

# **SCHEDULING PROTOCOL**

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## **SCHEDULING PROTOCOL (SP)**

### **SP 1 OBJECTIVES, DEFINITIONS AND SCOPE**

#### **SP 1.1 Objectives**

The objectives of this Protocol are:

- (a) to process the scheduling input data (submitted to the ISO under the Ancillary Service Requirements Protocol (ASRP), the Demand Forecasting Protocol (DFP), and the Schedules and Bids Protocol (SBP)) in order to develop Final Schedules for the Day-Ahead and Hour-Ahead Markets (real time management of the ISO Controlled Grid is addressed in the Dispatch Protocol (DP));
- (b) to provide for the scheduling of the use of transmission service rights under Existing Contracts;
- (c) to assist the ISO in purchasing Ancillary Services; and
- (d) to manage Congestion.

#### **SP 1.2 Definitions**

##### **SP 1.2.1 Master Definitions Supplement**

Unless the context otherwise requires, any word or expression defined in the Master Definitions Supplement to the ISO Tariff shall have the same meaning where used in this Protocol. A reference to a Section or an Appendix is to a Section or an Appendix of the ISO Tariff. References to SP are to this Protocol or to the stated paragraph of this Protocol.

##### **SP 1.2.2 Special Definitions for this Protocol**

In this Protocol, the following words and expressions shall have the meanings set opposite them:

**"ISO Home Page"** means the ISO internet home page at <http://www.caiso.com/iso> or such other internet address as the ISO shall publish from time to time.

##### **SP 1.2.3 Rules of Interpretation**

- (a) Unless the context otherwise requires, if the provisions of this Protocol and the ISO Tariff conflict, the ISO Tariff will prevail to

the extent of the inconsistency. If the provisions of this SP and an Existing Operating Agreement conflict, the provisions of the Existing Operating Agreement will prevail. The provisions of the ISO Tariff have been summarized or repeated in this Protocol only to aid understanding.

- (b) A reference in this Protocol to a given agreement, ISO Protocol or instrument shall be a reference to that agreement or instrument as modified, amended, supplemented or restated through the date as of which such reference is made.
- (c) The captions and headings in this Protocol are inserted solely to facilitate reference and shall have no bearing upon the interpretation of any of the terms and conditions of this Protocol.
- (d) This Protocol shall be effective as of the ISO Operations Date.
- (e) References to time are references to the prevailing Pacific time.

### **SP 1.3      Scope**

#### **SP 1.3.1      Scope of Application to Parties**

The SP applies to the following entities:

- (a) Scheduling Coordinators (SCs);
- (b) Utility Distribution Companies (UDCs);
- (c) Participating Transmission Owners (PTOs);
- (d) interfacing Control Area operators in accordance with Inter-Control Area agreements entered into with the ISO; and
- (e) the Independent System Operator (ISO).

#### **SP 1.3.2      Liability of ISO**

Any liability of the ISO arising out of or in relation to this Protocol shall be subject to Section 14 of the ISO Tariff as if references to the ISO Tariff were references to this Protocol.

### **SP 2      INTERFACE REQUIREMENTS**

The WEnet interface requirements and associated information requirements are described in the SBP.

## **SP 3      TIME LINES**

- (a) The ISO, for reliability purposes or due to error or delay caused by its inability to meet the timing requirements, may implement any temporary variation of timing requirements contained in this SP (including the omission of any step) in accordance with Section 2.2.12.1 of the ISO Tariff. The information will be published on WEnet and will include the following:
  - (i) the exact timing requirements affected;
  - (ii) details of any substituted timing requirements;
  - (iii) an estimate of the period for which this waiver will apply; and
  - (iv) reasons for the temporary variation.
- (b) The incorporation of the scheduling of the use of rights under Existing Contracts into the ISO's Day-Ahead, Hour-Ahead and real time processes is additionally described in SP 7 and in the SBP.

### **SP 3.1      Balanced Schedules**

#### **SP 3.1.1      Types of Balanced Schedules**

A Schedule shall be treated as a Balanced Schedule when the SC's aggregate Generation and external imports (adjusted for Transmission Losses) and Inter-Scheduling Coordinator Trades (whether purchases or sales), equal the SC's aggregate Demand forecast, including external exports, with respect to all entities for which the SC schedules.

#### **SP 3.1.2      Preferred Schedules**

The Preferred Schedule is the initial Schedule submitted by a SC in the Day-Ahead Market or Hour-Ahead Market. A Preferred Schedule shall be a Balanced Schedule submitted to the ISO by each SC on a daily and/or hourly basis.

#### **SP 3.1.3      Seven-Day Advance Schedules**

SCs may submit Balanced Schedules for up to seven (7) Trading Days at a time, representing the SC's Preferred Schedule for each Day-Ahead Market and/or Hour-Ahead Market. These advance Schedules can be overwritten by new Preferred Schedules at any time prior to



the deadline for submitting Day-Ahead Schedules and Hour-Ahead Schedules, as described in the SP. If not overwritten by the SC, a Schedule submitted in advance of this deadline for submission will become the SC's Preferred Schedule at the deadline for submitting Day-Ahead Schedules and/or Hour-Ahead Schedules. There is no validation of Schedules submitted in advance of the deadline for submitting Preferred Schedules. As part of the scheduling and validation process, the ISO will calculate and publish, via WEnet, the GMMs applicable to the Day-Ahead and Hour-Ahead Markets eight (8) days ahead of the Trading Day to which they relate, as described in SP 4.

