

Ancillary Services Manual

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Revision History

Version	Date	Revisions
<u>3.23</u>	<u>x/x/2012</u>	<p><u>Section 4.</u></p> <ul style="list-style-type: none"> ➤ <u>Clarified Regulation Service as Regulation Capacity, where applicable</u> <p><u>Section 4.2</u></p> <ul style="list-style-type: none"> ➤ <u>Added two-part Regulation Service Bid</u> ➤ <u>Added Regulation Movement Response Rate as static bid parameter</u> <p><u>Section 4.3.2</u></p> <ul style="list-style-type: none"> ➤ <u>Added language describing summation of Regulation Bid components for use by the optimization</u> ➤ <u>Revised language on Real-Time payments for providing Regulation Service in the Real-Time Market</u> <p><u>Section 4.3.4</u></p> <ul style="list-style-type: none"> ➤ <u>Revised language describing allocation of ACE to Regulation Service resources scheduled by RTD</u> <p><u>Section 4.3.5</u></p> <ul style="list-style-type: none"> ➤ <u>Specified that AGC will use Regulation Movement Response Rate in determining basepoints</u> ➤ <u>Added Small Event RPU</u> ➤ <u>Clarified that Regulation Service schedules are set to zero during Large and Small Event Pick-ups and Max Gen Pickups</u> ➤ <u>Moved last sentence of 4.10 (resume sending AGC Base Point Signals) to this section</u> <p><u>Section 4.4</u></p> <ul style="list-style-type: none"> ➤ <u>Added PTS calculation of Movement MW</u> ➤ <u>Removed PTS performance adjustment exclusion for LESRs in settlement calculations</u> <p><u>Section 4.8</u></p> <ul style="list-style-type: none"> ➤ <u>Reference Rate Schedule 3 of MST for Regulation Service market price calculations, and Regulation Service demand curve information</u> ➤ <u>Minor wording revisions to conform with Market Services Tariff</u> <p><u>Section 4.9</u></p> <ul style="list-style-type: none"> ➤ <u>Deleted section 'Reinstating Performance Charges' (was removed from tariff)</u> <p><u>Section 4.10</u></p> <ul style="list-style-type: none"> ➤ <u>Deleted section. Redundant with 4.3.5. Moved last sentence (resume sending AGC Base Point Signals) to 4.3.5.</u> <p><u>Section 4.13.2</u></p> <ul style="list-style-type: none"> ➤ <u>Changed 'regulation ramp rate' to 'Regulation Capacity response rate'</u> <p><u>Section 4.13.3</u></p> <ul style="list-style-type: none"> ➤ <u>Added that other data besides Performance Index may be used for LESRs</u> <p><u>Section 6.4.1</u></p> <ul style="list-style-type: none"> ➤ <u>Changed 'Regulation Service' to 'Regulation Capacity'</u>

		<p><u>Attachment D.</u></p> <ul style="list-style-type: none"> ➤ <u>Clarified Regulation Capacity Response Rate</u> ➤ <u>Added Regulation Movement Response Rate</u>
3.22	4/19/2012	<p>Section 3.6.1</p> <ul style="list-style-type: none"> ➤ Revised the reactive power metering requirements for existing generators to include an extraordinary circumstances case
3.2.1	X/X/2011	<p>Section 2.2 & 2.3</p> <ul style="list-style-type: none"> ➤ Refer to OATT, MST & Accounting & Billing Manual for Settlement Information <p>Section 3.4</p> <ul style="list-style-type: none"> ➤ Refer to OATT, MST & Accounting & Billing Manual for Settlement Information <p>Section 3.6.1</p> <ul style="list-style-type: none"> ➤ Move specification of acceptable generator VSS data from section 3.4.1 to section 3.6 <p>Section 4.4, 4.5, 4.6, 4.7, 4.11 & 4.12</p> <ul style="list-style-type: none"> ➤ Refer to OATT, MST & Accounting & Billing Manual for Settlement Information <p>Section 4.13.2</p> <ul style="list-style-type: none"> ➤ Regulation Test Requirements are adjusted including changes to the testing window for the prequalification performance test <p>Section 6.1, 6.6, 6.7 & 6.10</p> <ul style="list-style-type: none"> ➤ Refer to OATT, MST & Accounting & Billing Manual for Settlement Information <p>Attachment C</p> <ul style="list-style-type: none"> ➤ Refer to OATT, MST & Accounting & Billing Manual for Settlements Information
3.20	5/16/2011	<p>Section 3.2</p> <ul style="list-style-type: none"> ➤ Removal of language allowing a resource under the operational control of an External Control Area operator to be eligible for supplying VSS <p>Section 3.4.1</p> <ul style="list-style-type: none"> ➤ Clarifying the method for determining the payments for VSS suppliers <p>Section 3.5</p> <ul style="list-style-type: none"> ➤ Removed VSS penalty structure from the Ancillary Services Manual. This language is found in the Market Services Tariff <p>Section 3.6.1</p> <ul style="list-style-type: none"> ➤ Revised the reactive power metering requirements for existing generators ➤ Conformed the Ancillary Services Manual to comply with NPCC Directory #10 test data retention requirements <p>Section 3.6.2</p> <ul style="list-style-type: none"> ➤ Conformed the Ancillary Services Manual to comply with NPCC Directory #10 generators with common elements testing requirements
3.19	2/1/2011-3/9/2011	<p>Section 4.8</p> <ul style="list-style-type: none"> ➤ Updates to the Regulation Service quantities and their associated prices

4. REGULATION AND FREQUENCY RESPONSE SERVICE

This section describes the regulation and frequency response service.

4.1 Description

Regulation and frequency response services are necessary for the continuous balancing of resources (generation and NY Control Area interchange) with load, and to assist in maintaining scheduled Interconnection frequency at 60 Hz. This service is accomplished by committing Generators including Limited Energy Storage Resources (LESRs) and Demand Side Resources (Regulation Service Suppliers) whose output or demand is raised or lowered (predominately using Automatic Generation Control (AGC)) as necessary to follow moment-by-moment changes in load. The service is in addition to operating reserve services required for system contingency purposes. The NYISO offers regulation and frequency response services to serve Load within the NY Control Area.

The NYISO establishes the regulation and frequency response requirements consistent with criteria established by North American Electric Reliability Council (NERC), which may vary by hour and by season. The NYISO shall post the hourly regulation and frequency response requirements and shall present any updates of the regulation and frequency response requirements to the System Operation Advisory Subcommittee (SOAS) for discussion and comment. Should the NYISO determine that it intends to establish regulation and frequency response requirements for any hour that are lower than any requirement for that hour in the seasonal regulation and frequency response requirements published as of March 1, 2004, it shall present, prior to posting, its analysis and the revised requirement to the Operating Committee for approval. Should the NYISO determine, for reliability reasons, that it intends to establish regulation and frequency response requirements for any hour that are higher than the requirement for that hour currently in effect, it shall raise the requirement, issue a notice as soon as possible, repost the hourly regulation and frequency response requirements for that season, and discuss its adjusted regulation and frequency response requirement for that hour at the next regularly scheduled Operating Committee meeting. Shortly after the end of each Capability Period, the NYISO shall present SOAS with an analysis of the regulation performance in that Capability Period. The NYISO also establishes Regulation Service Supplier performance measurement criteria and procedures for bidder qualification and for the disqualification of bidders that fail to meet such criteria as defined in section [4.134.134.13](#).

