

## **Appendix B - Scheduling and Reductions of Real-Time External Transactions under Standard Market Design**

### **A. Scheduling of External Transactions**

Pursuant to ISO New England Operating Documents, and specifically Section II.44 “Scheduling and Curtailment Rules for Real-Time External Transactions” (Section II.44) of the Open Access Transmission Tariff (OATT), External Transactions submitted to an external node are scheduled in economic order, based on the Locational Marginal Price (LMP) and transfer limit forecasted for the external interface. This section describes the Real-Time Energy Market External Transaction scheduling process. This scheduling process may occur on an hourly interval or more than once an hour with neighboring Control Areas/Balancing Authority Areas (CAs/BAAAs) for which ISO has implemented protocols for the shorter scheduling intervals.

#### **1. Scheduling in Normal Conditions**

##### **1.1 Economics Considered First**

- a. A Real-Time Energy Market External Transaction is considered economic based on a comparison of its bid/offer price to the associated external node’s forecasted LMP.
  - An export transaction is considered to be economic when its bid price is equal to or greater than the external node’s forecasted LMP.
  - An import transaction is considered to be economic when its offer price is equal to or less than the external node’s forecasted LMP.
  - Self-Scheduled and wheel-through transactions are always considered to be economic.
  - Priced Real-Time Energy Market External Transactions that are also submitted in the Day-Ahead Energy Market on the same transaction ID will be treated as Self-Scheduled External Transactions in the Real-Time Energy Market for the associated megawatt amounts that cleared the Day-Ahead Energy Market, unless the Market Participant modifies the price of its Real-Time offer during the Re-Offer Period. If that price is modified during the Re-Offer Period, those hours where the price was modified will be considered at that revised price in the scheduling of the Real-Time Energy Market.
- b. When the net schedule associated with an external interface does not exceed the transfer limit of that interface all economic External Transactions submitted to that external interface shall be scheduled for the next scheduling interval.
- c. When the net schedule associated with an external interface does exceed the transfer limit of that interface and, therefore, does not allow all associated economic External Transactions to be scheduled for the next scheduling interval, the transactions shall be scheduled in economic order until the transfer limit is reached.

- If the transfer limit is reached and there is only one External Transaction causing the limit to be exceeded, a partial schedule shall be set for that transaction so that the transfer limit is not exceeded.
- If the transfer limit is reached and there are multiple External Transactions at the same price causing the limit to be exceeded, the following section shall be used to determine which of the transactions shall be scheduled.

## 1.2 Transaction Priority resolves ties within Economics

- a. When the scheduling of a group of equally priced External Transactions on a given external interface would cause the transfer limit for that interface to be exceeded, transaction priority, as described in Section C of this Appendix, shall be used as a tiebreaker to order transactions at that price. Transactions shall be ordered on the basis of transaction priority, as appropriate for that interface, and ties within the same level of transaction priority will be resolved based on whether the transaction cleared the Day-Ahead Energy Market.
- b. Where advance reservations are not required relative to a given external interface (i.e., external interfaces solely made up of Pool Transmission Facility (PTF), transactions shall be scheduled in the following order:
  - In accordance with Section II.44 (a) of the ISO Tariff, certain External Transaction sales and purchases (“Section II.44 (a) External Transactions”) shall receive a higher transaction priority when compared to other Real-Time External Transaction purchases or sales. In the event that the transfer limit for a given interface does not allow all the Section II.44 (a) External Transactions to be scheduled, they shall be scheduled in the following order:
    1. The portion of all Section II.44 (a) External Transactions that has cleared a corresponding Day-Ahead Energy Market transaction shall be scheduled on a pro-rata basis.
    2. The portion of all Section II.44 (a) External Transactions that has not cleared a corresponding Day-Ahead Energy Market transaction shall then be scheduled on a pro-rata basis,
  - In accordance with Section II.44 (b) of the ISO Tariff, certain External Transaction sales and purchases (“Section II.44 (b) External Transactions”) shall receive the same transaction priority. In the event that the transfer limit for a given interface does not allow all the Section II.44 (b) External Transactions to be scheduled, they shall be scheduled in the following order:
    1. The portion of all Section II.44 (b) External Transactions that has cleared a corresponding Day-Ahead Energy Market transaction shall be scheduled on the basis of its Real-Time Energy Market timestamp order, where the first submitted is the first to be scheduled.
    2. The portion of all Section II.44 (b) External Transactions that has not cleared a corresponding Day-Ahead Energy Market transaction shall be scheduled on the basis of its Real-Time Energy Market timestamp order, where the first submitted is the first to be scheduled.

