

# *Ancillary Services Manual*

*October 2011*

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## Revision History

Version	Date	Revisions
3.2.1	X/X/2011	<p><b>Section 2.2 &amp; 2.3</b></p> <ul style="list-style-type: none"> <li>➤ Refer to OATT, MST &amp; Accounting &amp; Billing Manual for Settlement Information</li> </ul> <p><b>Section 3.4</b></p> <ul style="list-style-type: none"> <li>➤ Refer to OATT, MST &amp; Accounting &amp; Billing Manual for Settlement Information</li> </ul> <p><b>Section 3.6.1</b></p> <ul style="list-style-type: none"> <li>➤ Move specification of acceptable generator VSS data from section 3.4.1 to section 3.6</li> </ul> <p><b>Section 4.4, 4.5, 4.6, 4.7, 4.11 &amp; 4.12</b></p> <ul style="list-style-type: none"> <li>➤ Refer to OATT, MST &amp; Accounting &amp; Billing Manual for Settlement Information</li> </ul> <p><b>Section 4.13.2</b></p> <ul style="list-style-type: none"> <li>➤ Regulation Test Requirements are adjusted including changes to the testing window for the prequalification performance test</li> </ul> <p><b>Section 6.1, 6.6, 6.7 &amp; 6.10</b></p> <ul style="list-style-type: none"> <li>➤ Refer to OATT, MST &amp; Accounting &amp; Billing Manual for Settlement Information</li> </ul> <p><b>Attachment C</b></p> <ul style="list-style-type: none"> <li>➤ Refer to OATT, MST &amp; Accounting &amp; Billing Manual for Settlements Information</li> </ul>
3.20	5/16/2011	<p><b>Section 3.2</b></p> <ul style="list-style-type: none"> <li>➤ Removal of language allowing a resource under the operational control of an External Control Area operator to be eligible for supplying VSS</li> </ul> <p><b>Section 3.4.1</b></p> <ul style="list-style-type: none"> <li>➤ Clarifying the method for determining the payments for VSS suppliers</li> </ul> <p><b>Section 3.5</b></p> <ul style="list-style-type: none"> <li>➤ Removed VSS penalty structure from the Ancillary Services Manual. This language is found in the Market Services Tariff</li> </ul> <p><b>Section 3.6.1</b></p> <ul style="list-style-type: none"> <li>➤ Revised the reactive power metering requirements for existing generators</li> <li>➤ Conformed the Ancillary Services Manual to comply with NPCC Directory #10 test data retention requirements</li> </ul> <p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ Conformed the Ancillary Services Manual to comply with NPCC Directory #10 generators with common elements testing requirements</li> </ul>
3.19	2/1/2011-3/9/2011	<p><b>Section 4.8</b></p> <ul style="list-style-type: none"> <li>➤ Updates to the Regulation Service quantities and their associated prices</li> </ul> <p><b>Section 6.8</b></p>

		<ul style="list-style-type: none"> <li>➤ Updates to the prices associated with certain reserve products (Total 10-Minute Reserves and Long Island 30 Minute Reserves)</li> </ul> <p><b>Section 7.4</b></p> <ul style="list-style-type: none"> <li>➤ Updates to black start service procedures for black start Generator actions.</li> </ul>
<b>3.18</b>	<b>11/18/2010</b>	<p><b>Sections 3.6 and 3.6.1</b></p> <ul style="list-style-type: none"> <li>➤ Changed timing and requirements for Leading Reactive Power tests.</li> </ul> <p><b>Attachment B</b></p> <ul style="list-style-type: none"> <li>➤ Included certification for Leading Reactive Power tests on Figure B-3.</li> </ul>
<b>3.17</b>	<b>09/21/2010</b>	<p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ Updated Table 3.1 to reflect revised real-power level for Leading Reactive Power tests.</li> </ul> <p><b>Section 3.6.4</b></p> <ul style="list-style-type: none"> <li>➤ Changed timing for reporting test results.</li> </ul> <p><b>Section 3.7.2</b></p> <ul style="list-style-type: none"> <li>➤ Corrected misspelled word.</li> </ul> <p><b>Section 4.1</b></p> <ul style="list-style-type: none"> <li>➤ Changed Regulation and Frequency Response Requirement posting to as needed.</li> </ul> <p><b>Section 4.2</b></p> <ul style="list-style-type: none"> <li>➤ Corrected and added Response Rate Requirements.</li> </ul> <p><b>Section 4.3.1</b></p> <ul style="list-style-type: none"> <li>➤ Changed paragraph formatting.</li> </ul> <p><b>Section 4.3.2</b></p> <ul style="list-style-type: none"> <li>➤ Corrected Regulation Service capacity allocation with respect to the Regulation Response Rate.</li> </ul> <p><b>Section 4.7.3</b></p> <ul style="list-style-type: none"> <li>➤ Corrected equation for Payment/Charge calculation.</li> </ul> <p><b>Section 4.13.2</b></p> <ul style="list-style-type: none"> <li>➤ Changed MMP to MMA.</li> </ul> <p><b>Section 4.13.3</b></p> <ul style="list-style-type: none"> <li>➤ Changed MMP to MMA.</li> </ul> <p><b>Section 6.1</b></p> <ul style="list-style-type: none"> <li>➤ Corrected description of transaction types that result in energy loss.</li> </ul> <p><b>Section 6.2.1</b></p> <ul style="list-style-type: none"> <li>➤ Revised Table 6.2 as follows:             <ul style="list-style-type: none"> <li>• Added zones to locational titles.</li> <li>• Changed Long Island 10-minute Spinning Reserve requirement.</li> <li>• Updated references to NYSRC, NERC and NPCC requirements.</li> </ul> </li> </ul> <p><b>Section 6.4.1</b></p> <ul style="list-style-type: none"> <li>➤ Added reference to Real-Time dispatch.</li> </ul> <p><b>Section 6.8</b></p> <ul style="list-style-type: none"> <li>➤ Changed paragraph formatting.</li> </ul> <p><b>Section 6.9</b></p> <ul style="list-style-type: none"> <li>➤ Referred to Market Services Tariff for exceptions to requirements for</li> </ul>

		<p>Self-Supply of Operating Reserves.</p> <p><b>Section 6.12.2</b></p> <ul style="list-style-type: none"> <li>➤ Changed MMP to MMA.</li> </ul> <p><b>Attachment D</b></p> <ul style="list-style-type: none"> <li>➤ Removed attachment.</li> </ul> <p><b>Attachment E</b></p> <ul style="list-style-type: none"> <li>➤ Corrected misspelled word.</li> </ul>
3.16	07/16/2010	<p><b>Global</b></p> <ul style="list-style-type: none"> <li>➤ Standardized references to NYISO tariffs and updated tariff citations to reflect section renumbering secondary e-Tariff implementation.</li> </ul> <p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ Changed requirements for real-power level for Limited Control Run of River Hydro Resources to test as a percentage of UCAP.</li> <li>➤ Changed real-power levels for reactive power testing to a table format (Table 3.1).</li> </ul> <p><b>Attachment A</b></p> <ul style="list-style-type: none"> <li>➤ In Attachment A-1, added <i>UCAP</i> to column heading for DMNC entry.</li> <li>➤ In Attachment A-1, added footnote that UCAP is used only for Limited Control Run of River Hydro Resources.</li> </ul> <p><b>Attachment B</b></p> <ul style="list-style-type: none"> <li>➤ Updated Figure B-1 to provide for using UCAP for Limited Control Run of River Hydro Resources.</li> </ul>
3.15	10/21/2009	<p><b>Section 7.2</b></p> <ul style="list-style-type: none"> <li>➤ Corrected reference to Rate Schedule 5 of the <i>NYISO Market Administration and Control Area Services Tariff (Services Tariff)</i>.</li> </ul> <p><b>Section 7.3</b></p> <ul style="list-style-type: none"> <li>➤ Corrected title and replaced text with reference to Rate Schedule 6 of the <i>NYISO Open Access Transmission Tariff (OATT)</i>, Rate Schedule 5 of the <i>NYISO Services Tariff</i>, and the <i>Accounting and Billing Manual</i>.</li> </ul> <p><b>Section 7.4</b></p> <ul style="list-style-type: none"> <li>➤ Added requirement for annual certification.</li> </ul>
3.14	09/17/2009	<p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ Added requirement for real-power level at which Leading VAr tests must be conducted.</li> </ul>
3.13	06/02/2009	<p><b>Global</b></p> <ul style="list-style-type: none"> <li>➤ Revised external-document links to explicitly cite URLs from which documents may be accessed.</li> </ul> <p><b>Section 4 Global</b></p> <ul style="list-style-type: none"> <li>➤ Added process and procedures specific to Limited Energy Storage Resources.</li> <li>➤ Replaced or inserted, where appropriate, "Regulation" with "Regulation Service."</li> </ul> <p><b>Section 4.2</b></p> <ul style="list-style-type: none"> <li>➤ Added Figures describing LESR scheduling limits.</li> </ul> <p><b>Section 4.3.2</b></p> <ul style="list-style-type: none"> <li>➤ Added LESR Regulation Service scheduling protocol.</li> </ul> <p><b>Section 4.3.4</b></p>



		<ul style="list-style-type: none"> <li>➤ Modified Description of Regulation Service energy deployments by AGC that include LESR devices.</li> </ul> <p><b>Section 4.3.5</b></p> <ul style="list-style-type: none"> <li>➤ Described RTD/AGC interaction during the scheduling of LESR Regulation service</li> <li>➤ Defined treatment of LESRs during RTD-CAM events.</li> </ul> <p><b>Section 4.4</b></p> <ul style="list-style-type: none"> <li>➤ Defined Performance Tracking exemption in place for LESR devices.</li> </ul> <p><b>Section 4.5.2</b></p> <ul style="list-style-type: none"> <li>➤ Clarified LESR DAM settlement eligibility.</li> </ul> <p><b>Section 4.6.4</b></p> <ul style="list-style-type: none"> <li>➤ Clarified LESR Real-Time settlement eligibility.</li> </ul> <p><b>Section 4.7.4</b></p> <ul style="list-style-type: none"> <li>➤ Added section to describe LESR energy settlements.</li> </ul> <p><b>Section 4.13.2</b></p> <ul style="list-style-type: none"> <li>➤ Modified Regulation Service Pre-qualification test procedure.</li> </ul>
<p><b>3.12</b></p>	<p><b>04/23/2009</b></p>	<p><b>Global</b></p> <ul style="list-style-type: none"> <li>➤ Reformatted per new template to standardize presentation.</li> <li>➤ Implemented minor stylistic changes.</li> <li>➤ Standardized labeling and numbering of graphical and tabular material.</li> </ul> <p><b>Revision History Table</b></p> <ul style="list-style-type: none"> <li>➤ Changed column headings as follows:             <ul style="list-style-type: none"> <li>• “Revision” changed to “Version”</li> <li>• “Changes” changed to “Revisions”</li> </ul> </li> <li>➤ Standardized date format to mm/dd/yyyy.</li> <li>➤ Implemented minor stylistic changes in entries.</li> </ul> <p><b>Section 3.2</b></p> <ul style="list-style-type: none"> <li>➤ Added provisions for exemption of Leading VAR test requirements.</li> <li>➤ Changed form to Attachment A-1.</li> <li>➤ Clarified qualification form submittal requirements.</li> <li>➤ Included e-mail address for qualification form.</li> </ul> <p><b>Section 3.6</b></p> <ul style="list-style-type: none"> <li>➤ Added reference to exemption of Leading VAR test requirements.</li> </ul> <p><b>Section 3.6.1</b></p> <ul style="list-style-type: none"> <li>➤ Added reference to exemption of Leading VAR test requirements in two paragraphs.</li> </ul> <p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ Added provision for submitting net metered data for absorbing reactive power.</li> </ul> <p><b>Section 3.6.6</b></p> <ul style="list-style-type: none"> <li>➤ New section detailing exemption of Leading VAR test requirements.</li> </ul> <p><b>Attachment A</b></p> <ul style="list-style-type: none"> <li>➤ Revised “Attachment A” name to “Attachment A-1.”</li> <li>➤ Clarified qualification form submittal requirements.</li> <li>➤ Removed requirement to submit test results at the same time as the qualification form.</li> </ul>

		<ul style="list-style-type: none"> <li>➤ Added Attachment A-2, "Request for Identical Treatment."</li> </ul> <p><b>Attachment B</b></p> <ul style="list-style-type: none"> <li>➤ Changed title to "MVAr Capability Test Forms."</li> </ul>
3.11	09/16/2008	<p><b>Section 4</b></p> <ul style="list-style-type: none"> <li>➤ Substantial information added to address Demand Side Ancillary Services (DSASP) related resources.</li> </ul> <p><b>Section 5.3</b></p> <ul style="list-style-type: none"> <li>➤ Monthly Meter Reading Adjustments detail regarding internal NYISO procedures was removed and reader is directed to refer to the Accounting and Billing Manual for this information.</li> </ul> <p><b>Section 6</b></p> <ul style="list-style-type: none"> <li>➤ Substantial information added to address Demand Side Ancillary Services related resources.</li> </ul> <p><b>Various Sections throughout Manual</b></p> <ul style="list-style-type: none"> <li>➤ Grammatical edits related to changing language to be consistent with DSASP Tariff language. a spreadsheet, report, test and form.</li> </ul> <p><b>Attachment C</b></p> <ul style="list-style-type: none"> <li>➤ Substantial information added to address Demand Side Ancillary Services (DSASP) related resources.</li> </ul> <p><b>Attachment E</b></p> <ul style="list-style-type: none"> <li>➤ New Attachment added to address Demand Side Ancillary Services (DSASP) related resources.</li> </ul>
3.10	02/26/2008	<p><b>Section 3.2</b></p> <ul style="list-style-type: none"> <li>➤ Added clarifying sub-bullet to first bullet in first paragraph.</li> <li>➤ Added clarifying sub-bullet to first bullet in second paragraph.</li> </ul> <p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ Added clarifying language to the lagging MVAr test requirements to third paragraph, including bullets clarifying DMNC test requirements and nameplate data allowances.</li> </ul> <p><b>Section 3.6.4</b></p> <ul style="list-style-type: none"> <li>➤ Grammatical edits related to Attachment B and the clarification of the usage of a spreadsheet, report, test and form.</li> </ul> <p><b>Sections 4.6.3, 6.10, and Various Sections throughout Manual</b></p> <ul style="list-style-type: none"> <li>➤ Minor formatting changes.</li> </ul> <p><b>Attachment A</b></p> <ul style="list-style-type: none"> <li>➤ Resource table updated with clarifying column-heading information.</li> <li>➤ Document approval requirements were edited for clarity.</li> </ul> <p><b>Attachment B</b></p> <ul style="list-style-type: none"> <li>➤ Figures B-1, B-2, and B-3 updated with new spreadsheet content.</li> </ul>
3.9	10/30/2007	<p><b>Section 3.1</b></p> <ul style="list-style-type: none"> <li>➤ Deleted "generation" from first paragraph.</li> </ul> <p><b>Section 3.2</b></p> <ul style="list-style-type: none"> <li>➤ Formatted first paragraph into bullets.</li> <li>➤ Corrected address of Manager, Auxiliary Market Operations.</li> </ul> <p><b>Section 3.4.2</b></p> <ul style="list-style-type: none"> <li>➤ Added "and, except as noted in the following paragraph, Qualified Non-Generator Voltage Support Resources" to first paragraph.</li> </ul>