**SP 3.1.4 Suggested Adjusted Schedules**

If the sum of SCs' Preferred Schedules would cause Congestion across any Inter-Zonal Interface, the ISO shall issue Suggested Adjusted Schedules to all SCs in the Day-Ahead Market only. These Suggested Adjusted Schedules will not apply to uses of transmission owned by non-participating transmission owners nor to uses of either Existing Rights or Non-Converted Rights under Existing Contracts. A modification flag, set by the ISO, will indicate whether the scheduled output in a Settlement Period has been modified as a result of Congestion Management. The ISO will publish as public information, via the WEnet, estimated Usage Charges for Energy transfers between Zones.

**SP 3.1.5 Revised Schedules**

Following receipt of a Suggested Adjusted Schedule, a SC may submit to the ISO a Revised Schedule, which shall be a Balanced Schedule. There are no Revised Schedules in the Hour-Ahead Market.

**SP 3.1.6 Final Schedules**

If the ISO notifies a SC that there will be no Congestion on the ISO Controlled Grid based on the Preferred Schedules submitted by all SCs, the Preferred Schedule shall become that SC's Final Schedule. If the ISO notifies a SC that there will be no Congestion on the ISO Controlled Grid based on the Revised Schedules submitted by all SCs, the Revised Schedule shall become that SC's Final Schedule. If there is Congestion based on the Revised Schedules, the ISO shall modify the Revised Schedules and issue Final Schedules. The SCs will be notified, via WEnet, that their Schedules have become final. The ISO will also publish a final set of Usage Charges for Energy transfers between Zones, applicable to all SCs.

## **SP 3.2 Day-Ahead Market**

The Day-Ahead Market is a forward market for Energy and Ancillary Services. The Day-Ahead Market operates individually for each Settlement Period of the Trading Day. The Day-Ahead Market starts at 6:00 pm two days ahead of the Trading Day and ends at 1:00 pm on the day ahead of the Trading Day, at which time the ISO issues the Final Day-Ahead Schedules.

### **SP 3.2.1 By 6:00 pm, Two Days Ahead**

By 6:00 pm two days ahead of the Trading Day (for example, by 6:00 pm on Monday for the Wednesday Trading Day), the ISO will publish, via WEnet, the following information for each Settlement Period of the Trading Day:

- (a) a forecast of conditions on the ISO Controlled Grid, including transmission line and other transmission facility Outages;
- (b) a forecast of Generation Meter Multipliers (GMMs), as developed in accordance with SP 4, at each Generator location and Scheduling Point;
- (c) a forecast of system Demands by Zone;
- (d) an estimate of the Ancillary Services requirements for the ISO Control Area (see the ASRP for the details on these requirements);
- (e) a forecast of Loop Flows over interfaces with other Control Areas;
- (f) a forecast of the potential for Congestion conditions;
- (g) a forecast of total and Available Transfer Capacity over certain rated transmission paths and Inter-Zonal Interfaces.

### **SP 3.2.2 By 6:00 am, One Day Ahead**

By 6:00 am on the day ahead of the Trading Day (for example, by 6:00 am on Tuesday for the Wednesday Trading Day), the following information flows for each Settlement Period of the Trading Day will be required to take place:

- (a) SCs will provide, via WEnet, the ISO with forecasts of their Direct Access Demand by UDC Service Area;
- (b) the ISO will publish, via WEnet, an updated forecast of system Demands and of the Ancillary Services requirements; and

- (c) the ISO will validate (in accordance with the SBP) the information submitted above by SCs and UDCs.

**SP 3.2.3 By 6:30 am, One Day Ahead**

By 6:30 am on the day ahead of the Trading Day (for example, by 6:30 am on Tuesday for the Wednesday Trading Day) and for each Settlement Period of the Trading Day the ISO will provide to UDCs, via WEnet, the sum of the SCs' Direct Access Demand forecasts by UDC Service Area; and

**SP 3.2.4 [Unused]**

**SP 3.2.5 [Unused]**

**SP 3.2.6 By 10:00 am, One Day Ahead**

**SP 3.2.6.1 Actions by SCs and the ISO**

By 10:00 am on the day ahead of the Trading Day (for example, by 10:00 am on Tuesday for the Wednesday Trading Day) and for each Settlement Period of that Trading Day (see SP 3.2.6.2 for information on the pre-validation performed at 10 minutes prior to the 10:00 am deadline):

- (a) SCs will submit their Preferred Day-Ahead Schedules to the ISO in accordance with the SBP;
- (b) SCs will submit, as part of their Preferred Day-Ahead Schedules, their Adjustment Bids, if any, to the ISO in accordance with the SBP;
- (c) SCs will submit their Ancillary Services bids, if any, to the ISO in accordance with the SBP and SP 9;
- (d) SCs will submit their schedules for self-provided Ancillary Services, if any, to the ISO in accordance with the SBP and SP 9;
- (e) the ISO will validate (in accordance with the SBP) all SC submitted Preferred Day-Ahead Schedules for Energy and Adjustment Bids;
- (f) the ISO will validate (in accordance with the SBP) all SC submitted schedules for self-provided Ancillary Services and Ancillary Services bids which were part of their Preferred Day-Ahead Schedules;

- (g) the ISO will start the first iteration of Inter-Zonal Congestion Management process as described in SP 10;
- (h) the ISO will start the Ancillary Services bid evaluation process as described in SP 9;
- (i) the ISO will notify SCs of any Reliability Must-Run Units which have not been included in Preferred Day-Ahead Schedules but which the ISO requires to run in the Trading Day; and
- (j) the ISO will notify SCs of any Ancillary Services it requires from specific Reliability Must-Run Units under their Reliability Must-Run Contracts in the Trading Day.