- c. Where advance reservations are required relative to a given external interface [i.e., external interfaces made up of Merchant Transmission Facility (MTF) or Other Transmission Facility (OTF)], transaction priority is based on the priority of the associated transmission reservation. In accordance with Section II.44 (a) of the OATT: For External Transactions referenced in Attachment G-3 that also require an advance physical reservation associated with a MTF or OTF external interface, the MTF or OTF transmission priority shall take precedence for the purposes of scheduling External Transactions. In the case of a tie within a transaction priority:
- Transactions within a given sub-category of non-Firm transaction priority shall be scheduled in the following order:
    1. The portion of all transactions in this category that has cleared a corresponding Day-Ahead Energy Market transaction shall be scheduled on the basis of its' Real-Time Energy Market timestamp, where the first submitted is the first to be scheduled.
    2. The portion of all transactions in this category that has not cleared a corresponding Day-Ahead Energy Market transaction shall be scheduled on the basis of its' Real-Time Energy Market timestamp, where the first submitted is the first to be scheduled.
  - Transactions with Firm transaction priority shall be scheduled in the following order:
    1. The portion of all transactions in this category that has cleared a corresponding Day-Ahead Energy Market transaction shall be scheduled on a pro-rata basis.
    2. The portion of all transactions in this category that has not cleared a corresponding Day-Ahead Energy Market transaction shall be scheduled on a pro-rata basis,

In instances of an Energy transaction scheduled against multiple reservations on a MTF or OTF external interface, the lowest transmission priority of the associated reservations shall apply.

- d. The transaction priority for wheel-through transactions will be based on the transmission service utilized at the restricted external interface. Where advance reservations are not required, the transaction priority for the wheel-through transaction is equal to all other External Transactions on that interface (See Section A.1.2.b.). Where advance reservations are required, the transaction priority for the wheel-through transaction is assigned as indicated by the transmission reservation (See Section A.1.2.c.).

**Please note:** that this assignment of transaction priority for wheel-through transactions is applied for all scheduling and reductions discussed in this Appendix.

- e. The external transaction's Real-Time Energy Market timestamp is based on the time of submittal or modification of the energy transaction to the Real-Time Energy Market.

**Please note:** the determination of the Real-Time Energy Market timestamp as described here is applicable for all scheduling and reductions discussed situations discussed in this Appendix.

## 2. Scheduling under Ramp Constraints

If a ramp constraint exists that must be mitigated during the Scheduling process, the following rules shall apply:

- a. Reductions to eliminate the ramp constraint will be made to External Transactions on all selected external interfaces simultaneously using the same methodology.
- b. Transactions helping the ramp constraint will be excluded from the ramp constraint evaluation. Therefore, External Transactions flowing in the opposite direction of the ramp constraint will be excluded from the ramp constraint evaluation. In addition, External Transactions flowing in the same direction as the ramp constraint but that have a MW value that is changing in the opposite direction of the ramp constraint will continue to be scheduled (e.g. an import transaction is changing from 100MW to 50 MW during an import ramp constraint).
- c. Wheel-through transactions will be excluded from the ramp constraint evaluation.
- d. All External Transactions will be categorized into one or two of the four groups described below:
  - Group 1: External Transactions submitted only into the Real-Time Energy Market and whose schedule is directly impacting the ramp constraint (e.g., an import transaction is changing from 0 MW to 150 MW during an import ramp constraint).
  - Group 2: External Transactions submitted only into the Real-Time Energy Market and whose schedule is not changing during the time of the ramp constraint.
  - Group 3: External Transactions that have cleared in the Day-Ahead Energy Market, have a corresponding transaction submitted into the Real-Time Energy Market under the same transaction identifier and whose schedule is directly impacting the ramp constraint (e.g., an import transaction is changing from 0 MW to 150 MW during an import ramp constraint).
  - Group 4: External Transactions that have cleared in the Day-Ahead Energy Market, have a corresponding transaction submitted into the Real-Time Energy Market under the same transaction identifier and whose schedule is not changing during the time of the ramp constraint.
- d. The scheduling under the ramp constraint will occur as described below:
  1. A single External Transaction can have MW in one or two of the groups described above (e.g., an External Transactions that is submitted only into the Real-Time Energy Market whose schedule is changing from 100 MW to 150 MW would have 50 MW in Group 1 and 100 MW in Group 2).
  2. Reductions will be made to Group 1 first, Group 2 second, Group 3 third and then to Group 4. All the MW from External Transactions with in one group will be reduced to zero MW before utilizing any MW from a subsequent group.
  3. If only a portion of the MW within a group are required to resolve the ramp constraint, the evaluation of all External Transactions within that group to determine which transaction are reduced shall be made in a manner consistent with the normal scheduling rules – economics, priority and timestamp.

