute transaction during the same hour, down to the REP level, in order to mimic the displacement of a local generator. In contrast, Geographic Eligibility omits any requirement to match attribute and energy transactions, acknowledging that the "right" answer to identifying displacement benefits may be elusive, and instead simply defines the region considered eligible consistent with the objectives of the policy or market in question. Consider the repercussions of these extremes.

A Strict Energy Delivery Requirement that respects all market boundaries assures that environmental benefits are as local as possible. In the extreme, energy delivery would have to occur down to the local zone within the sink market area. If the only reason for a transaction is to get immediate and local benefits, this would be an appropriate approach. (Of course, this assumes that there is good and cost effective renewables potential in the designated market area that is developable, which is often not the case). Such an approach also increases the likelihood that other local, non-environmental objectives – diversity of local electricity supply infrastructure, reduced dependence on imported energy sources, and protection of indigenous industries – would be maximized. Yet, while requiring Strict Energy Delivery will not seal out generation from outside of a market area, it will indirectly give more weight to local over distant resources, even if the local and distant generators have equivalent environmental benefits.[32]

The Geographic Eligibility approach recognizes the complexity and cost of the Strict Energy Delivery regime, and recognizes that any attempt to modify the Strict Energy Delivery regime to lower its costs involves making approximations and taking a risk that the environmental benefits of eligible distant generators may not equate to the benefits of eligible local generators. Once one is willing to consider such approximations, why not just go all the way to Geographic Eligibility? The freedom from physical scheduling requirements across boundaries and the associated costs, operational burdens, and risks[33] may allow market participants to increase environmental benefits by accessing lower cost renewables. A more liquid market for renewables is likely under this scenario. The scope of Geographic Eligibility can be set as strictly (narrow) or leniently (broad) as desired.

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short-term attribute transactions onto a long-term energy transaction, or (c) hitching short-term energy and attribute transactions, where either could have been arranged first.

[32] This was a desirable feature from the perspective of some of the stakeholders interviewed.

[33] These include transaction costs, transmission charges not associated with any additional economic costs imposed on the transmission system, imbalance and/or regulation penalties that may be out-of-line with actual costs imposed on the system, and transmission basis risk between locational-based energy markets.

But each of these extremes has a flaw. The Strict Energy Delivery requirement can be operationally burdensome and complex (particularly for intermittent generation), and risks balkanizing markets for generation attributes to a degree that raises the cost of renewables development. On the other hand, once you establish the eligible region under Geographic Eligibility, you are clearly omitting equally beneficial (from an environmental perspective) transactions that could be delivered from outside the geographic zone.

Between these extremes, we have therefore identified a number of alternatives. In certain circumstances, these approaches may deliver enhanced regional or global environmental advantages at a given cost, while not substantially compromising local benefits. We have also identified some of the challenges resulting from the transience of boundaries, which suggests moving away from "made-up" boundaries across which eligible generators are subjected to radically different delivery requirements.

Based on these considerations and our previous analysis, and ignoring the impact of policy coordination challenges (discussed in a subsequent section), Table 1 provides a summary of our recommendations. In particular, we identify preferred ways of accounting for cross-border attribute transactions, given different objectives and attribute demands. In completing this table we have considered primarily:

- 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 versus cost between strict and relaxed delivery;
- the tradeoff between the theoretical benefits and complexity of the benefits-driven approach.

We have not considered potential constraints resulting from Interstate Commerce Clause or NAFTA considerations. Such considerations, if binding, would presumably lead one away from narrower Geographic Eligibility approaches.

Table 1: Recommended Approaches to Attribute Import/Export Treatment

Situation:	Recommended Approach, Impacts Aligned with Environmental Objectives	Other Approaches Suitable for Environmental and Other Objectives	Might Achieve Some Objectives, but Poorly Targeted	Not Recommended, Fails to Meet Objectives
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	Super-Market Geographic Eligibility	Unconstrained Geographic Eligibility
RPS and Emission Performance Standards, Regional Objectives	Relaxed Energy Delivery with Wholesale or Retail Matching	Benefits-Driven Eligibility Strict Energy Delivery	Sub-Market Area Geographic Eligibility	Unconstrained Geographic Eligibility

Table 1: Recommended Approaches to Attribute Import/Export Treatment				
Situation:	**Recommended Approach, Impacts Aligned with Environmental Objectives**	**Other Approaches Suitable for Environmental and Other Objectives**	**Might Achieve Some Objectives, but Poorly Targeted**	**Not Recommended, Fails to Meet Objectives**
Objectives	Matching Super-Market Geographic Eligibility	(Wholesale or Retail) Market-Area Geographic Eligibility		
RPS and Emission Performance Standards, National or Global Objectives	Unconstrained Geographic Eligibility		All others	
Fuel Source Disclosure[34]	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	Super-Market Geographic Eligibility	Unconstrained Geographic Eligibility; Benefits-Driven Eligibility[35]
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	Super-Market Geographic Eligibility	Unconstrained Geographic Eligibility
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	Sub-Market Area Geographic Eligibility	Unconstrained Geographic Eligibility
Green Power Transaction (from REP or TRC), National/Global Objectives, no Fuel Source Disclosure	Unconstrained Geographic Eligibility		Super-Market Geographic Eligibility; All Others	

[34] We assume that comprehensive fuel source disclosure requires a nexus to retail sales in all cases.

[35] In the case of claims-based disclosure for claims based on benefits, this would become the recommended approach.

In general, it is clear that Unconstrained Geographic Eligibility at greater-than market area scope is the best approach for TRC-only transactions and financial compliance with national RPS requirements 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 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 least suited to any situation requiring local or regional benefits or a nexus to retail sales, however. For attribute demands that require a nexus to retail electricity sales, treatment of attribute imports and exports requires repercussions or displacement in the sink market, with the remaining design question simply being what degree of benefits are necessary and how best to achieve them. Therefore, where a nexus to retail sales is required, either Strict or Relaxed Energy Delivery should be preferred. This is the case for most state disclosure, EPS, and RPS requirements. The objectives of the individual policy will guide which of the Delivered Energy Eligibility approaches might be most suitable.

A number of other interesting observations can be drawn from the table above. These include:

- Under fuel source disclosure, we do not differentiate between local, regional and global objectives, because we assume the mandate is informational and simply requires a nexus to retail sales.
- In the absence of fuel source disclosure requirements, from the perspective of retail customers, there is little difference in the method of accounting for delivered or TRC-only green purchases.
- A number of alternatives are available that may be suitable for specific purposes in the absence of practical constraints. As we explore the limitations imposed by practical constraints, reference to this table will be of use in finding accounting approaches suitable to multiple policies or purposes.

Text Box 2.
Differential Impact of Eligibility Approaches on Renewable Resource Types

Stakeholders have pointed out that the choice to move away from Strict Delivered Energy Eligibility and towards Relaxed Delivered Energy Eligibility or Geographic Eligibility may be differentially advantageous to intermittent wind and solar over other renewable generation types (e.g. biomass, hydro, or geothermal). This may or may not be desirable. Wind power is, today, the most cost-effective renewable resource and is often a specific target of policy assistance. This may justify some recognition that approaches more beneficial to intermittent renewables may lead to more renewable generation per dollar spent. Nonetheless, regulators should be cognizant that their choices will skew the relative opportunities for base load and intermittent renewable technologies. Owners of these technologies that have commented on this report are acutely aware of this impact.

Text Box 3.
Export Eligibility: Addressing Green Washing, Sham Transactions and Gaming

As noted in Appendix A.4, rules for generation attribute requirements and attribute accounting systems have thus far paid little attention to addressing exports. However, without any restrictions on the ability to export attributes, some regulators responsible for disclosure or EPS requirements have expressed legitimate concerns that market participants could exploit gaps in their rules or the underlying accounting systems by engaging in sham transactions solely for the purpose of "green washing" a disclosure label or evading the intent of an EPS requirement. For example, large-scale swap transactions consisting of offsetting imports of desirable attributes and exports of less desirable attributes between market areas could be arranged (directly by a single entity or using third parties to disguise the intent). In doing so, a REP could make its resource mix appear far "cleaner" without anything actually happening. The undesirable attributes are pushed to a location where they may have no repercussions (for instance because there is no disclosure requirement or no retail choice).

Requirements for a compatible disclosure policy or compatible information system may be explicitly introduced to prevent or reduce such sham transactions. Such requirements (discussed further in the next chapter) are necessary for customers in the neighboring market to "see" not only that attributes from local generation are not present when exported, but also to see whether undesirable attributes have been returned.

Even compatible information systems and disclosure requirements may not mitigate concerns over sham transactions, however. First, if there are disclosure gaps present within the neighboring market area, such that undesirable attributes could be exported to where they will not be disclosed to retail customers, then there *might* be no such repercussions. Such gaps exist under at least three circumstances: (a) disclosure requirements are of the claims-based or claims or proxy variety; (b) there are pockets of customers who receive no source or emissions disclosure (e.g., customers of municipal utilities); and (c) there are retail choice gaps, where customers could not change their buying behavior despite being provided with evidence of a swap of desirable for undesirable generation sources.[36] Second, there are numerous large and small end-users that simply do not care what their disclosure label says, so even full disclosure does not provide repercussions necessary to inhibit such green washing.

