ISO New England Manual for

# Forward Reserve and Real-Time Reserve

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*ISO New England Manual for*

# Forward Reserve and Real-Time Reserve

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# Introduction

## About This Manual

Welcome to the ***ISO New England Manual for Forward Reserve and Real-Time Reserve, M-36***. The ***ISO New England Manual for Forward Reserve and Real-Time Reserve*** is one of a series of manuals concerning the wholesale electricity markets administered by the ISO. This manual details the Forward Reserve Market including how Forward Reserve is acquired in the Forward Reserve Auction and how the value of Forward Reserve is determined in accordance with Market Rule 1. Market Rule 1 is Section III of the ISO Tariff and can be obtained from the ISO website at www.iso-ne.com.

This manual assumes that the reader has reviewed Market Rule 1 before or in conjunction with using the manual. Terms that are capitalized in this manual generally are defined in Section I of the ISO Tariff or ***ISO New England Manual for Definitions & Abbreviations, M-35***.

The reader is referred first to Market Rule 1 for an explanation and information regarding the operation of the Forward Reserve Market.

The ***ISO New England Manual for Forward Reserve and Real-Time Reserve*** consists of six Sections. The Sections are as follows:

Section 1: Overview of Forward Reserve Market Operations
Section 2: Forward Reserve Auction Process
Section 3: Assignment of Forward Reserve Obligations
Section 4: Delivery of Forward Reserve
Section 5: Consequences of Non-Delivery of Forward Reserve
Section 6: Forward Reserve and Real-Time Reserve Accounting

## Target Users

The target users for the ***ISO New England Manual for Forward Reserve and Real-Time Reserve*** are:

- *Market Participants* – Any Market Participants requesting to sell Operating Reserve to the Forward Reserve Market.

- *ISO market operations administrators* – The ISO market operations administrators are responsible for conducting the Forward Reserve Auction and calculating the Forward Reserve Threshold Price.

- *ISO settlement administrators* – The ISO settlement administrators are responsible for determining the weekly billing statements.

## *References*

The references to other documents that provide background or additional detail directly related to the ***ISO New England Manual for Forward Reserve and Real-Time Reserve*** are:

- Market Rule 1
- ***ISO New England Manual for Market Operations, M-11***
- ***ISO New England Manual for Installed Capacity, M-20***
- ***ISO New England Manual for Definitions & Abbreviations, M-35***
- Applicable ISO New England Operating Procedures

# Section 1: Overview of Forward Reserve Market Operations

Welcome to the *Overview of Forward Reserve Market Operations* Section of the ***ISO New England Manual for Forward Reserve and Real-Time Reserve***. In this Section you will find the following information:

- A description of the Forward Reserve Market (see "Overview").

## 1.1 Overview

The Forward Reserve Market is a market to procure Ten-Minute Non-Spinning Reserve (TMNSR) and Thirty-Minute Operating Reserve (TMOR) on a forward basis for delivery in Real-Time. The Forward Reserve Market includes a Forward Reserve Delivery Period auction (Forward Reserve Auction) to acquire, in advance, capability to supply required Operating Reserve to meet the Forward Reserve requirements in each identified Reserve Zone.

Forward Reserve Auctions are held twice per year, corresponding to the Forward Reserve Procurement Periods. The Forward Reserve Auctions occur approximately two months prior to the beginning of each Forward Reserve Procurement Period. Prior to each auction, the ISO calculates the Forward Reserve requirements in accordance with the methodology described under Section 2 of this manual and in accordance with Market Rule 1 Section III.9.2.

Forward Reserve Auction Offers are submitted on a portfolio basis. The Forward Reserve Auction simultaneously clears Forward Reserve Auction Offers to meet Forward Reserve requirements using a mathematical programming algorithm. The mathematical algorithm produces separate clearing prices for the Forward Reserve purchased in each Reserve Zone. The Forward Reserve Auction Offers and Forward Reserve Clearing Prices are in $/MW-month. The Forward Reserve Clearing Prices for each Reserve Zone are based on the marginal costs to simultaneously serve an incremental increase in Forward Reserve requirement, similar to the manner in which LMPs are calculated. The Forward Reserve Auction Offers cannot exceed the Forward Reserve Offer Cap.

Each Forward Reserve Auction substitutes higher quality TMNSR for lower quality TMOR when it is economical to do so after the TMNSR requirement has been met within the applicable Reserve Zones. The Forward Reserve Auction will also utilize excess TMNSR and TMOR in one Reserve Zone to meet the TMNSR and TMOR requirements of another Reserve Zone provided that no constraints exist that would prevent the excess TMNSR and TMOR from being delivered to that Reserve Zone. In addition, price cascading is applied to ensure that the Forward Reserve Clearing Price for TMOR in a Reserve Zone is always less than or equal to the Forward Reserve Clearing Price for TMNSR in that Reserve Zone.

A Market Participant whose offers have cleared in the Forward Reserve Auction receives a Forward Reserve Obligation for each Reserve Zone equal to the amount of that Market Participant's Forward Reserve Auction Offers that cleared in the auction. A Market

Participant's Forward Reserve Obligation also reflects any Internal Bilateral Transactions for Forward Reserve that the Market Participant may have entered into. To meet their Forward Reserve Obligations, Market Participants must assign Forward Reserve to their Forward Reserve Resources on a daily basis at any time prior to the close of the Re-Offer Period for each Operating Day such that the aggregate assignments are greater than or equal to their Forward Reserve Obligations. Market Participants must submit Supply Offer, Demand Reduction Offer, or Demand Bid prices associated with their Forward Reserve Resources at or above the Forward Reserve Threshold Price. Real-Time Reserve Designations are discussed in Market Rule 1 Section III.1.7.19.

A failure-to-reserve occurs when a Market Participant's Forward Reserve Delivered Megawatts associated with a Reserve Zone is less than that Market Participant's associated Forward Reserve Obligation. Failure-to-reserve results in a forfeiture of payment for any Forward Reserve megawatts not delivered plus a financial penalty. Penalties are assessed based upon the applicable penalty rates and the megawatt amounts of non-delivery.

Each Forward Reserve Resource is expected to activate Forward Reserve if requested to do so by the ISO. Failure-to-activate Forward Reserve, i.e., failure to deliver the energy when called, will result in a financial penalty separate and distinct from the failure-to-reserve financial penalty.

Suppliers of Forward Reserve are paid for their services on an hourly basis during the Forward Reserve Delivery Period and not at the time the Forward Reserve Auction clears. The applicable costs of the Forward Reserve Market as allocated to each Load Zone are allocated to Market Participants on the basis of hourly Real-Time Load Obligations within the applicable Load Zone for each hour.

# Section 2: Forward Reserve Auction Process

Welcome to the *Forward Reserve Auction Process* Section of the ***ISO New England Manual for Forward Reserve and Real-Time Reserve***. In this Section you will find the following information:

- Definition of the Forward Reserve Procurement Period.
- Methodology used to determine the Forward Reserve requirements.
- Determination of the Forward Reserve Threshold Price.
- Timing of the Forward Reserve Auctions.
- Submittal of Forward Reserve Auction Offers.
- Forward Reserve Auction Clearing.

The ISO conducts Forward Reserve Auctions for each Forward Reserve Procurement Period that simultaneously clear the submitted Forward Reserve Auction Offers to meet the Forward Reserve requirements for each Reserve Zone in accordance with the following business rules.

## 2.1 Forward Reserve Procurement Period

The Forward Reserve Procurement Period is the period during which delivery of Forward Reserve is required, as defined in Market Rule 1 Section III.9.1.

Delivery of Forward Reserve is only required during the Forward Reserve Delivery Period, as defined in Market Rule 1 Section III.9.1.

## 2.2 Determination of Forward Reserve Requirements

The following methodology is used to establish zonal Forward Reserve requirements. These calculations are performed by the ISO for an applicable Forward Reserve Procurement Period and the results are communicated to Market Participants prior to each Forward Reserve Auction.

### *2.2.1 Reserve Zone Definition*

A Reserve Zone represents an area within the ISO New England Transmission System that is identified by the ISO as requiring specific amounts of Operating Reserve that must be procured within that area. The required amount of Operating Reserve within a Reserve Zone is calculated in accordance with criteria specified in ISO New England Operating Procedure No. 8 and ISO New England Operating Procedure No. 19. Except for the Rest of System Reserve Zone, a Reserve Zone must be contained completely within a single Load Zone and may be comprised of a subset of Nodes contained within a Load Zone. A Rest of System Reserve Zone has been established by the ISO, in accordance with Market Rule 1 Section III.2.7 (d). The currently defined Reserve Zones and their relationship to Load Zones are defined in Table 2.1.

| Reserve Zone | Associated Load Zone(s) |
|---|---|
| SW Connecticut | Connecticut |
| Connecticut | Connecticut |
| NEMA/Boston | NEMA/Boston |
| Rest of System (ROS) | Vermont, New Hampshire, Maine, WCMASS, SEMASS, Rhode Island |

***Table 2.1: Reserve Zone Definition***

Forward Reserve Clearing Prices are calculated for each Reserve Zone.

### *2.2.2 System Forward Reserve Requirements*

The system Forward Reserve requirements for the New England Control Area will be calculated based on the criteria specified in ISO New England Operating Procedure 8 (OP-8). The amount of Forward Reserve to be procured in the auction will be the system Forward Reserve requirement for the New England Control Area as calculated pursuant to Market Rule 1 Section III.9.2.1.

### 2.2.3 Zonal Forward Reserve Requirements

Consistent with ISO New England Operating Procedure 19 (OP-19) and the ISO's operational practice, zonal Forward Reserve requirements for applicable Reserve Zones will reflect the need for 30-minute contingency response to provide second contingency coverage in import-constrained Reserve Zones. The zonal Forward Reserve requirement for each applicable Reserve Zone can be satisfied only by Resources capable of providing TMOR or higher quality reserve products that are located within the applicable Reserve Zone.

### 2.2.4 Calculation of Zonal Forward Reserve Requirements

Under current operating practice, the Zonal Reserve Requirements are calculated each day according to the following formulae.

(a) The second contingency in each Reserve Zone shall be calculated as follows:

$$\text{2nd Gen} = \text{Limit}_{\text{N-1}} - \text{Limit}_{\text{N-2, Gen}} + \text{CONTG} - \text{30ACT}$$

$$\text{2nd Line} = \text{Limit}_{\text{N-1}} - \text{Limit}_{\text{N-2, Line}} - \text{30 ACT}$$

(b) The external reserve support (ERS) will be calculated as follows:

$$\text{ERS} = \text{Limit}_{\text{N-1}} - (\text{LOAD} - \text{GEN})$$

(c) The daily locational reserve requirement ("dLRR"), which is the amount of 30-minute contingency response, given the available transfer capability on the interface, that must be physically located within the import-constrained area to ensure recovery from the loss of the second contingency, will be calculated as follows:

$$\text{dLRR} = \text{MAX}(\text{2nd Gen, 2nd Line}) - \text{ERS}$$

Where:

LOAD = Forecast daily peak load

GEN = Minimum capacity commitments required for first contingency coverage

CONTG = Second generation contingency

$\text{Limit}_{\text{N-1}}$ = First contingency interface limit

$\text{Limit}_{\text{N-2, Gen}}$ = Second generation contingency interface limit

$\text{Limit}_{\text{N-2, Line}}$ = Second line contingency interface limit

30ACT = Non-generation based 30-minute actions

dLRR = The locational reserve requirement is the amount of 30-minute contingency response, given the available transfer capability on the interface, that must be physically located within the import-constrained area to ensure recovery from the loss of the second contingency.