4.2 Source of Service

Regulation Service is bid into the market by Regulation Service qualified suppliers that have AGC capability and that wish to participate in the Regulation Service Market.

Generators and Demand Side Resources bidding to provide Regulation Service are required to submit two-part Bids, consisting of the following: a Regulation Capacity Bid indicating the MW and price (\$/MW) of the Regulation Capacity they are making available to the

NYISO, and a Regulation Movement Bid indicating the price (\$/MW) for each MW of Regulation Movement they can provide when instructed. Regulation Service Resources are not obligated to participate and provide Regulation Service unless they have bid for Regulation Service and that bid has been accepted.

The NYISO selects Regulation Service in the Day-Ahead Market and the Real-Time Market from qualified Resources that bid to provide Regulation Service. Market Participants may submit bids to the NYISO for Regulation Service up to the Real-Time Market market-close time (75-minutes prior to the operation hour).

The bid evaluation program validates a Regulation Service bid and returns a message to the bidder indicating that data supplied is either validation passed or validation failed. Validation passed and validation failed bids (or any bid) may be changed and resubmitted prior to market closing time. Bid information includes:

~~• Regulation response rate, in MW/min, with the exception that LESRs are not required to provide a regulation response rate.~~

~~➤ Regulation Response Rate is a static bid parameter and can be modified only through a request to the Customer Relations Department.~~

- ~~▪ Regulation availabilityCapacity/price, in \$/MW~~
- ~~▪ Regulation Movement/price, in \$/MW~~
- ~~▪ Regulation AvailabilityCapacity MW – regulation capacity available in one direction

 - ~~➤ For example a bid of 5 MWs is a bid to provide 5 MWs of regulation up and 5 MWs of regulation down.~~~~

There are also static bid parameters that can be modified only through a request to the NYISO:

- ~~▪ Regulation Capacity Response Rate (RCRR), in MW/min, with the exception that LESRs are not required to provide a RCRRegulation Capacity Response rate.~~
- ~~▪ Regulation Movement Response Rate (RMRR), in MW/6 seconds. Regulation suppliers are not required to provide a Regulation Movement Response Rate, but should supply one if they want a value other than the default value of Regulation Capacity Response Rate ÷ 10. By default, the RMRR will be established as the RCRR ÷ 10. Regulation suppliers may provide a RMRR that exceeds the equivalent RCRR in the event that the supplier is capable of responding at a faster response rate; however, the RMRR may not be less than the RCRR on a time-equivalent basis.~~

The NYISO Market Participants User’s Guide describes the bidding protocols and the checks that the NYISO makes to ensure validity. For Generators that are not LESR devices and Demand Side Resources, the maximum Regulation ~~Service e~~Capacity (or regulating margin) that can be offered is calculated as the regulation capacity response rate times five minutes. For LESR devices, the maximum Regulation ~~Service e~~Capacity that can be offered is the unit’s bid in Upper Operating Limit.

Figure 4-1~~Figure 4-1~~Figure 4-1 shows how Regulation ~~Service e~~Capacity is defined with respect to a Demand Side Resource’s operating range. The assumption in this scenario is

that the Demand Side Resource has not been scheduled to provide energy other than to support a Regulation Service schedule.

~~Figure 4-2~~~~Figure 4-2~~~~Figure 4-2~~ shows how Regulation ~~Service~~ ~~e~~Capacity is defined with respect to a generating unit's operating range, for the situation without Reserve activation.

~~Figure 4-3~~~~Figure 4-3~~~~Figure 4-3~~ shows the Regulation Service deployment for an LESR that has no energy limitations and has an accepted bid for its full bid Regulation ~~Service~~ ~~e~~Capacity. The Upper and Lower Regulating Limits = the Upper Operating and Lower Operating limits respectively.

~~Figure 4-4~~~~Figure 4-4~~~~Figure 4-4~~ shows the Regulation Service deployment for an LESR whose energy storage position limits the amount of Regulation Service it can provide. RTD has set a BP to consume, and the Regulation Service deployed is centered on that BP. The Upper Regulating Limit is reduced below the Upper Operating Limit as the energy storage is limited and the device can-not sustain energy injection at its maximum operating capacity for the next 5 minute RTD interval.