### 3. Scheduling Related to Minimum Generation Emergency

If the normal scheduling process, described in Section A.1, results in a net schedule that would create or worsen a Minimum Generation Emergency for the overall New England Control Area/Balancing Authority Area (CA/BAA) or into a specific region (e.g. Maine) the following rules shall be applied. This OP-9 document does not define when the actions for reduction shall be taken or the number of megawatts to be reduced, but describes the order in which the transactions shall be impacted if reductions are required in accordance with Manual 11.

- a. The transactions that are impacted by this condition are described below:
  - All imports will be considered under the scheduling rules defined in this section.
  - All export transactions that are economic will continue to be scheduled under Section A.1 and A.2.
  - If the condition is applicable in all of New England, wheel through transactions will continue to be scheduled under Section A.1 and A.2.
  - If the condition is limited to a local region (i.e. Maine), and the importing interface of a wheel through transaction is located within that region, the wheel through transaction will be considered as an import under the scheduling rules defined in this section.
- b. If a Minimum Generation Emergency Warning has been issued and a reduction is required to Real-Time Energy Market External Transactions that have not also cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price where the most expensive transactions are reduced first. If there is a tie in price, the transaction priority shall be used as the tiebreaker where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker, where the most recent submittals are reduced first.
- c. If a Minimum Generation Emergency has been declared and after reductions have been made to transactions not cleared in the Day-Ahead Energy Market, if a reduction is then required to Real-Time Energy Market External Transactions that have cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price. However, the price associated with all Real-Time Energy Market External Transactions that have cleared the Day-Ahead Energy Market are equal and the transaction priority shall be used as the tiebreaker, where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker where the most recent submittals are reduced first.

#### 4. Scheduling Related to Capacity Deficient Conditions

If the normal scheduling process, defined in Section A.1, results in a net schedule that would create or worsen a capacity deficient condition for the overall New England CA/BAA or out of a specific region (e.g. Connecticut), the following rules shall be applied. This OP-9 document does not define when the actions for reduction shall be taken, but describes the order in which the transactions shall be impacted if reductions are required in accordance with Manual 11.

- a. The transactions that are impacted by this condition are described below:
  - All exports will be considered under the scheduling rules defined in this section, except those exports identified as being backed by a resource without a capacity obligation (de-listed MWs) that meet the criteria detailed below:
    - If the transaction is identified as being backed by a resource without a capacity obligation (fully de-listed MWs), and the referenced resource is self-scheduled to the amount of the export transaction, the transaction shall be excluded from the reduction process described below.
    - If the transaction is identified as being backed by a resource without a capacity obligation (fully de-listed MWs), and the referenced resource is not self-scheduled to the amount of the export transaction, the offered MW amount of the transaction that is not self-scheduled shall be considered in the scheduling process described below.
    - If the transaction is backed by a resource with a partial capacity obligation (partially de-listed Resource) any self-scheduled MWs, up to the delisted quantity but not exceeding the amount of the export transaction), will be excluded from the reduction process described below
      - If the resource's Real-Time Economic Maximum Limit is below its Seasonal Claimed Capability (SCC), the amount of de-listed, self-scheduled MWs exempted from the reduction process described below will be reduced proportionately to the difference between the EcoMax and the SCC.
        - For example, if a resource has a 600 MW SCC with 400 MW listed and 200 MW delisted with a declared EcoMax of 300MW (1/2 the SCC), up to 100 MW of the resource that is self-scheduled will be excluded from the reduction process described in this section
  - All import transactions that are economic will continue to be scheduled under Section A.1 and A.2.
  - If the condition is applicable to all of New England, wheel through transactions will continue to be scheduled under Section A.1 and A.2.
  - If the condition is applicable in only a local region (i.e. Connecticut), and the exporting interface of a wheel through transaction is located within that region, that wheel through transaction will be considered as an export under the scheduling rules defined in this section.