**SP 3.2.6.2 Pre-validation**

At 10 minutes prior to the deadline for submittal of the Preferred Day-Ahead Schedules, Adjustment Bids, schedules for self-provided Ancillary Services, and Ancillary Services bids (the “submittal”), the ISO shall conduct a pre-validation of the stage two validation described in the SBP. The purpose of this is to allow the SCs, particularly those involved in the Inter-Scheduling Coordinator Trades, to identify and resolve any validation problems. The ISO will immediately communicate the results of each SC’s pre-validation to that SC via WEnet.

**SP 3.2.6.3 Invalidation**

Invalidation of the submittal for any Settlement Period results in rejection of the submittal for all Settlement Periods of the relevant Trading Day. SCs may check at any time prior to 10:00 am whether or not their submittal will pass the ISO’s validation checks at 10:00 am. It is the responsibility of the SCs to perform such checks since Preferred Day-Ahead Schedules, Adjustment Bids, Schedules of self-provided Ancillary Services and Ancillary Services bids which are invalidated cannot be resubmitted after 10:00 am for the Day-Ahead Market. The ISO will immediately communicate the results of each SC’s 10:00 am validation to that SC via WEnet.

**SP 3.2.7 By 11:00 am, One Day Ahead**

By 11:00 am on the day ahead of the Trading Day (for example, by 11:00 am on Tuesday for the Wednesday Trading Day) and for each Settlement Period of that Trading Day:

- (a) the ISO will complete the first iteration of the Inter-Zonal Congestion Management process described in SP 10 (if Inter-Zonal Congestion does not exist in any Settlement Period of

the Trading Day, the scheduling process will continue with the steps at SP 3.2.9);

- (b) the ISO will provide, via WEnet, Suggested Adjusted Day-Ahead Schedules for Energy to all SCs which submitted Preferred Day-Ahead Schedules at 10:00 am, including the SCs which it is proposed should, as a result of Inter-Zonal Congestion Management, have their Preferred Day-Ahead Schedules modified;
- (c) the ISO will publish on WEnet the estimated Day-Ahead Usage Charge rate (in \$/MWh of scheduled flow) for Energy transfers between Zones; and
- (d) the ISO will provide, via WEnet, along with the Suggested Adjusted Day-Ahead Schedules, schedules for Ancillary Services to the SCs which either:
  - (i) submitted Ancillary Services bids and which, as a result, are proposed to supply Ancillary Services; or
  - (ii) submitted schedules to self-provide Ancillary Services and which schedules have been accepted by the ISO.

**SP 3.2.8 By 12:00 Noon, Day Ahead**

By 12:00 noon on the day ahead of the Trading Day (for example, by 12:00 noon on Tuesday for the Wednesday Trading Day) and for each Settlement Period of that Trading Day (except where Inter-Zonal Congestion does not exist, in which case, the scheduling process will omit this step):

**SP 3.2.8.1 Actions by SCs and the ISO**

- (a) SCs will submit Revised Day-Ahead Schedules to the ISO, in response to the ISO's Suggested Adjusted Day-Ahead Schedules, in accordance with the SBP;
- (b) SCs will submit, as part of their Revised Day-Ahead Schedules, revised Adjustment Bids (allowing the range of usage to change, but not the prices), if any, to the ISO in accordance with the SBP;
- (c) SCs will submit revised Ancillary Services bids, if any, to the ISO in accordance with the SBP and SP 9;
- (d) SCs will submit their schedules for self-provided Ancillary Services, if any, to the ISO in accordance with the SBP and SP 9;

- (e) the ISO will validate (in accordance with the SBP) all SC submitted Revised Day-Ahead Schedules for Energy and Adjustment Bids;
- (f) the ISO will validate (in accordance with the SBP) all SC submitted schedules for self-provided Ancillary Services and Ancillary Services bids which were part of their Revised Day-Ahead Schedules;
- (g) the ISO will start the second (and final) iteration of the Inter-Zonal Congestion Management process as described in SP 10;
- (h) the ISO will start the second (and final) iteration of the Ancillary Services bid evaluation process as described in SP 9; and
- (i) the ISO will use the SC's Preferred Day-Ahead Schedule in the event the SC does not submit a Revised Day-Ahead Schedule. If a SC desires to revise only part of its Preferred Day-Ahead Schedule, those portions of the Revised Day-Ahead Schedule must be submitted, including both the removal of any resources in the Preferred Day-Ahead Schedule which are not to be included in the Revised Day-Ahead Schedule and the addition of any resources that were not included in the Preferred Day-Ahead Schedule but that are to be included in the Revised Day-Ahead Schedule. A SC's failure to remove such resources will cause the Revised Schedule to be unbalanced, and rejected as such in the ISO's validation process.

#### **SP 3.2.8.2 Pre-validation**

At 10 minutes prior to the deadline for submittal of the Revised Day-Ahead Schedules, Adjustment Bids, schedules for self-provided Ancillary Services, and Ancillary Services bids (the "submittal"), the ISO shall conduct a pre-validation of the stage two validation described in the SBP. The purpose of this is to allow the SCs, particularly those involved in Inter-Scheduling Coordinator Trades, to identify and resolve any validation problems. The ISO will immediately communicate the results of the pre-validation of each SC's submittal to that SC via WEnet.

#### **SP 3.2.8.3 Invalidation**

Invalidation of the submittal for any Settlement Period results in rejection of the submittal for all Settlement Periods of the relevant Trading Day. SCs may check at any time prior to 12:00 noon whether

or not their submittal will pass the ISO's validation checks (which are undertaken at 12:00 noon). It is the responsibility of the SCs to perform such checks since Revised Day-Ahead Schedules, Adjustment Bids, schedules of self-provided Ancillary Services and Ancillary Services bids which are invalidated cannot be resubmitted after 12:00 noon for the Day-Ahead Market. The ISO will immediately communicate the results of each SC's 12:00 noon validation to that SC via WEnet.