		<p><b>Section 3.4.3</b></p> <ul style="list-style-type: none"> <li>➤ Added “In the case of the Cross-Sound Scheduled Line, the product of \$3919/MVAr and that tested, Reactive Power (MVAr) capacity measured at maximum real power flow.” as a third bullet.</li> </ul> <p><b>Section 3.4.4</b></p> <ul style="list-style-type: none"> <li>➤ Clarified definitions of D1, D2, and Bid.</li> </ul> <p><b>Section 3.5</b></p> <ul style="list-style-type: none"> <li>➤ Added “its Normal Operating limit, which must be at least 90% of its” to first paragraph.</li> </ul> <p><b>Section 3.5.2</b></p> <ul style="list-style-type: none"> <li>➤ Added “Generators that fail to provide voltage support following contingencies will not be charged lost opportunity costs for replacement sources of voltage support because there will not be enough time to arrange for replacement sources.” to paragraph b.</li> </ul> <p><b>Section 3.6.1</b></p> <ul style="list-style-type: none"> <li>➤ Added the following: “Small units at the same site may apply test results from one unit to another unit at the same site. In order to qualify for this treatment, the units must be electrically identical and must be less than 60 MW nameplate capacity. Qualification to apply test results from one unit to another requires one-time submittal of the D-curve and registration information for each unit, along with a request for this treatment, and pre-approval by the Manager, Auxiliary Market Operations. Each year, a test result form must be submitted for each unit that is requesting this treatment. The test form must reference the PTID of the unit at the site that actually performed the test and the date and time of the test.”</li> </ul> <p><b>Section 3.6.5</b></p> <ul style="list-style-type: none"> <li>➤ Added fourth condition for Out of Period Reactive Capability Testing, with associated guidance: “A nuclear generating unit that has an AVR that is not functioning during the test period.”</li> </ul> <p><b>Attachment C</b></p> <ul style="list-style-type: none"> <li>➤ Added clarifying language to table: <i>each 30-second interval “p” or during each 30-second interval “p”.</i></li> <li>➤ Added definition of “measured output: , MW<sub>meas p</sub>.”</li> <li>➤ Corrected Regulation Performance Index formula.</li> </ul>
<p>3.8</p>	<p>06/06/2007</p>	<p><b>Section 3.2</b></p> <ul style="list-style-type: none"> <li>➤ Second paragraph – added “Attachment A”.</li> </ul> <p><b>Section 3.6</b></p> <ul style="list-style-type: none"> <li>➤ Second paragraph – corrected “Test data reports must be submitted electronically by the VSS Supplier within ten (10) business days...” – originally stated five (5) business days.</li> </ul> <p><b>Attachment A</b></p> <ul style="list-style-type: none"> <li>➤ Updated first bullet – added, “including voltage regulator...data sheet (“D-curve”).”</li> </ul> <p><b>Attachment B</b></p> <ul style="list-style-type: none"> <li>➤ Section B-1 – Restored missing “Reason for Limit” column.</li> <li>➤ Section B-2 and B-3 – Removed “Part 1” from figure titles.</li> </ul>
<p>3.7</p>	<p>03/08/2007</p>	<p><b>Administrative Change</b></p> <ul style="list-style-type: none"> <li>➤ Removed 10 Krey Blvd address for Manager, AMO, and replaced with 3890 Carman Road address.</li> </ul>

		<p><b>Section 3.6</b></p> <ul style="list-style-type: none"> <li>➤ Clarify that functioning AVR is required during</li> </ul>
3.6	12/08/2006	<p><b>Attachment B – AGC Functional Requirements</b></p> <ul style="list-style-type: none"> <li>➤ Deleted. There were no references to the Attachment in version 3.5 of the manual.</li> </ul> <p><b>Attachment A – VSS Qualifications Request Form</b></p> <ul style="list-style-type: none"> <li>➤ New. Inserted Qualification Request Form from TB 103. (TB 103 can be retired.) Subsequent Attachments have been relabeled.</li> </ul> <p><b>Section 1.3</b></p> <ul style="list-style-type: none"> <li>➤ Inserted new section 1.3 “Payments and Charges for Ancillary Services” (from TB 121; TB 121 should be incorporated in the <i>Accounting and Billing Manual</i> before being retired). Sections following 1.3 have been renumbered.</li> </ul> <p><b>Section 3.2</b></p> <ul style="list-style-type: none"> <li>➤ Inserted new section 3.2 Supplier Qualifications (from TB 091 and TB 103); sections following 3.2 have been renumbered.</li> </ul> <p><b>Section 3.6</b></p> <ul style="list-style-type: none"> <li>➤ Modified in accordance with RT SCHED 2, Sect 1.1. <ul style="list-style-type: none"> <li>• Changed title of heading to “Reactive Power Capability Demonstration”.</li> <li>• Second paragraph – inserted language on providing data during actual operation.</li> <li>• Section 3.6 (old section 3.5) – Incorporated TB 091. (TB 091 can be retired.)</li> </ul> </li> </ul> <p><b>Section 3.6.1</b></p> <ul style="list-style-type: none"> <li>➤ Changed title of heading to “Frequency and Timing”.</li> <li>➤ First paragraph – inserted language stating each calendar year resources providing VSS must demonstrate both lagging and leading reactive capability.</li> </ul> <p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ First paragraph – inserted language on how measurements should be taken and how tests must be performed.</li> </ul> <p><b>Section 3.6.4</b></p> <ul style="list-style-type: none"> <li>➤ Changed title of heading to “Reporting Requirements.”</li> <li>➤ Replaced demonstration with “tests and/or demonstrations.”</li> <li>➤ Section 3.6.4 (old section 3.5.4) – Incorporated TB 126. (TB 126 must also be incorporated in ICAP manual then can be retired.)</li> </ul>
3.5	05/18/2006	<p><b>Section 3.1</b></p> <ul style="list-style-type: none"> <li>➤ Second paragraph – Added Note.</li> </ul> <p><b>Section 3.2</b></p> <ul style="list-style-type: none"> <li>➤ First para, first sent. – Deleted “Generating” added “Supplier’s”.</li> <li>➤ Third bullet, second sent. – Added “range” after capability. Added “..., as directed by...System Operator” to second sentence.</li> </ul> <p><b>Section 3.3</b></p> <ul style="list-style-type: none"> <li>➤ Third bullet – Deleted “payments...utility generators.”</li> </ul> <p><b>Section 3.3.1</b></p> <ul style="list-style-type: none"> <li>➤ First sent. – Added “synchronous” before generators. Also, added “the</li> </ul>

		<p>gross...MVAR" before capability.</p> <p><b>Section 3.3.2</b></p> <ul style="list-style-type: none"> <li>➤ First sent. – Added "...as the product of...The NYISO shall..." Also, added "to Suppliers on a monthly basis."</li> </ul> <p><b>Section 3.3.5</b></p> <ul style="list-style-type: none"> <li>➤ First sent. – Added "in accordance with Rate Schedule No. 2 of the OATT." Deleted second sentence and all other text until section 3.4.</li> </ul> <p><b>Section 3.4</b></p> <ul style="list-style-type: none"> <li>➤ Added line item #4.</li> <li>➤ Second paragraph – Added "...and is not otherwise...section 3.6.2."</li> </ul> <p><b>Sections 3.4.1 and 3.4.2</b></p> <ul style="list-style-type: none"> <li>➤ Line items a) through c) – Added "supplier" deleted "provider". Line item c) – Added "Resource" deleted "provider".</li> </ul> <p><b>New Section 3.4.3</b></p> <ul style="list-style-type: none"> <li>➤ Added entirely new section.</li> </ul> <p><b>Section 3.5</b></p> <ul style="list-style-type: none"> <li>➤ First para, first sent. – Deleted "...generators used" added "resources". Also, added "..., and provides the basis...support service".</li> <li>➤ Second para, first sent. – Deleted "...are used for" added, "participate in".</li> <li>➤ Second para, second sent. – Added "...reports must be...upon". Also, deleted "for any unit will be accepted" and added "acceptance will be".</li> </ul> <p><b>Section 3.5.1</b></p> <ul style="list-style-type: none"> <li>➤ First para, first sent. – Added "synchronous" and "voltage support". Second sent. Added "<i>The demonstrated Gross... (calendar) year.</i>" Second sentence was completely rewritten.</li> </ul> <p><b>Section 3.5.2</b></p> <ul style="list-style-type: none"> <li>➤ First para, first sent. – Deleted "conduct" and added "perform and report". Third sent. deleted "terminals" and added "terminal (gross)... interconnection (net)". Added new first paragraph under "Annual Tests". Under "Test Results" deleted "five (5)" and replaced with "ten (10)". Added new second sentence "The test report...electronically."</li> </ul> <p><b>Section 3.5.4</b></p> <ul style="list-style-type: none"> <li>➤ New.</li> </ul> <p><b>Section 3.6.2</b></p> <ul style="list-style-type: none"> <li>➤ Changed title of section from "Automatic Voltage Regulator Availability" to "Voltage Support Availability". Under "Supplier Actions" added "...is obligated...support capability. The supplier..." Added line item #1 – "The Automatic Voltage...System Operator." Added to line item #2 was rewritten. Added to line item #3 "and TO System Operator..." Deleted "needed" and replaced with "necessary." Added "(or other)". Added new line item #4.</li> </ul>
<p><b>3.0</b></p>	<p><b>11/01/2005</b></p>	<p><b>Global Changes</b></p> <ul style="list-style-type: none"> <li>➤ All Sections and Attachments include changes to reflect SMD2. All references to SCD changed to RTD, Pool Control Error (PCE) changed to ACE, NYISO changed to NYISO, Security Constrained Dispatch to Real-Time Dispatch.</li> <li>➤ All references to 30- and 10-minute synchronized reserves were changed to 30- and 10-minute spinning reserves. In addition, all references to Transmission Provider (TP) were changed to</li> </ul>

		<p>Transmission Owner (TO).</p> <ul style="list-style-type: none"> <li>➤ When and where appropriate, RTD was changed to RTD-CAM.</li> <li>➤ Document formatting was repaired.</li> </ul> <p><b>Section 2.3.3</b></p> <ul style="list-style-type: none"> <li>➤ Reference to Section 2.2.1 instead of repeating the lengthy description.</li> </ul> <p><b>Section 3</b></p> <ul style="list-style-type: none"> <li>➤ Added new text after figure 3.1.</li> </ul> <p><b>Sections 3.4.1 and 3.4.2</b></p> <ul style="list-style-type: none"> <li>➤ Added “Reinstatement of Payments”.</li> </ul> <p><b>Section 4.2</b></p> <ul style="list-style-type: none"> <li>➤ Changed generating unit operating characteristics exhibit and response rate definitions to reflect Technical Bulletin 71.</li> </ul> <p><b>Section 4.3.1</b></p> <ul style="list-style-type: none"> <li>➤ Updated figure 4.3.1-1.</li> </ul> <p><b>Section 4.3.2</b></p> <ul style="list-style-type: none"> <li>➤ Added regulation default description.</li> </ul> <p><b>Section 4.3.5</b></p> <ul style="list-style-type: none"> <li>➤ Added “in proportion to this ramp rate; however, some quantization is needed to avoid very small schedule changes,” to second paragraph.</li> </ul> <p><b>Section 4.4.1</b></p> <ul style="list-style-type: none"> <li>➤ Renamed section to Performance Penalty to Performance Adjustment and deleted Deferral of Regulation Performance Penalties.</li> </ul> <p><b>Section 4.4.2</b></p> <ul style="list-style-type: none"> <li>➤ Deleted. Old Section 4.4.2, Regulation Performance Penalty, moved to new Attachment D.</li> </ul> <p><b>Section 4.6</b></p> <ul style="list-style-type: none"> <li>➤ Old Section 4.6 was moved to new Section 4.13.</li> </ul> <p><b>Section 4.6.4</b></p> <ul style="list-style-type: none"> <li>➤ Added “In addition, Attachment D of this Manual provides additional information on performance-based adjustments to regulation service payments” to last paragraph.</li> <li>➤ Moved equation for <math>K_{PI}</math> and additional text to Attachment D.</li> </ul> <p><b>Section 4.6.5</b></p> <ul style="list-style-type: none"> <li>➤ Deleted.</li> </ul> <p><b>Sections 4.7 through 4.13</b></p> <ul style="list-style-type: none"> <li>➤ New additions.</li> </ul> <p><b>Section 6.1</b></p> <ul style="list-style-type: none"> <li>➤ Joint optimization descriptions added.</li> <li>➤ Deleted text under figure 6.1-1.</li> </ul> <p><b>Sections 6.2 through 6.10</b></p> <ul style="list-style-type: none"> <li>➤ Replaces old Sections 6.2 through 6.4.</li> </ul> <p><b>Section 6.2</b></p> <ul style="list-style-type: none"> <li>➤ Inserted new section and table to be consistent with Technical Bulletin 87.</li> </ul> <p><b>Section 6.7.2</b></p> <ul style="list-style-type: none"> <li>➤ Added the following paragraph “Scarcity pricing rules A and B are</li> </ul>
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		<p>invoked when SCR/EDRP resources are activated and, but for the SCR/EDRP resources, the NYCA would experience a shortage of reserve. Scarcity pricing rule A applies when, but for SCR/EDRP resources, the NYCA would experience a shortage of reserve. Scarcity pricing rule B applies when, but for SCR/EDRP resources, the eastern portion of the NYCA would experience a shortage of reserve.”</p> <p><b>Section 6.11</b></p> <ul style="list-style-type: none"> <li>➤ Same as old Section 6.5.</li> </ul> <p><b>Section 6.12</b></p> <ul style="list-style-type: none"> <li>➤ Same as old Section 6.6.</li> </ul> <p><b>Attachments</b></p> <ul style="list-style-type: none"> <li>➤ Deleted original Attachment A – Dispatch Load and Spinning Reserve. The remaining attachments were re-numbered.</li> </ul> <p><b>Attachment A</b></p> <ul style="list-style-type: none"> <li>➤ New test forms.</li> </ul> <p><b>Attachment B – AGC Functional Requirements</b></p> <ul style="list-style-type: none"> <li>➤ Under section “Unit Response Rates” <ul style="list-style-type: none"> <li>• First paragraph – added “A unit may specify up to three NORMAL response rates. When multiple NORMAL response rates are defined, each is applied to a portion of the unit’s operating range.”</li> <li>• Second paragraph – added “the capacity-weighted” before the three instances of NRR. In addition, made NRR plural.</li> </ul> </li> <li>➤ End of Ramped RTD Basepoints section, added text from section 5.3.7 of the <i>Transmission and Dispatching Operations Manual</i>.</li> </ul> <p><b>Attachment C</b></p> <ul style="list-style-type: none"> <li>➤ Replaced Regulation Performance Penalty with Regulation Performance Adjustment.</li> <li>➤ Added equation for <math>K_{PI}</math> and additional text from section 4.6.4 to Attachment C.</li> </ul> <p><b>Attachment D</b></p> <ul style="list-style-type: none"> <li>➤ Replaced – Removed actual document and provided a link to the document, which is maintained by NERC.</li> </ul> <p><b>Attachment E</b></p> <ul style="list-style-type: none"> <li>➤ Deleted.</li> </ul> <p><b>Attachment F</b></p> <ul style="list-style-type: none"> <li>➤ Deleted.</li> </ul>
<p><b>2.0</b></p>	<p><b>04/06/2004</b></p>	<p><b>Global</b></p> <ul style="list-style-type: none"> <li>➤ Complete reformatting of document.</li> <li>➤ Grammatical and syntactical corrections.</li> </ul> <p><b>Sections 3.3.1 through 3.3.3, 3.5.1, and 3.5.2</b></p> <ul style="list-style-type: none"> <li>➤ Deleted references to Six-year testing, and updated the cost determination to reflect current <i>NYISO Services Tariff /Rate Schedule No. 2</i>.</li> </ul> <p><b>Section 4.1</b></p> <ul style="list-style-type: none"> <li>➤ Added “which may vary by hour and by season. Seasonally, the NYISO shall post the hourly regulation and frequency response requirements and, prior to the start of the season, shall present the regulation and frequency response requirements to the SOAS for discussion and comment. Should the NYISO determine that it intends to establish regulation and frequency response requirements for any</li> </ul>

		<p>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 analyses of the regulation performance in that Capability Period.” to second paragraph.</p> <p><b>Section 4.3</b></p> <ul style="list-style-type: none"> <li>➤ Added “As specified in Section 4.1, r” to first sentence. Added “or directly from the NYISO.” to last sentence.</li> </ul> <p><b>Section 4.3.2</b></p> <ul style="list-style-type: none"> <li>➤ Added “for that day” to first sentence.</li> </ul> <p><b>Attachment B</b></p> <ul style="list-style-type: none"> <li>➤ Replaced Reactive Capability test form with current (2004) version.</li> </ul>
<p><b>1.0</b></p>	<p><b>07/15/1999</b></p>	<p><b>Initial Release</b></p> <ul style="list-style-type: none"> <li>➤ Section 2.3.2, page 8 <ul style="list-style-type: none"> <li>• Clarification of applicability of service charges.</li> </ul> </li> <li>➤ Section 2.3.3, page 10 <ul style="list-style-type: none"> <li>• Charges Associated with Local Reliability Rules.</li> </ul> </li> <li>➤ Section 3.3.5, page 7 <ul style="list-style-type: none"> <li>• Clarification of applicability of voltage support charges.</li> </ul> </li> </ul>



# 1. OVERVIEW

This section gives an overall description of the following Ancillary Services.

