III.14 Regulation Market.

For purposes of this Section III.14, the settlement interval is every five minutes. If a dollar-per-MW-hour value is applied in a calculation where the interval of the value produced in that calculation is less than an hour, then for purposes of that calculation the dollar-per-MW-hour value is divided by the number of intervals in the hour.

III.14.1 Regulation Market System Requirements.

The Regulation Capacity Requirement and Regulation Service Requirement are determined based on historical control performance and compliance with NERC and NPCC control standards. The Regulation Capacity Requirement and Regulation Service Requirement will be published on the ISO's website.

During abnormal system conditions, the ISO may deviate from the Regulation Capacity Requirement or Regulation Service Requirement to maintain system reliability.

III.14.2 Regulation Market Eligibility.

A Regulation Resource must satisfy the following conditions:

(a) Physical Parameters.

(i) Automatic Response Rate.

1. The minimum Automatic Response Rate is 1 MW/minute.

(ii) Regulation Capacity.

1. The minimum Regulation Capacity of a Generator Asset that is not part of an Electric Storage Facility will be determined based on the Generator Asset's size and operating characteristics and must be greater than or equal to: (a) 5 MW, and; (b) two times the Generator Asset's AGC SetPoint Deadband plus 1 MW.

2. The minimum Regulation Capacity of a Continuous Storage ATRR and a Generator Asset associated with a Binary Storage Facility is 0.1 MW.

3. The minimum Regulation Capacity of a Resource that does not provide Regulation pursuant to subsections (ii)(1) or (ii)(2) of this Section III.14.2(a) is 1 MW after aggregation.

(b) Regulation Registration and Technical Requirements.

A facility capable of providing Regulation:

(i) shall be located within the New England Control Area;

(ii) shall meet the requirements specified in ISO New England Operating Procedure No. 14 and ISO New England Operating Procedure No. 18;

(iii) shall not be registered as both an ATRR and a dispatchable Generator Asset, nor as both an ATRR and a DARD, unless it is a Continuous Storage Facility (however, an ATRR may be located at the same facility as either or both a Generator Asset and a DARD if the Generator Asset and DARD are separately metered and reported);

(iv) may provide Regulation only as an ATRR, and not as another Resource type, if registered as an ATRR;

(v) shall be capable of receiving and following AGC SetPoints sent electronically at four-second intervals;

(vi) shall have a demonstrated capability to reliably follow Dispatch Instructions, consistent with normal operating characteristics and physical offer parameters, including Regulation Capacity and Automatic Response Rate. Resources without an operational history of providing Regulation must establish and demonstrate this capability as follows:

1. Any Resource with less than one-hour sustainability must participate in the Regulation test environment specified in Section III.14.9. (For a storage facility, sustainability is measured based on full rate of charge/discharge starting from a half-full status.)
2. All Resources must satisfy a minimum responsiveness test that demonstrates that a Resource can follow AGC SetPoints.

(c) Aggregation.

(i) An ATRR that is not part of a Continuous Storage Facility may be composed of an aggregation of facilities of less than 1 MW in size, which may be geographically dispersed. Each of the facilities that form the aggregated ATRR must meet the Regulation Market eligibility requirements specified in this Section III.14.2 other than MW size.

(ii) A single AGC SetPoint will be sent every AGC cycle to the aggregated ATRR. A Market Participant with an aggregated ATRR is responsible for management and control of the component facilities to ensure an accurate aggregate response to the AGC SetPoint.

(iii) The component facilities must be metered and recorded in a manner that allows real-time performance to be measured against Dispatch Instructions and provides for the retention of the recorded information for purposes of verification, accounting for any performance

offsets from other loads, generation or devices under the direct or indirect control of the aggregator as specified in ISO New England Operating Procedure No. 18, Metering and Telemetering Criteria.

III.14.3 Regulation Market Offers.