**SP 3.2.9 By 1:00 pm, Day Ahead**

By 1:00 pm on the day ahead of the Trading Day (for example, by 1:00 pm on Tuesday for the Wednesday Trading Day) and for each Settlement Period of that Trading Day:

- (a) the ISO will complete the second iteration, if necessary, of the Inter-Zonal Congestion Management process described in SP 10;
- (b) the ISO will provide, via WEnet, Final Day-Ahead Schedules to all SCs which, depending on the existence of Inter-Zonal Congestion, could be:
  - (i) the Preferred Day-Ahead Schedules (when no Congestion was found at 11:00 am);
  - (ii) the Revised Day-Ahead Schedules (when no Congestion was found at 1:00 pm); or
  - (iii) modified Revised Day-Ahead Schedules for those SCs which had their Revised Day-Ahead Schedules for Energy modified for Inter-Zonal Congestion;
- (c) the ISO will publish on WEnet the Day-Ahead Usage Charge rate (in \$/MWh of scheduled flow) for Energy transfer between Zones, if any;
- (d) the ISO will provide, via WEnet, as part of the Final Day-Ahead Schedules, schedules for Ancillary Services to the SCs which either:
  - (i) submitted Ancillary Services bids and which, as a result, have been selected to supply Ancillary Services; or
  - (ii) submitted schedules to self-provide Ancillary Services and which schedules have been validated by the ISO; and
- (e) the ISO will coordinate with adjacent Control Areas on the net schedules between the ISO Control Area and such other

Control Areas. If the ISO and the operator of an adjacent Control Area have different records with respect to the net schedules, individual SC intertie schedules will be examined. If the other Control Area's records are determined to be correct, the ISO will notify the affected SC. The affected SC is required to correct its schedule in the Hour-Ahead Market.

**SP 3.2.10 By 1:30 pm, Day Ahead**

By 1:30 pm on the day ahead of the Trading Day (for example, by 1:30 pm on Tuesday for the Wednesday Trading Day) and for each Settlement Period of the Trading Day the ISO will publish, via WEnet, an updated forecast of system Demands.

**SP 3.3 Hour-Ahead Market**

- (a) The Hour-Ahead Market is a "deviations" market in that it represents changes from the Day-Ahead Market commitments already made for each Settlement Period in the Trading Day. The SCs do not schedule these deviations. Instead, these deviations are calculated by the ISO as the difference between the Final Hour-Ahead Schedules (reflecting updated forecasts of Generation, Demand, external imports/exports and Inter-Scheduling Coordinator Trades) and the Final Day-Ahead Schedules. If a SC does not submit a valid Preferred Hour-Ahead Schedule, its Final Day-Ahead Schedule will be deemed to be its Preferred Hour-Ahead Schedule.
- (b) The Hour-Ahead Markets for each Settlement Period of each Trading Day open when the Day-Ahead Market commitments are made for the same Trading Day. Hour-Ahead Market commitments are made one hour ahead of the start of the applicable Settlement Period, at which time the ISO issues the Final Hour-Ahead Schedules. There is an option in the bid submittal process for a SC to submit a Schedule or bid for one Settlement Period of the Trading Day or a set of Schedules and bids for all Settlement Periods of the Trading Day (but only between 1:00 pm and 12:00 midnight the day before).

**SP 3.3.1 By Two Hours Ahead**

By two hours ahead of the Settlement Period (for example, by 10:00 am for the Settlement Period starting at 12:00 noon [or hour ending 1300]) and with respect to that Settlement Period:



**SP 3.3.1.1 Actions by SCs and the ISO**

- (a) SCs will submit their Preferred Hour-Ahead Schedules to the ISO in accordance with the SBP;
- (b) SCs will submit, as part of their Preferred Hour-Ahead Schedules, their Adjustment Bids, if any, to the ISO in accordance with the SBP;
- (c) SCs will submit their Ancillary Services bids, if any, to the ISO in accordance with the SBP and SP 9;
- (d) SCs will submit their Schedules for self-provided Ancillary Services, if any, to the ISO in accordance with the SBP and SP 9;
- (e) the ISO will validate (in accordance with the SBP) all SC submitted Preferred Hour-Ahead Schedules for Energy and Adjustment Bids;
- (f) the ISO will validate (in accordance with the SBP) all SC submitted Schedules for self-provided Ancillary Services and Ancillary Services bids which were part of their Preferred Hour-Ahead Schedules;
- (g) the ISO will start the Inter-Zonal Congestion Management process as described in SP 10; and
- (h) the ISO will start the Ancillary Services bid evaluation process as described in SP 9.

**SP 3.3.1.2 Pre-validation**

At 10 minutes prior to the deadline for submittal of the Preferred Hour-Ahead Schedules, Adjustment Bids, schedules for self-provided Ancillary Services, and Ancillary Services bids (the "submittal"), the ISO shall conduct a pre-validation of the stage two validation described in the SBP. The purpose of this is to allow the SCs, particularly those involved in the Inter-Scheduling Coordinator Trades, to identify and resolve any validation problems. The ISO will immediately communicate the results of the pre-validation of each SC's submittal to that SC via WEnet.