- Scheduling, System Control and Dispatch Service
- Voltage Support Service
- Regulation and Frequency Response Service
- Energy Imbalance Service
- Operating Reserve Service
- Black Start Capability Service

## 1.1 Purpose

The purpose of this Manual is to provide an overview of the Ancillary Services available in the New York market along with settlement process associated with each of the available ancillary services.

## 1.2 Summary of Services

Ancillary Services support the transmission of energy from resources to loads, while maintaining reliable operation of the New York State (NYS) Power System. Ancillary Services consist of physical equipment and human resources. The New York Independent System Operator (NYISO) is also responsible for directing the actions of Generation Resources and other facilities that provide Ancillary Services to the NYISO.

The NYISO coordinates the provision of all Ancillary Services and directly arranges for the supply of all Ancillary Services that are not self-supplied. Some Ancillary Services must be provided by the NYISO; others can either be provided by the NYISO or procured by the Transmission Customers and Suppliers themselves. Some Ancillary Services are provided at market-based prices, while others, due to the nature of the service, are provided at embedded cost-based prices. All Ancillary Service providers must be scheduled by the NYISO. [Table 1.1](#) presents a summary of the NYISO Ancillary Services.

**Table 1.1 Ancillary Services Summary**

Ancillary Service	Is the Service Location Dependent?	Who provides the Service – NYISO or Self-Supplied (SS)?	What is the Pricing method for the Ancillary Service?
Scheduling, System Control and Dispatch Service	No	NYISO	Embedded
Voltage Support Service	No	NYISO	Embedded
Regulation and Frequency Response Service	No	NYISO or (SS)	Market-based
Energy Imbalance Service	No	NYISO	Market-based
Operating Reserve Service	Yes	NYISO or (SS)	Market-based

Black Start Capability Service	Yes	NYISO	Embedded
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### 1.3 Payments and Charges for Ancillary Services

Payments and charges for ancillary services are described in the *NYISO Accounting and Billing Manual* (available from the NYISO Web site at the following URL: [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)) and set forth in the *NYISO Open Access Transmission Tariff (OATT)* and *NYISO Market Administration and Control Area Services Tariff (Services Tariff)* as noted in [Table 1.2](#).

**Table 1.2 Rate Schedules for Ancillary Services**

Ancillary Service	NYISO OATT Rate Schedule	NYISO Services Tariff Rate Schedule
Scheduling, System Control and Dispatch Service	1	1
Voltage Support Service	2	2
Regulation and Frequency Response Service	3	3
Energy Imbalance Service	4	N/A
Operating Reserve Service	5	4 and 6
Black Start Capability Service	6	5

### 1.4 Self-Supply of Ancillary Services

Transmission Customers and Suppliers are permitted to Self-Supply certain Ancillary Services, as identified in [Table 1.1](#). In general, the following process must occur in order to Self-Supply Ancillary Services:

1. A Transmission Customer bids the resource required to provide the Ancillary Service into the Ancillary Services market.
2. The NYISO selects the successful bidders to provide each Ancillary Service. The selection of all Ancillary Service providers is subject to the same locational criteria.
3. Transmission Customers and Suppliers with resources selected by the NYISO use the revenues that they would otherwise have received for providing these services as an offset against charges they would otherwise need to pay the NYISO for the service.
  - The LSEs identify in their application to NYISO the Ancillary Services that they plan to purchase through the NYISO.
  - All suppliers of Ancillary Services using the self-supply option must place the facility under the operational control of the NYISO. All of these resources are subject to the same NYISO locational and performance criteria, and are subject to all payments and penalties as are defined for all other suppliers of the service.
  - For more information, see the *NYISO Accounting and Billing Manual* (available from the NYISO Web site at the following URL:

[http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp))

## 1.5 Metering Requirements

- Ancillary Services Suppliers must ensure that adequate metering data is made available to the NYISO by direct transmission to the NYISO through existing Transmission Owner communication equipment.
- Additionally, for operational purposes, metered data provided to the NYISO must also simultaneously be provided to the Transmission Owner, which will handle such information consistent with the [OASIS](#) standards of conduct as specified in FERC Order No. 889.

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## 2. SCHEDULING, SYSTEM CONTROL, AND DISPATCH SERVICE

This section describes the scheduling, system control and dispatch services provided by the New York Independent System Operator (NYISO).

### 2.1 Description

The scheduling, system control and dispatch service is grouped into two broad categories related to the physical operation of the NY Control Area:

- System Security Management in real-time
- Capacity Management

The list of services, together with a description of each service is presented in [Table 2.1](#) and [Table 2.2](#).

**Table 2.1 System Security Management in Real Time Functions**

Service Function	Description
Tie-Line Regulation and Frequency Support	The NYISO develops the Area Control Error (ACE) for the NY Control Area and Automatic Generation Control (AGC).
System Restoration	The NYISO develops and manages operating procedures to be used as a guide to NY Control Area restoration, following major disturbances. The NYISO provides restoration training to NYISO Dispatchers, Transmission Owners, LSEs, and Generators.
Time Error Management	The NYISO performs all required activities for time error correction and coordinates this activity with neighboring Control Areas.
Interchange Scheduling Management	The NYISO coordinates the scheduling of all Bilateral Transactions in the Day-Ahead and Real-Time Market. The NYISO prepares a monthly forecast, on a daily basis, of all system transfer limitations due to scheduled facility outages.
System Emergency Management	The NYISO develops procedures for operation of the New York Control Area that define the various security operating states and the responsibilities of the NYISO and the LSEs. System emergency management entails the cooperation of the NYISO, LSEs, Transmission Owners, and Generators in returning the NY Control Area to a Normal State from either a Major Emergency, Warning, or Alert State.
Administration of Inter-Control Area Emergency Transactions	The NYISO coordinates the purchases and sales of Energy and Capacity, on a prescheduled or emergency basis, to prevent the NY Control Area from leaving the Normal State or to assist neighboring Control Areas.
Operator Initiated Load Shedding	The NYISO develops and manages operating procedures that specify conditions under which NYISO directed Load Shedding is carried out.

<b>Service Function</b>	<b>Description</b>
Under Frequency Load Shedding	The NYISO establishes guidelines and coordinates the settings and amounts of automatic under-frequency relays within each Transmission Owners' distribution area.
Transmission System Operation	The NYISO monitors the operation of the transmission system and coordinates circuit, capacitor, and reactor switching, as well as scheduling flows on phase angle regulators (PARs) which control the flows into or out of neighboring control areas.
Real-Time Commitment (RTC) and Real-Time Dispatch (RTD) Programs	The NYISO maintains and modifies the RTC and RTD programs, as required, to maintain reliable power system operation.
Security Constrained Unit Commitment (SCUC) Programs	The NYISO maintains and modifies the SCUC programs, as required, to maintain reliable power system operation.
Locational-Based Marginal Price Programs	The NYISO maintains and modifies the LBMP software programs as required.
Communications	The NYISO PCC and Transmission Owner Control Centers maintain communication systems and SCADA systems. The NYISO also maintains an OASIS node and an Electronic Bid System.

**Table 2.2 Capacity Management Functions**

<b>Service Function</b>	<b>Description</b>
Installed Capacity Criteria and Requirements	The NYISO establishes the installed capacity requirements for each LSE, based on standards promulgated by the NYSRC.
On-Line and Forecasted Capacity Management	The NYISO, on a Day-Ahead and week-ahead basis, forecasts the expected operating capacity that is required to meet the forecasted peak load and reserve requirement.
Operating Reserve Management	The NYISO continuously monitors the Operating Reserve to ensure that there is sufficient on-line capacity to meet the peak load and reserve requirements of the dispatch day.
Operating Reserve Scheduling	The NYISO establishes operating procedures for the management of Operating Reserve. The NYISO establishes the required amount of Operating Reserve and schedules the bidding suppliers to provide the service.
Generator Outage Scheduling	The NYISO coordinates the generator maintenance schedules to ensure sufficient Operating Reserve margins.
Transmission Facility Outage Coordination	The NYISO coordinates all requested transmission outages to ensure system reliability and transmission transfer capabilities.
Generation and Auxiliary Facility Outage Coordination	The NYISO coordinates the simultaneous outages of generators and key auxiliary generator equipment such as Automatic Voltage Regulators (AVRs) and Power System Stabilizers (PSSs), in order to maintain the security of the NY Control Area.

## 2.2 Recovery of NYISO Costs

Please refer to Rate Schedule 1 of the NYISO OATT, Rate Schedule 1 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for information about recovery of NYISO costs associated with ISO Annual Budget Charge and Other Non-Budget Charges and Payments.

## 2.3 Payment for Service

Please refer to Rate Schedule 1 of the NYISO OATT, Rate Schedule 1 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for information about ISO Annual Budget Charge and Other Non-Budget Charges and Payments.

## 2.4 Services Performed at the Request of a Market Participant

Market Participants may request and pay for the following NYISO Services:

- System Reliability Impact Study (ESRIS)
- Facilities Study
- Local Control Center operator training
- Re-enforcement Option Study (PSC can also request)
- System Impact Study
- Interconnection Study

Studies may also be requested by the New York State Reliability Council (NYSRC). For further details, see the *Transmission Expansion and Interconnection Manual* (available from the NYISO Web site at the following URL:

[http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)).

### 3. VOLTAGE SUPPORT SERVICE

This section describes the voltage support service (VSS).

#### 3.1 Description

In order to maintain transmission voltages on the NYS Transmission System within acceptable limits, facilities under the control of the NYISO are operated to produce (or absorb) Reactive Power. Thus, Reactive Supply and Voltage Control Service (“Voltage Support Service”) must be provided to support all Transactions on the NYS Transmission System. The amount of VSS that must be supplied will be determined based on the Reactive Power support necessary to maintain transmission voltages within limits that are generally accepted in the region and consistently adhered to by the NYISO.

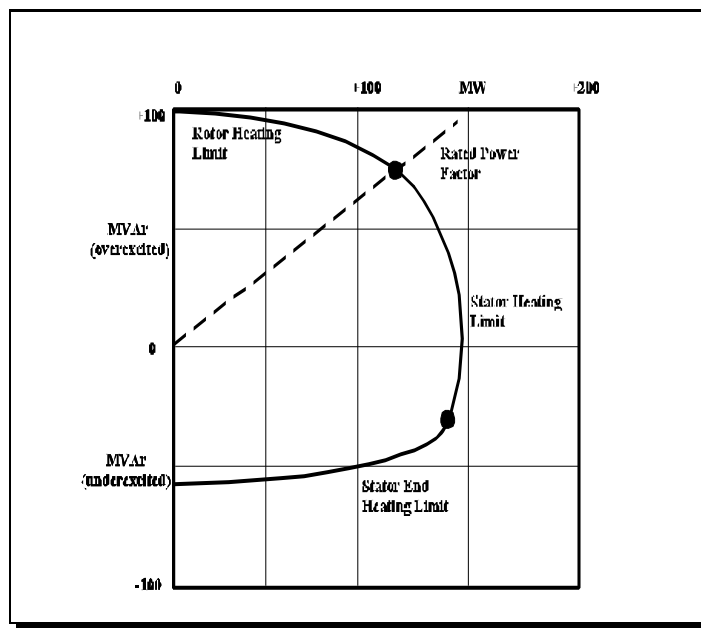


Figure 3-1 Generator MVAR versus MW Capability

The ability of a generator to produce or absorb Reactive Power (MVAR) is limited by generator heating considerations. At full load, a generator is able to produce or absorb a relatively small amount of Reactive Power. As the generator’s production of real power decreases, its ability to produce or absorb Reactive Power increases. Figure 3-1, called a reactive capability curve or a D-Curve, is representative of generators limiting characteristics at a particular temperature. Reactive capability decreases as the generator heats up and increases as the generator cools down. The reactive capability curve therefore will “shrink” with heating and “expand” with cooling of the machine.

#### 3.2 Supplier Qualification

The NYISO requires that VSS suppliers meet the following criteria. Each resource must:



- Be able to produce and absorb Reactive Power within its tested reactive capability range
  - If the resource is precluded from running in “lead” mode in which it can absorb reactive power, then the unit is not eligible to provide Voltage Support Services.
  - The requirement to absorb Reactive Power may be set aside by the NYISO with input from the Transmission Owner in whose Transmission District the Resource is located. To grant an exemption from the requirement that the Resource be able to absorb Reactive Power, the NYISO shall have determined that: (1) the resource is unable, due to transmission system configuration, to absorb Reactive Power; (2) the ability of the resource to produce Reactive Power is needed for system reliability; and (3) for purposes of system reliability the resource does not need to have the ability to absorb Reactive Power.
- Be able to maintain a specific voltage level under both steady-state and post-contingency operating conditions, subject to the limitation of its tested reactive capability
- Be able to automatically respond to voltage control signals; for a generator, a functioning Automatic Voltage Regulator (AVR) is required
- Be under the operational control of the NYISO or a Transmission Owner
- Successfully perform a Reactive Power (MVar) capability tests in accordance with the NYISO Procedures described below

In order to qualify to receive payments as a VSS Supplier the candidate Supplier, including previously disqualified VSS Suppliers that must re-qualify, must:

- complete a VSS Qualification Form. That form is provided as [Attachment A-1](#) of this manual. The Qualification Form must:
  - be completed by a representative of the Supplier and signed by a Vice-President (or equivalent signing authority) of the corporation,
  - include a statement of intent to provide Voltage Support Services,
  - have generator documentation attached, including the manufacturer’s model number or equivalent data as determined by the NYISO, manufacturer’s specifications, a block diagram and associated data, and a generator reactive capability datasheet (“D-curve”), and
  - have documentation that the synchronous generator or synchronous condenser has an automatic voltage regulator (AVR). This documentation shall include the AVR manufacturer model number, manufacturer’s specifications, voltage regulator block diagram, and associated data.
- return the Voltage Support Service Suppliers Qualification Form, and supporting data to the following e-mail box or address:

[vss\\_test\\_results@nyiso.com](mailto:vss_test_results@nyiso.com)

Manager, Auxiliary Market Operations  
 New York Independent System Operator, Inc.  
 10 Krey Boulevard  
 Rensselaer, NY 12144

### 3.3 Responsibilities for Service

The NYISO directs the Supplier's Resources to operate within their tested reactive capability limits. The scheduling of VSS is the responsibility of the NYISO.

- NYISO – The NYISO coordinates the NYS Power System voltages throughout the NYCA.
- Transmission Owners – Transmission Owners are responsible for the local control of the Reactive Power resources that are connected to their network.
- Suppliers – Suppliers are expected to operate their Resources within demonstrated reactive capability limits. VSS suppliers are also expected to maintain a specific voltage level, as directed by the NYISO and the Transmission Owner System Operator, under both steady-state and post-contingency operating conditions subject to the limitations of the Resource's tested reactive capability.