### *2.2.5 Establishing Zonal Forward Reserve Requirements*

Using the formulae stated in Section 2.2.4, a historical set of dLRR values will be calculated for each season in each Reserve Zone. The historical period will be a rolling two years. The initial zonal Forward Reserve requirements for each applicable Reserve Zone will be set to the 95$^{th}$ percentile value from distributions of historical requirements data for the previous two like Forward Reserve Procurement Periods for each applicable Reserve Zone. The percentile value will be evaluated as part of the auction parameters. In the event of a change in the configuration of the transmission system or the addition or retirement of a major Generator Asset, the second contingency or the ERS will be recalculated on a going forward basis (for use in future auctions) using modified assumptions that reflect actual performance of the reconfigured system.

## 2.3 Determination of Forward Reserve Threshold Price

Market Participants with Forward Reserve Resources must offer corresponding Blocks of energy associated with these Resources at or above the Forward Reserve Threshold Price in order for the Forward Reserve assigned to these Resources to qualify as meeting the Market Participant's Forward Reserve Obligation. The formula for determining the Forward Reserve Threshold Price is fixed for the duration of a Forward Reserve Procurement Period. The Forward Reserve Threshold Price changes daily with fuel price indices. In successive auctions, the ISO will reevaluate the Forward Reserve Threshold Price formula on the basis of experience, expected operating conditions and other relevant information.

The Forward Reserve Threshold Price is calculated as the product of the Forward Reserve Heat Rate and the Forward Reserve Fuel Index. The calculation of the Forward Reserve Threshold Price is described in Market Rule 1 Section III.9.6.2. The Forward Reserve Threshold Price shall not exceed the Energy Offer Cap.

The Forward Reserve Heat Rate is fixed in the notice of the auction. It does not change during a Forward Reserve Procurement Period. The Forward Reserve Heat Rate will be specified for each auction.

The Forward Reserve Fuel Index used for the purposes of calculating the Forward Reserve Threshold Price is a daily index applicable to the New England Control Area as specified in Market Rule 1 Section III.9.6.2.

The ISO will provide notice to Market Participants at least twenty business days prior to a Forward Reserve Auction of the proposed components of the Forward Reserve Threshold Price (the proposed fixed heat rate and fuel index) for the next Forward Reserve Auction. The ISO notice will provide an explanation of the factors used to determine the proposed Forward Reserve Threshold Price.

## 2.4 Forward Reserve Auction Timeline

A Forward Reserve Auction schedule for upcoming auctions will be provided on the ISO's website. Forward Reserve Auctions will be held in advance of the applicable Forward Reserve Procurement Period. Each Forward Reserve Procurement Period will have separate offers and separate clearing prices. The sequence of events for Forward Reserve Auctions is as follows:

(1) No later than twenty business days before the auction-quoting period begins for the applicable Forward Reserve Procurement Period, the ISO will publish the Forward Reserve requirement for each Reserve Zone and the Forward Reserve Heat Rate to be used to calculate the Forward Reserve Threshold Price. In exigent circumstances, the ISO may publish revisions to the Forward Reserve requirements and Forward Reserve Heat Rate on its website during the twenty business days prior to the auction-quoting period for use in the Forward Reserve Auction.

(2) Beginning ten business days before the first business day of the month preceding the applicable Forward Reserve Procurement Period, the ISO opens a five (5) business day auction-quoting period. Market Participants may then submit offers to sell Forward Reserve that are specific to a Reserve Zone and that are applicable to the Forward Reserve Delivery Period.

(3) Within five business days of the quoting period closing, or such later time as may be approved by the ISO Board, the ISO performs the Forward Reserve Auction clearing analysis and posts the Forward Reserve Clearing Prices and the Forward Reserve megawatts cleared for each Reserve Zone. The ISO will also perform a simulated Forward Reserve Auction to calculate and post the TMNSR and TMOR proxy system clearing prices for the purposes of cost allocation.

Following the posting of the auction results, Market Participants may begin submitting information related to Internal Bilateral Transactions for Forward Reserve and assignments of Forward Reserve Obligations as described in Section 3 of this manual.

## 2.5 Forward Reserve Auction Offers

Forward Reserve Auction Offers must specify the following:

(1) The Reserve Zone the offer is applicable to;

(2) For each reserve product (TMNSR and TMOR) a set of Forward Reserve Auction Offers in the form of MW and $/MW-Month amounts. Up to 20 such offer blocks are permitted per offer per reserve product. Each block must be at least 1 MW in size and in ascending $/MW-Month cost order.

Only Market Participants may submit Forward Reserve Auction Offers into the Forward Reserve Auction and Forward Reserve Auction Offers cannot exceed the Forward Reserve Offer Cap.

## 2.6 Forward Reserve Auction Clearing

Forward Reserve Auction Offers will be evaluated using auction clearing software that utilizes an optimization program with the objective function of minimizing the total cost of the Forward Reserve procured to meet the Forward Reserve requirement based on Forward Reserve Auction Offers, subject to a shortage penalty that is equal to the Forward Reserve Offer Cap. Forward Reserve Clearing Prices for TMNSR and TMOR will be calculated for each Reserve Zone on a simultaneous basis. The Forward Reserve Clearing Prices for each Reserve Zone represent the marginal costs to meet the Forward Reserve requirement, similar to the manner in which LMPs are calculated.

The auction clearing software may use higher quality TMNSR to meet TMOR requirements when it is economical to do so within the applicable Reserve Zones. The auction clearing software also utilizes excess TMNSR and TMOR in one Reserve Zone to meet the TMNSR and TMOR requirements in another Reserve Zone provided that there are no constraints that prevent the excess TMNSR and TMOR from being delivered to that Reserve Zone. As a result, price cascading ensures that the Forward Reserve Clearing Price for TMNSR in a Reserve Zone is always greater than or equal to the Forward Reserve Clearing Price for TMOR in that Reserve Zone.

Additionally, the auction may clear partial amounts of a Market Participant's Forward Reserve Auction Offer to meet the applicable Forward Reserve requirement. If more than one marginal Forward Reserve Auction Offers contain the same offer prices at a location, the offers will be cleared pro-rata based upon the megawatts of Forward Reserve submitted.

### *2.6.1 Insufficient Forward Reserve Auction Offer Amounts*

In the event that the total Forward Reserve Auction Offer MW amount available to a Reserve Zone is insufficient to satisfy the Forward Reserve requirement (as defined in Section 2.2.5 above), the Forward Reserve Clearing Price for that Reserve Zone is set equal to the Forward Reserve Offer Cap.

# Section 3: Assignment of Forward Reserve Obligations and Internal Bilateral Transactions

Welcome to the *Assignment of Forward Reserve Obligations* Section of the ***ISO New England Manual for Forward Reserve and Real-Time Reserve***. In this Section you will find the following information:

- A description of the process required for assignment of Forward Reserve Obligations to eligible Resources
- Forward Reserve Resource eligibility requirements
- Performance Audit requirements

## 3.1 Forward Reserve Obligation Assignment

A Market Participant with Forward Reserve Obligation obtained as a result of a Forward Reserve Auction must convert that Forward Reserve Obligation into Resource specific Forward Reserve Obligations by assigning Forward Reserve to its Forward Reserve Resources (see Section 3.2 for eligibility requirements). This Resource specific assignment of Forward Reserve must be completed as provided under Market Rule 1 Section III.9.5.1 by the Lead Market Participant for the Resource(s).

### *3.1.1 Market Participant Eligibility to Assign Forward Reserve*

A Market Participant may only fulfill its Forward Reserve Obligation by assigning Forward Reserve MWs to Forward Reserve Resource(s) in which the Market Participant has an Ownership Share or, in the case of Demand Response Resource(s), of which the Market Participant is the Lead Market Participant.

The status of a Market Participant as an affiliate of another Market Participant that has an Ownership Share in a Forward Reserve Resource is not taken into consideration in determining whether the Market Participant has satisfied its Forward Reserve Obligation. If a Market Participant with a Forward Reserve Obligation does not have an Ownership Share in a Forward Reserve Resource, the Market Participant may transfer its Forward Reserve Obligation through an Internal Bilateral for Market for Forward Reserve. In the event that more than one Market Participant has an Ownership Share in a Forward Reserve Resource, the Forward Reserve assigned to that Resource will be allocated pro-rata by Ownership Share.

### *3.1.2 Internal Bilateral Transactions for Forward Reserve Obligations*

Market Participants may enter into hourly Internal Bilateral Transactions for Forward Reserve Obligations on a daily basis. Internal Bilateral Transactions for Forward Reserve

Obligations must be entered by the buyer and subsequently confirmed by the seller through the Market User Interface prior to 1700 hours (prevailing Eastern Time) on the second ($2^{nd}$) Business Day after the applicable Operating Day. See the ***ISO New England User Guide for submitting Internal Bilateral Transactions via SMS*** for additional information regarding submittal of Internal Bilateral Transactions for Forward Reserve. Market Participants may enter into Internal Bilateral Transactions that transfer Forward Reserve Obligations.

Internal Bilateral for Market for Forward Reserve must be submitted prior to 1700 hours (prevailing Eastern Time) on the second Business Day after the applicable Operating Day within the Forward Reserve Procurement Period.

All Internal Bilateral for Market for Forward Reserve are expected to be a physical transfer of Forward Reserve Obligation. Bilaterals for Market for Forward Reserve decrease the sellers' Forward Reserve Obligation and increase the buyers' Forward Reserve Obligation for the Reserve Zone and reserve product.

## 3.2 Forward Reserve Resource Eligibility

Forward Reserve Resources are Resources that have been assigned Forward Reserve MWs by Market Participants to meet their Forward Reserve Obligations. To be eligible to be a Forward Reserve Resource, a Resource must satisfy the criteria specified in Market Rule 1 Section III.9.5.2. A Resource without a Real-Time offer will have zero Qualifying Megawatts, which could result in a Forward Reserve Failure-to-Reserve Penalty if an assignment is made to such a Resource.

External Resources will be permitted to participate in the Forward Reserve Market when the respective Control Areas implement the technology and processes necessary to support recognition of Operating Reserve from External Resources.

## 3.3 Forward Reserve Resource Performance Audits

Forward Reserve Resources are subject to all the Resource performance audits and testing as described in Market Rule 1 Section III.9.5.

