4.5   **Real-Time Market Settlements**

Transmission Customers and Customers taking service under this ISO Services Tariff or the ISO OATT, shall be subject to the Real-Time Market Settlement. All withdrawals, injections and Demand Reductions not scheduled on a Day-Ahead basis, including Real-Time deviations from any Day-Ahead External Transaction schedules, shall be subject to the Real-Time Market Settlement. Transmission Customers not taking service under this Tariff shall be subject to balancing charges as provided for under the ISO OATT. Settlements with Suppliers scheduling service from External Suppliers to the LBMP Market or to External Loads from the LBMP Market will be based upon scheduled withdrawals or injections. Real-Time Market Settlements for Energy provided by Resources supplying Regulation Service or Operating Reserves shall follow the rules which are described in Rate Schedules 15.3 and 15.4, respectively.

For the purposes of this section, the scheduled output of each of the following Generators in each RTD interval in which it has offered Energy shall retroactively be set equal to its actual output in that RTD interval:

    (i)   Generators, except for the Generator of a Behind-the-Meter Net Generation Resource and Generators in an Aggregation, providing Energy under contracts executed and effective on or before November 18, 1999 (including PURPA contracts) in which the power purchaser does not control the operation of the supply source but would be responsible for penalties for being off-schedule, with the exception of Generators under must-take PURPA contracts executed and effective on or before November 18, 1999 who have not provided telemetering to their local TO and historically have not been eligible to participate in the NYPP

market, which will continue to be treated as TO Load modifiers under the ISO-administered markets;

(ii)   Existing topping turbine Generators and extraction turbine Generators producing electric Energy resulting from the supply of steam to the district steam system located in New York City (LBMP Zone J) in operation on or before November 18, 1999 and/or Generators utilized in replacing or repowering existing steam supplies from such units (in accordance with good engineering and economic design) that cannot follow schedules, up to a maximum total of 533 MW of such units.

This procedure shall not apply to Behind-the-Meter Net Generation Resources, Aggregations or a Generator for those hours it has used the ISO-Committed Flexible or Self-Committed Flexible bid mode.

In Sections 4.5.1, 4.5.2, 4.5.3, and 4.5.4 of this Tariff, references to "scheduled" Energy injections and withdrawals shall encompass injections, including Demand Reductions, and withdrawals that are scheduled Day-Ahead, unless otherwise noted, as well as injections and withdrawals that occur in connection with real-time Bilateral Transactions. In Sections 4.5.2 and 4.5.3 of this Tariff, references to Energy Withdrawals and Energy Injections shall not include Energy Withdrawals or Energy Injections in Virtual Transactions, or Energy Withdrawals or Energy Injections at Trading Hubs. Generators, including Limited Energy Storage Resources and Aggregations, that are providing Regulation Service shall not be subject to the real-time Energy market settlement provisions set forth in this Section, but shall instead be subject to the Energy settlement rules set forth in Rate Schedule 15.3 of this ISO Services Tariff.

4.5.1   Settlement for Customers Scheduled To Sell Energy in Virtual Transactions in Load Zones

The Actual Energy Injection in a Load Zone by a Customer scheduled Day-Ahead to sell Energy in a Virtual Transaction is zero and the Customer shall pay a charge for the Energy imbalance equal to the product of: (a) the Real-Time LBMP calculated in that hour for the applicable Load Zone; and (b) the scheduled Day-Ahead Energy Injection of the Customer for that Hour in that Load Zone.

4.5.2   Real-Time Market Settlements for Energy

4.5.2.1   General Rules for Suppliers

A Supplier, which is not a DER Aggregation, shall pay or be paid for Energy imbalance to account for differences between Actual Energy Injections, compensable Demand Reductions, real-time Energy schedules and Day-Ahead Energy schedules.

A DER Aggregation shall pay or be paid for Energy imbalance based on the (1) Actual Energy Injections, real-time Energy schedules, Day-Ahead Energy schedules, and (2) all compensable Demand Reductions eligible for payment at the applicable LBMP pursuant to Services Tariff Section 4.5.7.

A Generator or Aggregation that is not following Base Point Signals shall not be compensated for Energy in excess of its Real-Time Scheduled Energy injection if its applicable upper operating limit has been reduced below its bid-in upper operating limit by the ISO in order to reconcile the ISO's dispatch with the Generator or Aggregation's actual output, or to address reliability concerns.