### 3.4 Payment for Service

Please refer to Rate Schedule 2 of the NYISO Market Services Tariff for information about Payments for Supplying Voltage Support Service.

### 3.5 Failure to Perform by Suppliers

Please refer to Rate Schedule 2 of the NYISO Market Services Tariff for information about VSS Supplier failure to perform penalties.

### 3.6 Reactive Power Capability Testing or Demonstration

The purpose of the Reactive Power capability testing or demonstration is to establish a uniform procedure of determining, confirming, and documenting the Reactive Power capability of VSS Suppliers for real-time system voltage control. VSS suppliers must have a functioning automatic voltage regulator (AVR). The procedures set forth below provide the NYISO with accurate and timely information on the Reactive Power capability of the VSS Suppliers. The demonstration also provides confirmation that the supplier's AVR is in proper working condition and that the supplier is able to automatically adjust its reactive power production or consumption to properly control voltage.

Each year resources that participate in VSS must be tested to demonstrate Lagging Reactive Power capability. Once every three years, resources that participate in Voltage Support Service must be tested to demonstrate Leading Reactive Power Capability. Resources can alternatively provide data collected during actual operation to demonstrate both Lagging and Leading Reactive Power capability. If granted an exemption for absorbing Reactive Power as described in section [3.6.6](#) of this manual, a resource is not required to demonstrate Leading Reactive Power capability. In all cases, the Supplier's AVR must be enabled and providing automatic voltage control during the demonstration period. Tests may take the form of demonstration of Reactive Power capability based upon actual generator output data or tests conducted pursuant to the procedures set forth in this Manual. Tests must be

coordinated with the NYISO and the Transmission Owner (TO) in whose service territory the unit is located. Test data reports must be submitted electronically by the VSS Supplier within ten (10) business days of the test to the NYISO for review and acceptance. The demonstrated performance of the Lagging Reactive Power capability tests is the basis for compensation to Suppliers of VSS.

#### **Definitions**

**Lagging MVAR** – Reactive Power that is generated out of a generator and into the power system. By convention, lagging MVAR is a positive (+) number.

**Leading MVAR** – Reactive Power that is absorbed by a generator out of the power system. By convention, leading MVAR is a negative (-) number.

### **3.6.1 Frequency, Timing, and Other Requirements**

At least once each calendar year each Resource providing Voltage Support Service must test or demonstrate Lagging Reactive Capability. At least once every three calendar years, each Resource providing Voltage Support Service must test or demonstrate Leading Reactive Capability. If granted an exemption for absorbing Reactive Power as described in section [3.6.6](#) of this manual, a resource is not required to demonstrate Leading Reactive Power capability. The demonstrated *Gross* Lagging MVAR capability will be the basis for compensation in the next compensation (calendar) year.

Small units at the same site may apply test results from one unit to another unit at the same site. In order to qualify for this treatment, the units must be electrically identical and must be less than 60 MW nameplate capacity. Qualification to apply test results from one unit to another requires one-time submittal of the D-curve and registration information for each unit, along with a request for this treatment, and pre-approval by the Manager, Auxiliary Market Operations. The form to request this treatment is provided as [Attachment A-2](#). Each year, a test result form must be submitted for each unit that is requesting this treatment. The test form must reference the PTID of the unit at the site that actually performed the test and the date and time of the test.

Both Lagging MVAR and Leading MVAR capability must be tested or demonstrated during the Summer Capability Period (May 1 through October 31, inclusive). Failure to test or demonstrate the resource's Reactive Power capability will result in the disqualification of the resource in the next compensation year. If granted an exemption for absorbing Reactive Power as described in section [3.6.6](#) of this manual, a resource is not required to demonstrate Leading Reactive Power capability. The Supplier's AVR must be enabled and providing automatic voltage control during the demonstration period.

Demonstration results must be retained for the current and most recent prior test period. Any supplemental engineering analysis to support data for the current and most recent prior test period must also be retained.

Beginning with the Summer 2012 Capability Period, VSS suppliers that do not make adequate metering data available to the NYISO through existing Transmission Owner communication equipment as required during the Capability Year will be disqualified as VSS suppliers. If Transmission Owner communication equipment is down during the test

the NYISO will accept real time Generator Owner data via direct communications to the NYISO. Any supplier who has been removed from the VSS program due to inadequate metering data may be reinstated as a VSS supplier once that supplier complies with all conditions outlined in Section 3.2 of this Manual.

Lagging MVAR capability testing will normally be performed during on-peak hours. The VSS Supplier must operate at maximum Lagging MVAR for at least one hour for the test to be acceptable.

The Leading MVAR testing will normally be performed during off-peak hours. The Leading MVAR test shall be scheduled with the corresponding TO, who will inform the NYISO. Prior to conducting the test, the VSS Supplier and the TO shall consult with each other regarding the conditions of the test. The VSS Supplier must operate at maximum Leading MVAR for at least one hour for the test to be acceptable. The megawatt output at the time of the test shall be recorded, and the AVR shall be in service at all times during the test.

A VSS Supplier may schedule additional MVAR tests during the Summer capability period, however; only one test at a time may be scheduled. When scheduling an additional Reactive Capability Test, the VSS Supplier must again follow the test procedures given below. The VSS Supplier will be placed at the end of the queue for scheduling requests when requesting additional tests during a given capability period.

### 3.6.2 Test Procedure for Generators

Reactive Power capability tests are to be carried out under normal operating conditions. Extreme measures that might overstate a unit's reactive capability must be avoided. For example, measurements should be made with the unit operating with normal hydrogen pressure (or other normal coolant conditions).

Both leading and lagging MVAR are to be measured at the generator terminal (gross) and, if metered data is available, at the point of interconnection (net). If a generator's gross metered data does not reflect its ability to absorb MVARs from the power system, the net metered data at the point of interconnection may be submitted in addition to gross metered data to demonstrate the leading MVAR capability.

Effective at the beginning of the 2010 test period, Lagging and Leading tests must be performed at the real power levels described in Table 3.1. For both the lagging and leading MVAR tests, the real power level within the defined range that is chosen shall be the exclusive decision of the generator.

**Table 3.1 Real Power Level Requirements for Reactive Power Capability Testing**

	Limited Control Run-of-River Hydro Resources		All Other Generators	
	Lagging	Leading	Lagging	Leading

ICAP Suppliers <sup>1</sup> and Non-ICAP Suppliers with a Valid DMNC Test <sup>2</sup>	≥ 90% of UCAP <sup>3</sup>	≥ 10% of UCAP <sup>3</sup>	≥ 90% of DMNC <sup>4</sup>	≥ 10% of DMNC <sup>4</sup>
All Other Non-ICAP Suppliers	≥ 90% of Generator Nameplate MW	≥ 10% of Generator Nameplate MW	≥ 90% of Generator Nameplate MW	≥ 10% of Generator Nameplate MW

- 1 *ICAP Supplier* refers to resources qualified to supply UCAP as defined in the *NYISO Services Tariff*.
- 2 DMNC tests cannot be used for Limited Control Run-of-River Hydro Resources that are not ICAP Suppliers.
- 3 *Unforced Capacity (UCAP)* refers to the rating assigned to ICAP Suppliers as defined in the *NYISO Services Tariff*. The UCAP value that is tested to must correspond to the Available UCAP recorded in the NYISO ICAP Automated Market System.
- 4 *DMNC* refers to the Dependable Maximum Net that is in effect at the time of the test. The DMNC value that is tested to must correspond to the DMNC recorded in the NYISO ICAP Automated Market System.

The verification of Gross Reactive Power Capability and Net Reactive Power Capability for facilities with multiple generators and/or common elements which are dependent upon one another for normal operation shall be based on the reactive power capability of the facility and not the sum of the capabilities of the individual generators.

The Transmission Owner is responsible for coordinating the test with the respective plant. Each Transmission Owner shall notify the NYISO at least one hour prior to the initiation of generator MVAR testing. The NYISO in turn notifies any other affected Transmission Owners. Test procedures are set forth below:

1. The VSS Supplier must notify the NYISO and the Transmission Owner (TO), at least five (5) business days prior to the day that the test is to be performed if the Supplier is a generator sized 100 MW or larger. Other VSS Suppliers must also notify the NYISO and TO of their plan to test, but a five-day notification is not required, though it is encouraged. The following information must be included in the notification of intent to perform a Reactive Capability test:
  - VSS Supplier name (as listed in the NYISO MIS)
  - VSS Supplier point identifier (PTID – a five digit number)
  - Net operating capability of the unit (MW)
  - VSS Supplier operator company name
  - Transmission Owner area
  - Test requested (lagging or leading)
  - Date and time of the test start
  - Name and telephone number of the person requesting the test

A generator that is normally scheduled in the DAM and is operating within 100 MW of its normal operating capability may perform the MVAR test without the 5-day prior notification. If a generator’s normal operating capability is less than 100 MW, the 5-day prior notification is also not required but is still recommended.

2. The NYISO will notify the VSS Supplier of the status of the request three (3) business days prior to the planned test date. It should be noted that test approvals are subject to a NYISO reliability review and the NYISO reserves the right to cancel or terminate the test at any time. The TO may also request that the NYISO cancel or terminate the test at any time should local reliability criteria be violated. The NYISO will document all approvals, cancellations, and terminations including the party responsible and reason for implementing the cancellation or termination.
3. On the day prior to the scheduled date of the Reactive Capability Test, generators with a normal MW operating capability of 100 MW or greater must bid energy into the Day-Ahead Market (DAM). The bid must be structured to ensure that the generator is scheduled at the appropriate MW level for the hours requested to perform the Reactive Capability Test. The VSS Supplier must notify the NYISO (notify NYISO Generation Scheduling at (518) 356-6050) by hour 14:00 of the prior business day that the unit has been scheduled in the DAM, and that the test will be conducted as scheduled. If the generator is not scheduled, then the Reactive Capability Test is cancelled. If the generator has a net operating capability of less than 100 MW or if the generator is a quick start unit that can be committed by the Real-Time Commitment (RTC), a DAM bid is not required. The VSS Supplier must still notify the NYISO and the TO, by hour 14:00 of the prior business day, of the intent to perform a Reactive Capability Test.
4. On the day of the scheduled Reactive Capability Test, the VSS Supplier, through the TO, must request permission from the NYISO System Operator to perform the test at least three (3) hours prior to the test start time. The generator must also bid energy into the Hour-Ahead Market (if not previously committed in the DAM) to ensure that the generator is scheduled at the appropriate MW level for the hours requested to perform the Reactive Capability Test. The NYISO System Operator will approve or deny the request, through the TO, at least two (2) hours prior to the scheduled test, allowing time for any desired Hour-Ahead Market bid adjustments. The NYISO will document all approvals, cancellations and terminations of the tests. The log will include the name of the party and reason for implementing the cancellation or termination.
5. Upon beginning the test, the VSS Supplier must notify the NYISO System Operator, through the TO, that the Reactive Capability Test has started.
6. The NYISO will log that the VSS Supplier is performing a Reactive Capability Test.
7. Upon completion of the test, the VSS Supplier must notify the NYISO System Operator, through the TO, that the test is complete. The NYISO will log the completion time and the name of the generator plant personnel reporting the test.

### **3.6.3 Test Procedure for Synchronous Condensers**

Each synchronous condenser providing this service will be required to demonstrate the maximum leading and lagging MVAR capability it can maintain for one hour.

### 3.6.4 Reporting Requirements

Attachment B of this manual illustrates the spreadsheet based test report forms that are to be used to document the results of Reactive Power capability tests and demonstrations. An electronic version of the test report forms is available on the NYISO Web site. Suppliers of VSS must complete the forms and submit the completed forms to the NYISO within ten (10) business days of the test or demonstration. The forms must include supporting performance data including gross and net MW and MVAR output, terminal or station bus voltage, and unit auxiliary load MW and MVAR. These data must be sampled at the beginning and end of the test or demonstration period and least once every five (5) minutes during the test or demonstration period. The test report forms must clearly indicate the start and end times of the test or demonstration period.

The completed test report forms must be submitted electronically (by email) to the NYISO at the following email address: [vss\\_test\\_results@nyiso.com](mailto:vss_test_results@nyiso.com). If the lagging and leading MVAR capability tests or demonstrations are performed on different dates, then the results of the lagging and leading tests or demonstrations can be submitted separately.

The NYISO collects generator reactive capability data of VSS Suppliers. The NYISO provides these data to the operating division of the Generator's Transmission Owner (TO) within sixty (60) days of the end of the test period. This allows sufficient time for the NYISO to assemble the data with due consideration to Generator owner reporting requirements.

### 3.6.5 Allowance for Out-of-Period Reactive Capability Testing

There are four (4) conditions where NYISO will provisionally accept testing for Voltage Support Service when that test is not conducted within the specified Summer Capability Period:

- A new resource entering commercial operation, or
- An existing provider's resource returning to service from an extended forced outage, or
- An existing resource becoming eligible to qualify as a VSS supplier, or
- A nuclear generating unit that has an AVR that is not functioning during the test period.

#### ***Initial Qualification of New Resource***

For a new resource entering commercial service and requesting qualification as a Voltage Support Service supplier, the resource must complete the annual test requirements within thirty (30) days of entering service, and forward the completed test report, in electronic form, to NYISO within ten (10) business days of the completion of that test. The resource shall also provide, in writing, the required documentation of the resource's reactive capability and automatic voltage regulator.

#### ***Existing Resource returning from Extended Forced Outage***

An existing supplier's resource returning to service following an extended forced outage must complete the annual test requirements within thirty (30) days of returning to service,

and forward the completed test report, in electronic form, to NYISO within ten (10) business days of the completion of that test.

***Existing Resource becoming eligible as a VSS Supplier***

If, as the result of equipment upgrades or changes in qualification requirements, an existing supplier's resource becomes eligible, the Supplier must complete the annual test requirements within thirty (30) days of the effective date of the change in qualification requirement or equipment upgrade, and forward the completed test report, in electronic form, to NYISO within ten (10) business days of the completion of that test.

***Nuclear Unit with Non-Functioning AVR***

If the unit is able to successfully complete the test with a functioning AVR after the test period but before the end of the current year, full compensation will be allowed for the next payment year. The unit will be required to meet the follow-up requirement set forth below to continue receiving payments after the beginning of the test period. If that test results in reduced voltage support, the payments will be reduced for that entire year, including return of excess compensation for the months before the in-period test.

If the unit is able to successfully conduct an out-of-period test after the beginning of the year, the unit will receive monthly VSS payments at the level achieved in the test for all months following the conduct of the test. To receive payments at the levels achieved in the out-of-period test, the unit will voluntarily provide voltage support within operational limits without compensation in the months of the year prior to its out-of-period test. The unit will be required to meet the follow-up requirement set forth below to continue receiving payments after the beginning of the test period. If the unit produces a lower level of MVAr than was achieved in the out-of-period test, the VSS payments will be reduced consistent with the results of the in-period test for the remaining months of the year; provided further, however, should a generator perform a subsequent in-period test that demonstrates a higher level of MVAr capability, the VSS payments will be based on the results of the later test for the remaining months of the year.

***Follow-up Testing Requirement***

For any of the above conditions, the following conditions and requirements apply:

The NYISO will accept the demonstrated lagging MVAr capability as the basis for compensation on a provisional basis until the beginning of the next Summer Capability Period.

To continue qualification to receive VSS payments the resource is required to perform a complete annual test within thirty (30) days of the start of the Summer Capability Period, and forward the completed test report, in electronic form, to NYISO within ten (10) business days of the completion of that test. This "in period" test will also qualify the resource for continued participation in the VSS in the next compensation year.