# Section 4: Delivery of Forward Reserve

Welcome to the *Delivery of Forward Reserve* Section of the ***ISO New England Manual for Forward Reserve and Real-Time Reserve***. In this Section you will find the following information:

- An overview description of how the amount of delivered Forward Reserve is determined
- Mitigation of Forward Reserve Resource Supply Offers and Demand Bids

## 4.1 Overview of Forward Reserve Delivery Accounting

In order to be eligible to receive Forward Reserve Credits, Market Participants must successfully deliver their Forward Reserve Resource's capability to the Real-Time Energy Market by offering such capability as Supply Offers, Demand Reduction Offers, or Demand Bids at or above the Forward Reserve Threshold Price. In the case of Supply Offers, offering at or above the Forward Reserve Threshold Price should provide a high probability that the Generator Asset will not be producing Energy, thus allowing the Resource to supply the delivered reserve megawatts when needed. In the case of Demand Reduction Offers, offering at or above the Forward Reserve Threshold Price should provide a high probability that the Demand Response Resource will not be dispatched to reduce demand, thus allowing the Demand Response Resource to supply the delivered reserve megawatts when needed. In the case of Demand Bids, offering at or above the Forward Reserve Threshold Price should provide a high probability that the Dispatchable Asset Related Demand will be consuming Energy at its Maximum Consumption Limit, thus allowing the Dispatchable Asset Related Demand to supply the delivered reserve megawatts when needed. The Forward Reserve Resource is then scheduled, dispatched, operated and accounted for in accordance with ISO New England System Rules in the same manner as other Resources.

The Forward Reserve Delivered Megawatts associated with a Forward Reserve Resource is dependent upon the amount of Forward Reserve Qualifying Megawatts (amount of capability offered at or above the Forward Reserve Threshold Price), the amount of Forward Reserve the Resource is actually capable of providing (available megawatts) and the Forward Reserve Assigned Megawatts.

## 4.2 Mitigation of Forward Reserve Resource Offers

The Internal Market Monitor will mitigate Forward Reserve Resource Offers pursuant to Market Rule 1 Section III.A.13.4.

# Section 5: Consequences of Non-Delivery of Forward Reserve

Welcome to the *Non-Delivery Consequences* Section of the ***ISO New England Manual for Forward Reserve and Real-Time Reserve***. In this Section you will find the following information:

- Consequences of failing to reserve Forward Reserve
- Consequences of failing to activate Forward Reserve

Market Participants that fail to reserve an amount of Forward Reserve that is equal to their Forward Reserve Obligation are subject to forfeiture of Forward Reserve Credits and to penalties. Market Participants that fail to activate the amount of Forward Reserve delivered when requested by the ISO in Real-Time are subject to penalties. These consequences are generally described in the following Sections.

## 5.1 Failure-to-Reserve Consequences

A failure-to-reserve occurs when the Market Participant's Forward Reserve Delivered Megawatts are less than that Market Participant's Forward Reserve Obligation. Under these circumstances, the Market Participant is charged a penalty for the Forward Reserve Failure-to-Reserve Megawatts. Market Rule 1 Section III.9 provides calculation details regarding Forward Reserve Failure-to-Reserve Megawatts and penalty charges.

## 5.2 Failure-to-Activate Consequences

Market Participants with Forward Reserve Resources that fail to activate their delivered Forward Reserve per Dispatch Instructions are required to pay a performance penalty calculated pursuant to Market Rule 1 Section III.9.

### *5.2.1 Failure-to-Activate Determination*

A failure-to-activate is determined using the criteria as specified in Market Rule 1 Section III.9.7.2.

Failure-to-activate determination in Real-Time for Generator Assets and Dispatchable Asset Related Demands will be made on the basis of telemetered megawatts. Failure-to-activate determination in Real-Time for Demand Response Resources will be made on the basis of the telemetered one-minute megawatts or five-minute megawatts of the associated Demand Response Assets, as appropriate.

### *5.2.2 Further Consequences of Failure-to-Activate*

A Market Participant's Forward Reserve Resource that fails to activate its reserved Forward Reserve will have its reserve related Offer Data parameters adjusted in accordance with Market Rule 1 Section III.9.7. These adjusted parameters will be used on a going forward basis for the purposes of calculating that Resource's qualifying, available and delivered megawatts until such time that these parameters are subsequently modified in accordance with Sections III.1.11.3(c), III.9.7.2 and III.9.7.3 of Market Rule 1. In the case of a Forward Reserve Resource that is a Fast Start Generator or Fast Start Demand Response Resource that fails to activate any Forward Reserve at all, the Resource's Forward Reserve Delivered Megawatts shall be set to zero in each subsequent hour in the applicable Forward Reserve Delivery Period until the Market Participant notifies the ISO that the Forward Reserve Resource is capable of providing the Forward Reserve Delivered Megawatts. In the case of a Forward Reserve Resource that fails to activate by not achieving the desired level of operation consistent with its Offered CLAIM10, Offered CLAIM30, or redeclared CLAIM10 or CLAIM30, the ISO may adjust the Resource's Offer Data parameters to be consistent with actual performance. Consequently, a Market Participant may also incur a Forward Reserve Failure-to-Reserve Penalty as a direct result of the reduction in delivered Forward Reserve associated with that Market Participant's Forward Reserve Resource that failed to activate.

# Section 6: Forward Reserve and Real-Time Reserve Accounting

## 6.1 Forward Reserve and Real-Time Reserve Accounting Overview

The Forward Reserve Market is a market for the procurement of forward commitments for delivery of TMNSR and TMOR that is administered by the ISO. Market Participants submit portfolio-based offers to provide TMNSR and TMOR on a Reserve Zone basis. The ISO clears the Forward Reserve Market based on the portfolio offers submitted and the Forward Reserve requirement. There is a separate Forward Reserve Auction held each year for the summer and winter Forward Reserve Procurement Periods.

A Market Participant whose offers have cleared in the Forward Reserve Auction receives a Forward Reserve Obligation that is equal to that Market Participant's amount of cleared TMNSR and/or TMOR in the auction. These obligations are Reserve Zone specific. These Market Participant obligations are then adjusted by any Internal Bilateral Transactions for Forward Reserve. For each day of the Forward Reserve Procurement Period, Market Participants must assign their Forward Reserve Obligations to eligible Forward Reserve Resources such that, in aggregate, the total assigned TMNSR and TMOR megawatts are equal to or greater than the Market Participant's Reserve Zone specific obligations. Market Participants that fail to reserve sufficient Forward Reserve to meet their Forward Reserve Obligations in the Real-Time Energy Market are penalized for the megawatts not reserved.

In addition to penalties for failure-to-reserve, a failure-to-activate penalty is also imposed on Forward Reserve Resources that fail to provide the energy associated with Forward Reserve Delivered Megawatts when requested to activate by the ISO in real-time.

Market Participants are paid based upon their Final Forward Reserve Obligations, such obligations accounting for the failure-to-reserve in the Real-Time Energy Market, and the applicable Forward Reserve Payment Rate.

Real-Time reserve accounting rules are described in Market Rule 1 Section III.10.

## 6.2 Final Forward Reserve Obligation

There are several interim steps involved in the calculation of a Market Participant's Final Forward Reserve Obligation. These interim calculations and the final calculation of Forward Reserve Obligations are described in detail in this section.

The ISO accounting process retrieves the following data items for each hour of the Operating Day for Forward Reserve Resources in order to perform these interim calculations:

(1) Forward Reserve Assigned Megawatts;
(2) Real-Time Supply Offer, Demand Reduction Offer, and Demand Bid price data;
(3) Offered CLAIM10 and Offered CLAIM30 or Redeclarations;
(4) Real-Time ramp rates as adjusted for performance and/or Redeclarations.

### *6.2.1 Forward Reserve Qualifying Megawatts*

Forward Reserve Qualifying Megawatts applicable for each Reserve Zone for each applicable hour of the Operating Day are the megawatts of capability offered into the Real-Time Energy Market by a Market Participant for a Forward Reserve Resource at or above the Forward Reserve Threshold Price for each applicable hour of the Operating Day. In the case of a Forward Reserve Resource Generator Asset that is providing Forward Reserve from an off-line state, the offer at or above the Forward Reserve Threshold Price is calculated to include both the Energy portion of the Supply Offer and a pro-rated amount of Start-Up Fees and No-Load Fees. In the case of a Forward Reserve Resource Demand Response Resource that is providing Forward Reserve from a not dispatched state, the offer at or above the Forward Reserve Threshold Price is calculated to include both the Energy portion of the Demand Reduction Offer and a pro-rated amount of the Interruption Cost. For Forward Reserve Resources that are providing Forward Reserve from an on-line state for Generator Assets or Dispatchable Asset Related Demands, or from a dispatched state for Demand Response Resources, the offer at or above the Forward Reserve Threshold Price is calculated to include just the Energy portion of the Supply Offer, Demand Reduction Offer, or Demand Bid. If a Forward Reserve Resource's Supply Offer or Demand Reduction Offer has been mitigated below the Forward Reserve Threshold Price in accordance with Section 4.2 of this manual, the mitigated Supply Offer price or Demand Reduction Offer price is used to determine qualifying megawatts.

#### 6.2.1.1 ISO ACTIONS

(1) For an off-line Forward Reserve Resource (including a Demand Response Resource that has not been dispatched):

(a) For a Generator Asset, the ISO calculates the submitted Real-Time Supply Offer energy price for use in determining Forward Reserve Qualifying Megawatts as:

*Real-Time Off-Line Energy Price (i) = ((The effective Real-Time Cold Start-Up Fee + Real-Time No-Load Fee) submitted as described in Market Rule 1 Section III.9.6.1 for the applicable hours) / the effective Real-Time Economic Maximum Limit) + Real-Time Off-line Energy Offer (i), where*

*Real-Time Off-line Energy Offer (i) = the off-line Generator Asset's Real-Time Block price (i) submitted in accordance with Market Rule 1 Section III.9.6.1 for the applicable hour(s).* For a Demand Response Resource, the ISO calculates the submitted Real-Time Demand Reduction Offer energy price for use in determining Forward Reserve Qualifying Megawatts as:

*Real-Time Off-Line Energy Price (i) = (effective Interruption Cost submitted as described in Market Rule 1 Section III.9.6.1 for the applicable hours) / the effective Real-Time Maximum Reduction) + Real-Time Energy Offer (i), where*

*Real-Time Energy On-Line Offer (i) = the not dispatched Demand Response Resource's Real-Time Block price (i) submitted in accordance with Market Rule 1 Section III.9.6.1 for the applicable hour(s)*

(2) For an on-line Forward Reserve Resource (including a dispatched Demand Response Resource):

(a) The ISO calculates the submitted Real-Time Supply Offer, Demand Reduction Offer and Demand Bid energy price for use in determining qualifying megawatts pursuant to Market Rule 1 Section III.9.6.1 as:

*Real-Time On-Line Energy Offer (i) = the Resource's Real-Time Block price (i)*

(3) The ISO calculates Forward Reserve Qualifying Megawatts for each Forward Reserve Resource applicable for each Reserve Zone for each hour of the Operating Day as follows.