(a) A Market Participant with a Regulation Resource must submit a Regulation Market Supply Offer to provide Regulation. The Regulation Market Supply Offer may specify offer parameters that vary on an hourly basis and shall remain effective until cancelled or replaced by the Market Participant. A Market Participant may modify Regulation Market Supply Offer parameters for a given hour up to five minutes before the start of the hour. Regulation Resource availability must be updated throughout the Operating Day to reflect the actual operating capability of the resource. The Regulation Market Supply Offer of a Regulation Resource must specify the following offer parameters:

(i) Regulation Resource status (available/unavailable)

(ii) Regulation High Limit

For a Generator Asset, the Regulation High Limit must be less than or equal to the Generator Asset's Economic Maximum Limit. For a Continuous Storage ATRR, the Regulation High Limit must be positive and equal to the Regulation Low Limit multiplied by negative one, with an allowance for round-trip efficiency loss.

(iii) Regulation Low Limit

For a Generator Asset, the Regulation Low Limit must be greater than or equal to the Generator Asset's Economic Minimum Limit. For a Continuous Storage ATRR, the Regulation Low Limit must be negative and equal to the Regulation High Limit multiplied by negative one, with an allowance for round-trip efficiency loss.

(iv) Automatic Response Rate (MW/minute)

(v) Regulation Capacity Offer ($/MW)

The Regulation Capacity Offer price must be greater than or equal to $0/MW and may not exceed $100/MW. A Market Participant may include estimated inter-temporal opportunity costs in its Regulation Capacity Offer price.

(vi) Regulation Service Offer ($/MW of instructed movement)

The Regulation Service Offer price must be greater than or equal to $0/MW of instructed movement and may not exceed $10/MW of instructed movement.

(b) Additional Constraints on Offer Parameters.

Regulation offer parameters that exceed recent historical performance for Regulation Capacity or Automatic Response Rate will be constrained to reflect values consistent with the demonstrated performance of the Resource. The Resource of a Market Participant that submits offer parameters inconsistent with demonstrated performance will be disqualified from selection to provide Regulation until the submitted parameters are modified to be consistent with demonstrated performance.

(c) Regulation Capacity Performance Adjustment.

(i) Regulation Capacity offers will be evaluated in the Regulation selection process using a capacity value adjusted to reflect historical performance. The adjusted value will account for the Resource's demonstrated ability to follow the AGC dispatch signal over an hour at the offered Regulation Capacity level. The percentage adjustment will be reevaluated periodically to account for changes in the performance of the Resource. Resources with no historical performance record will be evaluated pursuant to the regulation resource test environment specified in Section III.14.9.

(ii) The adjusted Regulation Capacity value will be used for the purpose of selecting Resources (described in Section III.14.5) and for determining Regulation Capacity compensation (described in Section III.14.8), but will not be used in Regulation dispatch (described in Section III.14.6).

III.14.4 [Reserved]

III.14.5 Regulation Market Resource Selection.

Resources are selected each hour (or more frequently as needed) to provide Regulation from eligible and available Resources to meet the Regulation Capacity Requirement and Regulation Service Requirement at the least cost based on: Regulation Capacity Offers, Regulation Service Offers, estimated energy opportunity costs and opportunity cost sensitives, impacts on system production costs, and operational requirements related to reliability, including a minimum aggregated response rate and minimizing short-term changes in the assignment of Resources to provide Regulation.

(a) Regulation Capacity Offers will be evaluated in the selection process using a Regulation Capacity value adjusted to reflect historical performance, as described in Section III.14.3(c).

(b) For the purposes of least-cost Resource selection, the following penalty factors are used for any violation of the Regulation requirements constraint.

(i) For Regulation Capacity shortfall:

1. When the Energy Component of the Real-Time Locational Marginal Price is at least $100/MW, the penalty factor is $100/MW plus the Energy Component of the Real-Time Locational Marginal Price for each megawatt of Regulation Capacity shortfall.
2. When the Energy Component of the Real-Time Locational Marginal Price is less than $100/MW, the penalty factor is the maximum of either zero or $100 plus the Energy Component of the Real-Time Locational Marginal Price for each megawatt of Regulation Capacity shortfall.

(ii) For Regulation Service shortfall:

1. The penalty factor is $10/MW for each megawatt of Regulation Service shortfall.

(c) An eligible Resource may be omitted from providing Regulation due to operational restrictions, including, but not limited to, binding transmission constraints, planned shutdown, or known or anticipated system operating conditions.