What options are available to mitigate these concerns, short of establishing high fences that preclude legitimate, socially desirable transactions? We can start with the presumption that no one-way transfer of renewable energy attributes, or for that matter any generation source attributes that would have positive value, would by itself constitute a sham transaction. It is more difficult, but not impossible, to identify legitimate (non-sham) transactions for attributes that might be expected to have negative value from a disclosure or EPS perspective. For instance, export restrictions should not unduly restrict a multi-market REP from legitimately

[36] It is important to note that such gaps may also be present within the sink area, if there are regions such as municipal light plants with no attribute requirements and no retail choice, so this is not necessarily an issue limited to exports from a market area.

balancing its portfolio to meet obligations in multiple markets. Given these considerations, mitigation could be accomplished by:

- Starting with the presumption that any export of non-renewable attributes would be considered a sham and prohibited unless a non-sham purpose could be demonstrated to a market monitor. In effect, this approach requires an export permit for all but renewable attributes. Exports of anything else besides a blend representing the system mix would require a permit requiring a showing that the transaction is not a sham.

- Establishing a requirement that exported attributes from less desirable (non-renewable) resources must be sold and disclosed at retail to customers that have retail choice, as evidenced by an affidavit or other mechanism provided by the exporting entity to the accounting administrator. This would close any disclosure gaps, but could not address the presence of customers for whom price is the only consideration.

4.8 Other Practical Constraints

As we have seen, selection of an approach to treating cross-border attribute transactions depends on the nature of one's policy objectives: if the driving force is global environmental benefits, then placing very few limits on attribute eligibility may be economically advantageous. If, on the other hand, local environmental objectives drive a mandate, then local displacement would be required.

In practice, practical constraints make selecting the appropriate eligibility approach more complex for at least three reasons.

- Policy Coordination: The most important constraint is that of policy coordination: there may be multiple attribute policies operating *within* the same market area (e.g., an RPS, EPS, and fuel source disclosure), each with its own set of objectives and, potentially, different methods for accounting for imports and exports.

- Lack of Clarity on Objectives: In addition, a lack of precisely and singularly defined objectives confounds crisp application of the recommendations in the previous section. Both mandates and customer-driven purchases may be driven simultaneously by a mixture of local, regional, and global objectives. In addition, the specific objectives of attribute policies and markets are often not precisely defined in enabling legislation, leaving those responsible for implementing the accounting and verification protocols with little guidance on how to treat cross-border transactions. 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, subject to tradeoffs in credibility and cost as well as policy coordination constraints.

- Barriers to Renewable Energy Development**:** Renewable generators must be built where the resources are, and some regions are resource-poor. Market opportunities will dictate where renewable energy developers will seek to build their generators. 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 sufficiently high barriers and costs that they may hamper the ultimate goal of many of the policies: increased renewable generation.

A final practical constraint may be the perceived or actual administrative and systems costs associated with implementing an otherwise preferred approach.

Among these constraints, policy coordination challenges are particularly complex and these issues are therefore discussed at greater length below.

4.8.1 Policy Coordination

Different attribute requirements *within* a market area may have different objectives as well as perhaps different accounting and verification approaches. And yet, accounting and verifying imports or exports in multiple manners in the same region (e.g. for RPS versus disclosure) creates a serious risk of confusion, complexity, and double counting. Consider, for example, claims-based marketing of attributes from generators located outside of the market area (e.g. distinct energy-TRC transactions), which may not correspond with a market's source disclosure requirements. Similar challenges would arise if RPS standards relying on TRCs coexisted in a market with disclosure requirements using a contract-path-based accounting approach.

The resulting confusion, or intentional or inadvertent double counting or omission (in the case of green-washing), may undermine the credibility of the accounting and verification systems and therefore the market. Attribute buyers may be unable to ascertain whether they have clear rights to an attribute when more than one import or export accounting system is applicable. Such uncertainty undermines the marketability of attributes. Migration of attributes between market areas for RPS purposes beyond what is recognized for disclosure purposes creates the possibility that a REP could have more attributes than load, leading to a situation in which there is not a conservation of attributes. The resulting potential for inaccuracy may or may not be acceptable.

The presence of comprehensive source disclosure and/or EPS requirements 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 therefore limits the available import/export eligibility approaches that might be used for other attribute demands – e.g. purchase mandates or voluntary purchases driven by global concerns. In this instance, one cannot rely solely on the objectives of a single policy or renewable attribute purchaser to select an ideal approach to addressing attribute imports and exports.

There are two basic approaches for addressing these complexities. Neither of the alternatives is perfect for every situation, and each has its implications.

- Adopt Strictest Approach: The first option is to acknowledge the policy coordination constraints and restrict import treatment to a narrower interpretation than policy objectives alone would dictate. This implies adopting a most-limiting-common-denominator import eligibility approach (such as one of the energy delivery eligibility requirements) for use in all attribute requirements and demands in the market area. Consistency, simplicity, clarity, and

credibility are likely to be gained, but at higher cost to end-users (due to excluding potentially eligible low-cost renewable generation) and reduced market access for generators. A comprehensive certificates system, such as that implemented by NEPOOL for ISO-New England, was designed to support multiple policies in this manner.

- Mitigate Consequences: The second alternative involves utilizing a broader import eligibility rule consistent with the objectives of the policy or purchaser, while attempting to mitigate the negative consequences. To accomplish this implies a hybridized approach. For example, an RPS adopted (at least in part) to accomplish regional or global environmental benefits could allow compliance to be demonstrated via (a) attributes recognized under the primary accounting system used for source disclosure purposes with delivered energy eligibility for imports, but also (b) allowing a supplemental mode of TRC compliance subject to geographic eligibility rules. The TRCs would count towards RPS but not disclosure. This is a delicate balance. It requires that null energy be disclosed as something other than "renewable" in the source region. While this approach allows access to the lowest cost renewables to meet the RPS objectives, it may result in misleading source disclosure labels.[37]

[37] Customers might see some REPs with higher renewable percentages on the disclosure label than others, each resulting from RPS compliance activities. If RPS percentages are low, this may be of limited importance, but with substantial percentages customers may inappropriately impute different portfolio quality to these REPs unless RPS attributes are excluded from disclosure labels altogether.

5 Information System, Attribute Requirement, and Transaction Compatibility

Even when policymakers want to allow certain cross-border attribute transactions, the ability of a state to recognize those attributes may be contingent on the presence of a **compatible information system** in the source market area. Compatibility is about the technical issues of veracity and information exchange. A compatible information system can be thought of as an information system in the source (or any intervening) market area that is sufficiently compatible with the sink area's system to assuage potential concerns of the responsible regulators and market participants. The presence of compatible systems maintains credibility by eliminating most opportunities for the inadvertent or purposeful inaccuracy of information on cross-border attribute transactions. In addition, compatibility of information systems and disclosure requirements provides a defense against "green-washing" and sham transactions designed to shuffle undesirable attributes into a place where they will not be seen.

The concept of a compatible information system might be verbalized in terms of requirements on the accounting system itself, or in terms of minimally compatible or consistent disclosure requirements. Even in the absence of such a fully compatible information system, a given market area's accounting and verification system or regulatory rules may recognize certain cross-border attribute transactions provided that they meet the standards of **compatible transactions**.

In this chapter, we address the following questions:

- Why are we concerned with the compatibility of attribute accounting and verification information systems and attribute policy requirements? (Section 5.1)
- What standards are implied by the concept of compatibility? (Section 5.2)
- How do issues or concerns potentially addressed by information system or policy compatibility translate into criteria for evaluating whether such compatibility is present? (Section 5.3)
- What features would allow conceptually different information systems or attribute policies to be considered fully compatible or equivalent? (Section 5.4)
- When information systems or policy requirements are not fully compatible (or have not yet been formally declared to be compatible), under what conditions can a *transaction* be deemed compatible, or sufficiently consistent with the sink area's information system or policy requirements to be counted? (Section 5.5)
- Who should determine whether an accounting and verification system, requirement or transaction is compatible? (Section 5.6)

5.1 Why Are We Concerned with Compatibility?

The compatibility of attribute accounting and verification information systems is primarily of concern to regulators for purposes of generation attribute requirement eligibility, green market building, and consumer protection. Regulatory concerns include ensuring the veracity and uniqueness of generation source claims as well as avoiding the potential for evading the policy's intent through sham transactions, as discussed in the Text Box 3. The concerns may also extend

to other philosophical constraints discussed in earlier chapters – such as settlement period and the degree and nature of unbundling – geared towards assuring a level playing field for out-of-market generation and in-market generation. It is also of interest to policy-makers and the general populace to the extent that it influences the ability of society to achieve environmental benefits at lowest social cost. Finally, compatibility issues are central to the commercial interests of developers of renewable generation (as well as those interested in financing, marketing or trading these resources) because they help determine whether certain power plants are capable of fulfilling certain policy or market demands.