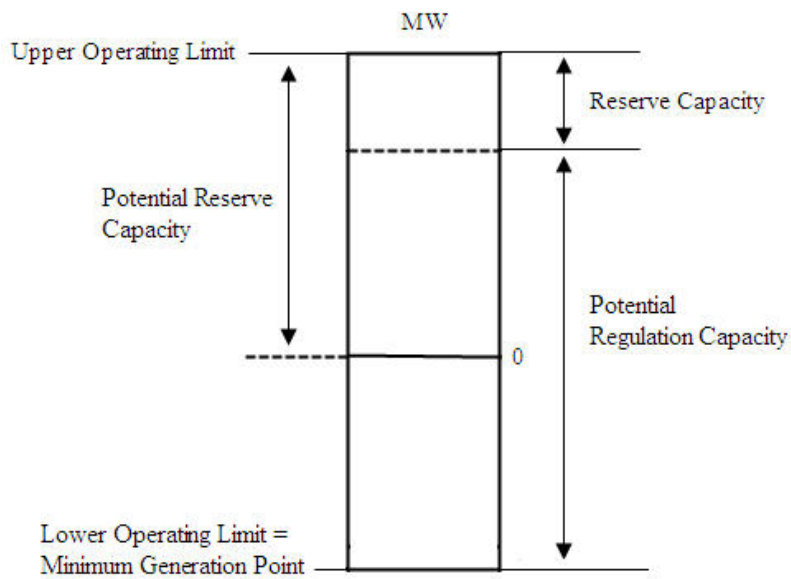


Figure 4-1 Demand Side Resources Operating Characteristics

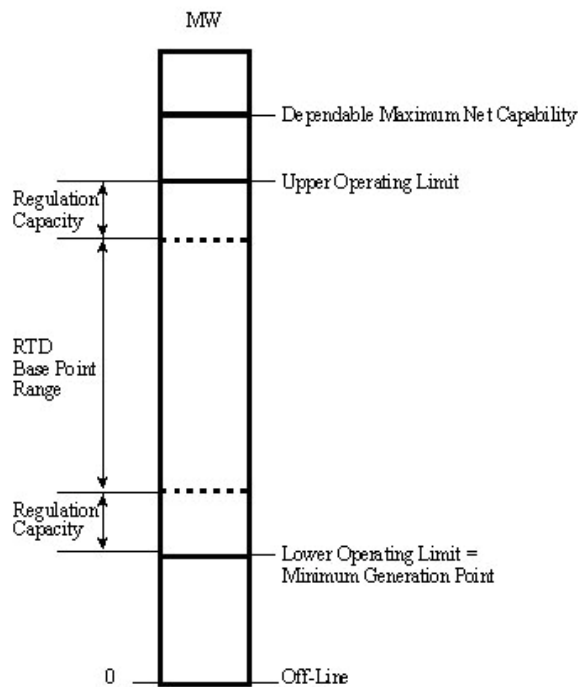


Figure 4-2 Generating Unit Operating Characteristics

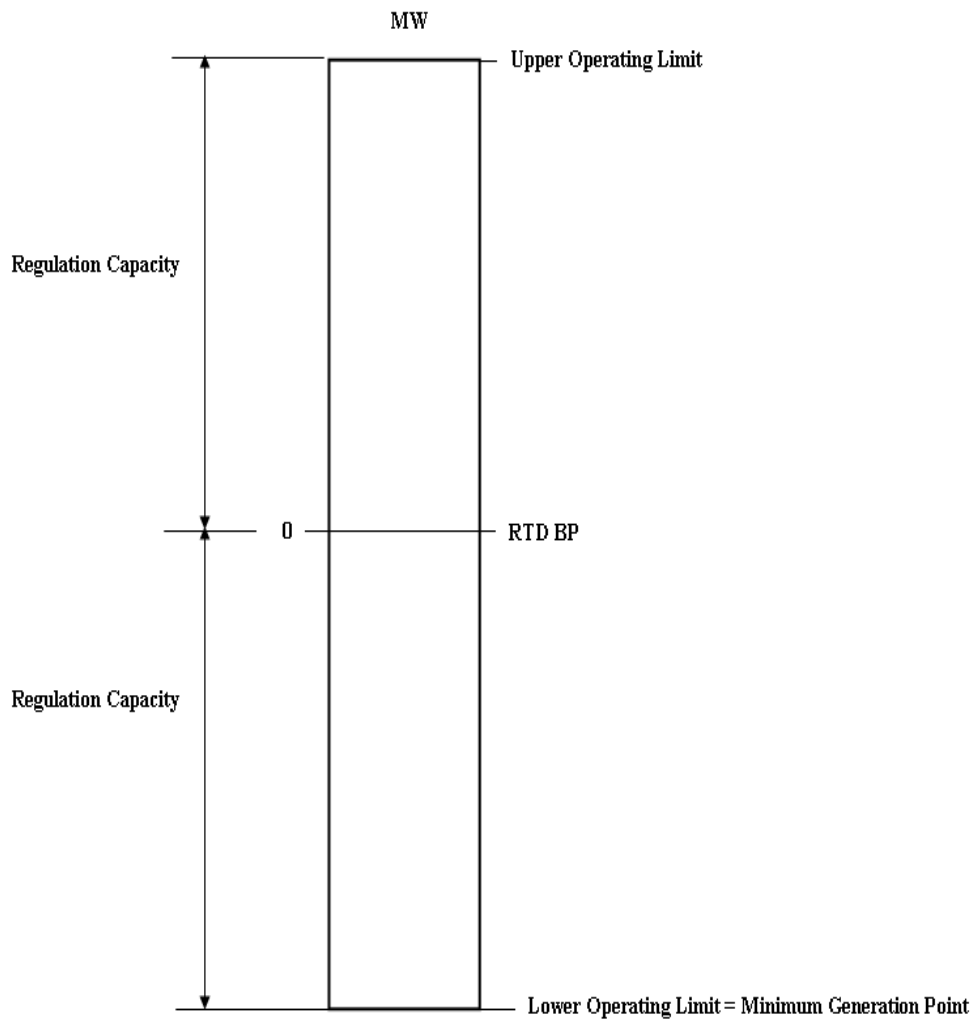


Figure 4-3 LESR with Full Regulation Service Deployment

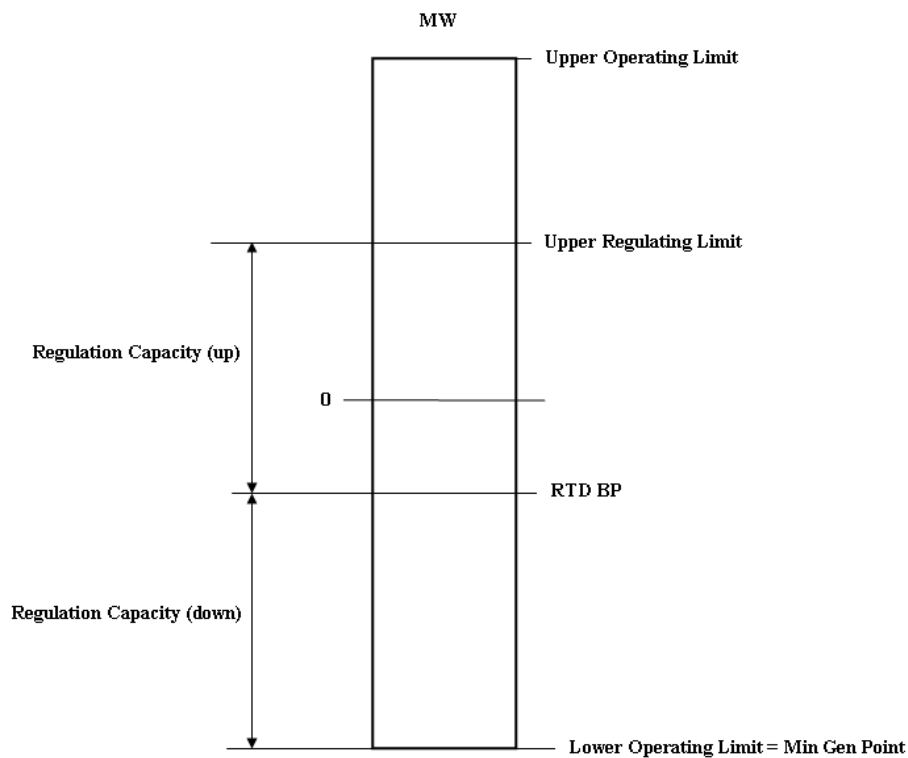


Figure 4-4 LESR with RTD Managing Energy Level; Equal Reg Up and Reg Down

Note: Modification of response rates must be coordinated with the Customer Relations Department.

There are up to ~~five~~^{six} response rates that are ~~bid~~ ^{provided} by the suppliers:

- *Normal Response Rate (NRR)* – There may be up to **three** response rates given with each generator. They are used under non-reserve pickup conditions.
- *Regulation Capacity Response Rate (RCRR)* – This response rate is used for scheduling ~~r~~Regulation Capacityservice.
- *Regulation Movement Response Rate (RMRR)* - This response rate is used for dispatching Regulation Service providers.
- *Emergency Response Rate (ERR)* – This response rate is used under reserve pickup conditions. ERR must be greater than or equal to the maximum NRR. Demand Side Ancillary Service Providers may only bid one NRR and the ERR must equal the NRR.