**SP 3.3.1.3 Invalidation**

Invalidation of the submittal results in rejection of the submittal. SCs may check at any time prior to two hours ahead of the relevant Settlement Period whether or not their submittals will pass the ISO's validation checks (which are undertaken at two hours ahead of the

Settlement Period). It is the responsibility of SCs to perform such checks since Preferred Hour-Ahead Schedules, Adjustment Bids, schedules of self-provided Ancillary Services and Ancillary Services bids which are invalidated cannot be resubmitted for the Hour-Ahead Market after two hours ahead of the relevant Settlement Period. The ISO will immediately communicate the results of each SC's two hour ahead validation to that SC via WEnet.

**SP 3.3.2 By One Hour Ahead**

By one hour ahead of the Settlement Period (for example, by 11:00 am for the Settlement Period starting at 12:00 noon [or hour ending 1300]) and in respect of that Settlement Period:

- (a) The ISO will use the SC's Final Day-Ahead Schedule, without any Day-Ahead Adjustment Bids or Day-Ahead Ancillary Service bids, in the event the SC's Preferred Hour-Ahead Schedule fails validation. If a SC desires to submit an Hour-Ahead Schedule that is different than its Final Day-Ahead Schedule the SC must submit the Hour-Ahead Schedule including the addition or removal of any resources (i.e., for those resources to be removed, a zero value for the hourly MW quantity) in its Final Day-Ahead Schedule that are to be added, or that are not to be included, in the Hour-Ahead Schedule. A SC's failure to add or remove such resources will cause the Hour-Ahead Schedule to be unbalanced, and rejected as such in the ISO's validation process.
- (b) the ISO will complete, if necessary, the Inter-Zonal Congestion Management process described in SP 10;
- (c) the ISO will provide, via WEnet, Final Hour-Ahead Schedules for Energy to the ISO's real time dispatchers for use under the DP and to all SCs which, depending on the existence of Inter-Zonal Congestion, could be:
  - (i) the Preferred Hour-Ahead Schedules (when no Congestion was found at one hour ahead); or
  - (ii) modified Preferred Hour-Ahead Schedules for those SCs which had their Preferred Hour-Ahead Schedules for Energy modified for Inter-Zonal Congestion; and
- (d) the ISO will publish on WEnet the Hour-Ahead Usage Charge rate (in \$/MWh of scheduled flow) for Energy transfers between Zones, if any;

- (e) the ISO will provide, via WEnet, as part of the Final Hour-Ahead Schedules, schedules for Ancillary Services to the ISO's real time dispatchers for use under the DP and to the SCs which either:
  - (i) submitted Ancillary Services bids and which, as a result, have been selected to supply Ancillary Services; or
  - (ii) submitted schedules to self-provide Ancillary Services and which schedules have been validated by the ISO; and
- (f) each SC will provide the ISO, via a form and by means of communication specified by the ISO, resource specific information for all Generating Units and Curtailable Demands constituting its System Unit, if any, scheduled or bid into the ISO's Day-Ahead Market and/or Hour-Ahead Market for Ancillary Services.
- (g) the ISO will coordinate with adjacent Control Areas on the net schedules between the ISO Control Area and such other Control Areas. If the ISO and the operator of an adjacent Control Area have different records with respect to the net schedules, individual SC intertie schedules will be examined. If the other Control Area operator's records were in error, no changes will be required by the ISO or SCs. If the other Control Area operator's records are determined to be correct, the ISO will notify the affected SC. The ISO will manually adjust the affected SC's schedule to conform with the other Control Area operator's net schedule, in real time, and the affected SC will be responsible for managing any resulting Energy imbalance.

## **SP 4 TRANSMISSION SYSTEM LOSS MANAGEMENT**

### **SP 4.1 Overview**

- (a) A SC must ensure that each Schedule it submits to the ISO is a Balanced Schedule in which aggregate Generation and external imports (adjusted for Transmission Losses) and Inter-Scheduling Coordinator Trades equals the aggregate Forecast Demand and external exports. The ISO will, for this purpose, specify GMMs for each Energy supply source (Generating Units and external imports at Scheduling Points) to account for the Energy lost in transmitting power from Generating Units

and/or Scheduling Points to Load. Inter-Scheduling Coordinator Trades will not be subject to such adjustments, beyond the impact of GMMs on the respective SC's Generation and external imports. The ISO will, in accordance with this SP 4, derive a location specific GMM for each Generating Unit and external import on the ISO Controlled Grid.

- (b) At all times, the ISO will make available GMMs for the seven Trading Days starting with the Trading Day after the next Trading Day. Each day, at 6:00 pm, the ISO will calculate and publish, via WEnet, the GMMs applicable to the Day-Ahead Markets and the Hour-Ahead Markets for the eighth (8<sup>th</sup>) Trading Day forward. In other words, if the current Trading Day is day 0, the ISO will publish at 6:00 pm today, via WEnet, the GMMs for Trading Days 2 through 8. On Trading Day 1, at 6:00 pm, the ISO will drop the GMMs for Trading Day 1 and add the newly calculated GMMs for Trading Day 9, with the GMMs for Trading Days 3 through 8 remaining the same.

## **SP 4.2 Generator Meter Multipliers (GMMs)**

### **SP 4.2.1 Derivation of GMMs**

- (a) The ISO will utilize the Power Flow Model to determine the GMMs which will be used to allocate, to each Generating Unit and external import, scheduled and re-estimated Transmission Losses.
- (b) For each Settlement Period, the GMMs will be first calculated before SCs submit Day-Ahead Preferred Schedules. Prior to the time when SCs are required to submit their Day-Ahead Preferred Schedules, the ISO will forecast the total Control Area Demand. This forecast, along with the ISO forecast of Generation and Demand patterns throughout the ISO Control Area, will be used to develop estimated GMMs for each Generating Unit and each external import. The ISO will calculate and publish (in accordance with SP 3.2.1) GMMs for each Settlement Period to reflect different expected Generation and Demand patterns and expected operations and maintenance requirements, such as line Outages, which could affect Transmission Loss determination and allocation.
- (c) After determination of the Final Schedules in the Hour-Ahead Market, the ISO will utilize the Power Flow Model to calculate revised GMMs to allocate re-estimated Transmission Losses to

each Generating Unit and each external import. This run of the Power Flow Model will use Generation and Demand from the Final Hour-Ahead Schedule. Any difference between scheduled and re-estimated Transmission Losses will be considered as an Imbalance Energy deviation and will be purchased or sold in the Real Time Market at the Hourly Ex Post Price.