If the Energy provided by a Supplier over an RTD interval is less than the Supplier's Day-Ahead Energy schedule, and if the Supplier reduced the Energy it provides in response to instructions by the ISO or a Transmission Owner that were issued in order to maintain a secure

and reliable dispatch, the Supplier may be entitled to a Day-Ahead Margin Assurance Payment, pursuant to Attachment J of this ISO Services Tariff.

4.5.2.1.1 Supplier Payments when LBMP is Positive

When the LBMP calculated in that RTD interval at the applicable Generator or Aggregation's bus is positive, the Supplier payment shall be calculated as follows:

Supplier payment for Energy injections and withdrawals = $((\text{MIN}(AE_{iu}, RTS_{iu}) - DAS_{hu})$

$* LBMP_{iu}^{RT}) * \frac{S_i}{3600}$

Where:

AE_{iu} = (1) average Actual Energy Injection by Supplier u in interval i expressed in terms of MW; or (2) average Actual Energy Withdrawal by an Energy Storage Resource u or Aggregation u that includes Energy Storage Resource(s) in interval i expressed in terms of MW;

RTS_{iu} = (1) real-time Energy scheduled by Supplier u in interval i plus Compensable Overgeneration; or (2) real-time Energy scheduled for withdrawal by Energy Storage Resource u or Aggregation u that includes Withdrawal-Eligible Generator(s) in interval i plus 3% of the absolute value of the Energy Storage Resource's or Aggregation's Lower Operating Limit; or (3) average Actual Energy Withdrawal by an Energy Storage Resource u or Aggregation u that includes Withdrawal-Eligible Generator(s) in interval i when it has been designated as operating Out-of-Merit to withdraw at the request of a Transmission Owner or the ISO;

DAS_{hu} = Day-Ahead Energy schedule for Supplier u in hour h containing interval i;

$LBMP_{iu}^{RT}$ = real-time price of Energy at the location of Supplier u in interval i;

S_i = number of seconds in RTD interval i;

Supplier payment for Demand Reductions =

$(\text{MIN}(ADR_{iu}, \text{MAX}(RTS_{iu} - AE_{iu}, 0)) * LBMP_{iu}^{RT}) * \frac{S_i}{3600}$

Where:

ADR_{iu} = average Actual Demand Reduction that is eligible for Energy payments pursuant to Services Tariff Section 4.5.7 by Supplier u in interval i, the ADR_{iu} term will be set to zero if the Actual Demand Reduction is not eligible for Energy payments pursuant to Services Tariff Section 4.5.7;

The remaining variables are defined above in this Section 4.5.2.1.1.

4.5.2.1.2 Supplier Payments when LBMP is negative, during a large event reserve pickup, during a maximum generation pickup, or during a Transmission Owner initiated reserve pickup

When: (1) the LBMP calculated in that RTD interval at the applicable Generator or Aggregation bus is negative; or (2) the ISO initiates a large event reserve pickup or a maximum generation pickup under RTD-CAM that applies to the Load Zone where the Generator or Aggregation is located; or (3) a Transmission Owner initiates a reserve pickup in accordance with a Reliability Rule, including a Local Reliability Rule, then the Supplier payment shall be calculated as follows:

Supplier payment for Energy injections and withdrawals = $((AE_{iu} - DAS_{hu}) * LBMP_{iu}^{RT})$

$* \frac{S_i}{3600}$

Where:

The variables are defined above in this Section 4.5.2.1..1

Supplier payment for Demand Reductions = $ADR_{iu} * LBMP_{iu}^{RT} * \frac{S_i}{3600}$

Where:

ADR_{iu} = average Actual Demand Reduction by Supplier u in interval i;

The remaining variables are defined above in Section 4.5.2.1.1.

4.5.2.1.3　Supplier Payments for Imports

Suppliers scheduling Imports shall pay or be paid for Energy imbalance to account for differences between real-time Energy schedules and Day-Ahead Energy schedules. For an Import to the LBMP Market that is only scheduled in the Real-Time Market, or to the extent it is scheduled to supply additional or less Energy to the LBMP Market in real-time than it was scheduled to supply Day-Ahead, the Supplier payment shall be calculated as follows:

$$\text{Supplier payment for Imports} = ((\text{RTS}_{iup} - \text{DAS}_{hup}) * LBMP_{ip}^{RT}) * \frac{S_i}{3600}$$

Where:

RTS_{iup} = real-time Energy scheduled for injection by Supplier u in interval i at Proxy Generator Bus p;