Note: With the exception of RMRR, ~~T~~he above response rates are not applicable to LESRs.

For all Regulation Service providers except LESRs, the RCRR must be \leq to the minimum NRR, and the ERR must be \geq to the maximum NRR. The minimum NRR must be $\geq 0.01 * \text{Maximum Summer Operating Limit (Summer Capability Period)}$ and $\geq 0.01 * \text{Maximum Winter Operating Limit (Winter Capability Period)}$. The Maximum Summer and Winter Operating Limits are modified by Customer Relations and are described in the *NYISO Market Participants User Guide* (available from the NYISO Web site at http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp).

Regulation Service providers are not required to provide a RMRR, but should supply one if they want a value other than the default value of $\text{RCRR} \div 10$. If submitted, the RMRR must be $\geq \text{RCRR} \div 10$

- Individual units may bid into the market as groups of units, providing the units are pre-qualified to be bid and operated together as though they are a single unit for all generator bid services (units participating as part of a group are not allowed to bid individually or as part of another group). Pre-qualification specifications for units to bid as a group include metering support, billing, and performance measurements as if a single unit.

4.3 Scheduling of Service

Regulation Service requirements are determined by the NYISO consistent with industry standards set by NERC. The Regulation Service requirements may include locational requirements and consider transmission constraints. Automatic Generation Control signals for Regulation Service are transmitted to the individual units via the Transmission Owners. Regulation Service providers may also receive Regulation Service signals directly from the NYISO. Receiving regulation signals directly from the NYISO does not eliminate the need to receive signals directly from the TO.

4.3.1 Generating Unit Operating States

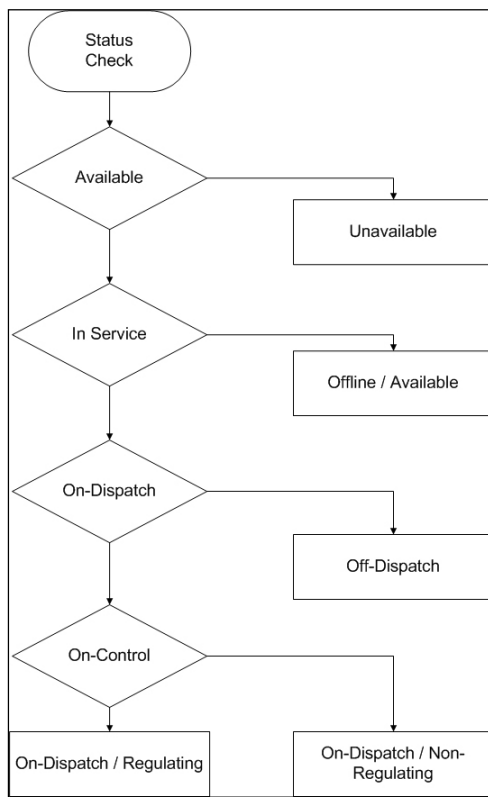


Figure 4-5 Generating Unit Operating States

Generating units have the NYISO operating states as shown in Figure 4-5. Demand Side Resources participating in the energy or ancillary services programs for scheduling purposes are modeled as generators. This class of supplier has the same operating states as physical generating units.

- **Unavailable** – The unit is Off-Line and is not available for any ancillary services contribution.
- **Off-Line/Available** – The unit is Out-of-Service and Off-Line, but is available for ancillary services contribution.
- **Fixed (Off-Dispatch)** – The unit is In-Service and On-Line and is not under automatic control. This unit’s RT schedule is predetermined. Schedule changes may occur only on the quarter hour.
- **Flexible (On-Dispatch) and Non-Regulating** – The unit typically is not under automatic control. The basepoint for the unit is normally updated every five minutes. The unit does not participate in Regulation Service.
- **Flexible (On-Dispatch) and Regulating** – The unit is under automatic control. The unit has an Energy schedule that is established by RTD. The unit participates in Regulation Service as directed by AGC and, thus, may be requested to deviate from its RTD schedule.

4.3.2 Regulation Service Capacity Scheduling

In the Day-Ahead and Real-Time Markets, the NYISO submits to its scheduling and pricing software the Regulation Service Bids provided by each Supplier for use in solving to meet the NYISO's Regulation Capacity requirement. Specifically, the NYISO enters into the Day-Ahead and real-time software each Regulation Service Supplier's Regulation Capacity Bid MW and the sum of its i) Regulation Capacity Bid price and ii) the product of: a) the Supplier's Regulation Movement Bid price and b) the Regulation Movement Multiplier established for that hour.

Generators and Demand Side Resources

The Regulation Service Capacity is allocated awarded to each Regulation Service resource that was selected to provide Regulation Service. ~~The capacity allocated~~ is based on the economics of the bid and the NYISO Regulation Service requirement, not to exceed the lesser of the regulation response rate (RRR) times 5 minutes or the regulation availability MW's bid.

Regulation ~~Service Capacity~~ comprises two regions. The upper region is bounded by the unit upper operating limit. The lower region is bounded by the minimum generation point. Each region is equal to the Regulation ~~Service Capacity~~ accepted for that Unit. (See [Figure 4-1](#) ~~Figure 4-1~~ ~~Figure 4-1~~, on page [4-44](#) ~~4-43~~.)

Limited Energy Storage Resources

All offers by LESR devices in the Day-Ahead Regulation Services Market are evaluated and scheduled on an hourly basis without consideration that there may be energy limitations during the operating hour, due to the LESR's energy storage position, that may prevent the LESR from providing as much Regulation Service in real-time as it was scheduled to provide in the Day-Ahead Market.

In real-time, the amount of Regulation ~~Service Capacity~~ that an LESR can provide will depend on the current energy storage position of the LESR. As the amount of energy stored in the device increases or decreases, the amount of Regulation Service that can be sustained over an RTD interval may be less than the amount of Regulation ~~Service Capacity~~ originally offered in the Real-Time Market. In such cases, the RTD system will reduce amount of Regulation ~~Service Capacity~~ offered to reflect the amount of Regulation Service the LESR is currently able to provide, given its energy storage position. The amount of Regulation ~~Service Capacity~~ that an LESR is actually scheduled to provide in the Real-Time Market is based on this calculation of the amount of Regulation ~~Service Capacity~~ it is able to provide, given its energy storage position, and the economics of the bid.

The Regulation ~~Service Capacity~~ calculation is performed by taking the measured energy storage position of the device and calculating an upper and lower regulation limit (URL, LRL). The midpoint of the upper and lower limits establishes an RTD base point and the available Regulation ~~Service Capacity~~ = $.5 * (URL + \text{abs}(LRL))$.

During energy shortage intervals, as indicated by the activation of the Regulation Service Demand Curve, the Regulation ~~Service Capacity~~ offer may be further reduced. The Regulation ~~Service Capacity~~ available to be scheduled during the energy shortage

condition is based on the energy storage position of the device with an RTD base point set equal to 0. The available $\text{Regulation eCapacity} = \text{Min}(\text{abs}(\text{LRL}, \text{URL}))$.