***For off-line Forward Reserve Resource Generator Assets:***

*Forward Reserve Qualifying Megawatts = Real-Time Economic Maximum Limit – maximum of (Non-Qualifying Energy Blocks, RT offer External Transaction Sale MW) where:*

*Non-Qualifying Energy Blocks = total of Real-Time Block quantities with a Real-Time Off-Line Energy Offer (i) that is less than the Forward Reserve Threshold Price for the Operating Day.*

***For on-line Forward Reserve Resource Generator Assets:***

*Forward Reserve Qualifying Megawatts = Real-Time Economic Maximum Limit – the effective Real-Time Economic Minimum Limit, – Non-Qualifying Energy Blocks, where:*

*Non-Qualifying Energy Blocks = total of the Real-Time Block quantities above maximum of (Real-Time Economic Minimum Limit, RT offer External Transaction Sale MW) with a Real-Time On-Line Energy Offer (i) that is less than the Forward Reserve Threshold Price for the Operating Day.*

***For Forward Reserve Resource Dispatchable Asset Related Demands:***

*Forward Reserve Qualifying Megawatts = Real-Time Maximum Consumption Limit – Real-Time Minimum Consumption Limit - Non-Qualifying Energy Blocks, where:*

*Non-Qualifying Energy Blocks = total of Real-Time Block quantities above Real-Time Minimum Consumption Limit with Real-Time On-Line Energy Offer (i) that is less than the Forward Reserve Threshold Price for the Operating Day.*

***For Forward Reserve Resource Demand Response Resources that have not been dispatched:***

*Forward Reserve Qualifying Megawatts = Real-Time Maximum Reduction – Non-Qualifying Energy Blocks where:*

*Non-Qualifying Energy Blocks = total of the Real-Time Block quantities with a Real-Time Off-line Energy Offer (i) that is less than the Forward Reserve Threshold Price for the Operating Day.*

***For dispatched Forward Reserve Resource Demand Response Resources:***

*Forward Reserve Qualifying Megawatts = Real-Time Maximum Reduction – the effective Real-Time Minimum Reduction – Non-Qualifying Energy Blocks, where:*

*Non-Qualifying Energy Blocks = total of Real-Time Block quantities above Real-Time Minimum Reduction with a Real-Time On-Line Energy Offer (i) that is less than the Forward Reserve Threshold Price for the Operating Day.*

## *6.2.2 Forward Reserve Available Megawatts*

Forward Reserve Available Megawatts for each Reserve Zone are calculated for each Forward Reserve Resource for each hour of the Operating Day based on each Resource's

Forward Reserve Qualifying Megawatts and the amount of Forward Reserve the Resource is capable of providing.

For off-line Forward Reserve Resource Generator Assets, the reserve capability is determined from CLAIM10 and CLAIM30 and Offered CLAIM10 and Offered CLAIM30. For on-line Forward Reserve Resource Generator Assets, reserve capability is determined based on the Resource's ramp rate as adjusted for performance or Redeclarations.

For Forward Reserve Resource Dispatchable Asset Related Demands, the reserve capability is determined using the CLAIM10 or CLAIM30.

For Forward Reserve Resource Demand Response Resources that have not been dispatched, the reserve capability is determined from CLAIM10 and CLAIM30 and Offered CLAIM10 and Offered CLAIM30. For dispatched Forward Reserve Resource Demand Response Resources, reserve capability is determined based on the Resource's ramp rate as adjusted for performance or Redeclarations.

#### 6.2.2.1 ISO ACTIONS

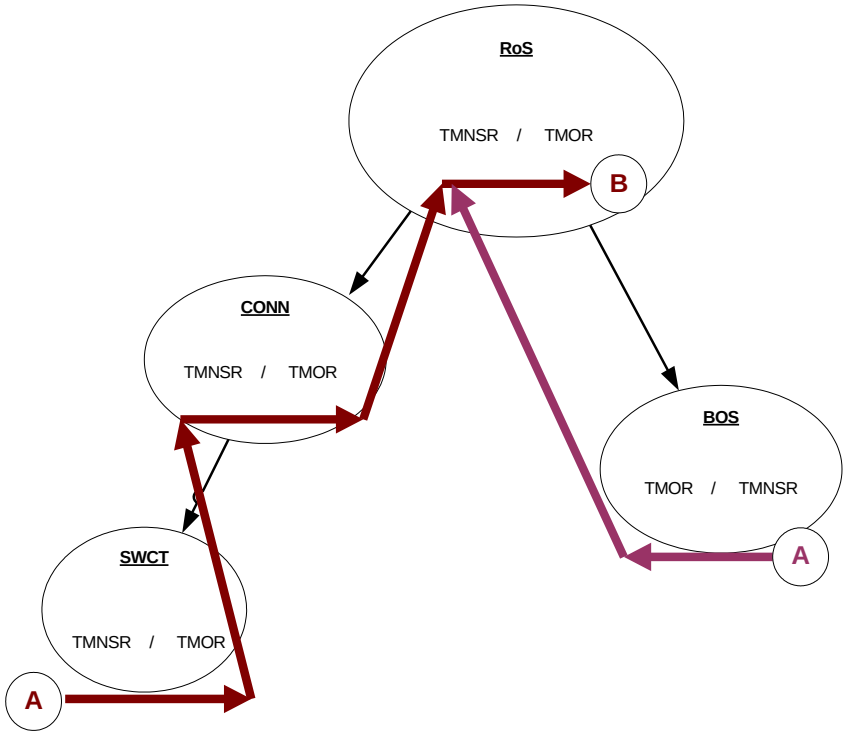
(1) The ISO calculates for each Reserve Zone each Forward Reserve Resource's Forward Reserve Available Megawatts for each hour of the Operating Day in Settlement Precedence Order as follows.

Qualifying megawatts, available megawatts and delivered megawatts are calculated first for the SW Connecticut Reserve Zone, second for the Connecticut Reserve Zone and third for the Rest of System Reserve Zone. Within each Reserve Zone, delivered megawatts for TMNSR in excess of TMNSR obligations are utilized to meet TMOR obligations within that Reserve Zone. Any remaining excess megawatts in SW Connecticut cascade for use in Connecticut and the Rest of System Reserve Zones. Any remaining excess megawatts in the Connecticut Reserve Zone cascade for use in the Rest of System Reserve Zone.

Qualifying megawatts, available megawatts and delivered megawatts are calculated first for the NEMA/Boston Reserve Zone and second for the Rest of System Reserve Zone. Within each Reserve Zone, delivered megawatts for TMNSR in excess of TMNSR obligations are utilized to meet TMOR obligations within that Reserve Zone. Any remaining excess megawatts in the NEMA/Boston Reserve Zone cascade for use in the Rest of System Reserve Zone.

The following diagram shows the Settlement Precedence Order:

***Exhibit 6.1: Forward Reserve Available Megawatts Settlement Precedence Order***



***For off-line Forward Reserve Resource Generator Assets:***

*Forward Reserve Available Megawatts for TMNSR = minimum of (Forward Reserve Qualifying Megawatts, CLAIM10 or Offered CLAIM10) – total of previously calculated Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations).*

***For on-line Forward Reserve Resource Generator Assets:***

*Forward Reserve Available Megawatts for TMNSR = minimum of (Forward Reserve Qualifying Megawatts, Real-Time ramp rate at Economic Max, up to the results of the Resource's performance monitoring audit, * 10) – total of previously calculated Real-Time Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

***For Forward Reserve Resource Dispatchable Asset Related Demands:***

*Forward Reserve Available Megawatts for TMNSR = minimum of (Forward Reserve Qualifying Megawatts, CLAIM10 or Offered CLAIM10) – total of previously calculated Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

***For Forward Reserve Resource Demand Response Resources that have not been dispatched:***

*Forward Reserve Available Megawatts for TMNSR = minimum of (Forward Reserve Qualifying Megawatts, CLAIM10 or Offered CLAIM10) – total of previously calculated Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations).*

***For dispatched Forward Reserve Resource Demand Response Resources:***

*Forward Reserve Available Megawatts for TMNSR = minimum of (Forward Reserve Qualifying Megawatts, Real-Time Demand Response Resource Ramp Rate, up to the results of the Resource's performance monitoring audit, * 10) – total of previously calculated Real-Time Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

(2) The ISO calculates for each Reserve Zone each Forward Reserve Resource's Forward Reserve Available Megawatts for TMOR for each hour of the Operating Day in Settlement Precedence Order as follows:

***For off-line Forward Reserve Resource Generators Asset:***

*Forward Reserve Available Megawatts for TMOR = minimum of (Forward Reserve Qualifying Megawatts, CLAIM30 or Offered CLAIM30) – total of previously calculated*

*Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

***For on-line Forward Reserve Resource Generator Assets:***

*Forward Reserve Available Megawatts for TMOR = minimum of (Real-Time Forward Reserve Qualifying Megawatts, Real-Time ramp rate at Economic Max, up to the results of the Resource's performance monitoring audit, * 30) – total of previously calculated Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

***For Forward Reserve Resource Dispatchable Asset Related Demands:***

*Forward Reserve Available Megawatts for TMOR = minimum of (Real-Time Forward Reserve Qualifying Megawatts, CLAIM30 or Offered CLAIM30) – total of previously calculated Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

***For Forward Reserve Resource Demand Response Resources that have not been dispatched:***

*Forward Reserve Available Megawatts for TMOR = minimum of (Forward Reserve Qualifying Megawatts, CLAIM30 or Offered CLAIM30) – total of previously calculated Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

***For dispatched Forward Reserve Resource Demand Response Resources:***

*Forward Reserve Available Megawatts for TMOR = minimum of (Real-Time Forward Reserve Qualifying Megawatts, Real-Time Demand Response Resource Ramp Rate as applicable, up to the results of the Resource's performance monitoring audit, * 30) – total of previously calculated Forward Reserve Delivered Megawatts for this Resource (see Section 6.2.3 of this manual for Delivered Megawatt calculations)*

## *6.2.3 Forward Reserve Delivered Megawatts*

Forward Reserve Delivered Megawatts for each Reserve Zone and reserve category are calculated for each Forward Reserve Resource for each hour of the Operating Day as the lesser of assigned megawatts or available reserve megawatts. Forward Reserve Available Megawatts are reduced by any amounts of Forward Reserve delivered by that Forward Reserve Resource. Any remaining Forward Reserve Available Megawatts cascade in Settlement Precedence Order to meet Reserve Zone delivery requirements. Remaining Forward Reserve Available Megawatts for TMNSR also qualify to meet Reserve Zone TMOR delivery requirements.

In determining Forward Reserve Delivered Megawatts for Demand Response Resources, the portion of the Forward Reserve Delivered Megawatts not associated with Net Supply are

increased by average avoided peak distribution losses as described in Market Rule 1 Section III.9.6.5.