### **3.6.6 Exemption from Requirement to Absorb Reactive Power**

The following three conditions must be met in order for the NYISO to grant an exemption from the requirement to absorb Reactive Power.



1. The ability of the resource to produce Reactive Power must be determined by the NYISO to be needed for reliable system operation.
2. The ability of the resource to absorb Reactive Power must be determined by the NYISO to not be necessary for reliable system operation.
3. The resource must be unable, due to system configuration, to absorb Reactive Power.

The NYISO will review a request for exemption with the Transmission Owner in whose Transmission District the Resource is located and determine whether the request will be granted. An exemption will not be granted over the objection of the Transmission Owner, except upon the approval of the President and Chief Executive Officer of the NYISO. Exemptions that are granted will be reviewed annually with the Transmission Owner in whose Transmission District the resource is located.

All requests for exemptions from absorbing Reactive Power must be made in writing to the Manager of Auxiliary Market Operations at the NYISO. These requests must include the specific resource(s) and the basis for requesting the exemption. Additional documentation may be required during the NYISO review. A request for exemption must be signed by an officer of the organization owning the resource (or equivalent signing authority) and can be submitted to the following e-mail box or address:

[vss\\_test\\_results@nyiso.com](mailto:vss_test_results@nyiso.com)

Manager, Auxiliary Market Operations  
 New York Independent System Operator, Inc.  
 10 Krey Boulevard  
 Rensselaer, NY 12144

Requests for exemptions from absorbing Reactive Power must be submitted prior to the end of the test period.

## **3.7 Voltage Support**

The following procedures apply to VSS.

### **3.7.1 Request for Voltage Support Service**

The NYISO may request corrective actions from voltage support facilities that are already in service and available. The procedures for Real-Time voltage control are covered in the *NYISO Emergency Operations* and *Transmission and Dispatching Operations* manuals (both of which are available from the NYISO Web site at the following URL: [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)).

### **3.7.2 Voltage Support Availability**

***Supplier Actions:***

The supplier is obligated to provide timely notification of any operational restrictions that may limit the voltage support capability.

The supplier must perform the following:

1. The Automatic Voltage Regulator (AVR) shall be maintained in service in automatic voltage regulation mode at all times, unless instructed otherwise by the NYISO or the Transmission Owner System Operator.
2. Provide immediate notification to the NYISO through the Transmission Owner System Operator whenever the AVR, or any other equipment necessary for maintaining the resource's demonstrated Reactive Power capability (including, but not limited to, auxiliary cooling systems, exciters, etc.) is forced out of service or derated, and provide notice as required by the *NYISO Outage Scheduling Manual* (available from the NYISO Web site at the following URL: [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)) prior to removal from service for scheduled maintenance.
3. Notify the NYISO and Transmission Owner System Operator of the estimated time for completion of necessary AVR (or other) repairs, or scheduled maintenance.
4. Notify the NYISO and Transmission Owner System Operator when maintenance is complete and the resource's voltage support capability is fully restored.

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## 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 4.13](#).

### 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. 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 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 availability/price, in \$/MW
- Regulation Availability 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.

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 capacity (or regulating margin) that can be offered is calculated as the regulation response rate times five minutes. For LESR devices, the maximum Regulation Service capacity that can be offered is the unit’s bid in Upper Operating Limit.

[Figure 4-1](#) shows how Regulation Service 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](#) shows how Regulation Service capacity is defined with respect to a generating unit's operating range, for the situation without Reserve activation.

[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 capacity. The Upper and Lower Regulating Limits = the Upper Operating and Lower Operating limits respectively.

[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.

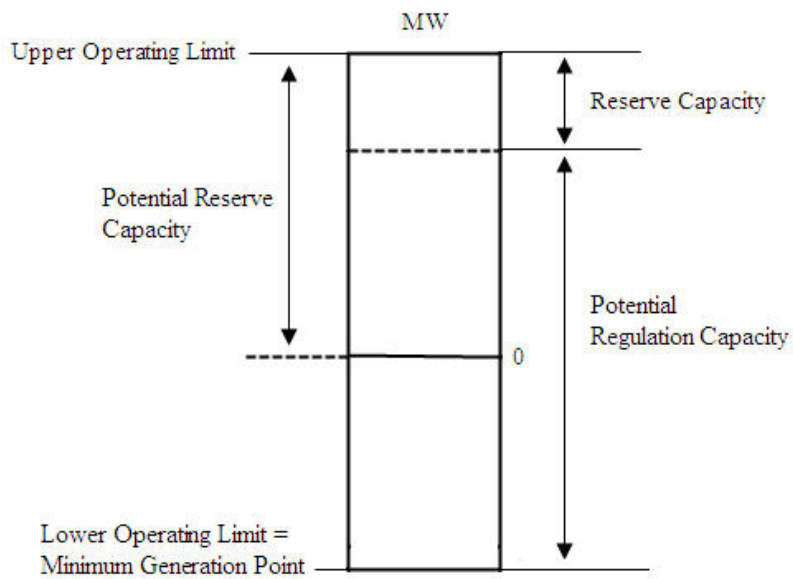


Figure 4-1 Demand Side Resources Operating Characteristics

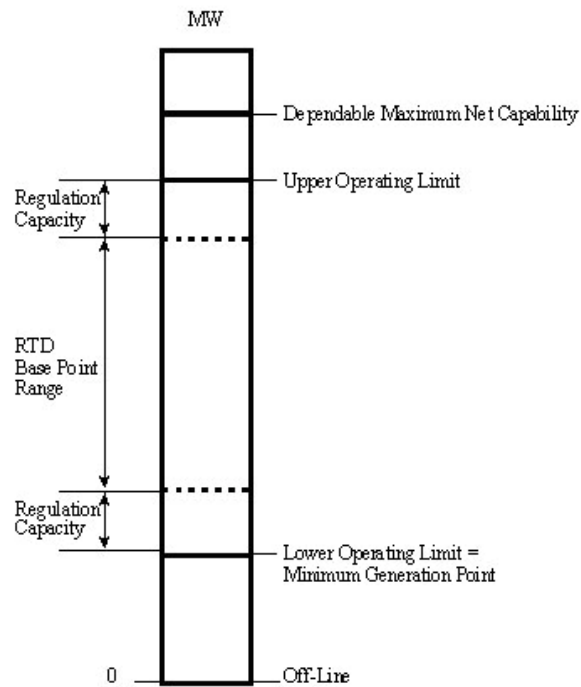
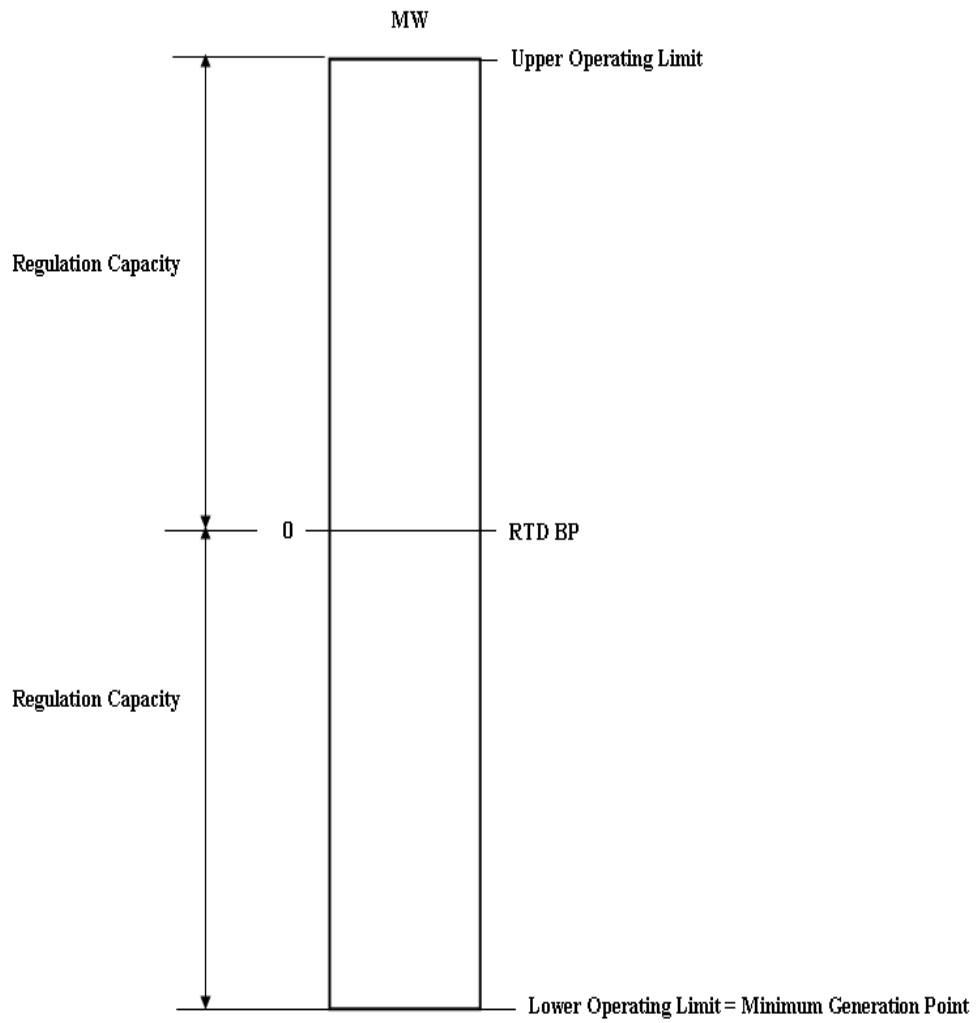
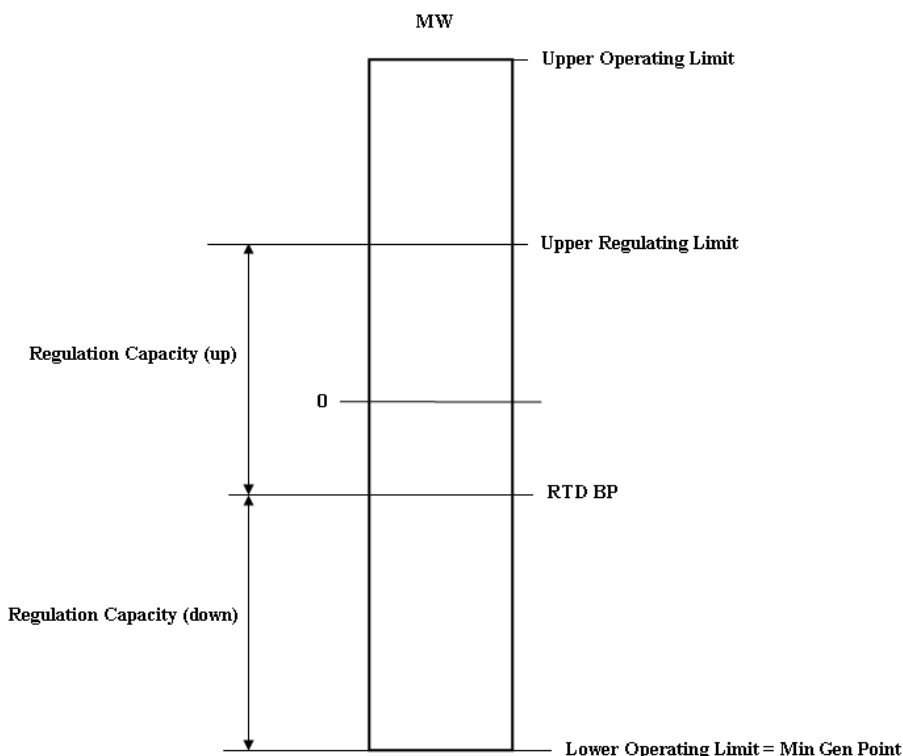


Figure 4-2 Generating Unit Operating Characteristics



**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 response rates that are bid 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 Response Rate (RRR)* – This response rate is used for scheduling regulation service.
- *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:** The above response rates are not applicable to LESRs.

For all Regulation Service providers except LESRs, the RRR 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  $\geq 0.01 * \text{Maximum}$



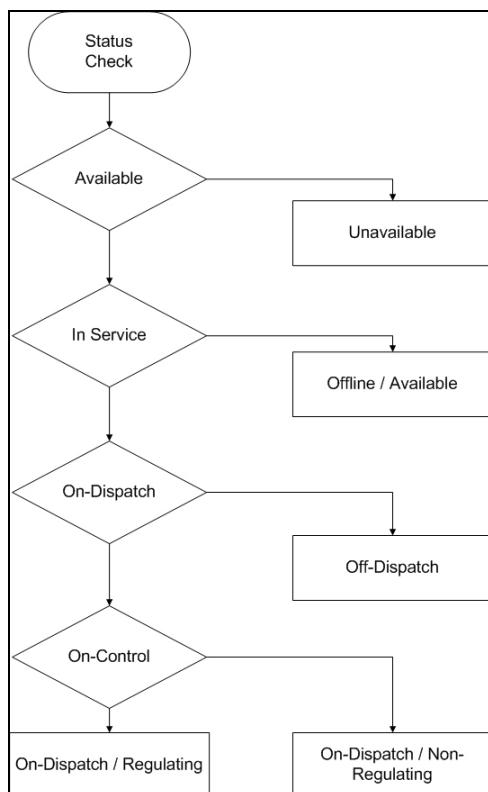
Winter Operating Limit (Winter Capability Period). The Maximum Summer and Winter Operating Limits are modified by Customer Relations and are described in the *NYISO Market Participants User Guide* (available from the NYISO Web site at [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)).

- 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

#### ***Generators and Demand Side Resources***

Regulation Service capacity is allocated 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](#), on page 4-3.)

#### ***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 originally offered in the Real-Time Market. In such cases, the RTD system will reduce amount of Regulation Service 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 that an LESR is actually scheduled to provide in the Real-Time Market is based on this calculation of the amount of Regulation Service 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 regulation capacity =  $\text{Min}(\text{abs}(LRL), \text{URL})$ .

#### ***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:

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 Service 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 capacity 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 and allocates this error to selected Regulation Service 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. 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. 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 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](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 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 Event Reserve Pick-ups or Max Gen Pickups, Regulation Service 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.

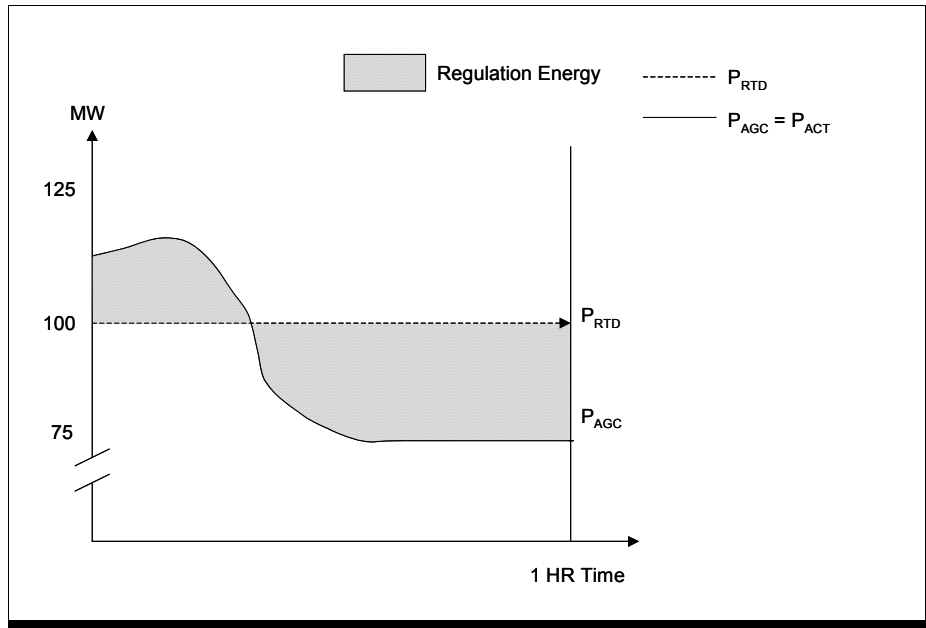
When more Regulation Service is required, the NYISO may request more Regulation Service capacity from the real-time Regulation Service market.