Commitment for Additional Regulation

The NYISO may commit additional resources in the real-time market to provide Regulation Service if any of the following conditions exist:

1. Insufficient Regulation Service MW is bid into the Day-Ahead Market.
2. Resources that were scheduled in the Day-Ahead Market to provide Regulation Service are not available in real-time.
3. More Regulation Service is required than had been anticipated would be needed in the Day-Ahead Market.

Regulation Service in Real-Time

Regulation Service Suppliers, including those not awarded a forward contract to provide Regulation Service in the Day-Ahead market, may bid uncommitted capacity into the Real-time market to provide Regulation Service. A Resource providing Regulation Service in the Real-time market will be paid based on: its real-time schedule for Regulation Capacity at the Regulation Capacity Market Price, and its real-time Movement MW at the Regulation Movement Market Price, taking into account the resource's performance relative to its instruction. The Resource will also be subject to a Regulation Service performance charge to account for non-performance. Calculation of Day-Ahead and Real-Time Regulation Market Prices is defined in Rate Schedule 3 of the NYISO Market Services Tariff.

- ~~1.— The Real-Time market clearing price (MCP) for Regulation Service~~
- ~~2.— Its real-time scheduled Regulation Service in MWs~~
- ~~3.— The length of the period of time during which it is committed to provide Regulation Service.—~~

A Supplier with a Day-Ahead Regulation Service schedule that notifies the NYISO that it cannot provide Regulation Service in real-time will receive a zero real-time Regulation ServiceCapacity schedule and buy out of its Day-Ahead commitment. A Supplier with a real-time Regulation Service schedule is subject to the performance settlement provisions as defined in section 4.6. A Supplier with a Day-Ahead Regulation Service schedule that continues into Real-Time is subject to the balancing and performance settlement provisions as defined in section 4.6.

A Supplier that is providing Regulation Service using an LESR will be subject to Regulation Service balancing in real time for any Regulation Service eCapacity scheduled day ahead that is not scheduled in real time as a result of the LESR's energy storage limitations.

4.3.3 Control Signals to Satellite Control Centers

Control signals designating the value of Unit Desired Generation (UDG) for each Resource are sent to the satellite control centers every six seconds. For Demand Side Resources, the UDG is the terminology used to indicate the AGC 6 second regulation schedule.

4.3.4 Regulation Service

The AGC function calculates an area control error (ACE) and allocates this error to selected Regulation Service providers scheduled by RTD. ~~LESR devices are selected first and assigned UDGs at the maximum values required, up to the regulation limits of the device, to address the regulation error. The ACE is allocated to all Regulation Service resources proportionally based on the amount of Regulation Movement MWs they are able to provide in the next six seconds using their six-second response rates, their current physical limitations, and security constraints. If additional regulation energy deployments are required, the remaining Regulation Service resources will be assigned the error in proportion to the amount of their Regulation Service capacity scheduled. For non-LESR resources~~ AGC will determine the UDG for each Resource by combining the Resource's Regulation requirement (if any) with its ramped basepoint derived from its RTD 5-minute basepoint, if any. The NYISO computer system will send UDGs to TOs that will in turn retransmit the UDGs to Regulation Service Resources in their control area. Regulation Service balancing payments and charges for all NYCA resources will be assigned by the NYISO directly to individual suppliers based on their monitored performance.

When LESR devices are approaching their energy limitations, as measured by their metered energy storage, AGC will transfer regulation energy deployments from the LESR's to other suppliers. This transfer is calculated by AGC and is designed such that the LESR's regulation energy schedule will become zero to coincide with the time that the LESR is either fully charged or fully discharged.

The amount of Regulation ~~Service~~ Capacity (MW) and Regulation Capacity ~~Response~~ Rate (MW/Minute) that is required for the NY Control Area is established by the NYISO and can vary on a seasonal and hourly basis. The *NYISO Transmission and Dispatching Operations Manual* (available from the NYISO Web site at the following URL: http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp) describes how the Regulation Service requirements are defined for the New York Control Area.

4.3.5 AGC and RTD Program Response

The AGC program uses each supplier's Regulation Movement Response Rate in determining base points. The RTD program uses the Normal Response Rate(s). RTD will assign basepoints to LESRs based solely on their stored energy levels. RTD-CAM may use either the Normal or the Emergency Response Rate, depending on reserve activation. All flexible Resources, including those with and without a real-time reserve schedule, may be required to respond to a reserve Pick Up. Resources with a real-time reserve schedule will have base points calculated using their Emergency Response Rates, others will have base points calculated using their Normal Response Rates. For RTD-CAM modes of Large or Small Event Reserve Pick-ups or Max Gen Pickups, all Regulation Service schedules are set to zero ~~is suspended~~ and LESRs will be assigned a zero RTD base point. ~~and a Regulation Service schedule = 0.~~ If upon occurrence of these events the LESR is consuming energy, AGC will immediately assign the device a zero UDG. If the device is injecting energy, AGC will hold the LESR UDG for the duration of the event or as long as possible subject to the energy storage remaining in the device. The NYISO will resume

sending AGC Base Point Signals as soon as possible after the end of the reserve or maximum generation pickup

When more Regulation Service is required, the NYISO may request more Regulation Service capacity from the real-time Regulation Service market.

A minimum ACE distribution value is established by the NYISO so that base point changes are distributed to only a few (or one) units when ACE is small.

4.4 Performance Tracking

The NYISO has a Performance Tracking System (PTS) to monitor the performance of Resources that provide Regulation Service. Payments and charges by the NYISO to each Supplier of this Service are based in part on the Resource's performance with respect to expectations. The PTS will also be used to calculate, for each RTD interval, the total Movement MW instructed for each unit that was scheduled to provide regulation, and to determine penalties assessed to non-regulating Resources that do not follow their RTD basepoints, thereby increasing the regulation burden.

[Figure 4-6](#) ~~Figure 4-6~~ ~~Figure 4-6~~ illustrates a regulating Resource that has perfect performance and [Figure 4-7](#) ~~Figure 4-7~~ ~~Figure 4-7~~ illustrates a regulating Resource with performance errors.