#### 6.2.3.1 ISO ACTIONS

(1) The ISO calculates for each Reserve Zone each Forward Reserve Resource's Forward Reserve Delivered Megawatts for TMNSR for each hour of the Operating Day as follows:

*Forward Reserve Delivered Megawatts for TMNSR = minimum of (Forward Reserve Assigned Megawatts for TMNSR, Forward Reserve Available Megawatts for TMNSR)*

(2) The ISO calculates for each Reserve Zone each Forward Reserve Resource's Forward Reserve Delivered Megawatts for TMOR for each hour of the Operating Day as follows:

*Forward Reserve Delivered Megawatts for TMOR = minimum of (Forward Reserve Assigned Megawatts for TMOR, Forward Reserve Available Megawatts for TMOR)*

(3) The ISO calculates for each Reserve Zone for each hour of the Operating Day each Market Participant's Forward Reserve Delivered Megawatts for TMNSR by summing all of that Market Participant's Resource related Forward Reserve Delivered Megawatts for TMNSR, taking into account that Market Participant's Ownership Share when the Forward Reserve Resource is a Generator Asset or DARD;

(4) The ISO calculates for each Reserve Zone for each hour of the Operating Day each Market Participant's Forward Reserve Delivered Megawatts for TMOR by summing all of that Market Participant's Resource related Forward Reserve Delivered Megawatts for TMOR, taking into account that Market Participant's Ownership Share in each when the Forward Reserve Resource is a Generator Asset or DARD;

### *6.2.4 Final Forward Reserve Obligation*

A Market Participant's Final Forward Reserve Obligation for each hour of the Operating Day, as calculated for each Reserve Zone, are the values used to calculate Forward Reserve Credits. A Market Participant's Final Forward Reserve Obligation may be less than that Market Participant's Forward Reserve Obligation if that Market Participant fails to reserve sufficient Forward Reserve to meet its Forward Reserve Obligation. The ISO calculates each Market Participant's Final Forward Reserve Obligation for each Reserve Zone as follows:

#### 6.2.4.1 ISO ACTIONS

(1) The ISO calculates, for each Reserve Zone and for each hour of the Operating Day, each Market Participant's Forward Reserve Obligation for TMNSR to account for Internal Bilateral Transactions for Forward Reserve:

*Market Participant Forward Reserve Obligation for TMNSR = Market Participant Forward Reserve Obligation from Forward Reserve Auction + Market Participant IBT purchases of Forward Reserve Obligations for TMNSR + Market Participant IBT sales of Forward Reserve Obligations for TMNSR,*

*where IBT purchases and Market Participant Forward Reserve Obligation for TMNSR are positive values and IBT sales are negative values;*

(2) The ISO calculates, for each Reserve Zone and for each hour of the Operating Day, each Market Participant's Final Forward Reserve Obligation for TMNSR:

*Market Participant Final Forward Reserve Obligation for TMNSR = minimum of (Market Participant Forward Reserve Obligation for TMNSR, Market Participant Forward Reserve Delivered Megawatts for TMNSR);*

(3) The ISO calculates, for each Reserve Zone and for each hour of the Operating Day, each Market Participant's Forward Reserve Obligation for TMOR to account for Internal Bilateral Transactions for Forward Reserve:

*Market Participant Forward Reserve Obligation for TMOR = Market Participant Forward Reserve Obligation for TMOR from Forward Reserve Auction + Market Participant IBT purchases of Forward Reserve Obligations for TMOR + Market Participant IBT sales of Forward Reserve Obligations for TMOR,*

*where IBT purchases and Market Participant Forward Reserve Obligation for TMOR are positive values and IBT sales are negative values;*

(4) The ISO calculates, for each Reserve Zone and for each hour of the Operating Day, each Market Participant's Final Forward Reserve Obligation for TMOR:

*Market Participant Final Forward Reserve Obligation for TMOR = minimum of (Market Participant Forward Reserve Obligation for TMOR, Market Participant Forward Reserve Delivered Megawatts for TMOR).*

## 6.3 Failure-to-Reserve and Failure-to-Activate Megawatts

If a Market Participant fails to reserve sufficient Forward Reserve in the Real-Time Energy Market to meet its Forward Reserve Obligation, a Forward Reserve Failure-to-Reserve Penalty is assessed for each hour of the Operating Day during which failure to reserve occurs. A Forward Reserve Failure-to-Activate Penalty is assessed if a Market Participant's Forward Reserve Resource fails to provide the energy associated with that Resource's Forward Reserve Delivered Megawatts when activated by the ISO in any hour of the Forward Reserve Delivery Period during an Operating Day. The ISO determines Forward Reserve Failure-to-Reserve Megawatts and Forward Reserve Failure-to-Activate Megawatts as follows:

### *6.3.1 ISO Actions for Failure-to-Reserve Megawatts*

The ISO calculates, for each Reserve Zone and for each hour of the Operating Day, each Market Participant's Forward Reserve Failure-to-Reserve Megawatts for TMNSR and for TMOR. (See Market Rule 1 Section III.9.7 for Failure-to-Reserve Megawatt calculations.)

### *6.3.2 ISO Actions for Failure-to-Activate Megawatts*

The ISO calculates for each hour of the Operating Day, the Forward Reserve Failure-to-Activate Megawatts for each Forward Reserve Resource for which the failure-to-activate flag is set to "Yes". (See Section 5 of this manual for details regarding determination of failure to activate, and Market Rule 1 Section III.9 for Failure-to-Activate Megawatts calculations.)

## 6.4 Reserve Quantity For Settlement

Reserve Quantity For Settlement calculations are addressed in Market Rule 1 Section III.10.1.

## 6.5 Reserve Related Credits and Forward Reserve Obligation Charges

The ISO uses the previously calculated amounts in Sections 6.2 and 6.4 of this manual along with Forward Reserve Clearing Prices and Real-Time Reserve Clearing Prices to calculate Market Participant Forward Reserve and Real-Time Reserve Credits. The ISO calculates these credits as follows:

### *6.5.1 Forward Reserve Credits*

The ISO calculates credits associated with Final Forward Reserve Obligations as follows:

#### 6.5.1.1 ISO ACTIONS

(1) The ISO calculates the hourly Forward Reserve Payment Rate for TMNSR for each Reserve Zone for hours in the Forward Reserve Delivery Period for each month within the Forward Reserve Procurement Period as described in Market Rule 1 Section III.9.8.

(2) The ISO calculates the hourly Forward Reserve Payment Rate for TMOR for each Reserve Zone for hours in the Forward Reserve Delivery Period for each month within the Forward Reserve Procurement Period as described in Market Rule 1 Section III.9.8.

(3) The ISO calculates for each hour of the Operating Day, for each Reserve Zone, each Market Participant's Forward Reserve Credit for TMNSR as:

*Forward Reserve Credit for TMNSR = hourly Forward Reserve Payment Rate for TMNSR * Market Participant Final Forward Reserve Obligation for TMNSR;*

(4) The ISO calculates for each hour of the Operating Day, for each Reserve Zone, each Market Participant's Forward Reserve Credit for TMOR as:

*Forward Reserve Credit for TMOR = hourly Forward Reserve Payment Rate for TMOR * Market Participant Final Forward Reserve Obligation for TMOR;*

(5) The ISO calculates for each hour of the Operating Day, for each Reserve Zone, the sum of all Market Participants' Forward Reserve Credits for TMNSR:

*Reserve Zone Forward Reserve Credit for TMNSR = sum of all Market Participants' Forward Reserve Credits for TMNSR within that Reserve Zone;*

(6) The ISO calculates for each hour of the Operating Day, for each Reserve Zone, the sum of all Market Participants' Forward Reserve Credits for TMOR:

*Reserve Zone Forward Reserve Credit for TMOR = sum of all Market Participants' Forward Reserve Credits for TMOR within that Reserve Zone;*

(7) The ISO calculates for each hour of the Operating Day, for each Reserve Zone, the sum of all Market Participants' Forward Reserve Credits for TMNSR and TMOR:

*Reserve Zone Forward Reserve Credits = sum of all Market Participants' Forward Reserve Credits for TMNSR within that Reserve Zone + sum of all Market Participants' Forward Reserve Credits for TMOR within that Reserve Zone;*

(8) The ISO calculates for each hour of the Operating Day, the total Forward Reserve Credits as the sum of all Market Participants' Forward Reserve Credits for TMNSR and TMOR in all Reserve Zones:

*Total Forward Reserve Credits = the sum of all Reserve Zone Forward Reserve Credit for TMNSR + the sum of all Reserve Zone Forward Reserve Credit for TMOR;*

## *6.5.2 Real-Time Reserve Credits*

Real-Time Reserve Credits calculations are addressed in Market Rule 1 Section III.10.2.

## *6.5.3 Forward Reserve Obligation Charges*

To ensure that Market Participants do not receive Real-Time Reserve Credits and Forward Reserve Credits for the provision of like Operating Reserve categories in Real-Time, the ISO calculates a Forward Reserve Obligation Charge that is applicable in each Reserve Zone.

### 6.5.3.1 ISO ACTIONS – FORWARD RESERVE OBLIGATION CHARGES

Any portion of the Reserve Quantity For Settlement and the Forward Reserve Delivered Megawatts provided by a Demand Response Resource other than MWs associated with Net Supply, is increased by average avoided peak distribution losses.

(1) The ISO calculates for each Reserve Zone in Settlement Precedent Order, each Resource's Forward Reserve Obligation Charge Megawatt for TMNSR as:

*Forward Reserve Obligation Charge Megawatt Limit for TMNSR = minimum of (sum of Reserve Quantity For Settlement for TMNSR and TMSR, sum of Forward Reserve Delivered Megawatts for TMNSR in all Reserve Zones)*

*Reserve Zone Forward Reserve Obligation Charge Megawatt for TMNSR = minimum of (Forward Reserve Obligation Charge Megawatt Limit for TMNSR – previously allocated Forward Reserve Obligation Charge Megawatts for TMNSR in other Reserve Zones, Forward Reserve Delivered Megawatts for TMNSR)*

(2) The ISO calculates for each Reserve Zone in Settlement Precedent Order, each Resource's Forward Reserve Obligation Charge Megawatt for TMOR as:

*Forward Reserve Obligation Charge Megawatt Limit for TMOR = minimum of [Reserve Quantity For Settlement for TMOR plus (Real-Time TMSR and TMNSR Designation in excess of Forward Reserve Delivered Megawatts for TMNSR), sum of Forward Reserve Delivered Megawatts for TMOR in all Reserve Zones]*

*Reserve Zone Forward Reserve Obligation Charge Megawatt for TMOR = minimum of (Forward Reserve Obligation Charge Megawatt Limit for TMOR – previously allocated Forward Reserve Obligation Charge Megawatts for TMNSR and TMOR in other Reserve Zones, Forward Reserve Delivered Megawatts for TMOR)*

This calculation is performed for each Resource assigned a Forward Reserve Obligation.

(3) The ISO calculates for each settlement interval of the Operating Day, for each Reserve Zone in Settlement Precedent Order, each Market Participant's Forward Reserve Obligation Charge MW for TMNSR as:

*Forward Reserve Obligation Charge Megawatt for TMNSR = MIN[sum of Forward Reserve Obligation Charge Megawatt for TMNSR + Forward Reserve Obligation Charge Megawatts for TMNSR not previously allocated in other Reserve Zones, Final TMNSR Forward Reserve Obligation MW]*

(4) The ISO calculates for each settlement interval of the Operating Day, for each Reserve Zone in Settlement Precedent Order, each Market Participant's Forward Reserve Obligation Charge MW for TMOR as:

*Forward Reserve Obligation Charge Megawatt for TMOR = MIN[sum of Forward Reserve Obligation Charge Megawatt for TMOR + Forward Reserve Obligation Charge Megawatts for TMOR and TMNSR not previously allocated in other Reserve Zones, Final TMOR Forward Reserve Obligation MW]*

(5) The ISO calculates for each Reserve Zone for each settlement interval of the Operating Day, each Market Participants' Forward Reserve Obligation Charges for TMNSR in each Reserve Zone:

*Forward Reserve Obligation Charge for TMNSR = Forward Reserve Obligation Charge Megawatt for TMNSR * Real-Time Reserve Clearing Price for TMNSR * (-1)*

(6) The ISO calculates for each Reserve Zone for each settlement interval of the Operating Day, the total of all Market Participants' Forward Reserve Obligation Charges for TMOR in each Reserve Zone:

*Reserve Zone Forward Reserve Obligation Charge for TMOR = Forward Reserve Obligation Charge Megawatt for TMOR * Real-Time Reserve Clearing Price for TMOR * (-1)*

## 6.6 Reserve Related Charges

The ISO allocates the total payments and penalty charges associated with Forward Reserve and the total payments associated with Real-Time Operating Reserve to Market Participants based on Real-Time Load Obligations within the applicable Load Zone. The total costs attributed to each Load Zone are calculated based upon the Forward Reserve and Operating Reserve load weighted clearing price ratios associated with meeting Reserve Zone specific Forward Reserve requirements and Reserve Zone specific Real-Time Operating Reserve Requirements and the total credits associated with provision of Forward Reserve and Real-Time Operating Reserve within each Load Zone.