A number of regulators and accounting and verification administrators have included "compatible information systems," "compatible disclosure requirements," or similar concepts in law, regulation or market rules. A number of examples are highlighted in Table 2.

Table 2: Examples of Compatibility or Similar References in Attribute Accounting Requirements

Market Rule	Description
New York Environmental Disclosure (N.Y. P.S.C. 1998)	Imports would be assigned a regional fuel mix and average emissions rates unless the state of origin had a **compatible tracking and environmental disclosure system** (to be demonstrated to the satisfaction of the Administrator).
NESCAUM Emission Performance Standard Model Rule (NESCAUM 1999) (Massachusetts, Connecticut & New Jersey)	Electricity imported from an identified power pool shall be assigned emissions attributes consistent with the method… if the Department determines an **essentially equivalent generation information system** is in use for that power pool. Electricity imported from an identified power pool but for which the Department has determined that no essentially equivalent generation information system exists, shall be assigned default emission attributes equivalent to the weighted average emissions of the power pool of origin…
New England Power Pool Generation Information System (GIS) Operating Rules	The fields for emissions and fuel sources for Certificates associated with Energy imported into the Control Area from adjacent control areas, unless meeting a series of requirements of an External Unit Contract that allow for recognition as source-specific attributes, will reflect the average mix of the exporting control area. "At such time as a source control area for imported Energy implements a generation information system **that is compatible with the GIS,** as determined by the [NEPOOL Participants Committee] or its delegatee (a "**Compatible GIS**"), the NPC or its delegatee may amend this Rule… to address the creation of Certificates under this Rule…" (Rule 2.7 Imports, para. (b))
Maine - Eligible Resource Portfolio Requirement (65-407 Maine PUC - Chapter 311)	Energy used to satisfy the portfolio requirement must be physically delivered to the ISO-NE control area or the Maritimes control area. For purposes of this Chapter, a resource physically delivered to a control area **must be recognized pursuant to the rules of that control area as serving load obligations in New England** or otherwise used to serve electricity load within the ISO-NE or Maritimes control areas.

Table 2: Examples of Compatibility or Similar References in Attribute Accounting Requirements

Market Rule	Description
Maine - Disclosure Regulation (65-407 Maine PUC - Chapter 306)	Until adjacent regions develop **compatible disclosure policies**, a competitive electricity provider's total imports into the ISO-NE control area or the Maritimes control area to serve load in Maine shall be ascribed the fuel mix and emissions characteristics of the exporting system's mix.
New England - NECPUC Model Disclosure Rule[38]	Imports: Until adjacent regions develop **compatible disclosure policies**, a Load-serving Entity's total imports to New England will be listed as a separate fuel source as defined in Rule…For the purpose of determining emissions characteristics… imports shall be ascribed the characteristics of the exporting system's mix.
Ontario *proposed* attribute tracking system[39]	Power imported into Ontario claimed from specific generating facilities can be accounted for in the tracking system if the exporter can prove the origin of the power. Sufficient proof will likely require the verification of a **compatible tracking system** or a system operator.
Massachusetts Preliminary RPS Design Proposal (Massachusetts Division of Energy Resources, 2000) (concept was not carried over into the Final RPS Rules (225 CMR 14.00)	… a facility not physically located within and interconnected to the New England Control Area may be recognized only under the following conditions: • The control area at the physical location of the facility and all intervening control areas or power pools must have **compatible Generation Information System**. • If there is no compatible GIS at the physical location of the facility, then the bundled energy and attributes must be transmitted under a bilateral transaction to either ISO-New England or a neighboring region with a **compatible Generation Information System**. • The Attributes must be recognized as a part of the mix of resources associated with energy serving load in New England by the New England regional Generation Information System (GIS)….

In summary, these references, found in a number of adopted or draft regulations or market rules, range from a specific compatibility requirement spelled out to mean that the source accounting system must remove the attributes from association with load in the source area and associate them with load in the sink area; to requirements that the accounting system be "compatible" or "essentially equivalent"; to a requirement that the disclosure policies be "compatible." These references leave undefined, or poorly defined, what conditions would satisfy their requirements. The task of making such determinations has not been completed in any of these jurisdictions.

5.2 What Do These Concepts Mean?

Before applying these terms, we first attempt to define and clarify their meaning.

5.2.1 Equivalent

While the definition of "identical" is clear, the term "equivalent" leaves some room for subjective judgment. The Merriam-Webster's Collegiate Dictionary offers one relevant

[38] This rule was developed for use as the basis for disclosure rules within each state in the region. (NECPUC 1998)

[39] Source: 11/14/01 e-mail from Stephanie Prosen, Ontario Ministry of Energy, Science and Technology

definition of equivalent that guides our interpretation: *"(3) corresponding or virtually identical especially in effect or function."* Thus, the equivalence of an attribute accounting and verification information system should be judged more by whether it has the same effect and function as the sink area system than by its particular structure.

5.2.2 Essentially Equivalent

By qualifying "equivalent" with "essentially", the authors of the NESCAUM Model EPS Rule introduced some room for minor departure from true equivalence, in form, effect, or function. What constitutes acceptable departure from equivalence, however, is subjective.

5.2.3 Compatible

According to Merriam-Webster's Collegiate Dictionary, the term compatible has the following meanings that may guide this analysis: *"(1) capable of existing together in harmony <compatible theories>; and (5) designed to work with another device or system without modification; especially: being a computer designed to operate in the same manner and use the same software as another computer."* Definition #1 suggests that information systems or policy requirements would need to be harmonious, which suggests a lack of conflict in any fundamental manner or philosophy. Definition #5 suggests a more rigid and planned compatibility. It does not appear that in the case of accounting and verification information systems that the software would have to be the same among compatible systems, or operate on the same platform. Rather, as long as the type, format, nature, timing and aggregation of data from the source area system is usable by the sink area, and does not create any significant conflict, it would seem to meet the harmony requirement. As with two computers, if the software allows data to be exchanged seamlessly so that a computer can (without error) execute its function with the imported data, it would be deemed compatible. For a source area disclosure requirement to be compatible with that in a sink market area, it would therefore need to have a similar function and effect, and avoid any overt conflict. One stakeholder argued that compatibility would require a similar theoretical underpinning – for example both systems would have to rely on certificates or contract-path tracking. In any event, compatibility clearly does not require equivalence.

5.3 Criteria for Assessing Compatibility

The stakeholders interviewed for this report identified a variety of issues and concerns that might be addressed by information system or policy compatibility. In this section, we examine how these issues and concerns translate into criteria for evaluating whether such compatible or equivalent accounting systems or requirements are present. It is essential to remember that compatibility standards are comparative, not absolute. What is compatible with one system or policy may not be compatible with another.

The criteria for recognizing cross-border attribute transactions include, at a minimum, that the transaction and the unique claim to the attributes are verifiable. In addition, it seems clear that a distant generator should not be held to lower standards than those required of a local generator under a generation attribute requirement. These observations suggest that both technical and

policy factors come into play when assessing how attribute accounting systems or disclosure policies compare.

We have developed a list of potential criteria that might be considered by policymakers, regulators, and market participants in assessing the compatibility of different accounting systems and disclosure requirements. These criteria could apply to: (1) comprehensive accounting and verification systems for attributes, and (2) independent attribute registries established to fill a verification void; such an attribute registry might support a subset of the market (i.e. renewables) or a subset of those generators (i.e. an opt-in system). The criteria also might be applied in assessing the compatibility of disclosure policies. Any requirements for energy delivery or displacement are features of policy eligibility, not compatibility, and hence are not considered as a potential criterion. Our purpose here is to assess the scope of full compatibility between accounting systems or disclosure policies. If two information accounting systems are not deemed compatible for all purposes, however, that need not rule out the possibility that they may be compatible for a subset of transaction types. This issue is addressed further in Section 5.5.

5.3.1 Verification and Accuracy of Generation Quantity and Type

An absolutely essential requirement of compatibility is the ability for the source region and/or intervening regions to provide an assurance that (1) the type of generation resource is accurate, e.g. wood-fueled biomass, not MSW-fueled biomass, and (2) the quantity of energy claimed to be generated during a period of time is actually generated and delivered to the grid.[40] In any market area where there is a wholesale market, the ability to point to the meter data that forms the basis of settlements in the energy market should generally suffice. In a region without independent market settlements, independently audited meter data should still suffice. This basic requirement is unlikely to be controversial. Since, by virtue of declaring another system as compatible, one region may be vesting another region with authority to verify the information in its own region as accurate, a regulator or accounting system administrator may wish to consider whether sufficient sanctions are in place in the source region to discourage misrepresentations on par with whatever mechanisms are used locally. This may be important to the integrity of the system because once certificates or disclosure labels are issued, they may be difficult to retract.