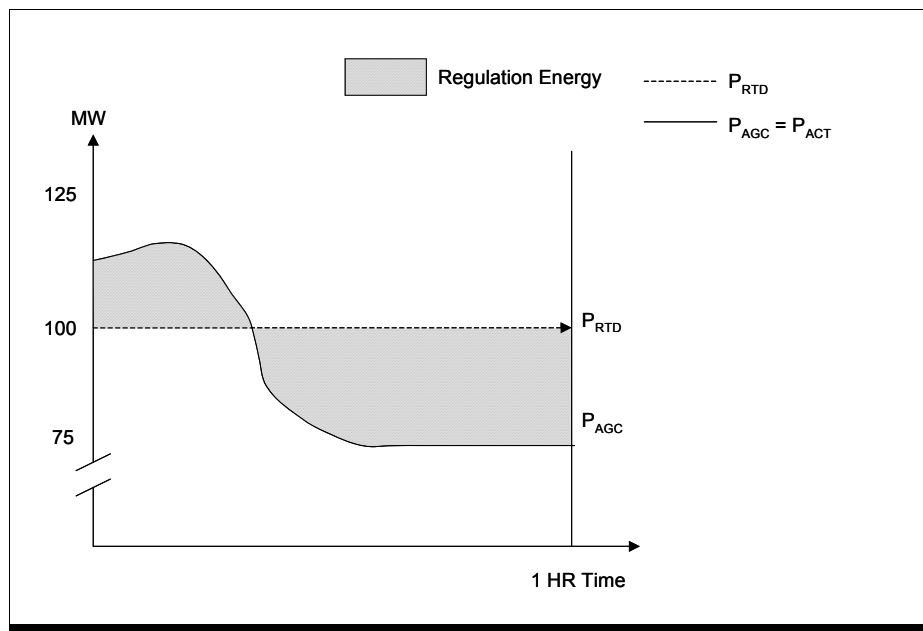


Figure 4-6 Perfect Performance

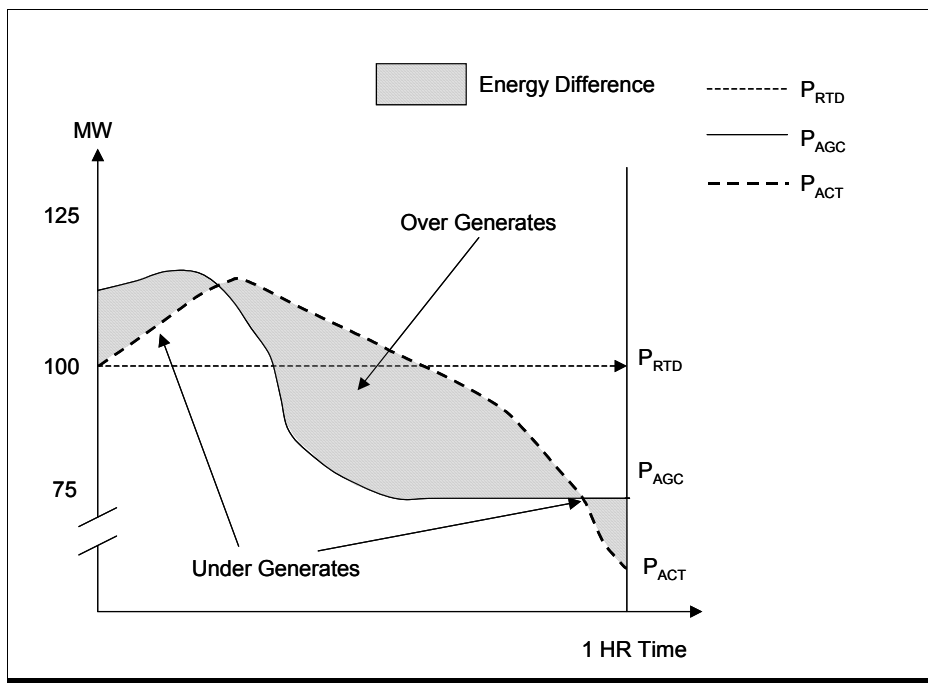


Figure 4-7 Error in Performance (30-Second Bandwidth not Included)

Regulation Service Resources are required to change their output level at a rate consistent with the amount of Regulation Service each resource has been scheduled to provide.

Regulation Service Resources will not receive payments for additional Regulation Service eCapacity as a result of following AGC signals that call for them to provide more Regulation Service than they have been scheduled to provide; but they will be paid for any additional energy they produce as a result of following such signals.

Performance Adjustment

Based on the performance measurements developed by PTS, the Billing Settlement System will calculate performance adjustments for both Regulation Service Suppliers and Energy Suppliers that are not providing Regulation Service. Appendix G of the Accounting and Billing manual presents a detailed description of the calculation of Regulation Service performance adjustments and Persistent Under Generation charges determinants.

~~AGC's maximization of the capabilities of LESR devices together with metering latency can result in incorrect performance measurements being calculated by PTS. Therefore, performance measurements developed by PTS will not be included in the settlement calculations for LESR devices until further analysis and observation of performance is available.~~

4.5 Regulation Service Settlements – Day-Ahead Market

Please refer to Rate Schedule 3 of the NYISO OATT, Rate Schedule 3 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for information about Day Ahead Market Settlements.

4.6 Regulation Service Settlements – Real-Time Markets

Please refer to Rate Schedule 3 of the NYISO OATT, Rate Schedule 3 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for information about Real-Time Market Settlements.

4.7 Energy Settlement Rules for Generators Providing Regulation Service

Please refer to Rate Schedule 3 of the NYISO OATT, Rate Schedule 3 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for information about Energy Settlement rules for generators providing Regulation Service.

4.8 Regulation Service Demand Curve

The NYISO shall establish a Regulation Service Demand Curve that will apply to both the Day-Ahead and ~~Real-Time~~ Regulation ~~Capacity Service in~~ Markets ~~Price and settlements~~. The market ~~clearing~~ prices for Regulation ~~ServiceCapacity~~ calculated pursuant to ~~sections 4.5.1 and 4.6.1 of this Manual~~ ~~Rate Schedule 3 of the NYISO Market Services Tariff~~ shall take account of the demand curve established in ~~this section~~ ~~Rate Schedule 3~~, so that Regulation ~~ServiceCapacity~~ is not ~~purchased~~ ~~scheduled~~ at a cost higher than the demand curve indicates should be paid in the relevant market.

The NYISO shall establish ~~and post~~ a target level of Regulation Service for each hour, which will be the number of MW of Regulation ~~ServiceCapacity~~ that the NYISO would seek to maintain in that hour. The NYISO will then define a Regulation Service demand curve for that hour as follows: ~~(Effective only after tariff approval by FERC)~~

1. For quantities of Regulation ~~ServiceCapacity~~ that are less than or equal to the target level of Regulation Service minus 80 MW, the price on the Regulation Service demand curve shall be \$400/MW.
2. For quantities of Regulation ~~ServiceCapacity~~ that are less than or equal to the target level of Regulation Service minus 25 MW but that exceed the target level of Regulation Service minus 80 MW, the price on the Regulation Service demand curve shall be \$180/MW.
3. For quantities of Regulation ~~ServiceCapacity~~ that are less than or equal to the target level of Regulation Service but that exceed the target level of Regulation Service

minus 25 MW, the price on the Regulation Service demand curve shall be \$80/MW.

4. For all other quantities, the price on the Regulation Service demand curve shall be \$0/MW. However, the NYISO shall not schedule more Regulation Service than the target level for the requirement for that hour.

In order to respond to operational or reliability problems that arise in Real-Time, the NYISO may procure Regulation [ServiceCapacity](#) at a quantity and/or price point different from those specified above. The NYISO shall post a notice of any such purchase as soon as reasonably possible and shall report on the reasons for such purchases at the next meeting of its Business Issues Committee. The NYISO shall also investigate whether it is necessary to modify the quantity and price points specified above to avoid future operational or reliability problems. The NYISO will consult with its Market ~~Advisor~~ [Monitoring Unit](#) when it conducts this investigation.