Calculation and allocation of penalty charges for failure-to-deliver and failure-to-activate Forward Reserve, allocation of Forward Reserve Credits and Real-Time Reserve Credits to each Load Zone and calculation of each Market Participant's related Load Zone charges is performed as follows.

### *6.6.1 Forward Reserve Penalty Charges*

The ISO calculates charges associated with failure-to-reserve Forward Reserve and failure-to-activate Forward Reserve utilizing the megawatt values calculated under Section 6.3 of this manual as described below. The Real-Time Forward Reserve market is an hourly market, and the calculations below are performed for each hour of the Operating Day.

#### 6.6.1.1 ISO ACTIONS FOR FAILURE-TO-RESERVE

Any portion of the Forward Reserve Failure-to-Reserve Megawatts provided by a Demand Response Resource other than MWs associated with Net Supply, is increased by average avoided peak distribution losses.

(1) The ISO calculates for each Reserve Zone, each Market Participant's Forward Reserve Failure-to-Reserve Penalty for TMNSR as:

*Forward Reserve Failure-to-Reserve Penalty for TMNSR = Forward Reserve Failure-to-Reserve Megawatts for TMNSR * maximum of (Forward Reserve Payment Rate for TMNSR * 1.5, Real-Time Reserve Clearing Price for TMNSR – Forward Reserve Payment Rate for TMNSR) * (-1);*

(2) The ISO calculates for each Reserve Zone, each Market Participant's Forward Reserve Failure-to-Reserve Penalty for TMOR as:

*Forward Reserve Failure-to-Reserve Penalty for TMOR = Forward Reserve Failure-to-Reserve Megawatts for TMOR * maximum of (Forward Reserve Payment Rate for TMOR * 1.5, Real-Time Reserve Clearing Price for TMOR – Forward Reserve Payment Rate for TMOR) * (-1);*

(3) The ISO calculates for each Reserve Zone, the sum of all Market Participants' Forward Reserve Failure-to-Reserve Penalties for TMNSR:

*Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMNSR = sum of all Market Participants' Forward Reserve Failure-to-Reserve Penalties for TMNSR within that Reserve Zone;*

(4) The ISO calculates for each Reserve Zone, the sum of all Market Participants' Forward Reserve Failure-to-Reserve Penalties for TMOR:

*Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMOR = sum of all Market Participants' Forward Reserve Failure-to-Reserve Penalties for TMOR within that Reserve Zone;*

(5) The ISO calculates for each Reserve Zone, the sum of all Market Participants' Failure-to-Reserve Penalties as:

*Reserve Zone Forward Reserve Failure-to-Reserve Penalty = Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMNSR + Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMOR;*

#### 6.6.1.2 ISO ACTIONS FOR FAILURE-TO-ACTIVATE

Any portion of the Forward Reserve Failure-to-Activate Megawatts provided by a Demand Response Resource, other than megawatts associated with Net Supply, is increased by average avoided peak distribution losses.

(1) The ISO calculates for each Reserve Zone, each Resource's Forward Reserve Failure-to-Activate Penalty as:

*Resource Forward Reserve Failure-to-Activate Penalty for TMNSR = Forward Reserve Failure-to-Activate Megawatts for TMNSR * maximum of (2.25 * Forward Reserve Payment Rate for TMNSR, applicable nodal LMP) * (-1);*

(2) The ISO calculates for each Reserve Zone, each Market Participant's Forward Reserve Failure-to-Activate Penalty for TMNSR by summing each Market Participant's Forward Reserve Failure-to-Activate Penalties for TMNSR for each Resource. For each Generator Asset and DARD, this calculation also takes each Market Participant's Ownership Share into account where this value is assumed to be 100% to the Lead Market Participant for Demand Response Resources:

*Market Participant Forward Reserve Failure-to-Activate Penalty for TMNSR = sum (Resource Forward Reserve Failure-to-Activate Megawatts for TMNSR * Market Participant ownership share);*

(3) The ISO calculates for each Reserve Zone, each Resource's Forward Reserve Failure-to-Activate charge for TMOR as:

*Resource Forward Reserve Failure-to-Activate Penalty for TMOR = Forward Reserve Failure-to-Activate Megawatts for TMOR * maximum of (2.25 * Forward Reserve Payment Rate for TMOR, applicable nodal LMP) * (-1);*

(4) The ISO calculates for each Reserve Zone, each Market Participant's Forward Reserve Failure-to-Activate Penalty for TMOR by summing each Market Participant's Forward Reserve Failure-to-Activate Penalty for TMOR for each Resource. For each Generator Asset and DARD, this calculation also takes each Market Participant's Ownership Share into account where this value is assumed to be 100% to the Lead Market Participant for Demand Response Resources:

*Market Participant Forward Reserve Failure-to-Activate Penalty for TMOR = sum (Resource Forward Reserve Failure-to-Activate Megawatts for TMOR * Market Participant ownership share);*

(5) The ISO calculates for each Reserve Zone, the sum of all Market Participants' Forward Reserve Failure-to-Activate Penalties for TMNSR:

*Reserve Zone Forward Reserve Failure-to-Activate Penalty = sum of all Market Participants' Forward Reserve Failure-to-Activate Penalties for TMNSR within that Reserve Zone;*

(6) The ISO calculates for each Reserve Zone, the sum of all Market Participants' Forward Reserve Failure-to-Activate Penalties for TMOR:

*Reserve Zone Forward Reserve Failure-to-Activate Penalty for TMOR = sum of all Market Participants' Forward Reserve Failure-to-Activate Penalties for TMOR within that Reserve Zone;*

(7) The ISO calculates for each Reserve Zone, the sum of all Market Participants' Failure-to-Activate Penalties as:

*Reserve Zone Forward Reserve Failure-to-Activate Penalty = Reserve Zone Forward Reserve Failure-to-Activate Penalty for TMNSR + Reserve Zone Forward Reserve Failure-to-Activate Penalty for TMOR;*

## *6.6.2 Forward Reserve Charges*

The ISO divides the allocation of Forward Reserve credits and penalties in two parts. In the first part, the ISO calculates the cost and penalties of procuring Forward Reserve to satisfy only the system-wide reserve requirement. These costs are allocated to all Market Participants based on their Real-Time Load Obligations. In the second part of the cost allocation, the ISO allocates the remaining Forward Reserve credits and penalties associated with incremental cost to procure local reserve requirements. These costs are allocated only to Market Participants with Real-Time Load Obligations in constrained Reserve Zones.

#### 6.6.2.1 ISO ACTIONS ASSOCIATED WITH THE PROCUREMENT OF FORWARD RESERVE TO MEET THE SYSTEM-WIDE RESERVE REQUIREMENT

The ISO calculates for each procurement period and for each Reserve Zone, the lowest cost for procuring Forward Reserve to meet the system-wide reserve requirement (i.e., ignoring any local reserve requirements for a Reserve Zone).

(1) The ISO calculates for each procurement period the rate associated with procuring TMNSR Forward Reserve to meet only the system-wide reserve requirements as:

*Forward Reserve Market TMNSR Proxy Price = the TMNSR Clearing Price as determined pursuant to Market Rule 1 Section III.9.9.1*

(2) The ISO calculates for each procurement period the rate associated with procuring TMOR Forward Reserve to meet only the system-wide reserve requirements as:

*Forward Reserve Market TMOR Proxy Price = the TMOR Clearing Price as determined pursuant to Market Rule 1 Section III.9.9.1*

(3) The ISO calculates for each hour of the Operating Day and for each procurement period the rate associated with procuring TMNSR Forward Reserve to meet only the system-wide reserve requirements as:

*Hourly Net Forward Reserve Market TMNSR Proxy Price = Forward Reserve Market TMNSR Proxy Price divided by the Forward Reserve delivery hours in the current month*

(4) The ISO calculates for each hour of the Operating Day for each procurement period the rate associated with procuring TMOR Forward Reserve to meet only the system-wide reserve requirements as:

*Hourly Net Forward Reserve Market TMOR Proxy Price = Forward Reserve Market TMOR Proxy Price divided by the Forward Reserve delivery hours in the current month*

(5) The ISO calculates the total credits associated with the procurement of Forward Reserve to meet the system-wide reserve requirement for each hour of the Operating Day as:

*Pool Forward Reserve Market Proxy Credits = the sum of the ((TMNSR Forward Reserve Market minimum requirement for the New England Control Area pursuant to Market Rule 1 Section III.9.2.1 * Hourly Net Forward Reserve Market TMNSR Proxy Price) + (TMOR Forward Reserve Market minimum requirement for the New England Control Area pursuant to Market Rule 1 Section III.9.2.1 * Hourly Net Forward Reserve Market TMOR Proxy Price)*

(6) The ISO calculates for each procurement period the Load Zones that are considered constrained by local Reserve Zone requirements as:

*Forward Reserve Market Constrained Load Zone Flag = "Y" when the Load Zone is part of a Reserve Zone that has a local reserve requirements and either the Forward Reserve Clearing Price for TMNSR or TMOR is higher than the corresponding Forward Reserve Clearing Price in the Rest of System Reserve Zone. Otherwise, the Forward Reserve Market Constrained Load Zone Flag is set to "N".*

#### 6.6.2.2 ISO ACTIONS FOR CALCULATING CHARGE RATE FOR PROCURING FORWARD RESERVE TO MEET THE SYSTEM-WIDE RESERVE REQUIREMENT

For each hour of the Operating Day,

(1) The ISO calculates the credits associated with the procurement of Forward Reserve to meet the system-wide reserve requirement as:

*Pool Forward Reserve Market System Credit = minimum of (Pool Forward Reserve Market Proxy Credits, Total Forward Reserve Credits)*

(2) The ISO calculates the remaining unallocated credits (i.e., the incremental costs above the cost to meet the system-wide reserve requirement) as:

*Pool Forward Reserve Market Remaining Credit = Total Forward Reserve Credits - Pool Forward Reserve Market System Credit*

(3) The ISO calculates the sum of all Market Participants' Failure-to-Activate Penalties and Failure-to-Reserve Penalties as:

*Pool Forward Reserve Market Penalty = sum of Reserve Zone Forward Reserve Failure-to-Activate Penalty for TMNSR + sum of Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMOR + sum of Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMNSR + sum of Reserve Zone Forward Reserve Failure-to-Activate Penalty for TMOR*

(4) The ISO calculates for each Load Zone where the Forward Reserve Market Constrained Load Zone Flag = "Y", the sum of all Market Participants' Forward Reserve Penalties as:

*Constrained Load Zone Forward Reserve Penalty = sum of Reserve Zone Forward Reserve Failure-to-Activate Penalty for TMNSR + sum of Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMOR + sum of Reserve Zone Forward Reserve Failure-to-Reserve Penalty for TMNSR + sum of Reserve Zone Forward Reserve Failure-to-Activate Penalty for TMOR*

(5) The ISO calculates the sum of all Forward Reserve Penalties in constrained Load Zones as:

*Total Constrained Load Zone Forward Reserve Penalty = sum of Constrained Load Zone Forward Reserve Penalty*

(6) The ISO calculates the sum of all Forward Reserve Penalties in unconstrained Load Zones as:

*Total Unconstrained Load Zone Forward Reserve Penalty = Pool Forward Reserve Market Penalty - Total Constrained Load Zone Forward Reserve Penalty*

(7) The ISO calculates for each Load Zone, the Forward Reserve penalties associated with the cost to meet the system-wide reserve requirements as:

*If Pool Forward Reserve Market Remaining Credit > 0, then*

*Pool Forward Reserve Market System Penalty = (Total Unconstrained Load Zone Forward Reserve Penalty + (Total Constrained Load Zone Forward Reserve Penalty * Pool Forward Reserve Market System Credits / Total Forward Reserve Credits)).*

*Otherwise, Pool Forward Reserve Market System Penalty = Pool Forward Reserve Market Penalty*

(8) The ISO calculates for each Market Participant and for each Load Zone, the Reserve Charge Allocation MWs as:

*Reserve Charge Allocation MWs = sum of the Market Participant's Real-Time Load Obligation in the Load Zone (which includes the Market Participant's Real-Time Load Obligation associated with any Capacity Export Through Import Constrained Zone Transaction per Market Rule 1 Section III.1.10.7(f)(i) or with any FCA Cleared Export Transaction per Market Rule 1 Section III.1.10.7(f)(ii)) + sum of the Market Participant's Reserve Quantity For Settlement for DARDs in the Load Zone*

(9) The ISO calculates for each Load Zone, the Load Zone Reserve Charge Allocation MWs as:

*Load Zone Reserve Charge Allocation MWs = sum of all Market Participants' Reserve Charge Allocation MWs in the Load Zone*

(10) The ISO calculates the Total Pool Reserve Charge Allocation MWs as:

*Total Pool Reserve Charge Allocation MWs = sum of all Load Zone Reserve Charge Allocation MWs*

(11) The ISO calculates the charge rate for the cost to meet the system-wide reserve requirement as:

*Forward Reserve System Charge Rate = (-1) * (Pool Forward Reserve Market System Credit + Pool Forward Reserve Market System Penalty) / Total Pool Reserve Charge Allocation MWs*

#### 6.6.2.3 ISO ACTIONS FOR CALCULATING CHARGE RATES FOR THE REMAINING FORWARD RESERVE CREDITS ASSOCIATED WITH THE INCREMENTAL COST ABOVE THE COST TO MEET THE SYSTEM-WIDE RESERVE REQUIREMENT

For each hour of the Operating Day,

(1) The ISO calculates for each Load Zone where the Forward Reserve Market Constrained Load Zone Flag = "Y", the sum of all Market Participants' Forward Reserve Credit for TMNSR and TMOR as:

*Constrained Load Zone Forward Reserve Credit = the sum of all Forward Reserve Credit for TMNSR associated with the Load Zone + the sum of all Forward Reserve Credit for TMOR associated with the Load Zone*

(2) The ISO calculates the sum of all Forward Reserve Credits in constrained Load Zones

*Total Constrained Load Zone Forward Reserve Credit = sum of Constrained Load Zone Forward Reserve Credit*

(3) The ISO calculates each Constrained Load Zone (where the Forward Reserve Market Constrained Load Zone Flag = "Y"), the Forward Reserve credit associated with the incremental cost above the cost to meet the system-wide reserve requirement:

*Load Zone Forward Reserve Market Remaining Credit = Pool Forward Reserve Market Remaining Credit * Constrained Load Zone Forward Reserve Credit / Total Constrained Load Zone Forward Reserve Credit*

(4) The ISO calculates the Forward Reserve penalties associated with the incremental cost above the cost to meet the system-wide reserve requirement:

*Pool Forward Reserve Market Remaining Penalty = Pool Forward Reserve Market Penalty - Pool Forward Reserve Market System Penalty*

(5) The ISO calculates for each Constrained Load Zone, the Forward Reserve penalties associated with the incremental cost above the cost to meet the system-wide reserve requirement:

*If Pool Forward Reserve Market Remaining Credit > 0, then*

*Load Zone Forward Reserve Market Remaining Penalty = Constrained Load Zone Forward Reserve Penalty * (1 – (Pool Forward Reserve Market System Credit / Total Forward Reserve Credits))*

*Otherwise, Load Zone Forward Reserve Market Remaining Penalty = 0.*

(6) The ISO calculates for each Constrained Load Zone, the charges related to the purchase of Forward Reserve above the cost to meet the system-wide reserve requirement:

*Load Zone Forward Reserve Incremental Charge = (-1) * (Load Zone Forward Reserve Market Remaining Credit + Load Zone Forward Reserve Market Remaining Penalty)*

(7) The ISO calculates the sum of the charges related to the purchase of Forward Reserve above the cost to meet the system-wide reserve requirement:

*Pool Forward Reserve Incremental Charge = sum of Load Zone Forward Reserve Incremental Charge*

(8) The ISO calculates for each Constrained Load Zone, the charge rate related to the purchase of Forward Reserve above the cost to meet the system-wide reserve requirement:

*Load Zone Forward Reserve Incremental Charge Rate = Load Zone Forward Reserve Incremental Charge / Load Zone Reserve Charge Allocation MWs*

#### 6.6.2.4 ISO ACTIONS FOR CALCULATING CHARGES

For each hour of the Operating Day,

(1) The ISO calculates for each Market Participant and for each Load Zone, the charge related to the purchase of Forward Reserve to meet the system-wide reserve requirement as:

*Forward Reserve System Charge = Forward Reserve System Charge Rate * Reserve Charge Allocation MWs*

(2) The ISO calculates for each Market Participant and for each Load Zone, the charge related to the purchase of Forward Reserve above the costs to meet the system-wide reserve requirement as:

*Forward Reserve Incremental Charge = Load Zone Forward Reserve Incremental Charge Rate * Reserve Charge Allocation MWs*

(3) The ISO calculates for each Market Participant and for each Load Zone, the charges related to the procurement of Forward Reserve as:

*Forward Reserve Charge = Forward Reserve System Charge + Forward Reserve Incremental Charge* (4) The ISO calculates for each Load Zone, the sum of all market participants' charges related to the procurement of Forward Reserve as:

*Total Load Zone Forward Reserve Charge = sum of Forward Reserve Charge*

## *6.6.3 Real-Time Reserve Charges*

Real-Time Reserve Charges calculations are addressed in Market Rule 1 Section III.10.3.

# Revision History

## Approval

Approval Date: October 3, 2003
Effective Date: November 1, 2003

## Revision History

Revision: 1 - Approval Date: June 28, 2004

| Section No. | Revision Summary |
|---|---|
| Entire Manual | revised to reflect RTO terminology and to reflect the Market Rule 1 and Transmission Markets and Service Tariff provisions filed with the FERC (e.g., the elimination of Internal Point-to-Point Transmission Service). |

Revision: 2 - Approval Date: March 11, 2005

| Section No. | Revision Summary |
|---|---|
| 1.1 | Deletes "monthly" from the first paragraph to reflect weekly billing process. |
| 2.4.3(3) | Adds language clarifying the amounts cleared in the Forward Reserve Auction. |
| 3.1.1 | Revises language to clarify that Resources must be listed as ICAP Resources during the Forward Reserve Service Period. |
| 3.3.7 | Replaces the word "done" with "calculated". |
| 3.3.7.1&2 | Language is added to state that Delivered Off-Line Forward Reserve cannot exceed the Resource's Claim 10 and Claim 30 values. |

*The following revisions are contingent upon FERC acceptance of corresponding revisions to Market Rule 1 to be filed by the ISO.*

| | |
|---|---|
| 3.1.2 | Clarifies the dispatch control requirement by specifically referring to eligibility to submit Supply Offers and inclusion of the Resource in the ISO Settlement Market System (SMS). |
| 4.1.1&2 | Adds language to provide for Partial Planned Outage Treatment. |

Revision: 3 - Approval Date: May 6, 2005

| Section No. | Revision Summary |
|---|---|
| 3.3.3 | Revises title of Section 3.3.3 and text within Section 3.3.3 to use "Internal Market Monitoring Unit" instead of "Market Monitoring Unit". |

Revision: 4 - Approval Date: May 27, 2005

| Section No. | Revision Summary |
|---|---|
| 3.1.1 | Revises the section "ICAP Resource Requirement" to reflect the existence of partially de-listed Resources. |

| Revision: 5 - Approval Date: September 9, 2005 | |
|---|---|
| Section No. | Revision Summary |
| 3.3.4 & 3.3.6.1…… | References to Section 5 of M-28 are replaced by references to Appendix F to Market Rule 1. |

| Revision: 6 - Approval Date: October 14, 2005 | |
|---|---|
| Section No. | Revision Summary |
| 3.3.1 & 3.3.6.1…… | Replaces the term "Operating Reserve" with "NCPC". |
| 4.4.1……... | Replaces the term "Daily RMR Resource" with "Local Second Contingency Protection Resource". |

| Revision: 7 - Approval Date: June 2, 2006 | |
|---|---|
| Section No. | Revision Summary |
| Entire Manual rewritten to reflect ASM Phase II subjects which include the Locational Forward Reserve Market, Real-Time Reserve Clearing Prices, and Asset Related Demands. | |

| Revision: 8 - Approval Date: March 2, 2007 | |
|---|---|
| Section No. | Revision Summary |
| List of Figures And Tables…. | Adds "ISO New England Business Procedures" to the Table 1.1 title. |
| Introduction… | Adds "ISO New England Business Procedures" to this section. |
| Table 1.1…… | Adds "ISO New England Business Procedures" to the title and adds "Ancillary Service Schedule No. 2 Business Procedure" to the Transmission column. |
| 5.1……... | Defines the ISO approved annual maintenance schedule as of September 30 for the winter period and the ISO approved annual maintenance schedule as of May 31 for the summer period for the purpose of determining a Forward Reserve Failure-to-Reserve Penalty. |

| Revision: 9 - Approval Date: December 7, 2007 | |
|---|---|
| Section No. | Revision Summary |
| 3.2…….. | Deletes subsections (a), (b), (c), (d), (e), (f), (g) and (h). |
| 3.3……... | Revises the sentence to include a reference to Section III.9.5 of Market Rule 1. |
| 4.3……... | Deletes this section in its entirety. |

| Revision: 10 - Approval Date: September 5, 2008 | |
|---|---|
| Section No. | Revision Summary |
| 3.1……... | Clarifies the time when Resource specific assignment of Forward Reserve must be completed and who must perform the specific assignment. |
| 3.1.1…… | Adds a new subsection titled Ownership Share in Forward Reserve Resource. |
| 3.1.2…… | Adds a new subsection titled Internal Bilateral Transactions for Forward Reserve. |
| 5.1 & 5.2…… | Replaces the reference to ISO New England Manual for Market Rule 1 Accounting, M-28 with a reference to Section III.9 of Market Rule 1. |

Revision: 11 - Approval Date: May 7, 2010
Section No. Revision Summary
Entire Manual revised to reflect the Forward Capacity Market as contained in Section III.13 of Market Rule 1.