**SP 4.2.2 Methodology for Calculating Transmission Losses**

- (a) The ISO Power Flow Model will be utilized to calculate the effects on total Transmission Losses at each Generating Unit and Scheduling Point by calculating the sensitivity of injecting Energy at each Generating Unit bus or Scheduling Point to serve an increment of Demand distributed proportionately throughout the ISO Control Area. This will produce the Full Marginal Loss Rate at each Generating Unit and Scheduling Point.
- (b) The ISO will then determine the ratio of expected Transmission Losses to the total Transmission Losses that would be collected if Full Marginal Loss Rates were utilized to determine Transmission Losses. This ratio is referred to as the Loss Scale Factor.
- (c) The ISO will then multiply the Loss Scale Factor by the Full Marginal Loss Rate at each Generating Unit or Scheduling Point to determine each Generating Unit's or external import's Scaled Marginal Loss Rate. The GMM is calculated by subtracting the Scaled Marginal Loss Rate from unity.

**SP 4.3 Existing Contracts and Transmission Losses**

Certain Existing Contracts may have requirements for Transmission Loss accountability which differ from the provisions of this SP 4. Each PTO will be responsible for recovering any deficits or crediting any surpluses, associated with differences in assignment of Transmission Loss requirements, through its bilateral arrangements or its Transmission Owner's Tariff. The ISO will not undertake the settlement or billing of any such differences under any Existing Contract.

## **SP 5 RELIABILITY MUST-RUN GENERATION**

### **SP 5.1 Procurement of Reliability Must-Run Generation by the ISO**

#### **SP 5.1.1 Annual Reliability Must-Run Forecast - Technical Evaluation**

On an annual basis, the ISO will carry out technical evaluations based upon historic patterns of the operation of the ISO Controlled Grid and the ISO's forecast requirements for maintaining the reliability of the ISO Controlled Grid in the next year. The ISO will then determine which Generating Units it requires to continue to be Reliability Must-Run Units, which Generating Units it no longer requires to be Reliability Must-Run Units and which Generating Units it requires to become the subject of a Reliability Must-Run Contract which had not previously been so contracted to the ISO. None of the Generating Units owned by Local Publicly Owned Electric Utilities are planned to be designated as Reliability Must-Run Units by the ISO as of the ISO Operations Date but are expected to be operated in such a way as to maintain the safe and reliable operation of the interconnected transmission system comprising the ISO Control Area. However, in the future, Local Publicly Owned Electric Utilities may contract with the ISO to provide Reliability Must-Run Generation.

#### **SP 5.1.2 Annual Reliability Must-Run Forecast - Technical Studies**

The ISO will perform off-line technical studies, adopt existing procedures developed by PTOs and/or develop new operating procedures to identify the Reliability Must-Run requirements for various levels of system Demand.

### **SP 5.2 Designation of Generating Unit as Reliability Must-Run**

The ISO will have the right at any time based upon ISO Controlled Grid technical analyses and studies to designate or disqualify a Generating Unit as a Reliability Must-Run Unit.

### **SP 5.3 Scheduling of Reliability Must-Run Generation**

The ISO will notify SCs of any Reliability Must-Run Units not included in the Preferred Day-Ahead Schedules but which the ISO requires to run at 10 am on the day ahead of the Trading Day, as described in SP 3.2.6. The ISO will decrement SCs' scheduled Generation to accommodate the output of these Reliability Must-Run Units as part of the real time Intra-Zonal Congestion Management process described in DP 7.4.

**SP 5.4      Scheduling of Reliability Must-Run Ancillary Services**

The ISO will notify SCs of any Ancillary Services it requires from Reliability Must-Run Units under their Reliability Must-Run Contracts at 10 am on the day ahead of the Trading Day, as described in SP 3.2.6.

**SP 6        [UNUSED]**

**SP 7        MANAGEMENT OF EXISTING CONTRACTS FOR  
TRANSMISSION SERVICE**

**SP 7.1      Obligations of Participating Transmission Owners and  
Scheduling Coordinators**

**SP 7.1.1    Participating Transmission Owners**

Prior to the ISO accepting Schedules which include the use of Existing Rights or Non-Converted Rights under Existing Contracts, the Responsible PTO (as defined in the SBP) must have provided the ISO with the information required in the Transmission Control Agreement and the SBP, including transmission rights/curtailment instructions ("instructions") supplied in a form and by means of communication specified by the ISO.

**SP 7.1.2    Scheduling Coordinators**

The ISO will accept valid Schedules from a Responsible PTO that is the SC for the Existing Contract rights holders, or from Existing Contract rights holders that are SCs, or that are represented by a SC other than the Responsible PTO. Schedules submitted by SCs to the ISO which include the use of Existing Rights or Non-Converted Rights under Existing Contracts must be submitted in accordance with the SBP and this SP.