If the NYISO determines that it is necessary to modify the quantity and/or price points specified above in order to avoid future operational or reliability problems it may temporarily modify them for a period of up to ninety days. If circumstances reasonably allow, the NYISO will consult with its Market ~~Advisor~~ [Monitoring Unit](#), the Business Issues Committee, the Commission, and the PSC before implementing any such modifications. In all circumstances, the NYISO will consult with those entities as soon as reasonably possible after implementing a temporary modification.

The NYISO ~~and its Market Advisor~~ shall conduct periodic reviews as to whether the Regulation Service Demand Curves should be adjusted to optimize the economic efficiency of the NYISO Markets. [The Market Monitoring Unit shall be given the opportunity to review and comment on the NYISO's periodic reviews of the Regulation Service Demand Curve.](#)

4.9 Reinstating Performance Charges

~~This section intentionally deleted. The NYISO will monitor, on a Real-Time hourly or daily basis, as appropriate, its compliance with the standards established by NERC and NPCC and with the standards of Good Utility Practice for Control Performance, Area Control Area, Disturbance Control Standards, Reserve Pickup Performance, and System Security. Should it appear to the NYISO that degradation in performance threatens compliance with one or more of the established standards for these criteria or compromises reliability, and that reinstating the performance charges that were originally part of the NYISO's market design, would assist in improving compliance with established standards for these criteria, or would assist in re-establishing reliability, the NYISO may require Suppliers of Regulation Service, as well as Suppliers not providing Regulation Service, to pay a performance charge.~~

~~Any reinstatement of Regulation penalties pursuant to this section shall not override previous Commission approved settlement agreements that exempt a particular unit from such penalties. The NYISO shall provide notice of its decision to reinstate performance charges to the Commission, to each Customer and to the Operating Committee and the~~

~~Business Issues Committee no less than seven days before it re-institutes the performance charges.~~

~~If the NYISO determines that performance charges are necessary, Suppliers of Regulation Service shall pay a performance charge to the NYISO as follows:~~

$$\text{Performance Charge} = \text{Energy Deviation} * \text{MCP}_{\text{reg}} * (\text{Length of Interval}/60 \text{ minutes})$$

~~Where: _____~~

~~Energy Deviation (in MW) is the absolute difference between the actual Energy supplied by the Supplier and the Energy required by the AGC Base Point Signals, whether positive or negative, averaged over each RTD interval; and~~

~~MCP_{reg} is the Market Clearing Price (\$/MW), which applies to the RTD interval for this Service in the Real Time Market or the Day Ahead Market, if appropriate.~~

~~The method used by the NYISO to calculate the Energy Deviation will permit Suppliers a certain period of time to respond to AGC Base Point Signals. Initially this time period will be 30 seconds, although the NYISO will have the authority to change its length. If the Supplier's output at any point in time is between the largest and the smallest of the AGC Base Points sent to that Supplier within the preceding 30 seconds (or such other time period length as the NYISO may define), the Supplier's Energy Deviation at that point in time will be zero.~~

~~Otherwise, the Supplier may have a positive Energy Deviation. However, in cases in which responding to the AGC Base Point within that time period would require a Supplier to change output at a rate exceeding the amount of Regulation Service it has been scheduled to provide, the Supplier will have a zero Energy Deviation if it changes output at the rate equal to the amount of Regulation Service it is scheduled to provide.~~

4.10 Temporary Suspension of Regulation Service Markets during Reserve Pick-Up

~~This section intentionally deleted. During any period in which the NYISO has activated RTD-CAM software and has called for a “large event” or “small event” reserve or maximum generation pick-up, as described in Section 4 of the NYISO Services Tariff, the NYISO will suspend Supplier obligations to follow the AGC Base Point Signals sent to Regulation Service providers and will suspend the Real Time Regulation Service market. The NYISO will not procure any Regulation Service and will establish a Real Time Regulation Service Market clearing price of zero for settlement and balancing purposes. The NYISO will resume sending AGC Base Point Signals and restore the Real Time Regulation Service market as soon as possible after the end of the reserve or maximum generation pickup.~~

4.11 Charges Applicable to Suppliers That Are Not Providing Regulation Service

Please refer to Rate Schedule 3-A of the NYISO Market Services Tariff and the Accounting and Billing Manual for information about charges applicable to suppliers that are not providing Regulation Service.

4.12 Charges to Load Serving Entities

Please refer to Rate Schedule 3 of the NYISO OATT Rate Schedule 3 of the and the Accounting and Billing Manual for information about charges to Load Serving Entities.

4.13 Regulation Service Qualification and Performance Criteria

4.13.1 Regulation Qualified Resource Requirements

Any Resource that meets the following criteria will be considered a Regulation Qualified Resource and may submit offers for Regulation Service. All Regulation Qualified Resources must:

- Have the appropriate control equipment installed and be capable of providing Regulation Service.
- Be capable of receiving and responding to automatic control signals on a 6 second periodicity and must provide telemetered output data that can be scanned every 6 seconds.
- Provide for all required interfaces to the Transmission Owner (TO) control centers as defined by the TOs as described in the TO-MP Interconnection Agreement (if any).
- In order for a Demand Side Resource to provide Regulation Service the Demand Side Resource must take service from a qualified Load Serving Entity which is subject to the energy settlements of the *NYISO Services Tariff* and *NYISO OATT*.
- Be capable of supplying Regulation Service continuously in both the up or down direction for intervals in the scheduled hour and for all hours with accepted bids.
- Register the intent to provide Regulation Service with the Customer Relations department and provide all data required as defined in the Market Participant Registration Packet.
- Post all collateral requirements as defined in the *NYISO Service Tariff* Attachment K and Section 2 of the Market Participant Registration Packet.
- If requesting to qualify or required to re-qualify as a Regulation Service Supplier, successfully complete the pre-qualification performance test as described in section 4.13.2

4.13.2 Prequalification Performance Test

All participants requesting to become Regulation Service Suppliers and all participants that are required to prequalify as Regulation Service Suppliers must successfully complete the prequalification performance test.