- b. If M/LCC2 has been declared and a reduction is required to Real-Time Energy Market External Transactions that have not cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price where the least expensive transactions are reduced first. If there is a tie in price, the transaction priority shall be used as the tiebreaker where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker where the most recent submittals are reduced first.
- c. If OP-4 has been declared and after reductions have been made to transactions that did not clear the Day-Ahead Energy Market, if a reduction is then required to Real-Time Energy Market External Transactions that have cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price. However, the price associated with all Real-Time Energy Market External Transactions that have cleared the Day-Ahead Energy Market are equal and the transaction priority shall be used as the tiebreaker, where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker where the most recent submittals are reduced first.

## **B. Reductions of External Transactions within a Scheduling Interval**

A scheduled External Transaction shall not be reduced if cutting the transaction will have a negative effect upon reliability in the New England CA/BAA; system reliability shall always be the overriding consideration.

### **1. Reductions within a Scheduling Interval due to Transfer Capability**

In the event that scheduled External Transactions need to be reduced within the scheduling interval due to unexpected changes in power system conditions or the overloading of transmission facilities resulting in a reduction in the transfer limit of the associated external interface, the following rules shall be applied, pursuant to Section II.44.(b) and Section II.44.(d) of the Tariff .

- a. Where advance reservations are not required relative to the limited external interface (i.e., external interfaces solely made up of PTF), reductions shall be based on economics to the extent possible. In the case of economic ties, all External Transactions shall have equal transaction priority. There is a single exception to this rule:
  - Certain External Transaction sales and purchases shall receive a transaction priority in accordance with Section II.44 (a) of the Tariff. In the event that the transfer limit for a given external interface does not allow these transactions to flow, they shall be reduced on a pro-rata basis.
  - Transactions having the same priority and for which the above exemption does not apply shall be reduced in the in the following order:
    1. The portion of all transactions that did not clear a corresponding Day-Ahead Energy Market transaction shall be scheduled on the basis of their Real-Time Energy Market timestamp order, where the last submitted is the first reduced.
    2. The portion of all transactions that have a cleared corresponding Day-Ahead Energy Market transaction shall be reduced on the basis of their Real-Time Energy Market timestamp order, where the last submitted is the first reduced

- Transactions having the same priority and for which the above exemption applies shall be reduced in the following order:
  1. The portion of all transaction did not clear a corresponding Day-Ahead Energy Market transaction shall be reduced on a pro-rata basis.
  2. The portion of all transactions that have cleared corresponding Day-Ahead Energy Market transaction shall then be reduced on a pro-rata basis.
- b. Where advance physical reservations are required relative to the limited external interface (i.e., external interfaces made up of MTF or OTF), reductions shall be based on transaction priority of the associated transmission reservation to the extent possible. In accordance with Section II.44 (a) of the Tariff: For External Transactions referenced in Attachment G-3 that also require an advance physical reservation associated with a MTF or OTF external interface, the MTF or OTF transmission priority shall take precedence for the purposes of scheduling External Transactions. In the case of a tie in transaction priority:
  - External Transactions within a given sub-category of non-Firm transmission service shall be reduced in the in the following order:
    1. The portion of all transactions that did not clear a corresponding Day-Ahead Energy Market transaction shall be scheduled on the basis of their Real-Time Energy Market timestamp order, where the last submitted is the first reduced.
    2. The portion of all transactions that have a cleared corresponding Day-Ahead Energy Market transaction shall be reduced on the basis of their Real-Time Energy Market timestamp order, where the last submitted is the first reduced
  - External transactions with Firm transmission service shall be reduced in the following order:
    1. The portion of all transaction did not clear a corresponding Day-Ahead Energy Market transaction shall be reduced on a pro-rata basis.
    2. The portion of all transactions that have a cleared corresponding Day-Ahead Energy Market transaction shall then be reduced on a pro-rata basis.

In instances of an Energy Transaction scheduled against multiple reservations on a MTF or OTF external interface, the transaction priority shall be the lowest transmission priority of the associated reservations.

## **2. Reductions Related to a Minimum Generation Emergency within a Scheduling Interval**

In the event that scheduled External Transactions need to be reduced within the scheduling interval due to an expected or actual Minimum Generation Emergency, the Operator shall determine, in accordance with the ISO New England Manual for Market Operations (Manual M-11), the number of scheduled megawatts to be reduced, including the extent to which such reduction(s) shall affect external transactions and on which external interface(s) such reduction(s) shall apply. This OP-9 document does not define when the actions for reduction shall be taken, but describes the order in which the transactions shall be impacted if reductions are required.