(d) The ISO may deviate from the market-based Resource selections to maintain system reliability.

(e) In the event one or more Resources have equivalent least-cost characteristics in the selection process, the Resource with the larger Regulation Capacity value will be selected or, if the Regulation Capacity value is also equal, the Resource with the earliest Supply Offer submission time will be selected.

III.14.6 Regulation Market Dispatch.

Regulation Resources selected to provide Regulation are dispatched to reduce the New England Control Area's area control error as needed to ensure reliability and compliance with NERC and NPCC control standards.

(a) There are three types of AGC SetPoints used to dispatch Regulation Resources:

(i) an energy-neutral trinary dispatch that calculates AGC SetPoints equal to one of the following three values: Regulation High Limit, Regulation Low Limit, and a midpoint between the Regulation High Limit and the Regulation Low Limit;

(ii) a relative response rate dispatch using multi-valued AGC SetPoints with AGC SetPoint Deadbands, and;

(iii) an energy-neutral relative response rate dispatch using multi-valued AGC SetPoints with AGC SetPoint Deadbands.

(b) Regulation Resources may use the following dispatch methods:

(i) Generator Assets may be dispatched to provide Regulation using the AGC SetPoint described in (a)(ii);

(ii) Continuous Storage ATRRs may be dispatched to provide Regulation using the AGC SetPoint described in (a)(i) or (a)(iii); and

(iii) all other Regulation Resources may be dispatched to provide Regulation using any of the three AGC SetPoint types.

(c) A Market Participant permitted to use more than one dispatch method pursuant to Section III.14.6(b) may change the dispatch method to be effective at the start of every calendar quarter. Requests to change the dispatch method must be received no later than 30 Business Days before the requested effective date of the change.

(d) AGC SetPoints will be established to cost-effectively meet reliability criteria based on the current area control error, the Automatic Response Rate and offer parameters of the selected Resources, as well as the current and predicted state of the system.

(e) When either a Generator Asset or a Continuous Storage ATRR is providing Regulation, the related energy dispatch ranges shall be reduced as described in Section III.1.10.9(g) and (h).

III.14.7 Performance Monitoring.

(a) The performance of a Resource providing Regulation will be monitored in Real-Time and a performance score will be calculated. For each settlement interval, a Resource is considered to be non-performing if, after a grace period, the Resource is not responding to AGC SetPoints (or, in the case of a Continuous Storage ATRR, not responding to the net AGC SetPoint and Desired

Dispatch Points) at a rate at least equal to a percentage of its Automatic Response Rate or outside a tolerance band around the AGC SetPoint that is equal to a percentage of the Regulation Capacity of the Resource. The grace period will be between two and four minutes. The percentage of the Automatic Response Rate will be between 80 and 95 percent. The percentage of the Regulation Capacity of the Resource will be between 5 and 15 percent. The specific values will be published on the ISO's website.

(b) A Resource that changes its direction of movement in a manner inconsistent with the AGC SetPoint is considered non-performing for the remainder of the hour.

III.14.8 Regulation Market Settlement and Compensation.

(a) Calculation of Regulation Clearing Prices.

(i) Regulation Service clearing prices.

The Regulation Service clearing price is set equal to the highest Regulation Service Offer of the Resources providing Regulation.

(ii) Regulation Capacity clearing prices.

1. The Regulation Capacity clearing price is set such that total compensation from the Regulation Service clearing price and the Regulation Capacity clearing price will, based on a uniform clearing price applied to all selected Resources, ensure recovery of as-bid costs for Regulation Capacity, estimated Regulation Service, estimated energy opportunity costs, and the Resource-specific incremental cost savings payment determined for each Resource (as described in subsection (ii)(2) below).
2. The incremental cost savings provided by each Resource is assessed by determining the least-cost selection of Resources from the most recently approved Regulation selection process both with and without the particular Resource. The incremental cost savings for the settlement interval is the estimated total cost of Regulation without the Resource minus the estimated total cost of Regulation with the Resource, including the application of penalty factors to any violation of the Regulation requirements constraint.