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.

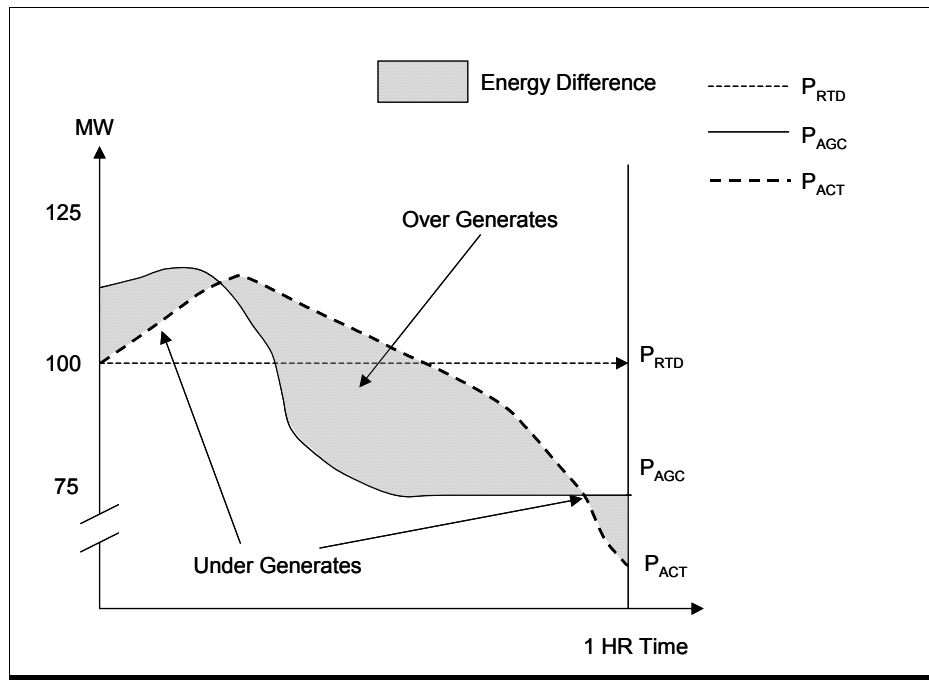
## 4.4 Performance Tracking

The NYISO has a Performance Tracking System (PTS) to monitor the performance of Resources that provide Regulation Service. Payments 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 determine penalties assessed to non-regulating Resources that do not follow their RTD basepoints, thereby increasing the regulation burden.

[Figure 4-6](#) illustrates a regulating Resource that has perfect performance and [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 capacity 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.

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 Service markets. The market clearing prices for Regulation Service calculated pursuant to sections 4.5.1 and 4.6.1 of this Manual shall take account of the demand curve established in this section so that Regulation Service is not purchased at a cost higher than the demand curve indicates should be paid in the relevant market.

The NYISO shall establish a target level of Regulation Service for each hour, which will be the number of MW of Regulation Service 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 Service 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 Service 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 Service 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 Service 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 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, 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.

## 4.9 Reinstating Performance Charges

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

$\text{MCP}_{\text{reg}}$  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**

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 5AM through hour beginning 8AM and for one consecutive 4 hour period spanning hour beginning 7PM through hour beginning 10PM.
- 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 regulation ramp rate \* 5 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 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.

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](mailto: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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## 5. ENERGY IMBALANCE SERVICE

This section describes the energy imbalance service.

### 5.1 Description

Energy imbalance service falls into the following categories:

- **Internal Energy Imbalance under the NYISO Services Tariff** – All internal Energy imbalances for Transmission Customers taking service under the *NYISO Services Tariff* are addressed through the Real-Time Market and through the Real-Time Settlement process. All scheduled withdrawals and injections, including deviations from Bilateral Transaction schedules by Transmission Customers taking service under the *NYISO Services Tariff*, are subject to the Real-Time Settlement. Refer to the *NYISO Accounting and Billing Manual* (available from the NYISO Web site at [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)) for the description of charges associated with internal energy imbalances. Generators, LSEs and Transmission Customers with imbalances may also be subject to charges for Regulation and Frequency Response Service.
- **Internal Energy Imbalance Under the NYISO OATT** – All internal energy imbalances for Transmission Customers taking service under the *NYISO OATT* and not under the *NYISO Services Tariff* shall, when the Transmission Customer's actual energy withdrawals are less than its scheduled energy delivery, pay to the NYISO an amount equal to the greater of 150% of the Real-Time LBMP at the point of delivery or \$100/Mwh. If the Transmission Customer's actual energy delivery exceeds its actual energy withdrawals, it will not be paid for the excess energy.
- **External Energy Imbalance** – External energy imbalance refers to the mismatch between scheduled and actual flows between the NY Control Area and other Control Areas. Inadvertent energy accounting is implemented according to existing NERC guidelines. Monthly internal/external meter corrections are also accounted for. Any increase or decrease in costs resulting from pay back of accumulated inadvertent interchange is included in the NYISO Scheduling, System Control, and Dispatch Service Charge.

The NYISO is responsible for providing this service.

### 5.2 External Imbalances

The NYISO performs the following for External inadvertent interchange:

- accurately accounts for inadvertent Energy interchange, through daily schedule verification and the use of reliable metering equipment.
- minimizes unintentional inadvertent accumulation in accordance with NERC and NPCC policies.
- minimizes accumulated inadvertent Energy balances in accordance with NERC and NPCC policies.

The NYISO reduces accumulated External inadvertent Energy balances by one or both of the following methods:

- scheduling interchange payback with another Control Area as an interchange schedule between Control Areas.
- unilaterally offsetting the tie-line interchange schedule when such action will assist in correcting an existing time error.

External inadvertent interchange accumulated during On-Peak hours is paid back during On-Peak hours. Inadvertent interchange accumulated during Off-Peak hours is paid back during Off-Peak hours. In either case, payback is made with Energy "in-kind."

The Energy Imbalance consists of calculations and inadvertent interchange reports that are produced on an hourly, daily, and monthly basis. The *NYISO Accounting and Billing Manual* (available from the NYISO Web site at the following URL: [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)) gives a detailed description.

The payback process for inadvertent interchange between the NY Control Area and its neighboring control areas is covered in 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](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp))

### **5.3 Monthly Meter Reading Adjustments**

The meter reading adjustment process is discussed in the *NYISO Accounting and Billing Manual* (available from the NYISO Web site at the following URL: [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)).



## 6. OPERATING RESERVE SERVICE

### 6.1 Description

Operating Reserve service provides backup generation and/or demand response in the event that the NYISO experiences a real time power system Contingency requiring emergency corrective action. In order for the New York Control Area (NYCA) to respond in a timely fashion, the reserves must be available from Generators or Demand Side Resources located within the NYCA and within specific regions, as required by the NYSRC.

#### *Types of Operating Reserves*

- **10-Minute Spinning Reserve** – Operating Reserves provided by qualified Generators and qualified Demand Side Resources located within the NYCA that are already synchronized to the NYS Power System and can respond to instructions from the NYISO to change output level within 10 minutes.
- **10-Minute Non-Synchronized Reserve (10-Minute NSR)** – Operating Reserves provided by Generators that can be started, synchronized, and loaded within 10 minutes. These reserves are carried on quick-start units, such as jet engine type gas turbines. Operating Reserves may also be provided by Demand Side Resources where the demand response is provided by a Local Generator.
- **30-Minute Spinning Reserve** – Operating Reserves provided by qualified Generators and qualified Demand Side Resources located within the NYCA that are already synchronized to the NYS Power System and can respond to instructions from the NYISO to change output level within 30 minutes.
- **30-Minute Non-Synchronized Reserve (30-Minute NSR)** – Operating reserves that can be provided by Generators that can be started, synchronized, and loaded within 30 minutes. Operating Reserves may also be provided by Demand Side Resources where the demand response is provided by a Local Generator.
- **Total 10-Minute Reserve** – The sum of the 10-Minute Spinning Reserve and 10-Minute NSR. [NERC defines this as Contingency Reserve]
- **Total 30-Minute Reserve** – The sum of the 30-minute Spinning Reserve and 30-Minute NSR provided by Generators and Demand Side Resources that respond to instructions to change output or provide a demand reduction within 30 minutes.
- **Total Operating Reserve** – The sum of the total 10-minute reserve and the total 30-minute reserve. [The NERC definition of operating reserve includes regulation]

#### *Minimum Operating Reserve Requirement*

The NYCA's Operating Reserve requirements are:

- Total Operating Reserve must be greater than or equal to one and one-half times the largest single Contingency (in MW) as defined by the NYISO;
- Total 10-Minute Reserve must be greater than or equal to the largest single Contingency (in MW) as defined by the NYISO;

- 10-Minute Spinning Reserve must be greater than or equal to one-half of the largest single Contingency (in MW) as defined by the NYISO.
- [Figure 6-1](#) illustrates these requirements. At all times sufficient total 10-minute reserve is maintained to cover the energy loss due to the most severe Normal Transfer Criteria contingency within the NYCA or the energy loss caused by the cancellation of an interruptible import transaction (neighboring control area to NYCA) whichever is greater. In addition:
  - The NYISO may establish additional categories of Operating Reserves if necessary to ensure reliability.
  - The NYISO ensures that providers of Operating Reserves are properly located electrically so that transmission constraints resulting from either commitment or dispatch of units do not limit the ability to deliver Energy to Loads in the case of a Contingency.
  - The NYISO ensures that Capacity counted toward meeting NYCA Operating Reserve requirements is not counted toward meeting Regulation and Frequency Response Service requirements.

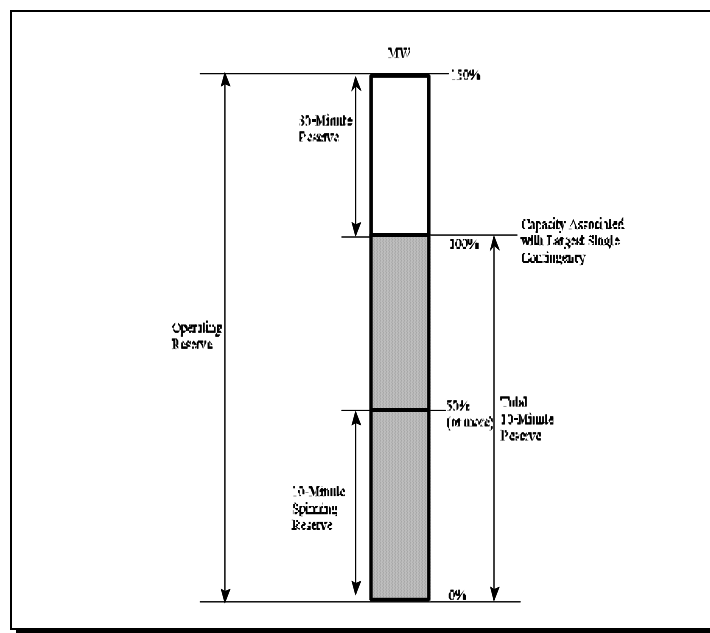


Figure 6-1 Operating Reserve Requirements

## 6.2 General Responsibilities and Requirements

The NYISO is responsible for scheduling the Operating Reserve service. The NYISO ensures that Operating Reserve is properly geographically located so that transmission constraints do not limit the ability to deliver Operating Reserve. Reserve suppliers receive both a Day-Ahead and a Real-Time schedule. The Real-Time schedule may differ from the Day-Ahead schedule. Reserve suppliers must specify a Day-Ahead availability bid for each category of reserve. The Real-Time availability bid is automatically set to zero for each

category of reserve and cannot be changed by a reserve supplier. [Table 6.1](#) summarizes supplier eligibility to provide ancillary services of reserve and regulation.

**Table 6.1 Ancillary Service Eligibility**

Unit Type	Ancillary Service				
	10-S	10-NS	30-S	30-NS	Reg
Flexible (on-dispatch) Start-up time greater than 30 minutes Not block loaded	✓	no	✓	no	✓
Flexible (on-dispatch) 10-minute start Not block loaded	✓	✓	✓	no	✓
Flexible (on-dispatch) 10-minute start Block loaded (no dispatchable range)	no	✓	no	no	no
Flexible (on-dispatch) 30-minute start Not block loaded	✓	no	✓	✓	✓
Flexible (on-dispatch) 30-minute start Block loaded (no dispatchable range)	no	no	no	✓	no
Fixed (off-dispatch)	no	no	no	no	no

### 6.2.1 NYISO Responsibilities

The NYISO shall procure on behalf of its Customers a sufficient quantity of Operating Reserve products to comply with the Reliability Rules and with other applicable reliability standards. To the extent that the NYISO enters into Operating Reserve sharing agreements with neighboring Control Areas its Operating Reserves requirements shall be adjusted accordingly.

The NYISO shall define requirements for Spinning Reserve, which may be met only by Suppliers that are eligible to provide Spinning Reserve; 10-Minute Reserve, which may be met by Suppliers that are eligible to provide either Spinning Reserve or 10-Minute Non-Synchronized Reserve; and 30-Minute Reserve, which may be met by Suppliers that are eligible to provide any Operating Reserve product. The NYISO shall also define locational requirements for Spinning Reserve, 10-Minute Reserve, and 30-Minute Reserve located East of Central East and on Long Island as shown in [Table 6.2](#).

**Table 6.2 Locational Reserve Requirements**

	<b>New York CA</b>	<b>Eastern New York</b>	<b>Long Island</b>
	A = most severe NYCA operating capability loss (1200MW) Zone A-K	Zone F-K	Zone K
10 Minute Spinning Reserve	½ A = 600MW  ( I )	¼ A = 300MW  ( IV )	0MW  ( VII )
10 Minute Total Reserve	A = 1200MW  ( II )	1200MW  ( V )	1/10 A = 120MW  ( VIII )
30 Minute Reserve	1½ A = 1800MW  ( III )	1200MW  ( VI )	270-540MW  ( IX )
<p>I. NYCA 10-minute spinning reserve is equal to at least one-half of the 10-minute total reserve. [NYS RC D-R3]</p> <p>II. NYCA 10-minute total reserve is equal to the operating capability loss caused by the most severe contingency under normal transfer conditions. [NYS RC D-R2]</p> <p>III. NYCA 30-minute total reserve is equal to one and one-half the 10-minute reserve necessary to replace the operating capability loss caused by the most severe contingency under normal transfer conditions. [NYS RC D-R2]</p> <p>IV. ENY 10-minute spinning reserve is based on the NERC requirement to plan to meet energy reserve requirements, including the deliverability/capability for any single Contingency and the NPCC requirement that reserves be distributed to ensure that they can be used without exceeding individual element ratings or transfer limitations. [NERC TOP-002, NPCC A-06]</p> <p>V. ENY 10-minute total reserve is based on Reliability Rules that require immediate measures (activation of ENY 10-minute reserves) be applied to bring loadings on an internal NY transfer interface to within limits in 15 minutes. [NYS RC F-R6]</p> <p>VI. ENY 30-minute total reserve is based on the NERC requirement to plan to meet energy reserve requirements, including the deliverability/capability for any single Contingency and the NPCC requirement that reserves be distributed to ensure that they can be used without exceeding individual element ratings or transfer limitations. [NERC TOP-002, NPCC A-06]</p> <p>VII. LI 10-minute spinning reserve is based on the NERC requirement to plan to meet energy reserve requirements, including the deliverability/capability for any single Contingency and the NPCC requirement that reserves be distributed to ensure that they can be used without exceeding individual element ratings or transfer limitations. [NERC TOP-002, NPCC A-06]</p> <p>VIII. LI 10-minute total reserve is based on the NERC requirement to plan to meet energy reserve requirements, including the deliverability/capability for any single Contingency and the NPCC requirement that reserves be distributed to ensure that they can be used without exceeding individual element ratings or transfer limitations. [NERC TOP-002, NPCC A-06]</p> <p>IX. LI 30-minute total reserve is based on Reliability Rules that require the ability to restore a transmission circuit loading to Normal Operating Criteria within 30 minutes of the contingency. The LI 30-minute reserve requirement will vary from 270MW for off-peak hours to 540MW for on-peak hours. [NYS RC F-R1]</p>			

In addition to being subject to the preceding limitations on Suppliers that can meet each of these requirements, the requirements for Operating Reserve located East of Central East may only be met by eligible Suppliers that are located East of Central East, and requirements for Operating Reserve located on Long Island may only be met by eligible Suppliers located on Long Island. Each of these Operating Reserve requirements shall be defined consistent with the Reliability Rules and other applicable reliability standards. The NYISO shall select Suppliers of Operating Reserves products to meet these requirements, including the locational Operating Reserves requirements, as part of its overall co-optimization process.