The External Transactions identified as candidates for reduction, in accordance with Section B.3.a.:

- b. If a Minimum Generation Emergency Warning has been issued and a reduction is required to Real-Time Energy Market transactions that have not also cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price where the most expensive transactions are reduced first. If there is a tie in price, the transaction priority shall be used as the tiebreaker where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker, where the most recent submittals are reduced first.
- c. If a Minimum Generation Emergency has been declared and after reductions have been made to transactions that did not clear the Day-Ahead Energy Market, if a reduction is then required to transactions that have cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price. However, the price associated with all transactions that have cleared the Day-Ahead Energy Market are equal and the transaction priority shall be used as the tiebreaker, where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker where the most recent submittals are reduced first

### **3. Reductions Related to a Capacity Deficient Condition within a Scheduling Interval**

In the event that scheduled External Transactions need to be reduced within the scheduling interval due to an expected or actual capacity deficient condition the Operator shall determine, in accordance with the ISO New England Manual for Market Operations (Manual M-11), the number of scheduled megawatts to be reduced, including the extent to which such reduction(s) shall affect External Transactions and on which external interface(s) such reduction(s) shall apply. This OP-9 document does not define when the actions for reduction shall be taken, but describes the order in which the transactions shall be impacted if reductions are required.

- a. The External Transactions identified as candidates for reduction are the same as those identified in Section B.4.a.
- b. If M/LCC2 has been declared and a reduction is required to Real-Time Energy Market transactions that have not cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price where the least expensive transactions are reduced first. If there is a tie in price, the transaction priority shall be used as the tiebreaker where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker where the most recent submittals are reduced first.
- c. If OP-4 has been declared and after reductions have been made to transactions that did not clear in the Day-Ahead Energy Market, if a reduction is then required to Real-Time Energy Market transactions that have cleared the Day-Ahead Energy Market, the reduction to that group of transactions shall first consider price. However, the price associated with all transactions that have cleared the Day-Ahead Energy Market are equal and the transaction priority shall be used as the tiebreaker, where those with the lowest priority are reduced first. If there is a tie in transaction priority, the Real-Time Energy Market timestamp of the transaction shall be used as the tiebreaker where the most recent submittals are reduced first.

**C. Listing of Transaction Priorities**

This section of the Appendix lists transaction priorities from lowest to highest. In general, the transaction priority is derived from the associated Transmission Service.

<b>Lowest Transaction Priority</b>		
<b>NERC # PRIORITY</b>	<b>DESCRIPTION</b>	<b>NERC ABBRV</b>
*0		NX
1	Transactions scheduled against Secondary Point-to-Point Transmission Service	NS
2	Transactions scheduled against Hourly Non-Firm Point-to-Point Transmission Service	NH
3	Transactions scheduled against Daily Non-Firm Point-to-Point Transmission Service	ND
4	Transactions scheduled against Weekly Non-Firm Point-to-Point Transmission Services	NW
5	Transactions scheduled against Monthly Non-Firm Point-to-Point Transmission Services.	NM
*6		NN
7	Transactions scheduled against the following types of Firm Transmission Service: <ul style="list-style-type: none"> <li>• Regional Network Service</li> <li>• Excepted Transactions with Firm status under OATT</li> <li>• Firm Point-to-Point Transmission Service</li> </ul> All types of Firm transmission service have equal transaction priority.	FN  F
**8	Transactions submitted in accordance with Section II.44(a) of the Tariff	
<b>HIGHEST TRANSACTION PRIORITY</b>		

\* = ISO does not use NERC PRIORITY 0 (NX), and NERC PRIORITY 6 (NN)

\*\* = ISO PRIORITY # = NERC PRIORITY

**OP 9 Appendix B Revision History**

**Document History** (This Document History documents action taken on the equivalent NEPOOL Procedure prior to the RTO Operations Date as well revisions made to the ISO New England Procedure subsequent to the RTO Operations Date.)

<b>Rev. No.</b>	<b>Date</b>	<b>Reason</b>
Rev 1	02/01/05	Updated to conform to RTO terminology
Rev 2	05/27/05	Revised to include requirements for fully and partially de-listed resources
Rev 3	04/13/07	Revised to include the next hours scheduling under ramp constraints
Rev 4	06/03/08	Annual Review by Procedure Owner. Revised to include the changes in OATT and Market Rules related to transactions clearing the Day-Ahead Energy Market having some priority in the Real-Time Energy Market
5	10/01/08	Various parts: The use of Next-Hour and In-hour were replaced with reference to scheduling intervals to be clear that transactions can be scheduled more frequently than once an hour