(b) Compensation to Regulation Providers.

A Market Participant with a Resource that is selected to provide Regulation and that complies with the dispatch and performance requirements in this Section III.14 shall receive a Regulation

Capacity payment, a Regulation Service payment and, in some cases, a Regulation make-whole payment, as described below.

(i) Regulation Capacity Payment.

The capacity payment for each five-minute interval is equal to the time on Regulation during the interval multiplied by the amount of actual Regulation Capacity multiplied by the Regulation Capacity clearing price multiplied by the Regulation performance score calculated pursuant to Section III.14.7.

(ii) Regulation Service Payment.

The service payment for each five-minute interval is equal to the amount of service provided (as measured by the absolute value of the Resource's scheduled movement at the claimed rate of response without delay, in megawatts, toward the AGC SetPoint in response to AGC dispatch signals) multiplied by the Regulation Service clearing price multiplied by the Regulation performance score calculated pursuant to Section III.14.7.

(iii) Make-Whole Payment.

If revenues from the Regulation Capacity clearing price and the Regulation Service clearing price (as adjusted by the performance score) are insufficient to cover a Market Participant's as-bid costs for the actual Regulation Capacity and the amount of Regulation Service provided during a settlement interval (as adjusted by the performance score) plus actual energy opportunity costs (as calculated in subsection (iii)(1) below), a make-whole payment will be provided.

1. Calculation of Actual Energy Opportunity Costs. A Resource-specific Regulation energy opportunity cost for Regulation Resources that are dispatchable in the Real-Time Energy Market is determined for each five-minute interval that the Resource is selected to provide Regulation. The Regulation energy opportunity cost shall be equal to the product of (i) the absolute value of the deviation of the Regulation Resource's dispatch level necessary to follow the ISO's Regulation signals from the Resource's expected dispatch level if it had been dispatched in economic merit order and (ii) the absolute value of the difference between the Real-Time Price at the Node associated with the Regulation Resource and the megawatt weighted average Supply Offer or Demand Bid price for the energy associated with the deviation of the Resource's expected dispatch level if it had been dispatched in economic merit order.

The Regulation energy opportunity cost for a Resource that is dispatched pursuant to Section III.1.10.9(f) shall be equal to zero for the settlement interval.

(c) Regulation Up Reserve Charge.

If all or a portion of a Resource's Regulation Capacity is included in the Resource's Reserve Quantity For Settlement, a regulation up reserve charge will be applied. The regulation up reserve charge is equal to the amount of Regulation Capacity that is included in the Resource's Reserve Quantity For Settlement multiplied by the lesser of the applicable Real-Time Reserve Clearing Price and the applicable Real-Time Locational Marginal Price.

(d) Regulation Charges.

Each Market Participant shall have a Regulation charge equal to its pro rata share of the Regulation Capacity Requirement and Regulation Service Requirement for the hour based on the Market Participant's total Real-Time Load Obligation. For the purposes of allocating Regulation charges, the Real-Time Load Obligation of a DARD associated with an ATRR that has provided Regulation during the hour shall be limited to the quantity of energy consumed by the DARD during the hour not associated with Regulation. Calculation of Regulation charges shall exclude contributions to Real-Time Load Obligations from Coordinated External Transactions.

III.14.9 Regulation Market Testing Environment.

The ISO administers a regulation resource test environment that allows Market Participants to evaluate or demonstrate the performance of Resources without an operational history of providing Regulation prior to participation in the Regulation Market.

Resources providing Regulation under the regulation resource test environment will be compensated for the Regulation Capacity and Regulation Service provided in response to AGC SetPoints at the lowest of the Regulation Capacity Offer prices and Regulation Service Offer prices offered for any Resource selected during each settlement interval. Resources that are also dispatchable in the Real-Time Energy Market will be compensated for Regulation energy opportunity costs incurred while operating under the regulation resource test environment.

Resources performing a minimal responsiveness test will not be compensated for Regulation.

A Resource may only provide Regulation under the regulation test environment until sufficient operational information has been collected to verify reasonable operating parameters for the Resource or to determine that the Resource does not meet the eligibility requirements necessary to participate in the Regulation Market.