The NYISO shall select Operating Reserves Resources that are properly located electrically so that all locational Operating Reserves requirements are satisfied, and so that transmission constraints resulting from either the commitment or dispatch of Resources do not limit the NYISO's ability to deliver Energy to Loads in the case of a Contingency. The NYISO will ensure that Suppliers that are compensated for using Capacity to provide one Operating Reserve product are not simultaneously compensated for providing another Operating Reserve product, or Regulation Service, using the same Capacity.

## 6.2.2 Supplier Eligibility Criteria

The NYISO shall enforce the following criteria, which define which types of Generators or Demand Side Resources are eligible to supply particular Operating Reserve products.

1. ***Spinning Reserve*** – Generators or Demand Side Resources that are not supporting their Demand Reduction through the use of Local Generation that are ISO-Committed Flexible or Self-Committed Flexible; are operating within the dispatchable portion of their operating range; and are capable of responding to NYISO instructions to change their output level within ten minutes, shall be eligible to supply Spinning Reserve.
2. ***10-Minute Non-Synchronized Reserve*** – Off-line Generators or Demand Side Resources that are supporting their demand reduction through the use of Local Generators that are capable of starting, synchronizing, and increasing their output level within ten minutes, shall be eligible to supply 10-Minute Non-Synchronized Reserve.
3. ***30-Minute Reserve (spinning and non-synchronized)*** – (i) Generators and Demand Side Resources that are not supporting their Demand Reduction through the use of Local Generation that are ISO-Committed Flexible or Self-Committed Flexible and operating within the dispatchable portion of their operating range shall be eligible to supply synchronized 30-Minute Reserves; (ii) Off-line Generators or Demand Side Resources that are supporting their demand reduction through the use of Local Generators that are capable of starting, synchronizing, and increasing their output level within thirty minutes, shall be eligible to supply non-synchronized 30-Minute Reserves.
4. ***Self-Committed Fixed and ISO-Committed Fixed Generators*** – Shall not be eligible to provide any kind of Operation Reserve.

### 6.2.3 Other Supplier Requirements

All Suppliers of Operating Reserve must be located within the NYCA and must be under NYISO Operational Control. Each Supplier bidding to supply Operational Reserve or reduce demand must be able to provide Energy or reduce demand consistent with the Reliability Rules and the NYISO Procedures when called upon by the NYISO. All Suppliers that are selected to provide Operating Reserve shall ensure that their Resources maintain and deliver the appropriate quantity of Energy, or reduce the appropriate quantity of demand, when called upon by the NYISO during any interval in which they have been selected.

Generators or Demand Side Resources that are selected to provide Operating Reserve in the Day-Ahead Market or any supplemental commitment may not increase their Energy Bids or Demand Reduction Bids for portions of their Resources that have been scheduled through those processes, or reduce their commitments, in Real-Time except to the extent that they are directed to do so by the NYISO. Generators and Demand Side Resources may enter into alternate sales arrangements utilizing any Capacity that has not been scheduled to provide Operating Reserve.

## 6.3 General Day-Ahead Market Rules

### 6.3.1 Bidding and Bid Selection

Resources capable of providing Spinning Reserve, 10-Minute Non-Synchronized Reserve, and/or 30-Minute Reserve (spinning and non-synchronized) in the Day-Ahead commitment may submit Availability Bids for each hour of the upcoming day. If a Supplier offers Resources that are capable, based on their indicated commitment status, of providing Operating Reserves but does not submit an Availability Bid, its Day-Ahead bid will be rejected in its entirety. A supplier may resubmit a complete Day-Ahead Bid, provided that the new bid is timely. Refer to [Table 6.1, on page 6-3](#).

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 will not receive a day-ahead energy schedule but the day-ahead energy bid submitted will be passed to the hour ahead market if the Day-Ahead reserve bid is accepted. This energy bid will be used by RTD to schedule demand reductions 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 20. This represents the amount of spinning reserve, above and beyond 10-minute spinning reserve, that the Resource could convert to energy within 30 minutes.

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

The NYISO shall select Operating Reserve Suppliers for each hour of the upcoming day through a co-optimized Day-Ahead commitment process that minimizes the total cost of Energy, Operating Reserves, and Regulation Service, using Bids submitted to the NYISO. As part of the co-optimization 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.

### **6.3.2 NYISO Notice Requirement**

The NYISO shall notify each Operating Reserve Supplier that has been selected in the Day-Ahead Scheduling process of the amount of each Operating Reserve product that it has been scheduled to provide. This notification is provided through the Market Information System consistent with all other Day-Ahead market notifications.

### **6.3.3 Responsibilities of Suppliers Scheduled to Provide Operating Reserves in the Day-Ahead Market**

Suppliers that are scheduled Day-Ahead to provide Operating Reserves shall either provide Operating Reserve, or Energy, or, when the NYISO has the capability to support demand side participation, reduce demand in Real-Time when scheduled by the NYISO in all hours for which they have been selected to provide Operating Reserve and are physically capable of doing so. However, Suppliers that are scheduled Day-Ahead to provide Operating Reserves and have startup periods of two hours or less may advise the NYISO no later than three hours prior to the first hour of their Day-Ahead schedule that they will not be available to provide Operating Reserves or Energy in Real-Time under normal conditions. Such Suppliers will be required to settle their Day-Ahead schedule at Real-Time prices. The only restriction on Suppliers' ability to exercise this option is that all Suppliers with Day-Ahead Operating Reserves schedules must make the scheduled amount of Capacity available to the NYISO for dispatch in the RTD if the NYISO initiates a Supplemental Resource Evaluation.

## 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 Service 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.



### **6.4.3 Obligation to Make Resources Available to Provide Operating Reserves**

Any Resource that is eligible to supply Operating Reserves and that is made available to the NYISO for dispatch in Real-Time, must also make itself available to provide Operating Reserves.

### **6.4.4 Activation of Operating Reserves**

All Resources that are selected by the NYISO to provide Operating Reserves shall respond to the NYISO's directions to activate in Real-Time.

### **6.4.5 Performance Tracking and Supplier Disqualifications**

When a Supplier selected to supply Operating Reserves is activated, the NYISO shall measure and track its actual Energy production or actual demand reduction against its expected performance in Real-Time. The NYISO may disqualify Suppliers that consistently fail to provide Energy when scheduled from providing Operating Reserves in the future. If a Resource has been disqualified, the NYISO shall require it to pass a re-qualification test before accepting any additional Bids to supply Operating Reserves, as described in sections 6.1 and 6.12 of this manual.

## **6.5 Operating Reserve Settlements – General Rules**

### **6.5.1 Establishing Locational Reserve Prices**

Except as noted below, the NYISO shall calculate separate Day-Ahead Market and Real-Time Market prices for each of the three Operating Reserve products for each of three locations:

1. West of Central-East (West or Western)
2. East of Central-East Excluding Long Island (East or Eastern)
3. Long Island (L.I).

The NYISO will thus calculate nine different locational Operating Reserve prices in both the Day-Ahead Market and the Real-Time Market.

### **6.5.2 Settlements Involving Suppliers of Operating Reserves Located on Long Island**

Suppliers of Operating Reserves located on Long Island shall receive settlement payments as if they were providing Operating Reserves located in the East. The NYISO will calculate separate locational Long Island Operating Reserves prices but will not post them or use them for settlement purposes.

### **6.5.3 “Cascading” of Operating Reserves**

The NYISO will deem Spinning Reserve to be the “highest quality” Operating Reserve, followed by 10-Minute Non-Synchronized Reserve and by 30-Minute Reserve (spinning and then non-synchronized). The NYISO shall substitute higher quality Operating Reserves in place of lower quality Operating Reserves, when doing so lowers the total as-bid cost, i.e., when the marginal cost for the higher quality Operating Reserve product is lower than the marginal cost for the lower quality Operating Reserve product, and the substitution of a higher quality for the lower quality product does not cause locational Operating Reserve requirements to be violated. However, to the extent that reliability standards require the use of higher quality Operating Reserves, substitution cannot be made in the opposite direction.

The price of higher quality Operating Reserves will not be set at a price below the price of lower quality Operating Reserves in the same location. Thus, the price of Spinning Reserves will not be below the price for 10-Minute Non-Synchronized Reserves or 30-Minute Reserves and the clearing price for 10-Minute Non-Synchronized Reserves will not be below the clearing price for 30-Minute Reserves.

## **6.6 Operating Reserve Settlements – Day-Ahead Market**

Please refer to Rate Schedule 5 of the NYISO OATT, Rate Schedule 4 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for information about Operating Reserve Settlements for the Day Ahead Market.

## **6.7 Operating Reserve Settlements – Real-Time Market**

Please refer to Rate Schedule 5 of the NYISO OATT, Rate Schedule 4 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for Information about Operating Reserve Settlements for the Real-Time Market.

## **6.8 Operating Reserve Demand Curves**

The NYISO shall establish nine Operating Reserve Demand Curves, one for each Operating Reserves requirement. Specifically, there shall be a demand curve for:

1. Total Spinning Reserves
2. Eastern or Long Island Spinning Reserves
3. Long Island Spinning Reserves
4. Total 10-Minute Non-Synchronized Reserves
5. Eastern or Long Island 10-Minute Non-Synchronized Reserves
6. Long Island 10-Minute Non-Synchronized Reserves
7. Total 30-Minute Reserves
8. Eastern or Long Island 30-Minute Reserves
9. Long Island 30-Minute Reserves.

Each Operating Reserve Demand Curve will apply to both the Day-Ahead Market and the Real-Time Market for the relevant product and location.

The NYISO Procedures shall establish a target level for each Operating Reserves requirement for each hour, which will be the number of MW of Operating Reserves meeting that requirement that the NYISO would seek to maintain in that hour if cost were not a consideration. The NYISO will then define an Operating Reserves demand curve for that hour corresponding to each Operating Reserves requirement as follows:

1. ***Total Spinning Reserves*** – For quantities of Operating Reserves meeting the total Spinning Reserves requirement that are less than or equal to the target level for that requirement, the price on the total Spinning Reserves demand curve shall be \$500/MW. For all other quantities, the price on the total Spinning Reserves demand curve shall be \$0/MW.
2. ***Eastern or Long Island Spinning Reserves*** – For quantities of Operating Reserves meeting the Eastern or Long Island Spinning Reserves requirement that are less than or equal to the target level for that requirement, the price on the Eastern or Long Island Spinning Reserves demand curve shall be \$25/MW. For all other quantities, the price on the Eastern or Long Island Spinning Reserves demand curve shall be \$0/MW.
3. ***Long Island Spinning Reserves*** – For quantities of Operating Reserves meeting the Long Island Spinning Reserves requirement that are less than or equal to the target level for that requirement, the price on the Long Island Spinning Reserves demand curve shall be \$25/MW. For all other quantities, the price on the Long Island Spinning Reserves demand curve shall be \$0/MW.
4. ***Total 10-Minute Reserves*** – For quantities of Operating Reserves meeting the total 10-minute reserves requirement that are less than or equal to the target level for that requirement, the price on the total 10-minute reserves demand curve shall be \$450/MW, (effective only after tariff approval by FERC). For all other quantities, the price on the total 10-minute reserves demand curve shall be \$0/MW.
5. ***Eastern or Long Island 10-Minute Reserves*** – For quantities of Operating Reserves meeting the Eastern or Long Island 10-minute reserves requirement that are less than or equal to the target level for that requirement, the price on the Eastern or Long Island 10-minute reserves demand curve shall be \$500/MW. For all other quantities, the price on the Eastern or Long Island 10-Minute Reserves demand curve shall be \$0/MW.
6. ***Long Island 10-Minute Reserves*** – For quantities of Operating Reserves meeting the Long Island 10-minute reserves requirement that are less than or equal to the target level for that requirement, the price on the Long Island 10-minute reserves demand curve shall be \$25/MW. For all other quantities, the price on the Long Island 10-minute reserves demand curve shall be \$0/MW.
7. ***Total 30-Minute Reserves*** – For quantities of Operating Reserves meeting the total 30-Minute Reserves requirement that are less than or equal to the target level for that requirement minus 400 MW, the price on the total 30-Minute Reserves demand curve shall be \$200/MW. For quantities of Operating Reserves meeting the total 30-Minute Reserves requirement that are less than or equal to the target level for that requirement minus 200 MW but that exceed the target level for that

requirement minus 400 MW, the price on the total 30-Minute Reserves demand curve shall be \$100/MW. For quantities of Operating Reserves meeting the total 30-Minute Reserves requirement that are less than or equal to the target level for that requirement but that exceed the target level for that requirement minus 200 MW, the price on the total 30-Minute Reserves demand curve shall be \$50/MW. For all other quantities, the price on the total 30-Minute Reserves demand curve shall be \$0/MW. However, the NYISO will not schedule more total 30-Minute Reserves than the level defined by the requirement for that hour.

8. ***Eastern or Long Island 30-Minute Reserves*** – For quantities of Operating Reserves meeting the Eastern or Long Island 30-Minute Reserves requirement that are less than or equal to the target level for that requirement, the price on the Eastern or Long Island 30-Minute Reserves demand curve shall be \$25/MW. For all other quantities, the price on the Eastern or Long Island 30-Minute Reserves demand curve shall be \$0/MW.
9. ***Long Island 30-Minute Reserves*** – For quantities of Operating Reserves meeting the Long Island 30-Minute Reserves requirement that are less than or equal to the target level for that requirement, the price on the Long Island 30-Minute Reserves demand curve shall be \$25/MW, (effective only after tariff approval by FERC). For all other quantities, the price on the Long Island 30-Minute Reserves demand curve shall be \$0/MW.

In order to respond to operational or reliability problems that arise in Real-Time, the NYISO may procure any Operating Reserve product at a quantity and/or price point different than 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 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, the Business Issues Committee, the Commission, and the PSC before implementing any such modification. 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 Operating reserves Demand Curves should be adjusted to optimize the economic efficiency of the NYISO Markets.

## 6.9 Self-Supply

Transactions may be entered into to provide for Self-Supply of Operating Reserves. Except as noted in Section 15.4.8 of the *NYISO Service Tariff*, Customers seeking to Self-Supply Operating Reserves must place the Generator(s) supplying any one of the Operating Reserves under NYISO control. The Generator(s) must meet NYISO rules for acceptability.

The amount that any such Customer will be charged for Operating Reserves will be reduced by the market value of the services provided by the specified Generator(s) as determined in the *NYISO Services Tariff*.

## 6.10 Operating Reserve Charge

Please refer to Rate Schedule 5 of the NYISO OATT, Rate Schedule 4 of the NYISO Market Services Tariff, and the Accounting and Billing Manual for Information about Operating Reserve Changes.