DAS_{hup} = Day-Ahead Energy schedule for Supplier u in hour h containing interval i at Proxy Generator Bus p;

$LBMP_{ip}^{RT}$ = real-time price of Energy at the Point of Receipt p (*i.e.*, the Proxy Generator Bus) in interval i;

S_i = number of seconds in RTD interval i;

4.5.2.2　Failed Transactions

If an Energy injection scheduled by RTC at a Proxy Generator Bus fails in the ISO's checkout process and the checkout failure occurred for reasons within the Supplier's or Transmission Customer's control, it will be required to pay the "Financial Impact Charge" described below. The ISO will determine whether the Transaction associated with an injection failed for reasons within a Supplier's or Transmission Customer's control.

If an Energy injection at a Proxy Generator Bus is determined to have failed for reasons within a Supplier's or Transmission Customer's control, the Financial Impact Charge will equal: (i) the difference computed by subtracting the actual real-time Energy injection from the amount

of the Import scheduled by RTC; multiplied by (ii) the greater of the Real-Time Market Congestion Component of the LBMP in the relevant interval, or zero.

If a Wheel Through fails for reasons within a Supplier's or Transmission Customer's control, the Financial Impact Charge will equal the sum of the Financial Impact Charge described in this section and the Financial Impact Charge described below in Section 4.5.3.2.

All Financial Impact Charges collected by the ISO shall be used to reduce the charges assessed under Rate Schedule 1 of this ISO Services Tariff. In the event that the Energy injections for an Import scheduled by RTC or RTD, at a Proxy Generator Bus is Curtailed at the request of the ISO, and (i) the real-time Energy Profile MW is equal to or greater than the Day-Ahead Energy Schedule for that interval, and (ii) the real-time Decremental Bid is less than or equal to the default real-time Decremental Bid amount as established by ISO procedures, then the Supplier or Transmission Customer that is subjected to the Curtailment, in addition to the charge for Energy Imbalance, shall be eligible to receive an Import Curtailment Guarantee Payment for its curtailed Import pursuant to Attachment J of this ISO Services Tariff.

4.5.2.3 Capacity Limited Resources and Energy Limited Resources

For any hour in which: (i) a Capacity Limited Resource or an Aggregation comprised entirely of Capacity Limited Resources is scheduled to supply Energy, Operating Reserves, or Regulation Service in the Day-Ahead Market; (ii) the sum of its schedules to provide these services exceeds its bid-in upper operating limit; (iii) the Capacity Limited Resource or Aggregation comprised entirely of Capacity Limited Resources requests a reduction for Capacity limitation reasons; and (iv) the ISO reduces the Capacity Limited Resource's or the Aggregation comprised entirely of Capacity Limited Resources upper operating limit to a level equal to, or greater than, its bid-in upper operating limit; the imbalance charge for Energy, Operating

Reserve Service or Regulation Service imposed on that Capacity Limited Resource or Aggregation comprised entirely of Capacity Limited Resources for that hour for its Day-Ahead Market obligations above its Capacity limited upper operating limit shall be equal to the product of: (a) the Real-Time price for Energy, Operating Reserve Service and Regulation Capacity; and (b) the Capacity Limited Resource's or the Aggregation comprised entirely of Capacity Limited Resources Day-Ahead schedule for each of these services minus the amount of these services that it has an obligation to supply pursuant to its ISO-approved schedule. When a Capacity Limited Resource's or the Aggregation comprised entirely of Capacity Limited Resources Day-Ahead obligation above its Capacity limited upper operating limit is balanced as described above, any real-time variation from its obligation pursuant to its Capacity limited schedules shall be settled pursuant to the methodology set forth in Section 4.5.2.1.

For any day in which: (i) an Energy Limited Resource or an Aggregation comprised entirely of Capacity Limited Resources is scheduled to supply Energy, Operating Reserves or Regulation Service in the Day-Ahead Market; (ii) the sum of its schedules to provide these services exceeds its bid-in Normal Upper Operating Limit; (iii) the Energy Limited Resource or the Aggregation comprised entirely of Capacity Limited Resources requests a reduction for Energy limitation reasons; and (iv) the ISO reduces the Energy Limited Resource's Day-Ahead Emergency Upper Operating Limit to a limit no lower than the Normal Upper Operating Limit; the Resource may be eligible to receive a Day-Ahead Margin Assurance Payment pursuant to Attachment J of this ISO Services Tariff.