5.3.2 Verifiability of Transfer of Title

In the presence of a Delivered Energy Eligibility requirement, a compatible system in the exporting market must be able to verify the transfer of title to attributes from its own system into another system. The source (or intervening) accounting system would also need to be able to verify the transfer of energy to the interface or border with the sink (or intervening) market area, as well as identify the entity holding title to energy and attributes at the source side of the border, whether the generator, an intermediary in the chain, or the REP.

[40] In some cases, special protocols may be developed to address off-grid generation or generation located behind the retail meter, should it be tracked through the source area information system and/or eligible under a particular policy requirement.

5.3.3 Uniqueness – No Double Counting

The most commonly mentioned criterion for compatibility is assurance of a unique claim to the attributes in question. This requirement is often verbalized as "avoiding double counting." The degree to which the source or intervening systems or policies can assure that no intentional or inadvertent double counting of the attributes has occurred, or that attributes have not been omitted, would need to be measured against the sink area approach. A few variations of this criterion are possible for characterizing the state of each market area's accounting system or policy, and for assessing their compatibility. These include:

- **No direct double counting or omission possible**: Exported attributes (bundled or unbundled) are uniquely retired from the source market area, in a manner in which they will not be *intentionall*y double counted or claimed by any REP within the market area or outside, or by any entity selling TRCs. Likewise, no attributes could be intentionally omitted. This should be mandatory for any conceivable system. For any system in which null energy is created through any degree of unbundling, title to such null energy cannot form the basis of an attribute claim. One aspect of this criterion is the ability to assure that the sum of attributes claimed does not exceed that generated in any particular time period. This would appear necessary to assure the credibility of any information system or policy. In any market area where an energy contract-path is used as a basis for property rights to attributes, it is critical that generators that wish to sell unbundled attributes into another market area opt-in fully to an attribute registry to avoid double counting loopholes.[41] While no direct double counting is allowed in this scenario, some indirect double counting could result from not removing renewable attributes sold elsewhere from a default system mix calculation.

- **No direct or indirect double counting possible**: This standard is one level stricter than the preceding variation. Attributes exported from the source area are removed from the source area accounting system entirely, including any system mix or residual system mix calculation used as a proxy for disclosure or other purposes. Such a standard would require that sales of attributes only (e.g. TRCs) be accounted for. This would be necessary to assure no possibility of double counting in any manner. Such a requirement may be necessary for equivalent systems should the sink system be this comprehensive. However, compatible systems may be able to get by with some minimal level of imprecision as under the "no direct double counting" criterion.

- **Certification of transfer of attributes to specific sink area**: This standard requires the source region's accounting system to not only remove exported attributes from the source region, but to also specifically designate exported attributes as associated with load in the specific sink region. Such a requirement would support verification of transfer of title to

[41] This means that if a generator receives TRCs for any generation during a period of time, then it must receive them for all generation during that period of time. If this does not occur, a generator may be able to claim the renewable energy attributes of a single MWh twice, once through the use of a TRC and another time with the use of a power sales contract. By requiring that generators opt-in fully, a purchaser from that generator will know that they have a right to make green power claims only if they purchase the generator's TRCs. This is the same conclusion derived by the Center for Resource Solutions (CRS 2001).

attributes into the sink market area. This would appear helpful, but not absolutely necessary, for preventing double-counting.

5.3.4 Highest Common Denominator Accounting Treatment

Whatever its own standards, fairness dictates that a market area should not give preferential accounting treatment to distant generation over local generation – a level playing field is necessary to avoid undue discrimination. This implies that source accounting systems or disclosure policies that provide greater flexibility to local generation would not automatically be deemed fully compatible with a sink market area system or requirement with less flexibility. The following accounting treatments fall into this category:

- **Degree of unbundling or disaggregation**: If, for example, no unbundling of TRCs from electricity is allowed in the sink area, then a source area accounting system that allows such unbundling might not be deemed fully compatible for all transactions. If a sink area allowed a broader degree of unbundling than the source area, the source area might be deemed compatible but not equivalent. Likewise, if a sink area's accounting system tracks whether or not emission reduction credits have been disaggregated and sold separately from other attributes and a source area's accounting system carries no such data, the systems may not be deemed compatible.

- **Settlement period**: A critical feature for comparing disclosure policies is the settlement period - the period over which load and generation are matched. If a disclosure policy uses Relaxed Delivered Energy Eligibility in the sink area, then a compatible disclosure requirement might dictate that the source settlement period be no broader than the sink settlement period. The settlement period itself is not as much of an issue for accounting and verification systems; rather the compatibility of such systems lies in their ability to track when generation occurred.

- **Time of generation specificity**: This compatibility test would be violated for both information systems and disclosure standards only if the sink area system did not allow attributes generated in one period to be moved to (or associated with load in) a later time period, while the source area system was incapable of providing information confirming that attributes were generated within the sink area's settlement period. For instance, if the sink area accounting system aggregates and tracks data monthly, then a source area accounting system that only tracked the calendar quarter in which energy was generated may not be compatible.

- **Plant specificity**: Similarly, if the sink area requirements dictate that data be tracked on a plant-specific basis, then any source area would need to be able to provide data in corresponding detail to be equivalent or fully compatible. In this case, a source area certifying that exported attributes were from "biomass" generation without plant-specific detail may not be deemed sufficient for use in the sink area. If the sink area's requirements were less specific than the source's, there would be little impediment to compatibility.

- **Losses**: Whatever the treatment of transmission losses in accounting for sink area generation, for a source area system to be considered compatible with that in the sink area it would need to be capable of providing sufficient information to calculate whatever adjustments were necessary so that generators exporting attributes from source to sink area get credit for a comparably loss-adjusted fraction of their generation as a generator within the sink area. For example, if the quantity of attributes associated with a generator in the sink area is calculated after loss-adjustment to the sink area's high-voltage transmission system, then a comparable loss adjustment to a common point may be necessary.[42] We believe the same standard would be sufficient to describe an essentially equivalent accounting and verification system.

5.3.5 Information Protocol Consistency

Accounting systems or requirements must be consistent in their technical information protocols if they are to provide necessary information for each other's use. If they do not use precisely the same information protocols, as long as they can deliver information in a different protocol than their standard format to meet the needs of the sink area, the systems might be deemed compatible and, perhaps, equivalent. There are several areas where information protocol commonality may come into play:

- **Common Data**: This refers to what information is tracked by the accounting system, or what is required by the disclosure policy. Without both systems capturing energy (MWh) generated as a function of time, for example, there is no hope for compatibility. Another data set of importance might be emissions data.

- **Common level of data resolution**: If the sink area system aggregates and reports energy data in units of MWh, as long as the source area reports in units of MWh or smaller, the systems would be both equivalent and compatible; if this were not the case, the sink area system could address any differences by rounding.

- **Terminology**: Information systems or disclosure requirements might have widely different definitions of generation type and eligibility. What is considered large hydro in one market might be generic hydroelectric in another. One market's wood waste plant might be sustainable biomass in another. As long as information is associated with attributes on a plant-specific basis, however, such terminology differences should not provide an impediment to equivalency or compatibility. Generators could simply register their characteristics using the sink-area terminology with the sink area accounting system or disclosure administrator.

- **Synchronous reporting**: If the sink area settlement for attributes closes in each quarter or each month for reporting purposes, an equivalent source (and any intervening) system or requirement would need to provide meter and transaction information on a similar basis. A

[42] What constitutes a common point may vary depending on the nature of the applicable import eligibility approach. Under a strict delivered energy regime, reducing the number of attributes for transmission losses into the sink system may be appropriate, while under a unrestricted geographic eligibility regime, it would not be reasonable to adjust for transmission losses from the generating source to the sink area.

compatible system or requirement would need to be capable of providing information on the sink area's schedule, even if it did not rely on the same reporting period itself. This requirement could prove a serious impediment to compatibility; however, it does not mean that data are not available through alternative means subject to subsequent confirmation. This is one justification for the compatible transaction discussion in Section 5.5.

5.4 Defining Compatible Information Systems and Disclosure Requirements

In Table 3 the proposed criteria introduced in the previous section are applied in an attempt to define the elements of fully compatible accounting and verification system. In addition, although it is a fundamentally different question, we have also attempted to define the characteristics of compatible disclosure requirements referenced in the NESCAUM EPS Model Rule.

In this table, compatibility is evaluated from the perspective of the sink area system. However, only general conclusions can be drawn in the abstract without identifying the specifics of the sink area regulation or accounting system against which another is being tested. The ability to draw more precise conclusions would depend on the characteristics of the sink area disclosure system – for instance, claims-based versus comprehensive uniform disclosure – and the sink area's accounting system design parameters.