**SP 7.2      Allocation of Forecasted Total Transfer Capabilities**

**SP 7.2.1    Categories of Transmission Capacity**

As used in this SP, references to new firm uses shall mean any use of ISO transmission service, except for uses associated with Existing Rights and Non-Converted Rights under Existing Contracts. Prior to the start of the Day-Ahead scheduling process, for each Inter-Zonal Interface, the ISO will allocate the forecasted total transfer capability

of the Interface to four categories. This allocation will represent the ISO's best estimates at the time, and is not intended to affect any rights provided under Existing Contracts, except as provided in SP 7.4. The ISO's forecast of total transfer capability for each Inter-Zonal Interface will depend on prevailing conditions for the relevant Trading Day, including, but not limited to, the effects of parallel path (unscheduled) flows and/or other limiting operational conditions. This information will be posted on WEnet by the ISO in accordance with SP 3.2.1. In accordance with Section 2.4.4.5.1.4 of the ISO Tariff, the four categories are as follows:

- (a) transmission capacity that must be reserved for firm Existing Rights and firm Non-Converted Rights;
- (b) transmission capacity that may be allocated for use as ISO transmission service (i.e., "new firm uses");
- (c) transmission capacity that may be allocated by the ISO for conditional firm Existing Rights and conditional firm Non-Converted Rights; and
- (d) transmission capacity that may remain for any other uses, such as non-firm Existing Rights and non-firm Non-Converted Rights for which the Responsible PTO has no discretion over whether or not to provide such non-firm service.

#### **SP 7.2.2 Prioritization of Transmission Uses**

The following rules are designed to enable the ISO to honor Existing Contracts in accordance with Sections 2.4.3 and 2.4.4 of the ISO Tariff, except as may be limited by the operation of SP 7.4.

Regardless of the success of the application of such rules, it is intended that the rights under Existing Contracts will be honored as contemplated by the ISO Tariff except as may be limited by the operation of SP 7.4. In each of the categories described in SP 7.2.1, the terms and conditions of service may differ among transmission contracts. These differences will be described by each Responsible PTO in the instructions submitted to the ISO in advance of the scheduling process in accordance with the SBP. In addition, scheduling and curtailment priorities associated with each category will be defined by SCs through the use of Adjustment Bids submitted as part of their Schedules as described in the following:

- (a) Transmission capacity for Schedules will be made available to holders of firm Existing Rights and firm Non-Converted Rights in accordance with this SP and the terms and conditions of their Existing Contracts. In the event that the firm uses of



these rights must be curtailed, they will be curtailed on the basis of "high priced Adjustment Bids". So as not to be curtailed before any other scheduled use of Congested Inter-Zonal Interface capacity, these high priced Adjustment Bids must fall within a range to be specified by the ISO (for example, a difference of \$900/MWh to \$999/MWh). This range will be reserved strictly for use in association with the prioritization of firm Existing Rights and firm Non-Converted Rights to use available Inter-Zonal Interface transmission capacity. These high priced Adjustment Bids are only for the ISO's use, in the context of Congestion Management, in recognizing the various levels of priority that may exist among the scheduled uses of firm transmission service. These high priced Adjustment Bids will not affect any other rights under Existing Contracts. Note that, in some instances, for a particular Inter-Zonal Interface, there may be multiple SCs submitting Schedules under several different Existing Contracts on behalf of several Existing Contract rights holders. In these circumstances, and to the extent the rights holders desire to coordinate the prioritization of their firm uses of the Inter-Zonal Interface (i.e., attribute high priced Adjustment Bids, within the specified range, to each Schedule), their SCs will make the arrangements among themselves ahead of the ISO's scheduling process. In the absence of an Adjustment Bid, the ISO will treat the scheduled use of firm transmission service under the Existing Contract as having specified a \$0.00/MWh Adjustment Bid (i.e., treated the same as non-firm transmission service).

- (b) ISO transmission service (i.e., "new firm uses") will be priced in accordance with the ISO Tariff. Usage Charges associated with the ISO's Congestion Management procedures, as described in SP 10, will be based on Adjustment Bids which do not fall within either of the ranges specified in (a) above or (c) below. In the absence of an Adjustment Bid, the ISO will treat the scheduled "new firm use" of ISO transmission service as a price taker paying the Usage Charge established by the highest valued use of transmission capacity between the relevant Zones.
- (c) Transmission capacity will be made available to holders of conditional firm Existing Rights and conditional firm Non-Converted Rights in a manner similar to that done prior to the ISO Operations Date; that is, allocated, as available, based on

the agreed priority. The levels of priority will be expressed in the Schedules in terms of "near-zero priced Adjustment Bids". Adjustment Bids with the lowest near-zero price will be treated with the lowest priority. These near-zero priced Adjustment Bids must fall within a range to be specified by the ISO (for example, a difference of \$0.001/MWh to \$0.009/MWh). This range will be reserved strictly for use in association with the prioritization of conditional firm Existing Rights and conditional firm Non-Converted Rights to use available Inter-Zonal Interface transmission capacity. These near-zero priced Adjustment Bids are only for the ISO's use, in the context of Congestion Management, in recognizing the various levels of priority that may exist among the scheduled uses of conditional firm transmission service. These near-zero priced Adjustment Bids are not intended to affect any other rights under Existing Contracts, nor are they intended to subordinate the ISO's scheduling of firm uses. Note that, in some instances, for a particular Inter-Zonal Interface, there may be multiple SCs submitting Schedules under several different Existing Contracts on behalf of several Existing Contract rights holders. In these circumstances, and to the extent the rights holders desire to coordinate the prioritization of their conditional firm uses of the Inter-Zonal Interface (i.e., attribute near-zero priced Adjustment Bids, within the specified range, to each Schedule), their SCs will make the arrangements among themselves ahead of the ISO's scheduling process. In the absence of an Adjustment Bid, the ISO will treat the scheduled use of conditional firm transmission service under the Existing Contract as having specified a \$0.00/MWh Adjustment Bid (i.e., treated the same as non-firm transmission service).