- Market Participants must notify the Customer Relations Department of their intent to complete a Regulation Service pre-qualification test. All qualification criteria defined in section 4.13.1 must be completed prior to the test request.
- Customer Relations will coordinate with Grid Operations to schedule the test.
- Once a time period has been identified, Customer Relations will activate the Regulation Service bidding privileges of the test participant.
- The Market Participant will be notified by a NYISO Customer Relations representative a minimum of two days prior to the test period, instructing the Supplier to begin bidding to provide Regulation Service. The Supplier should begin bidding to provide Regulation Service for all hours that the Resource is capable of providing the service.
- The testing window will be open for a calendar week. A minimum of 24 hours of Regulation Service must be awarded in the Day-Ahead or Real-Time market to the test participant over the calendar week. Of the 24 hours, Regulation Service must be awarded in the Day-Ahead or Real-Time market for one consecutive 4 hour period spanning hour beginning 05:00 through hour beginning 08:00 and for one consecutive 4 hour period spanning hour beginning 19:00 through hour beginning 22:00.
- The participant must bid into the Day-Ahead or Real-Time Market the maximum Regulation Service capability that wish to qualify. This value must be the lesser of the $\frac{\text{Regulation Capacity}}{\text{response rate}} * 5 \text{ minutes}$ or the Operating Capacity of the unit.
- Customer Relations will coordinate with Operations at the end of the test period to obtain the results of the test.
- A time weighted Performance Index greater than or equal to .85 must be demonstrated over the calendar month period in order to pass the prequalification test.
 - Given the metering latency issue [that may exists](#) for LESR devices ~~described in Section 4.4~~, the Performance Index methodology for passing the prequalification test will not be the only measure used by Customer Relations. The NYISO may request metering records of and engage in consultation with the LESR for this analysis.
- Actions in the event of a failed pre-qualification test
 1. Customer Relations will complete all standard audit documentation as defined in Attachment E of this Manual.
 2. Customer Relations will notify the customer indicating the results of the test.
 3. Customer Relations will remove all regulation bidding privileges.
 4. Customer Relations will forward the test results to Market Mitigation and Analysis (MMA).

5. Prior to requesting a re-test the test participant must provide an explanation to MMA describing the cause of the failed prequalification test.
6. Market Mitigation and Analysis will notify Customer Relations when the test participant is authorized to perform another test.
 - Test participants will be paid for all Regulation Service provided during the test as if the participant was a qualified Regulation Service Supplier.
 - The test participant will be responsible for any balancing payments due to poor performance during the test.

4.13.3 Supplier Regulation Service Performance Audit

All Generators and Demand Side Resources that bid Regulation Service into the NYISO markets may be requested to demonstrate their ability to achieve an acceptable Regulation Service response. The NYISO may conduct a performance audit of an individual Generator or Demand Side Resource at any time and without prior notification.

- The audit time period is defined as a calendar month.
- Regulation Service Suppliers with a time weighted Performance Index for the period chosen that is less than .85 will be referred to MMA for review. [As with the pre-qualification test described in Section 4.13.2, the NYISO may review other data for LESRs in performing the audit analysis.](#)

Suppliers who fail an audit, after consultation with MMA, may be subject to disqualification from participation in the Regulation Market. The procedure for notifying suppliers in the event that they fail an audit is as follows:

NYISO Actions

The NYISO shall:

- Notify the poor performing supplier via telephone or E-mail, upon determination by the NYISO that the supplier has failed an audit.
- Notify the Supplier that it is currently responsible for balancing Regulation Service market payments as described in *NYISO Services Tariff* Rate Schedule 3 and the *NYISO Accounting and Billing Manual* (available from the NYISO Web site at <http://www.nyiso.com/public/documents/manuals/administrative.jsp>), and that persistent non-compliance in accordance with this procedure may result in the provider being removed from the bidders list.

Market Mitigation and Analysis will review the individual cases of suppliers that fail an audit and will notify Customer Relations if they determine that the Supplier should no longer be qualified to bid Regulation Service.

Market Mitigation and Analysis can require that the Regulation Service provider perform a prequalification test once the Supplier has reported that it has addressed the cause of the poor performance.

Regulation Service Provider Actions

The Regulation Service Supplier shall acknowledge the NYISO notification and report its expectation of the time it will be able to return to normal performance. The provider shall

also describe the cause of its poor performance. This notification should be sent to the following e-mail address:

Reference_Price_Update@NYISO.com

Subject line of the e-mail should state “Regulation Service Performance Audit.”

If the Supplier has its qualified to bid Regulation Service status changed to not qualified to bid then the Supplier will be required to complete a prequalification test prior to being reinstated in the market.

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6.4 General Real-Time Market Rules

6.4.1 Bid Selection

The NYISO will automatically select Operating Reserves Suppliers in Real-Time from eligible Resources. All Suppliers will automatically be assigned a Real-Time Operating Reserves Availability bid of \$0/MW.

Demand Side Resources can be qualified to bid synchronous or non-synchronous reserves, but not both. Demand Side Resources that are qualified to bid synchronous reserves must bid a start up cost of \$0 and a minimum generation cost of \$0. Demand Side Resources that are qualified to bid non-synchronous reserves may bid a start up cost but the minimum generation cost must be set to \$0. Demand Side Resources make themselves eligible to offer reserves in the real time market by submitting a real time energy bid. Real time energy bids created from day-ahead bids, based on accepted day-ahead reserve bids cannot be increased. The real time energy bid will be used by RTD to determine energy schedules in real time.

The NYISO may schedule Suppliers that make themselves available to provide Operating Reserves up to the following maximum Operating Reserve levels:

1. For Spinning Reserves, the Resource's emergency response rate multiplied by ten.
2. For 10-Minute Non-Synchronized Reserves, or for non-synchronized 30-Minute Reserves, the Resource's UOL_N or UOL_E , whichever is applicable at the relevant time (the Resource may offer one product or the other depending on the time required for it to start-up and synchronize to the grid).
3. For synchronized 30-Minute Reserves, the Resource's emergency response rate multiplied by 30.

However, the sum of the amount of Energy, or Demand Reduction, that each Resource is scheduled to provide, the amount of Regulation ServiceCapacity it is scheduled to provide, and the amount of each Operating Reserves product it is scheduled to provide shall not exceed its UOL_N or UOL_E , whichever is applicable.

Suppliers will thus be selected based on their response rates, their applicable upper operating limit, and their Energy Bid (which will reflect their opportunity costs) through a co-optimized Real-Time commitment and dispatch process that minimizes the total cost of Energy, Regulation Service, and Operating Reserves. As part of the process, the NYISO shall determine how much of each Operating Reserves product particular Suppliers will be required to provide in light of the Reliability Rules and other applicable reliability standards, including the locational Operating Reserves requirements specified above.

6.4.2 NYISO Notice Requirements

The NYISO shall notify each Supplier of Operating Reserve that has been selected by RTD of the amount of Operating Reserve that it is scheduled to provide. This notification is provided through the Market Information System consistent with all other real-time market notifications.

Attachment D. Regulation Performance Audit Standards

The Regulation Response Audit form, as appropriate, will be completed after each specific audit.

Regulation Response Audit

INDIVIDUAL RESOURCE REGULATION PERFORMANCE RESPONSE TEST

Type of test: Regulation Performance Pass _____ Fail _____

This is a NYISO individual resource audit of _____ regulation performance.

The resource has a Regulation Capacity Response Rate of _____ MWs per minute.

The resource has a Regulation Movement Response Rate of _____ MW per 6 seconds.

The audit start time: _____.

The audit end time: _____.

Time weighted Performance Index: _____

Date _____

Comments and or actions taken _____

Audit Requested By:

Name: _____

Department: _____