Based on this attempt to align standards of compatible accounting and verification systems and compatible disclosure requirements with the criteria defined in Section 5.3, we can draw the following conclusions.

5.4.1 Compatible Accounting and Verification Systems

Regardless of the accounting method chosen, meeting the standard of a fully compatible accounting and verification system requires that the source area system at a minimum 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;
- that there has been no direct double counting of the attributes, and that the potential for indirect double counting is no greater than that possible in the sink area;
- that 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 that of the sink system;
- that, in the case of a Delivered Energy Eligibility requirement, the source system is capable of verifying the transfer of title of both energy and attributes at the market areas interface from a particular market participant to the sink area (in other words, assuring that the attribute has left the source system). However, we do not conclude that a source area must be capable of certifying to which *specific* sink area the title to attributes have been, although that would be helpful.

Table 3: Compatible Information Systems or Disclosure Requirements		
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

If the sink area requires data on the emissions characteristics of the generator, and the source area accounting and verification system tracks the fuel/technology type but does not track, provide, or require emissions data, this alone should not make the accounting systems incompatible. Instead, as long as title to the aggregated package of attributes and the associated quantity of production is established, it is straightforward to cross-reference with an acceptable source of emissions data.

Different treatment of losses is also not a major hindrance to compatibility, as long as data are available through some means to adjust source area data for the electrical loss treatment appropriate to the sink area system requirements. Neither does the use of different data resolution (different units of measure) preclude system compatibility. If the source system does

not use as small a unit of measure as the sink system, rounding should suffice in most cases, except when numbers are very small (e.g. solar PV production). Use of the same terminology to describe resource types is also not necessary for system compatibility. As long as data are maintained that associate attributes with specific generation units (e.g., generation ID numbers), the specific eligibility or categorization of that unit in the sink area can be determined independently of the source area terminology.

Finally, it is unclear whether accounting and verification compatibility would require a similar degree of enforceability of market rules. While the sink area may still require that the source area have similar enforcement rules for policy purposes, this does not appear critical on technical grounds.

5.4.2 Equivalent Accounting and Verification Systems

As noted in Section 5.2, equivalence represents a higher standard than compatibility. In considering our criteria, however, we are only able to draw minor distinctions between accounting and verification system equivalency and compatibility. While one might argue that a truly equivalent system might require an identical settlement period and treatment of electrical losses, it would seem that having a shorter settlement period or a system capable of converting to the loss treatment of the sink area would suffice to meet NESCAUM's *essentially equivalent* standard as long as a source area equivalent system tracks at least the level of detail of data tracked by the sink area system. Finally, the level of data resolution and synchronous reporting periods in the source area would also need to meet, or be more detailed or frequent, than that required in the sink area. We note that an "essentially" equivalent accounting and verification system would entail a subjective loosening of the "equivalent" standard, and we have not attempted to evaluate the looser standard independently here.

5.4.3 Compatible Disclosure Requirements

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 areas' 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 of attributes – the next most important objective appears to be foreclosing the potential for market participants to hide undesirable attributes by moving them to where they would not be seen. Neither of these purposes would appear to require similar limitations on the unbundling of attributes from energy. 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 characteristics) nor a common reporting period need be the same, as long as the data are available from a combination of verifiable sources to adjust to the sink area disclosure format.

5.5 Compatible Transactions Without a Fully Compatible System

If a fully compatible information system or disclosure policy is required by a sink area market to recognize an import, but is not in place in a source area, most stakeholders interviewed for this project still supported the recognition of certain types of transactions if they met appropriate standards for veracity and credibility and had repercussions consistent with sink area policy objectives. We will refer to such transactions as *compatible transactions*.

There are many circumstances under which a compatible or equivalent information system or disclosure policy may not be in place in the source area, including when the 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 or equivalency due to some lacking feature.

A new merchant plant built just outside of a market area with generation sold under a bilateral transaction to the sink market is one example of a transaction that may merit a path by which it could sell its attributes even absent a fully compatible or equivalent information system or disclosure policy.

As another example, consider a system or policy that is otherwise compatible or equivalent, but the source area independent verifier does not issue reports/independent verification until after the sink area administrator has closed its books on a settlement period. In such an instance, it might be reasonable and sufficient to allow the sink area REP to provide:

1. documentation of actual generation delivered into the source area grid,
2. documentation of a matching energy transaction (if required) scheduled over the interface during the appropriate settlement period and with transmission secured (if required),
3. a supporting affidavit affirming that:
   a. an independent system exists that verifies the uniqueness of this type of transaction (referencing specific statutes) and that will at a later date certify that attributes have been removed from the source area mix and have been associated with the sink area mix, and
   b. data has or will be submitted to this verifying entity consistent with their rules, such that the sink area certification/verification has every reason to expect subsequent verification from the source area.

Stakeholders interviewed for this project had a variety of views as to what might constitute a compatible transaction. Based on these views and our own analysis, a compatible transaction for generation attributes from one market area to another would seem to need (at a minimum) to meet the following criteria:

- Verification of generation: The generator and/or REP would need to verify that the generation has occurred, which can be accomplished for example through meter data provided to, by, or through control area operators.

- Verification of title to the attributes: The REP must be able to document its claim to title to the attributes. There may be a variety of methods to accomplish this, including contractual evidence, audit, report from an attribute registry (see more below), use of a "unit contract," affidavit, or citation of a regulatory or other independent process that will (in time) verify such title (as described in the first example above).

- No double counting – verification of a unique claim to attributes: The REP must provide evidence that no intentional or inadvertent double counting of the attributes has occurred or can reasonably occur in the source market area or otherwise, and (if there is any degree of unbundling occurring) that the commodity is not being sold as differentiated energy. An accounting of all production from a generator in an independent attribute registry (such as a TRC registry) may be the most effective way to assure no direct double counting. As long as any buyer, regulator, or anyone else wishing to verify the unique use and sale of the attributes was able to determine that the generator was registered, and the registry required registration of all of a generator's production,[43] the only way to claim generation from that source would be to possess the associated TRCs or associated balance in a registry account; energy-only transactions would not come with any property rights to attributes. Verification might also be accomplished in lieu of a registry through supply contracts and affidavits from the generator, under certain circumstances. Depending on the policy objectives, the sink area administrator may or may not apply the stricter "no indirect or diffuse double counting" criterion.

- Required repercussions: If the sink-area mandate or market for renewable energy required a degree of displacement of generation in the sink area, then a commensurate cross-border flow of energy would be required. How relaxed or strict the allowable energy delivery could be would depend on the objectives and details of the sink area policies.

- Highest common denominator treatment: The transaction structure would need to meet or exceed the transaction requirements applied to sink market generators, such as:
  - The matching of load to generation over the sink area settlement period standard.
  - Treatment of transmission losses so that distant generators are not given favorable treatment.
  - If no unbundling is allowed in the sink area, none would be allowed from source area generation. If a sink area allowed a degree of unbundling, as long as the transaction represented a similar or lesser degree of unbundling (even if the source market might allow a more complete unbundling), the transaction would be compatible. Such a transaction should, however, also respect the required repercussions as described above.

[43] For example, TRCs would be created for all generation from that source.

Clearly, demonstrating a compatible transaction under this case-by-case process requires that a high level of effort be expended. This substantial burden of proof, and the associated costs and effort, would fall mainly on the project proponent. While less than ideal, recognition of compatible transactions may allow renewable generation development to proceed in the absence of fully compatible accounting and verification systems under a set of circumstances that provide sufficient credibility.

5.6 Who Decides if a System, Requirement or Transaction is Compatible?

In the case of a regulatory requirement, such as an RPS standard or disclosure requirement, the authority to determine compatibility rests with the responsible regulatory agency. In other cases, the sink market area could maintain a review committee composed of market participants, local consumer protection and environmental advocates, and regulators that could determine the compatibility of accounting systems. Such a committee could also offer timely review of proposed compatible transaction structures on a case-by-case basis, with approval setting precedent (to be automatically adopted into market rules) for subsequent transactions with equivalent form and supporting documentation. Such a committee could be responsible for maintaining guidelines for compatible transactions and verification requirements. It might also serve the function of evaluating and certifying an independent registry for providing acceptable independent verification and assurance of unique attribute creation, use and sale.

6 Conclusion and Recommendations

Interest in transactions of attributes from specific (usually renewable) electricity generation types is being increasingly driven by mandates and consumer demands. The prospect for meeting these demands at lower cost, or increasing the environmental benefit achieved per dollar spent, is likely to cause an attribute buyer to look beyond the local market area for 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 will demand assurances that purchases are credible and achieve their objectives.

For these reasons, in this report we have attempted to bring some definition to the issues associated with transacting generation attributes across market area boundaries. We have also attempted to bring definition to "compatibility" requirements that might be placed upon neighboring market areas by local regulators or market area accounting and verification system administrators.