4.5.2.4 Demand Reductions

When the verified actual Demand Reduction over an hour from a Demand Reduction Provider that is also the LSE providing Energy service to the Demand Side Resource(s) that

produced the reduction is less than the Demand Reduction scheduled for that hour, that LSE shall pay a Demand Reduction imbalance charge consisting of the product of: (a) the greater of the Day-Ahead LBMP or the Real-Time LBMP for that hour and (b) the difference between the scheduled Demand Reduction and the verified actual Demand Reduction in that hour.

When the verified actual Demand Reduction over an hour from a Demand Reduction Provider that is not the LSE providing Energy service to the Demand Side Resource(s) that produced the reduction is less than the Demand Reduction scheduled over that hour, then (1) the LSE providing Energy service to the Demand Reduction Provider's Demand Side Resource(s) shall pay a Demand Reduction imbalance charge equal to the product of (a) the Day-Ahead LBMP calculated for that hour for the applicable Load bus and (b) the difference between the scheduled Demand Reduction and the verified actual Demand Reduction at that bus in that hour, and (2) the Demand Reduction Provider will pay an amount equal to (a) the product of (i) the higher of the Day-Ahead LBMP or the Real-Time LBMP calculated for that hour for the applicable Load bus, and (ii) the difference between the scheduled Demand Reduction and the verified actual Demand Reduction at that bus in that hour, and (b) minus the amount paid by the LSE providing service to the Demand Reduction Provider's Demand Side Resource(s) under (1), above.

4.5.3 Real-Time Market Settlements for Energy Withdrawals Other Than in Virtual Transactions

4.5.3.1 General Rules

A Customer (other than a Generator that is eligible to withdraw Energy) shall pay or be paid for Energy imbalance to account for differences between Actual Energy Withdrawals over an RTD interval and its Energy withdrawals scheduled Day-Ahead. The ISO shall charge the Customer as follows for each applicable Load Zone:

Customer Charge $= ((\text{AEW}_{icz} - \text{DAS}_{hcz}) * LBMP_{iz}^{RT}) * \frac{S_i}{3600}$

Where:

AEW_{icz} =   Actual Energy Withdrawal by Customer c in Load Zone z in interval i;

DAS_{hcz} =   Day-Ahead scheduled Energy withdrawals by Customer c in Load Zone z in hour h containing interval i;

$LBMP_{iz}^{RT}$ =   real-time price of Energy for Load Zone z in interval i;

S_i =   number of seconds in RTD interval i;

If the Generator of a Behind-the-Meter Net Generation Resource is not able to serve the Resource's Host Load at any time, any resulting Actual Energy Withdrawals that serve the Host Load will be charged to the Load Serving Entity responsible for serving the Behind-the-Meter Net Generation Resource.

4.5.3.1.1 Customer Settlements for Exports

Customers scheduling Exports shall pay or be paid for Energy imbalance to account for differences between real-time Energy schedules and Day-Ahead Energy schedules. For an Export from the LBMP Market that is only scheduled in the Real-Time Market, or to the extent it is scheduled to withdraw additional or less Energy from the LBMP Market in real-time than it was scheduled to withdraw Day-Ahead, the ISO shall charge the Customer as follows:

Customer Charge for Exports $= ((\text{RTS}_{iup} - \text{DAS}_{hup}) * LBMP_{ip}^{RT}) * \frac{S_i}{3600}$

Where:

RTS_{iup} =   real-time Energy scheduled for withdrawal by Customer u in interval i at Proxy Generator Bus p;

DAS_{hup} =   Day-Ahead Energy schedule for Customer u in hour h containing interval i at Proxy Generator Bus p;

$LBMP_{ip}^{RT}$ = real-time price of Energy at the Point of Delivery p (*i.e.*, the Proxy Generator Bus) in interval i;

S_i = number of seconds in RTD interval i;

4.5.3.2 Failed Transactions

If an Energy withdrawal at a Proxy Generator Bus scheduled by RTC fails in the ISO's checkout process and the checkout failure occurred for reasons within the Supplier's or Transmission Customer's control, it will be required to pay the "Financial Impact Charge" described below. The ISO will determine whether the Transaction associated with a withdrawal failed for reasons within a Supplier's or Transmission Customer's control.