Revision: 12 - Approval Date: November 18, 2010
Section No. Revision Summary
3.3, 5.2.1 &
5.2.2…… Replaces the reference to ISO New England Manual for Market Operations, M-11 with a reference to ISO New England Manual for Registration and Performance Auditing, M-RPA.

Revision: 13 - Approval Date: January 7, 2011 and April 1, 2011
Section No. Revision Summary
This set of revisions was approved on January 7, 2011

2.2.1…… Deletes the phrase "to ensure that delivery of Forward Reserve is distributed reliably throughout the ISO New England Transmission System" in the fourth sentence.
2.2.2.1……. Deletes this Section (Rest-of-System Reserve Zone Minimum Requirements) in its entirety.
2.2.4(c)…….. Deletes the load shed information contained in the term "30ACT".
2.2.6…… Deletes this Section (Indicative Local Forward Reserve Requirement Values) in its entirety.
2.2.7…… Deletes this Section (Adjustments to Forward Reserve Requirements) in its entirety.
2.4……... Deletes Exhibit 2.1: Forward Reserve Auction Timeline – 2006/2007 Winter Procurement Period.
2.6.2…… Deletes this Section (Forward Reserve Auction Example) in its entirety.
3.2…….. Revises "Failure-To-Deliver" to "Failure-to-Reserve" in the fifth sentence.
5.1…….. Deletes the second sentence regarding the exemption from the Failure-to-Reserve penalty for resources that are on the ISO's approved annual maintenance outage.

This set of revisions was approved on April 1, 2011

2.4…….. Deletes the third paragraph regarding Exhibit 2.1 (Exhibit 2.1 was deleted in a previous edit to the Manual).
2.4(3)…….. Added provisions for the calculation and posting of the proxy prices for the purposes of Forward Reserve Market cost allocation.

Revision: 14 - Approval Date: May 4, 2012
Section No. Revision Summary

| | |
|---|---|
| 2.3 & 2.4(1)… | Revises these two sections to reflect the change of the Forward Reserve Threshold Price and Forward Reserve Fuel Index to be a daily value instead of a monthly value. |

Revision: 15 - Approval Date: April 5, 2013

| Section No. | Revision Summary |
|---|---|
| 2.2.2…… | Revises this section to point to Section III.9.2.1 of Market Rule 1 for the calculation of the amount of the Forward Reserve requirement to be procured in the auction for the New England Control Area and deletes the actual language contained in Section III.9.2.1 of Market Rule 1. |

Revision: 16 - Approval Date: June 7, 2013

| Section No. | Revision Summary |
|---|---|
| 3.3……... | Deletes reference to Section 5 of ISO New England Manual M-RPA (Registration and Performance Auditing). |
| 5.2.1……... | Replaces reference to Section 5 of ISO New England Manual M-RPA (Registration and Performance Auditing) with a Market Rule 1 cross reference. |
| 5.2.2……... | Deletes reference to Section 5 of ISO New England Manual M-RPA (Registration and Performance Auditing). Clarifies Offered CLAIM10, Offered CLAIM30, redeclared CLAIM10 and redeclared CLAIM30 parameters. |

Revision: 17 - Approval Date: November 2, 2012

| Section No. | Revision Summary |
|---|---|
| 4.2…….. | Replaces “Internal Market Monitoring Unit” with “Internal Market Monitor”. |

Revision: 18 - Approval Date: June 7, 2012

| Section No. | Revision Summary |
|---|---|
| 5.2…….. | Revises the sentence to refer to Section III.9 of Market Rule 1 for the performance penalty calculation. |
| 5.2.1……... | Revises the Market Rule 1 reference from “Section III.9.5.3” to “Section III.9.7.2” for the specific Failure-to-Activate Tariff section. Deletes descriptive language that is not needed given the specific penalty calculation as specified in Market Rule 1. |
| 5.2.2……... | Deletes descriptive language that is not needed given the specific penalty calculation as specified in Market Rule 1. |

Revision: 19 - Approval Date: November 7, 2014

| Section No. | Revision Summary |
|---|---|
| 2.3 & 2.5(2)… | Replaces “block” with “Block”. |
| 3.1…….. | Revises the section to refer the reader to Market Rule 1 Section III.9.5.1 regarding the Resource specific assignment of Forward Reserve. |

Revision: 20 - Approval Date: November 6, 2015

| Section No. | Revision Summary |
|---|---|

| | |
|---|---|
| 2.4…….. | Revises the Internal Bilateral Transactions for Forward Reserve information submittal timeframe to "1700 hours (prevailing Eastern Time) on the second (2nd) Business Day after the applicable Operating Day within the Forward Reserve Procurement Period". |
| 3.1.2……... | Revises the Internal Bilateral Transactions for Forward Reserve information submittal and confirmation timeframe to "1700 hours (prevailing Eastern Time) on the second (2nd) Business Day after the applicable Operating Day". |

Revision: 21 - Approval Date: October 14, 2016

| Section No. | Revision Summary |
|---|---|
| Introduction, Section 1, Section 2, Section 3, Section 4, Section 5…….. …….. | Revises "ISO New England Manual for Forward Reserve" to "ISO New England Manual for Forward Reserve and Real-Time Reserve" in these Sections. |
| Section 6……. | Revises the title of this Section from "Section 6: Forward Reserve Market Settlement" to "Section 6: Forward Reserve and Real-Time Reserve Accounting", relocates Section 2: Forward Reserve and Real-Time Reserve Accounting from ISO New England Manual for Market Rule 1 Accounting, M-28 to this Section, and replaces "hour" with "settlement interval" in subsections 6.4.1(1) through 6.4.1(7), 6.5.2.1(1) through 6.5.2.1(3) and 6.5.3.1(3) through 6.5.3.1(6). |

Revision: 22 - Approval Date: October 4, 2018

| Section No. | Revision Summary |
|---|---|
| All sections…. | Updates the manual to conform with Price Responsive Demand Full Integration, Real-Time Reserve Designation and Settlement Rules, as well as numerous clean-up and clarifying changes. Clean-up changes include correcting capitalization of defined terms, updating section references, removing obsolete provisions and improving phrasing for clarity. |
| Section 1……. | Correction made to indicate the timing of Forward Reserve assignments. Corrects term "Forward Reserve *Delivery* Period". Adds "Demand Reduction Offers" to introductory section. Adds Tariff reference for Real-Time Reserve Designations. |
| Section 2…… | Removed duplicate information indicating the timing of Forward Reserve assignments and Supply Offer Caps by referencing the Tariff section containing that information. Specifies that the Assignment of Forward Reserve Obligations to specific Forward Reserve Resources may occur at anytime prior to the close of the Re-Offer Period for each Operating Day. Updates terminology to conform with Real-Time Reserve Designation and Settlement Rule filing by changing "local" to "zonal". |
| Section 3…… | Clarifies Ownership Share concept for DARD, Generator and Demand Response Resources in section 3.1.1. Removed unnecessary use of offline and online, clarifies Tariff section reference in section 3.2. Clarifies "Forward Reserve Failure-to-Reserve. |
| Section 4……. | Adds "Demand Bids" to the second bullet of the introductory information. Adds "Demand Reduction Offers" and description of Forward Reserve Delivery for Demand Reduction Offers to the overview section. Removes obsolete references to M-28. Fixed references to Generator Assets and DARD. |

Section 5…... Rephrases title of section 5. Adds description of how Failure-to-Activate will be determined in Real-Time for Demand Response Resources in section 5.2.1. Clarified how failure-to-activate rules to apply to Fast Start Demand Response Resources. Removes final paragraph describing a specific instance where no failure-to-reserve penalty will be incurred.

Section 6…… Removed three paragraphs of detail on Real-Time Reserve Designation replacing it with the relevant Section of Market Rule 1, Section III.10. Adds "Demand Reduction Offer" where applicable, specifies Forward Reserve Resource "Generator Asset" and adds detail on Forward Reserve calculations for DRRs in 6.2.1. Including: detail on Forward Reserve Qualifying Megawatts describing the calculations for dispatched and not dispatched Demand Response Resource Forward Reserve Resources. Removes from 6.2.1 the example calculation of Real-Time Supply Offer prices for Off-Line Forward Reserve Resource used for determination of qualifying megawatts. Clarifies terminology in 6.2.1.1, including but not limited to specifying that an off-line Forward Reserve Resource includes a Demand Response Resource that has not been dispatched, corrects terms "Generator Asset", "Economic Maximum Limit", and "Block Price". Adds section 6.2.1.1(1)(a) describing the calculation of Demand Response Resource Qualifying megawatts. Adds section to 6.2.1.1(3) describing the qualifying megawatt calculation for Forward Reserve Resource Demand Response Resources that have, and have not, been dispatched. Adds section to 6.2.2 describing the reserve capability determination for Forward Reserve Resource Demand Response Resources that have, and have not, been dispatched. Adds sections to 6.2.2.1 detailing the Settlement Precedent Order which has enabled the removal of the definition from M-35. Specifies "for the hour" for Real-Time Off-line and On-line Energy Price in Forward Reserve Resource calculations. Adds sections to 6.2.2.1 describing the Forward Reserve Available Megawatts for TMNSR and TMOR for both dispatched and not dispatched Demand Response Resource Forward Reserve Resources. In section 6.2.3 adds a paragraph on determining Forward Reserved Delivered Megawatts for Demand Response Resources. Clarifies in 6.2.3.1 (3) and 6.2.3.1(4) that Forward Reserve Resources that are Generator Assets or DARDs will have the Market Participant's Ownership Shares taken into account for their TMOR and TMNSR. Replaces detail from Section 6.4, on settlement calculations, with reference to the primary material on this subject in Market Rule 1, Section III.10.1. Removes extraneous detail from Section 6.5.2 and replaces with reference to relevant Market Rule 1 section. Replaces term, "Real-Time Reserve Designation" with "Reserve Quantity For Settlement". 6.5.3. removes an example from first paragraph. Adds sentence to explain that the Forward Reserve Delivered Megawatts provided by Demand Response Resources will be increased by average avoided peak distribution losses, except for Net Supply. 6.5.3.1, 6.6.1.2 (2), and 6.6.1.2 (4) specify treatment of Ownership Shares for the calculation of performance of DARD and Generator Assets which have been assigned a Forward Reserve Obligation and that the ownership share for Demand Response Resources is assumed to be 100% the Lead Market Participant for Demand Response Resources. In sections 6.6.3.1, 6.6.1.1, and 6.6.1.2, adds sentence to reiterate that

| | |
|---|---|
| | the Demand Response Resource failure-to-reserve megawatts provided will be increased by average avoided peak distribution losses, unless those megawatts were associated with Net Supply. In 6.6.2.1 clarifying changes were made to calculations associated with the procurement of forward reserve to meet the system-wide reserve requirement. Replaces "Reserve Designation" with "Reserve Quantity For Settlement". Section 6.6.3. was removed and replaced by a reference to the relevant section of Market Rule 1. |