6.1 Approaches to Addressing Imports and Exports

In Chapter 3 we identified and defined the range of discrete options for treating cross-border attribute eligibility. Each of these approaches can be used by accounting systems and regulators to define eligible resources and the types of cross-border transactions that they will recognize. The approaches include:

- **Geographic eligibility,** with variations – unconstrained, super-market area, market area, or sub-market area - defined with respect to the scale of the eligible region.
- **Benefits-driven eligibility**.
- **Delivered energy eligibility**, with variations distinguished by who can arrange the required cross-border energy transaction, as well as over what period the quantities of energy and attributes moved across a border must match. The possible variations include strict delivered energy eligibility with retail matching, relaxed delivered energy eligibility with retail matching, strict delivered energy eligibility with wholesale matching, and relaxed delivered energy eligibility with wholesale matching.

Then, in Chapter 4 we assessed the effectiveness of each of these alternatives, and concluded that there is no single, optimal solution in all cases. Instead, the objectives of the policy mandate or the transaction drive the ideal approach. Because of the range of potential objectives and tradeoffs involved, there may also be more than one option that would suffice in any given circumstance. We have therefore identified the range of potential alternatives that would align with the objectives underlying the attribute transactions in question, and recommended the best approaches for specific circumstances.

Practical constraints are frequently present, however, and confound the simple application of these recommendations. The most common constraints include the presence of multiple attribute policies operating within the same market area and the lack of precisely and singularly defined objectives. If policymakers are driven by different policy objectives, then they might identify

different treatments of imports and exports as being reasonable. Individually, this approach may seem reasonable. However, when layered together, the results could be an irreconcilable morass that hinders compatibility, limits liquidity of markets, and shrinks the scope of the market for specific generators. We therefore suggested approaches to addressing attribute import and export eligibility as well as accounting and verification in the presence of practical constraints.

6.2 Information System, Attribute Requirement, and Transaction Compatibility

When generator eligibility beyond a market area is consistent with a mandate's objectives, several attribute laws or market rules have declared that recognizing such generators' attributes may be contingent on the presence of a compatible or equivalent information system, or the presence of compatible disclosure requirements. While the reasoning is clear, these concepts have yet to be defined in any jurisdiction where they have been used or suggested.

In Chapter 5 we defined a series of criteria that pertain to the compatibility or equivalence of accounting and verification systems or disclosure standards. Using these criteria, we have attempted to define those characteristics that are required of compatible attribute accounting and verification systems, equivalent attribute accounting and verification systems, and compatible disclosure requirements.

We also identified situations in which accounting and verification systems or disclosure requirements may not yet be deemed fully compatible or equivalent, but in which recognition of specific attribute transactions may still be socially desirable. We introduced and defined the concept of a "compatible transaction", and we described the conditions under which such a transaction might be recognized in lieu of full systems compatibility.

6.3 Transition Issues

The conclusions that we have offered in this report represent an end-state that differs from the state of most markets today. We leave the reader with the following thoughts on the impact of decisions or actions that can be taken as markets evolve.

6.3.1 The Need for Clarity

Before or until the establishment of approved compatible information systems, market participants are clamoring for clarification. The current state of many attribute markets is fraught with uncertainty. Many market drivers are already in place, but project development cycles require lead-time, and developers require clarity of market rules to attract the financing necessary to build new renewable projects. To a local generator, its market revenues may be heavily dependent upon whether it must compete only against other local sources or against generators from far away. Likewise, to a developer looking to build a plant where renewable resources are ample but across a market area boundary from a particular mandate, uncertainty about market access will cloud its financial viability.

Unclear eligibility will therefore undermine progress in building environmentally preferable generation despite the presence of supportive mandates or consumer demands for green power. For these reasons, we urge those drafting laws, regulations, and market rules to help create an environment in which financing can occur by sending clear signals on intent and direction, even if some issues remain to be solved in the future.

6.3.2 The Role of Compatible Transactions

To date, the concept of compatibility or equivalency for recognizing cross-border attribute transactions has been put forth in several markets, but little progress has been made in applying the concepts. Stakeholders interviewed for this report have identified numerous challenges with developing markets for and complying with mandates for generation attributes. We recommend that, in the absence of information systems or disclosure requirements being declared fully compatible, market area accounting and verification administrators and regulators consider allowing attribute transactions that provide desired benefits to proceed under limited circumstances. By relying on compatible transactions (where feasible) as we have defined them, with high common denominator standards of evidence, administrators and regulators can be assured that their objectives will be met and credibility will not be undermined.

We note, however, that compatible transactions may be difficult to execute without the presence of an independent attribute registry. For this reason, we encourage those that might provide such a service to proceed, with an eye towards meeting the criteria identified in this report.

6.3.3 The Double-Edged Sword of Flexibility

Flexibility is desirable in an immature market. Its benefits include providing leeway to see how markets develop, while not stifling creativity and cost-effective means to achieve desired benefits. Too much flexibility with respect to eligibility, however, is dangerous from the perspective of generators and those who may finance them. If it looks like once a generator is financed on one basis, the rules might change, then that flexibility looks like regulatory risk and will undermine progress towards underlying objectives. For this reason, we urge those creating market rules to carefully balance the objectives of certainty and clarity on the one hand with flexibility on the other, considering the implications of these decisions on creating viable markets for new renewable generation.

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Gilles Favreau, Hydro Quebec, March 9, 2001.

Appendix A. Import and Export Treatment: Northeastern U.S. and Canada Markets

Experience from several specific market areas, including New York, the PJM Power Pool, the New England Power Pool, and Ontario can be used to illustrate concepts introduced in this report. Stakeholders in these market areas are currently engaged in various degrees of competitive market activity driven by wholesale and retail competition, and are establishing rules for and complying with disclosure, RPS, and/or EPS requirements. As a result, there is substantial ongoing or planned interchange of renewable energy attributes between these markets. Transactions between these market areas and neighboring regions that have evolved more slowly are also instructive. For example, if accounting systems so allow, Quebec might serve as a source for renewables in the U.S., and Ohio's competitive market might be a sink for renewables generated elsewhere.

An understanding of market characteristics is necessary to understand the issues involved with cross-border attribute transactions. Therefore, for each of the featured markets, we have summarized relevant characteristics including the current and expected basic market structure, drivers for renewable attribute supply and demand, the market's accounting and verification protocol and status, and the manner in which imports and exports are currently addressed.

A.1. Market Structure

Table 4 describes the salient characteristics of market structure present or pending in each of the illustrative market areas. These include:

- Competitive Retail Markets: The presence of competitive retail markets is critical to both the demand for renewable resources within those markets, and the potential repercussions for export of renewable attributes from those markets. Competitive retail markets dominate all of the markets examined, although Vermont, a few New Hampshire utilities, and most municipal utilities and some rural electric cooperatives continue in the integrated monopoly mode. Two issues raised by stakeholders in several of these market areas are: (1) whether renewables whose full costs are included in the retail rates of captive monopoly customer are being "double sold" if the attributes are sold into another state or market area to meet attribute demand, and (2) whether reciprocal access of out-of-market renewables to retail markets is necessary to create a level playing field. These arguments might apply to monopoly territories within the market area (such as municipal utilities or Vermont IOUs), or beyond (such as Quebec).

- Competitive Wholesale Markets and Open Transmission Access: The presence of competitive transmission service and wholesale spot energy and ancillary services markets dictate the ability of competitive entrants to effectively manage a retail load-serving power supply into which they could incorporate renewable attributes. Each illustrative market has or will soon establish the common elements of functionally competitive wholesale markets. Note that the Ohio market, bordering on PJM, is unique in having a competitive retail market without a corresponding competitive wholesale market.

- Generation Divestiture and the Role of Incumbent Distribution Utilities in Retail Markets: The degree to which incumbent distribution companies own generation or act as a retail merchant is also noted. Stakeholders have observed that the degree to which retail suppliers own environmentally less-desirable fossil or nuclear generation plants may influence the potential likelihood of "greenwashing" – e.g. owners of coal or nuclear generation buying unbundled renewable attributes to sell these resources as "green" – and therefore the degree to which regulators and other stakeholders may perceive market rules that allow various degrees of unbundling as consistent or compatible.[44]

- Geography versus Jurisdiction: As can be seen from the table, market areas may span multiple political jurisdictions. The degree to which the market area coincides geographically with jurisdictional boundaries, and the uniformity of retail competition and its associated market rules across a jurisdiction, will influence both the nature of the boundaries experienced and the development of deeper and more liquid markets for renewable generation attributes. The presence of pockets within a market area that are exempt from some of these market rules presents a challenge to the creation of comprehensive accounting systems capable of reliable transaction verification.

- Evolution: As noted in Section 2.6.3, seams exist today between these market areas, which result in barriers to renewable energy transactions, such as out-wheeling charges, transmission pancaking, or operational and scheduling hurdles for small, intermittent or distributed generation. Many aspects of market structure will continue to evolve as FERC pushes NY, NE and PJM towards broader regional markets.