If an Energy withdrawal at a Proxy Generator Bus is determined to have failed for reasons within a Supplier's or Transmission Customer's control, the Financial Impact Charge will equal: (i) the difference computed by subtracting the actual real-time Energy withdrawal from the amount of the Export scheduled by RTC; multiplied by (ii) the product of negative one and the lesser of the Real-Time Market Congestion Component of the LBMP in the relevant interval, or zero.

If a Wheel Through fails for reasons within a Supplier's or Transmission Customer's control, the Financial Impact Charge will equal the sum of the Financial Impact Charge described in this subsection and the Financial Impact Charge described above in Section 4.5.2.2.

All Financial Impact Charges collected by the ISO shall be used to reduce the charges assessed under Rate Schedule 15.1 of this ISO Services Tariff.

4.5.4 Settlement for Customers Scheduled To Purchase Energy in Virtual Transactions in Load Zones

The Actual Energy Withdrawal in a Load Zone by a Customer scheduled Day-Ahead to purchase Energy in a Virtual Transaction is zero and the Customer shall be paid the product of:

(a) the Real-Time LBMP calculated in that hour for the applicable Load Zone; and (b) the

scheduled Day-Ahead Energy Withdrawal of the Customer for that Hour in that Load Zone.

4.5.5   Settlement for Trading Hub Energy Owner when POI is a Trading Hub

Each Trading Hub Energy Owner who bids a Bilateral Transaction into the Real-Time

Market with a Trading Hub as its POI and has its schedule accepted by the ISO will pay the

product of: (a) the hourly integrated Real-Time LBMP for the Load Zone associated with that

Trading Hub; and (b) the Bilateral Transaction scheduled MW.

4.5.6   Settlement for Trading Hub Energy Owner when POW is a Trading Hub

Each Trading Hub Energy Owner who bids a Bilateral Transaction into the Real-Time

Market with a Trading Hub as its POW and has its schedule accepted by the ISO will be paid the

product of: (a) the hourly integrated Real-Time LBMP for the Load Zone associated with that

Trading Hub; and (b) the Bilateral Transaction scheduled MW.

4.5.7   Settlement for Demand Reductions

4.5.7.1   Monthly Net Benefits Test

The ISO shall perform the Net Benefits Test and post on its web site the Monthly Net

Benefit Threshold for each month by the 15th of the preceding month in accordance with ISO

Procedures. The Net Benefits Test shall establish the threshold price below which the dispatch

of Energy from Demand Side Resources is not cost-effective. The Net Benefits Test shall

consist of the following steps: (1) the ISO shall compile hourly supply curves for the Reference

Month; (2) the ISO shall develop the average supply curve for the Study Month by updating the

Reference Month supply curves for retirements and new entrants, and adjusting offers for

changes in fuel prices; (3) the ISO shall apply an appropriate mathematical formula to smooth

the average supply curve; and (4) the ISO shall evaluate the smoothed average supply curve to determine the Monthly Net Benefit Floor for the Study Month.

The ISO shall promptly post corrections, where necessary, to the Monthly Net Benefit Threshold. Corrections shall only apply to errors in conducting the calculations described above and/or in posting the properly calculated Monthly Net Benefit Threshold. Corrections shall not include recalculations based on changes in gas prices.

4.5.7.2   Settlement Eligibility for Demand Reductions

A DER Aggregation may offer into the Day-Ahead Market or Real-Time Market below the Monthly Net Benefit Threshold. However, when a DER Aggregation receives a real-time Energy schedule, and the Real-Time LBMP calculated in that RTD interval for the applicable Transmission Node is less than the Monthly Net Benefit Threshold price, Demand Reductions by the DER Aggregation shall not be eligible for Energy payments, Day Ahead Margin Assurance Payments or Bid Production Cost guarantee payments otherwise available under this Services Tariff. Provided, however, if the DER Aggregation is dispatched by the ISO or Transmission Owner to meet NYCA or local system reliability, the Demand Reductions shall be eligible for Energy payments. The DER Aggregation may also be eligible for Day Ahead Margin Assurance Payments pursuant to Attachment J of this ISO Services Tariff and Bid Production Cost guarantee payments pursuant to Attachment C of this ISO Services Tariff.

4.5.8   Performance Tracking

The ISO shall use a Performance Tracking System to compute the difference between the Energy actually supplied and the Energy scheduled by the ISO for all Suppliers located within the NYCA and shall use it to measure compliance with criteria associated with the provision of

Energy and Ancillary Services as set forth in the ISO Procedures. The Performance Tracking System shall also be used to report metrics for Loads.