## 6.11 Failure to Provide Operating Reserve

There is no explicit penalty for failing to provide Energy or failing to provide a Demand Reduction when Suppliers are scheduled for Energy or a Demand Reduction by RTD. If the Supplier does not perform, the following will occur:

- RTD converted the reserve schedule to energy (i.e., the reserve schedule went to zero) and the unit would buy out of its day-ahead reserve commitment at the real-time reserve market clearing price.
- A Generator would not receive any payment for energy scheduled but not produced and the Generator may receive Persistent Undergeneration charges.
- A Demand Side Resource will have a reserve performance index calculated for each interval of its real-time demand reduction schedule as follows:

$$\text{Reserve PI}_i = \text{Min} [((\text{ADR}_i / \text{RSR}_i) + .10), 1]$$

*Where:*

$\text{ADR}_i$  = Average Actual Demand Reduction for interval  $i$

If  $\text{ADR}_i \leq 0$  then set Reserve  $\text{PI}_i = 0$

$\text{RSR}_i$  = Ramped Scheduled Reduction for interval  $i$

- The Reserve Performance Index is used in the Day-Ahead Margin Assurance Payment (“DAMAP”) calculation which may reduce the DAMAP payments to Demand Side Resources. The result is that the Demand Side Resource may buy out of its Day-Ahead reserve position and not receive sufficient DAMAP payments to cover real time reserve market balancing costs.
- For more information, see *NYISO Accounting and Billing Manual* (available from the NYISO Web site at the following URL: [http://www.nyiso.com/public/markets\\_operations/documents/manuals\\_guides/index.jsp](http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp)).

## 6.12 Reserve Service Qualification and Performance Criteria

### 6.12.1 Reserve Qualified Resource Requirements

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

- Have the appropriate control equipment installed and be capable of providing Reserve Service.
- Be capable of receiving and responding to automatic control signals on a 5 minute 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 TO's as described in the TO-MP Interconnection Agreement.
- In order for a Demand Side Resource to provide reserve service the Demand Side Resource must take service from a qualified Load Serving Entity and all demand is subject to the energy settlements of the *NYISO Services Tariff* and *NYISO OATT*.
- Register the intent to provide reserve 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 Services Tariff* Attachment K and Section 2 of the Market Participant Registration Packet.
- Successfully complete the pre-qualification performance test as described in section 6.12.2.

### 6.12.2 Pre-Qualification and Re-Qualification Performance Test

All participants requesting to become reserve suppliers and all participants that are required to re-qualify as reserve providers must successfully complete the pre-qualification performance test.

- Market Participants must notify the Customer Relations Department of their intent to complete a reserve pre-qualification test. All qualification criteria defined in section 6.12.1 must be completed prior to the test request.
- Customer Relations will coordinate with Grid Operations to schedule the test.
- The Market Participant will be notified by a NYISO Customer Relations representative a minimum of two days prior to the test period indicating the dates that will be subject to pre-qualification test.
- Test participants will be instructed to submit reserve and energy bids for specified dates and for all hours that the Resource is capable of changing energy schedules or modifying demand in real time at the request of the NYISO.
- Operations will conduct a random audit(s) as described in [Technical Bulletin 142, Generator Performance Audit](#), with the exception, as described below, for testing of

non-synchronous reserves. Actions based on the results of the audit as a pre-qualification test described in [Technical Bulletin 142, Generator Performance Audit](#) will be replaced with actions as defined in this section.

- Operations will select providers that are qualifying non-synchronous reserve by randomly scheduling the resource within the first 14 days after notifying Customer Relations that they would like to perform a test. The participant must be scheduled to provide the service in order for Operations to schedule the unit for energy or demand response.
- Actions in the event of a failed pre-qualification audit (test)
  1. Operations will complete all standard audit documentation
  2. Operations will inform Customer Relations and MMA of the results of the audit (test)
  3. Customer Relations will notify the customer indicating the results of the test. If the test participant fails the test, Customer Relations will remove all reserve bidding privileges.
  4. Prior to requesting a re-test the test participant must provide an explanation to MMA describing the cause of the failed prequalification test. Documentation should be sent to;

[Reference\\_Price\\_Update@NYISO.com](mailto:Reference_Price_Update@NYISO.com)

Subject line of the e-mail should state “Reserve Performance Audit”

5. 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 reserve provided during the test as if the participant was a qualified reserve supplier.
  - The test participant will be responsible for any balancing payments due to poor performance during the test.

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## 7. BLACK START CAPABILITY SERVICE

This section describes the black start capability service.

### 7.1 Description

Black start capability represents the key Generators that, following a system-wide blackout, can start without the availability of an outside electric supply and are available to participate in system restoration activities that are under the control of the NYISO or, in some cases, under local Transmission Owner Control. If a partial or system-wide blackout occurs, these units assist in the restoration of the New York Control Area (NYCA). Specific generating units, identified in the NYISO Restoration Plan or, in specific Transmission Owners' local restoration plan(s), have the capability and training required to start up without the presence of a synchronized grid to provide the necessary auxiliary station power.

The NYISO Restoration Plan and/or Transmission Owner restoration plan(s) are implemented if a partial or complete system blackout occurs. The NYISO selects the generating resources with black start capability by considering the following operating characteristics:

- electrical location in the NYCA
- startup time: from NYISO order to start to minimum output
- maximum response rate (MW/minute) above minimum output
- maximum power output

### 7.2 Source and Scheduling of Service

LSEs must purchase black start capability service from the NYISO. Generation Resources providing this service must successfully pass the test for black start capability.

The NYISO identifies the generating units that are in critical areas for NYS Power System restoration. During system restoration activities, the NYISO manages and deploys the black start capability, as needed, depending on the specific situation.

The NYISO develops and periodically reviews the Black Start Restoration Plan for the NYS Power System. The NYISO may amend this restoration plan and determine black start requirements to account for changes in system configuration if the NYISO determines that additional black start resources are needed. The NYISO has the flexibility to seek bids for new resources whenever it amends the current plan.

Although the NYISO plan will restore a major portion of the state electric system, portions of the local Transmission Owner restoration plans may require some additional black start Generators, which are located in local Transmission Owner areas and which are not presently listed in the NYISO restoration plan. The NYISO will make payments for local area black start capability directly to the generating facilities that provide that service. Those payments will be determined under the terms of Rate Schedule 5 of the *NYISO Services Tariff*. The LSEs in those local Transmission Owner areas will be additionally

charged for that black start capability Service by the NYISO. Generating facilities, which are obligated to provide black start service as a result of divestiture contract agreements, will not receive NYISO payments for that service if they are already compensated for such service as part of those divestiture contracts.

### **7.3 Payment for Service**

Please refer to Rate Schedule 6 of the *NYISO OATT*, Rate Schedule 5 of the *NYISO Services Tariff*, and the *Accounting and Billing Manual* for information about payments for Black Start.

### **7.4 Black Start Service Procedures**

The following procedures apply to black start capability service:

#### ***NYISO Actions***

The NYISO Staff shall perform the following:

1. On a periodic basis, determine the amount and location for black start capability generation.
2. Select the Generators for black start capability based on location, price, and quality of supply.
3. Notify the selected Generators for black start testing.

#### ***Black Start Generator Actions***

The Black Start suppliers shall perform the following:

1. Those that are part of the ISO Plan, not including existing Generators under the Consolidated Edison Plan, will provide the NYISO with embedded cost information on an annual basis.
2. All black start providers must conduct performance testing annually during their respective test periods. All black start providers must submit testing data to the NYISO upon request.
3. All suppliers on an annual basis, provide a letter to the NYISO confirming that they:
  - (1) Identify and maintain a list of critical components in their black start facilities (e.g., batteries, diesel back-up generators, inverters, etc.) and perform tests to verify the condition of these critical components in accordance with good industry practice.
  - (2) Have developed test procedures and accordingly tested their black start facilities for each Capability Year.
  - (3) Have met the black start provider training requirements

## **Attachment A. Voltage Support Service Qualification Forms**

Attachment A-1

### VSS Qualifications Form

Attached to this form is:

- \_\_\_\_\_ Generator or synchronous condenser documentation, including the manufacturer’s model number or equivalent data as determined by the NYISO, manufacturer’s specifications, a block diagram and associated data, and a generator reactive capability data sheet (“D-curve”).
- \_\_\_\_\_ Documentation that demonstrates that the resource(s) listed below have an Automatic Voltage Regulator (AVR), including AVR manufacturer model number, manufacturer’s specifications, a voltage regulator block diagram and associated data.

The resource(s) listed below will participate in Voltage Support Ancillary Service under the direction of the NYISO and agree to comply with all applicable rules and procedures associated with NYISO voltage and Reactive Power control.

Unit Name	Station Name	Generator's Transmission Owner	NYISO MIS PTID	Type (Generator, Synchronous Condenser, etc.)	NYISO ICAP DMNC, UCAP* or Nameplate Rating	Generator Model and Number	AVR Model Number

Market Participant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_ Organization: \_\_\_\_\_

NYISO Approval: \_\_\_\_\_

Title: \_\_\_\_\_ Date: \_\_\_\_\_

\*UCAP rating is only used for Limited Control Run-of-River Hydro Resources.

**Attachment A-2**

**Request for Identical Treatment**

For a resource’s Voltage Support Service test to be applied to identical resources, the following criteria must be met:

- Resources must be rated at less than 60MW manufacturer’s nameplate
- Resources must be at the same site
- Resources must be electrically identical
- Resources must be stand alone (not part of a combined cycle unit, etc.)

The resources listed below are identical and are requesting that the test results from one resource apply to all the resources listed.

Unit Name	Station Name	NYISO MIS PTID	Type (Gen, Sync Cond, etc.)	Manufacturer	Model #	Nameplate MW	Nameplate MVar	Rated Power Factor	Interface Bus Name

Market Participant Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 Title: \_\_\_\_\_ Organization: \_\_\_\_\_

NYISO Approval: \_\_\_\_\_  
 Title: \_\_\_\_\_ Date: \_\_\_\_\_

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## **Attachment B. MVar Capability Test Forms**

**NYISO Voltage Support Ancillary Service Annual Reactive Capability Test Report**

Generator Owner (enter owner's name)  
 Generator Name (enter generator name)  
 Unit Name/ Number (enter unit number)  
 NYISO MIS PTID (enter ID number)  
 Other PTIDs Applied To (if applicable)  
 Generator ICAP DMNC/UCAP Rating (enter DMNC or UCAP MW-rating)  
 Group ICAP DMNC/UCAP Rating (if applicable)

NOTE: Reporting entity should complete all fields highlighted in yellow on this sheet, and all appropriate fields on the lag and lead test data sheets. Data recorded on the test data sheets will automatically populate into this summary sheet.

Check Workbook

**LAGGING MVAR MAXIMUM CAPABILITY TEST**

Test Date: (enter mm/dd/yyyy)  
 Start Time (enter hh.mm)  
 End Time (enter hh.mm)

NOTE: Cells shaded light green are automatically populated from the test data sheets.

	Gross Generator Output		Net Output to system		Hydrogen Pressure (PSIA)	Gen. Terminal Voltage		Tap Positions		In-plant Auxiliary Station Service Load		Reason For Limit
	Gross Real Power MW	Gross Reactive Power MVar	Net Real Power MW	Net Reactive Power MVar		Gen Terminal	Auxiliary Bus	GSU	Auxiliary Bus	MW	MVAR	
HP or CT (Unit/Part 1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
LP or ST (Unit/Part 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sum	0.00	0.00	0.00	0.00								

**LEADING MVAR MAXIMUM CAPABILITY TEST**

Test Date: (enter mm/dd/yyyy)  
 Start Time (enter hh.mm)  
 End Time (enter hh.mm)

NOTE: Cells shaded light green are automatically populated from the test data sheets.

	Gross Generator Output		Net Output to system		Hydrogen Pressure (PSIA)	Gen. Terminal Voltage		Tap Positions		In-plant Auxiliary Station Service Load		Reason For Limit
	Gross Real Power MW	Gross Reactive Power MVar	Net Real Power MW	Net Reactive Power MVar		Gen Terminal	Auxiliary Bus	GSU	Auxiliary Bus	MW	MVAR	
HP or CT (Unit/Part 1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
LP or ST (Unit/Part 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sum	0.00	0.00	0.00	0.00								

**COMMENTS:**

(additional comments can be included with e-mail submittal)

[Yellow comment box]

NYISO SHIFT SUPERVISOR: \_\_\_\_\_

TRANSMISSION PROVIDER DISPATCHER: \_\_\_\_\_

REACTIVE SUPPLIER: \_\_\_\_\_

**Figure B-1 NYISO Voltage Support Ancillary Service Annual Reactive Capability Test Report**



Lagging Test Data Recording Form - Part 1

Reading	Time	Gross Generator Output		Net Output to system		Hydrogen Pressure (PSIA)	Gen. Terminal Voltage		Tap Positions		In-plant Auxiliary Station Service Load	
		Gross Real Power MW	Gross Reactive Power MVAR	Net Real Power MW	Net Reactive Power MVAR		Gen Terminal	Auxiliary Bus	GSU	Auxiliary Bus	MW	MVAR
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
Calculated Average value for hour		0.0	0.0	0.0	0.0	0.0						

Data to be supplied at 5-minute intervals for duration of test hour.

Use Part 2 only for LP-shaft of cross-compound or steam turbine portion of combined-cycle unit when tested at the same time as generator in Part 1.

Lagging Test Data Recording Form - Part 2

Reading	Time	Gross Generator Output		Net Output to system		Hydrogen Pressure (PSIA)	Gen. Terminal Voltage		Tap Positions		In-plant Auxiliary Station Service Load	
		Gross Real Power MW	Gross Reactive Power MVAR	Net Real Power MW	Net Reactive Power MVAR		Gen Terminal	Auxiliary Bus	GSU	Auxiliary Bus	MW	MVAR
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
Calculated Average value for hour		0.0	0.0	0.0	0.0	0.0						

Figure B-2 Lagging Test Data Recording Form

**Leading Test Data Recording Form - Part 1**

Reading	Time	Gross Generator Output		Net Output to system		Hydrogen Pressure (PSIA)	Gen. Terminal Voltage		Tap Positions		In-plant Auxiliary Station Service Load	
		Gross Real Power MW	Gross Reactive Power MVAR	Net Real Power MW	Net Reactive Power MVAR		Gen Terminal	Auxiliary Bus	GSU	Auxiliary Bus	MW	MVAR
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												

Calculated Average value for hour  
 0.0      0.0      0.0      0.0      0.0

Data to be supplied at 5-minute intervals for duration of test hour.

**Use Part 2 only for LP-shaft of cross-compound or steam turbine portion of combined-cycle unit when tested at the same time as generator in Part 1.**

**Leading Test Data Recording Form - Part 2**

Reading	Time	Gross Generator Output		Net Output to system		Hydrogen Pressure (PSIA)	Gen. Terminal Voltage		Tap Positions		In-plant Auxiliary Station Service Load	
		Gross Real Power MW	Gross Reactive Power MVAR	Net Real Power MW	Net Reactive Power MVAR		Gen Terminal	Auxiliary Bus	GSU	Auxiliary Bus	MW	MVAR
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												

Calculated Average value for hour  
 0.0      0.0      0.0      0.0      0.0

By signing below, I, as an authorized representative of the Generator listed on this form, certify that the data submitted for the Leading Reactive Power capability test accurately demonstrates the maximum Leading Reactive Power of the generator at the time of the test.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name and Title: \_\_\_\_\_

**Figure B-3 Leading Test Data Recording Form**

## **Attachment C. Performance Adjustment for Regulating and Non-Regulating Suppliers**

**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 Performance Adjustment for Regulating and Non-Regulating Suppliers.**

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## **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 Response Rate of \_\_\_\_\_ MWs per minute.

The audit start time: \_\_\_\_\_.

The audit end time: \_\_\_\_\_.

Time weighted Performance Index: \_\_\_\_\_

Date\_\_\_\_\_

Comments and or actions taken \_\_\_\_\_

Audit Requested By:

Name: \_\_\_\_\_

Department: \_\_\_\_\_