[44] Such green-washing would not be an issue in markets where the generators generally are wholesale-only entities. For example, the New York environmental disclosure administrator has expressed concern that New England-style unbundling may not be compatible with its *conversion transaction* structure. However, if all generators were to sell into the New England wholesale spot market, or if retail load serving entities were required to retain attributes for owned generation not expressly sold under bilateral arrangements, the systems would be nearly identical. The fact that in New England most utilities have divested generation and do not play a merchant role means that today and in the near future, suppliers of retail load typically own or control very few generation resources.

Table 4: Market Structure					
Market Area	**Competitive retail market**	**Independent system operation**	**Competitive commodity market**	**Generation divestiture by DISCo**	**DISCo retail merchant?**
New York	Yes except Long Island[45]	NYISO	NYISO	Some	Affiliate
Pennsylvania	Yes	PJM	PJM	Some, not required	Affiliate
New Jersey	Yes	PJM	PJM	Some, not required	Affiliate
Maryland	Yes[45]	PJM	PJM	Some	Affiliate
Delaware	Yes[45]	PJM	PJM	No	Yes
D.C.	Yes	PJM	PJM	Yes	Affiliate
Massachusetts	Yes	ISO-NE	NEPOOL	Yes	No
Connecticut	Yes	ISO-NE	NEPOOL	Yes	Affiliate
Rhode Island	Yes	ISO-NE	NEPOOL	Yes	No
New Hampshire	Pending in most of state	ISO-NE	NEPOOL	Most, soon	Affiliate
Maine	Yes	ISO-NE	NEPOOL	Yes	Affiliate[46]
Vermont	No	ISO-NE	NEPOOL	No	Monopoly
Ontario	Yes	IMO	IMO	Some, pending	Yes

A.2. Drivers for Supply and Demand of Renewable Attributes

Table 5 describes the factors that drive supply and demand for renewable energy attributes in each of the illustrative market areas. These factors drive both the price for renewable attributes and the price differential between renewables and commodity energy. They include:

- Supply versus Demand: The presence or absence of renewable energy supply (existing or potential) in a market area, combined with the relative presence or absence of mandates or viable markets for driving renewable energy demand, strongly influences the probability that a market area will be a source or sink for renewable generation from another market area. Table 5 characterizes the nature of the supply and demand drivers for each illustrative market area. Source and emissions disclosure rules as well as RPS and EPS requirements can all drive the demand for renewable resources.

[45] Phased in by utility territory.

[46] Affiliate market shares are capped.

The combination of available or potential supply and demand suggests that some market areas may be natural importers, such as most of PJM and Ohio. Other market areas are natural exporters. For example, New York is adding new renewable generation despite the only recent emergence of retail marketing of renewables within the state to date. Quebec and some states within otherwise resource-limited market areas (e.g., Pennsylvania and Maine) are also natural exporters. New England might be a natural exporter of existing renewables, but a natural importer of new renewables.

Another factor is liquidity. A single state market may rely on just a few generators, especially if the qualifying attributes are just new renewables. Market areas or regions of eligibility covering many states allow all states in a region to share the regional supply. This stabilizes prices and encourages development where development is most competitive.

- Viability of Retail Markets: Viable competitive retail markets may be necessary for retail renewable energy marketing activity to play a significant role in driving renewable energy demand. Retail market viability is determined by market rules. Perhaps the strongest determinate has been the price set for provider of last resort (POLR) service (the back-out from distribution company rates for taking generation service from another party). If POLR rates are set near or below wholesale electricity prices, it is nearly impossible for a market to gain a foothold. Except in California, where subsidies distorted market prices, we have observed that the presence of price-based competition significantly enhances the prospects for renewable-based market offerings. This explains the lack of significant "green marketing" activity is most states. To date, the Pennsylvania retail market has proven the most viable for retail competition, and has driven demand for renewable energy accordingly. In many states, POLR rates are held low on a temporary, transitional basis (e.g. MA, RI, CT, NJ, MD). As these protections expire, additional competitive opportunities should arise in those states.

Table 5: Drivers for Supply and Demand of Renewable Generation Attributes					
Market Area	**Renewable supply Existing, Potential**[47]	**Source Disclosure Rules**	**Purchase Mandates**	**EPS**	**Retail Market Viability**
New York	M, H	*Known or proxy* with conversion transaction	State facilities	No	POLR pricing limits switches to some DISCos & customer classes
Pennsylvania	L, M	Report to customers upon request, no defined protocol	Default provider	No	POLR pricing allows switches for R, C&I
New Jersey	VL, VL	*Interim rules - known or proxy*	RPS	Maybe [48]	POLR pricing obstacle Few switches
Maryland	VL, L	Interim rules pending regional system; *known or proxy*	State facilities	No	POLR pricing limits switches to some DISCos & customer classes
Delaware	N, VL	Required Approach not specified	No	No	POLR pricing limits switches to C&I
D.C.	N, VL	No	No	No	POLR pricing obstacle Few switches
Massachusetts	M, M	*Known or proxy*[49]	RPS	Yes	POLR pricing obstacle; limited competition for default service customers
Connecticut	L, L	Being developed	RPS	Yes	POLR pricing obstacle; Few switches; Some green mktg.
Rhode Island	L, L	Interim claims documentation requirement; will adopt *Known or proxy*	No	No	POLR pricing obstacle Few switches
New Hampshire	M, M	Discussed but not yet implemented	No	No	POLR pricing limits switches
Maine	H, H	*known or proxy*	RPS	No	POLR pricing limits switches to C&I
Vermont	M, M	No	No	No	Market not open
Ontario	H, H	Proposed *claims or proxy*	No	No	Market just opening

[47] N = Negligible; VL = Very low; L = Limited; M = Moderate; H = High

[48] NJ can impose an EPS if (a) states representing at least 40% of PJM customers do so or (b) an EPS is deemed necessary to attain an ambient air quality standard.

A.3. Accounting and Verification of Generation Attribute Transactions

Effective accounting and verification systems for generation attributes should ideally cover an entire market area, at the very least. Stakeholders in the market areas identified above are in various stages of establishing a generation accounting and verification infrastructure matching the market area in scope. The degree to which unbundling of generation attributes from energy transactions (with or without an independent secondary market) is supported by market rules influences the ease and cost of transacting renewable attributes. But as disclosure rules approach the comprehensive uniform end of the spectrum, the ability to introduce unbundled attributes from generation not captured within the accounting system is severely hampered (at least for retail suppliers subject to disclosure requirements).

Below we summarize the current or proposed approach to transacting, accounting for, and verifying attribute transactions, the development status of the generation accounting and verification system, and the evolutionary trajectory (where the structure is in transition) for each illustrative market:

New York has established a system though its environmental disclosure rules (New York Public Service Commission, 1998) that requires a contract path for energy to establish title to attributes, but has also created a limited alternate method for transacting attributes called a "conversion transaction." Under a conversion transaction, a generator selling energy into the spot market may sell the attributes associated with that energy to an entity that is purchasing an equivalent amount of energy during a calendar quarter from the spot market. Conversion transactions must be reported to the NY Department of Public Service's Environmental Disclosure Administrator. The conversion transaction does not establish a distinct secondary market for unbundled attributes, and unbundled TRCs not meeting conversion transaction requirements would not be recognized.

Within **PJM**, developments are at an earlier stage than in New York. New Jersey and Maryland have established similar interim disclosure standards, initially requiring a contract path tracking of PJM energy settlements with no verification mechanism available beyond a Certified Public Accountant (CPA) audit. New Jersey's Environmental Information Disclosure rules will be phased in, starting with electricity suppliers providing their own disclosure information and relying on PJM ISO generation and load data to verify disclosure labels subject to CPA audit. Ultimately, a Program Administrator (to be established by the BPU) will run a full tracking system, which at present does not appear likely to allow a comprehensive unbundling of attributes. In addition, New Jersey has issued interim rules for its Renewables Portfolio Standard[50] that requires documentation and verification, subject to audit, of (bundled) energy deliveries to a retail supplier from generation that has flowed into PJM or the New York ISO control area. However, the NJ BPU envisions the future development of a renewable energy-trading program and would allow electric power suppliers to satisfy their RPS using a TRC system, if approved by the Board. The Mid-Atlantic states and market participants are exploring with PJM the development of an accounting and verification system to support these rules. New Jersey and Maryland thus appear committed to developing a PJM-wide system that could verify

[50] SUBCHAPTER 8, N.J.A.C. 14:4-8.

claims throughout the market area.[51] While there is no timetable yet for establishing such a system and its likely features are just beginning to take shape, some parties interviewed believe the ultimate PJM system might closely resemble New York's approach, and allow a limited degree of unbundling via the spot market, while others expect the ultimate approach to resemble New England's system, described below.

Most **New England** states have established (MA, ME) or plan to establish (RI, NH, CT) disclosure rules, several states (MA, ME, CT) have RPS requirement, and two (MA, CT) will have EPS requirements in the future. Though most of these existing rules do not explicitly allow for attribute unbundling, state regulators (through the New England Coalition of Public Utilities Commissioners (NECPUC) have worked together with NEPOOL participants and ISO-New England to establish a new full certificates system that will support all disclosure, RPS, and EPS rules in the region. This NEPOOL Generation Information System (GIS) became operational in 2002, allows for the unbundling of attributes from energy for *all* generators, and creates a distinct secondary market within New England for these attributes.

In **Ontario**, the Ministry of Energy, Science & Technology (MEST) is responsible for providing independent oversight of the environmental disclosure label, and implementing a system to account for and verify disclosure label content. To support disclosure requirements, a centralized database is envisioned to be maintained by the Independent Market Operator, completely independent of the systems used for wholesale and retail settlement. As in New York, a single administrative authority would be responsible for the creation of disclosure labels. MEST's conceptual design[52] for a tracking system would work with the wholesale settlement system, but rather than taking a comprehensive approach, would focus on entities offering products at retail differentiated by their source characteristics. The resulting system would allow retailers to self-report differentiated transactions. MEST plans to collect data from retailers, and perform balance checks to assure that information reported against specific plants is not greater than what is produced by those plants in a given period. The system would allow unbundling of energy and attribute transactions as long as that power can be attributed to a specific generating source, and is verified by the tracking system to be sold only once.

A.4. Treatment of Import and Export Attribute Transactions

The emphasis given to date to imports or exports in designing accounting protocols and market rules is influenced by whether a market area could be a significant net importer or exporter, and the relative scale of net imports or exports as a percentage of total load or generation within a market area. Addressing imports is clearly more critical for a net importing market, while the converse is true for a net exporting market area. However, present conditions can change. For example, New York has historically been an exporter to New England, but more rapid generation expansion in New England may cause this condition to reverse. Additionally, while imports or exports may represent a small percentage of total market load, they may still represent the

[51] Maryland in its Order 76241 required its environmental disclosure working group to coordinate with other states in the region to promote a single regional approach to fuel mix and emissions disclosures.

[52] The conceptual design has not yet received approval from the Minister of Energy, Science and Technology.

majority of transactions of an individual market participant. These observations suggest that it will generally be short sighted for accounting protocols to ignore either imports or exports.

Within the illustrative market areas, market rules for disclosure, RPS, and EPS, as well as accounting and verification systems being established to support them, have addressed geographic eligibility and cross-border transactions by either: (1) clearly identifying the treatment, (2) adopting interim approaches pending other developments (such as establishment of a verification system or recognition of an accounting system as sufficiently compatible), or (3) remaining silent on the issue.

In **New York**, the environmental disclosure administrator would assign to imports a regional fuel mix and average emissions rate, unless the state of origin had a compatible tracking and environmental disclosure system (discussed further in Chapter 5). The administrator will certify exports consisting of either bilateral (bundled) energy transactions, or conversion transaction re-bundled with an equivalent quantity of energy during a calendar quarter.

In **PJM**, an accounting and verification system has not yet been established. However, New Jersey's Interim RPS rules allow any energy delivered to PJM or NY to qualify, while explicitly excluding from Class II eligibility any resource that is located where retail competition is not permitted. The rule also excludes resource recovery facilities outside New Jersey that do not meet "the highest environmental standards." New Jersey's Environmental Information Disclosure rules attribute unit-specific characteristics to imports if the electricity supplier has filed with the Program Administrator documentation showing that there was a contract for energy from a specific unit, that the unit operated, that the electricity was transmitted to PJM, and that the generating company has not sold the electricity to any other party. The rules envision that the Program Administrator will identify and subtract exports from the calculated residual mix. The Maryland Environmental Information Disclosure Rules effectively mirror New Jersey's treatment, but rely on the Maryland Public Service Commission to carry out the accounting and verification tasks. In sum, while there appears to be no explicit mechanism to track exports to verify them to the importing system's satisfaction, there may (in principle) be an entity that has the necessary information on exports to be positioned to provide such verification.

In **New England**, market rules address imports and exports in a variety of ways:

- The Massachusetts Renewable Energy Portfolio Standard rules[53] allow imports to be eligible under ISO-New England's external transaction unit contracts, effectively requiring bilateral energy transactions with a demonstrated transmission path across the New England border.
- In contrast, the Massachusetts Information Disclosure Requirements (220 CMR 11.06) effectively bar imports from outside New England by requiring energy associated with imports to New England to be called "imports" for the purposes of disclosing fuel mix. The rules are completely silent on the issue of exports.
- The Maine disclosure rules[54] address imports by requiring that, until adjacent regions develop compatible disclosure policies, imports into the ISO-NE control area or the

[53] 225 CMR 14.00 – RENEWABLE ENERGY PORTFOLIO STANDARD

[54] Chapter 306 – Uniform Information Disclosure and Information Filing Requirements.

Maritimes control area to serve load in Maine be assigned the average fuel mix and emissions characteristics of the exporting system. The rules are silent on exports.

- Maine's Eligible Resource Portfolio Requirement[55] requires physical delivery of energy to the ISO-NE control area or the Maritimes control area, as well as requiring that the resource be recognized pursuant to the rules of the source control area as serving load obligations in New England, or otherwise used to serve electricity load within the ISO-NE or Maritimes control areas.
- Connecticut's RPS requirements are silent on imports.
- Connecticut, New Hampshire and Rhode Island, states that have opened to retail competition but not yet adopted disclosure rules, have (through their participation in NECPUC) developed a model disclosure rule that seeks to avoid double counting by listing imports to New England as a separate fuel source until adjacent regions develop compatible disclosure policies. Each of these states has expressed its intention to utilize the ISO's GIS system.
- NEPOOL has established a Generation Information System, or GIS, administered through ISO-NE, to support each of the states' individual rules. (NEPOOL 2002)
    - **Imports**. GIS operating rules effectively establish a strict delivered energy eligibility requirement with wholesale matching. The rules require that certificates be created for all energy imports, and will not recognize attributes unless there is a matching energy import. Generators outside of the control area must be registered to receive source-specific certificates for qualifying energy imports. If energy is imported as a "unit contract", certificates can reflect attributes of that generator, provided that it meets a stringent set of requirements.[56] If energy is imported via a system power contract or a unit contract not meeting the aforementioned stringent requirements, the fields on the certificate will reflect the most recently available overall mix of fuel sources and emissions of the source control area. The rule allows that once a source control area establishes a compatible generation information system (Compatible GIS), the NEPOOL Planning Committee (NPC) may amend the rules to address the creation of unit-specific certificates under a wider set of circumstances.
    - **Exports.** All energy exports must have associated certificates, and (with the exception of Reserved Certificates described below) there is no export of certificates without an energy transaction. An energy export may have associated with it specific certificates corresponding to a particular generator, otherwise the export energy transaction will be assigned Residual Mix Certificates. If a Compatible GIS is established in the adjacent control area in the future, the NPC may amend its current rules to address the assignment of Certificates. GIS Certificates from renewable generators may also be sold directly to third parties in good faith, arm's length transactions for reasonable value, independent of

[55] Chapter 311- Eligible Resource Portfolio Requirement

[56] (a) the generator is an RPS-eligible fuel type in some New England state, (b) the energy is imported from a registered generator in an adjacent control area, (c) the transaction has secured transmission rights, (d) energy is actually settled in Market Settlement System, and (e) the generator has provided the GIS Administrator with (i) evidence that energy was actually generated, (ii) a NERC tag for such Energy meeting the requirements of the Market Rules for External Unit Contracts for Energy 1 or Energy 2 and the requirements of the adjacent source control area, and (iii) certification of the seller of such Energy to the effect that the specified attributes have not been and will not be otherwise sold, retired, claimed, represented as part of Energy sold elsewhere or used to satisfy obligations in another jurisdiction.

transactions involving energy. Such certificates are designated as Reserved Certificates, are placed in special accounts, and are ultimately taken out of the GIS system altogether, not appearing in either load serving entity accounts or the residual mix calculation. Thus, attributes captured in GIS Certificates may ultimately be sold under TRC-only transactions within or outside of the NEPOOL GIS system. While the GIS system does not serve explicitly as a registry for such transactions, it can be used to assure that no double counting results.

Ontario's proposed tracking system is being designed by MEST staff, with a technical specifications document drafted and regulations to be drafted and approved in 2002. The proposed system would recognize energy imports into Ontario claimed from specific generating facilities if the exporter can prove the origin of the power, where proof is likely to require verification by a compatible tracking system or a system operator. All other imports would be assigned generic source and emissions characteristics. Energy exported from Ontario from specific generating facilities would receive documentation from the administrator that verifies that the energy was produced and attributes were removed from the Ontario mix.[57]

The **Ohio** disclosure rules make no mention of imports, exports or geographic eligibility.

[57] November 14, 2001 e-mail from Stephanie Prosen, Ontario Ministry of Energy, Science and Technology.