- (d) Transmission capacity will be made available to holders of non-firm Existing Rights and non-firm Non-Converted Rights in a manner similar to that done prior to the ISO Operations Date; that is, treated as the lowest valued use of available transmission capacity. Non-firm uses of transmission capacity under Existing Contracts will be indicated in Schedules submitted by SCs as \$0.00/MWh Adjustment Bids.

## **SP 7.3      The Day-Ahead Process**

### **SP 7.3.1      Validation**

The ISO will coordinate the scheduling of the use of Existing Rights and Non-Converted Rights with new firm uses in the Day-Ahead process. The ISO will validate the Schedules submitted by SCs on behalf of the rights holders for conformity with the instructions previously provided by the Responsible PTO in accordance with the SBP. Invalid Schedules will be rejected and the ISO will immediately communicate the results of each SC's validation to that SC via WEnet.

### **SP 7.3.2      Scheduling Deadlines**

Those Existing Contract rights holders who must schedule the use of their rights by the deadline for the submission of Schedules in the Day-Ahead Market must do so. After this time, the ISO will release these unused rights as available for new firm uses (not subject to recall).

### **SP 7.3.3      Reservation of Firm Transmission Capacity**

As an initial step in performing its Day-Ahead Congestion Management analysis, the ISO will determine the amount of transmission capacity that is available and subject to its Protocols by subtracting, from the total transfer capability of the Inter-Zonal Interface, the unused portions of capacity applicable to firm Existing Rights and firm Non-Converted Rights. For purposes of Congestion Management, the total transfer capability of the Inter-Zonal Interface is therefore adjusted downward by an amount equal to the unused portions of firm Existing Rights and firm Non-Converted Rights. By reserving these blocks of unused transmission capacity, Existing Contracts rights holders are able to schedule the use of their transmission service on the timelines provided in their Existing Contracts after the deadline of the ISO's Day-Ahead scheduling process (in other words, after 1:00 pm on the day preceding the Trading Day), but prior to the deadline of the ISO's Hour-Ahead scheduling process (in other words, two hours ahead of the Settlement Period).

### **SP 7.3.4      Allocation of Inter-Zonal Interface Capacities**

In the ISO's Congestion Management analysis of the Day-Ahead Market, for each Inter-Zonal Interface:

- (a) if all scheduled uses of transmission service fit within the adjusted total transfer capability, all are accepted (in other words, there is no Congestion);
- (b) if all scheduled uses of transmission service do not fit within the adjusted total transfer capability, scheduled uses of non-firm Existing Rights and non-firm Non-Converted Rights will be curtailed, pro rata, to the extent necessary. If the remaining scheduled uses of transmission service still do not fit within the adjusted total transfer capability, uses of conditional firm Existing Rights and conditional firm Non-Converted Rights will be curtailed (based upon the levels of priority expressed in the Schedules in terms of near-zero priced Adjustment Bids as described in SP 7.2.2 (c)) to the extent necessary;
- (c) if Congestion still exists after curtailing all non-firm and conditional firm uses of transmission service under Existing Contracts, the remaining transmission capacity (that is not already reserved as firm Existing Rights and firm Non-Converted Rights) is priced based upon Adjustment Bids. To the extent there are insufficient Adjustment Bids to fully mitigate the remaining Congestion, the default Usage Charge will apply and the ISO will curtail ISO transmission service (in other words, new firm uses), pro rata, to the extent necessary; and
- (d) if Congestion still exists after curtailing ISO new firm uses, scheduled uses of firm Existing Rights and firm Non-Converted Rights are then curtailed (based upon the priorities expressed in the Schedules in terms of high priced Adjustment Bids as described in SP 7.2.2 (a)) to the extent necessary.

## **SP 7.4 The Hour-Ahead Process**

### **SP 7.4.1 Validation**

The ISO will coordinate the scheduling of the use of Existing Rights and Non-Converted Rights with new firm uses, in the Hour-Ahead process. The ISO will validate the submitted Schedules for conformity with the instructions provided by the Responsible PTOs, in accordance with the SBP. Invalid schedules will be rejected and the ISO will immediately communicate the results of each SC's validation to that SC via WENet.

**SP 7.4.2      Scheduling Deadlines**

Those rights holders who must schedule the use of their rights by the deadline for the submission of Schedules in the Hour-Ahead Market must do so. After this time, the ISO will release these unused rights as available for new firm uses (not subject to recall).

**SP 7.4.3      Acceptance of Firm Transmission Schedules**

Before allocating any remaining transmission capacity under the following provisions of this SP 7, the ISO will accept Schedules associated with firm Existing Rights and firm Non-Converted Rights (subject to validation under SP 7.4.1), allocating transmission capacity for use by these rights holders.

**SP 7.4.4      Reservation of Firm Transmission Capacity**

The ISO will adjust the total transfer capabilities of Inter-Zonal Interfaces with respect to firm Existing Rights and firm Non-Converted Rights as it does in its Day-Ahead process described in this SP 7.3.3. Therefore, holders of Existing Rights and Non-Converted Rights are still able to exercise whatever scheduling flexibility they may have under their Existing Contracts after the Schedules and bids submittal deadline of the ISO's Hour-Ahead scheduling process, as described further in SP 7.5.

**SP 7.4.5      Allocation of Inter-Zonal Interface Capacities**

In the ISO's Congestion Management analysis of the Hour-Ahead Market, for each Inter-Zonal Interface:

- (a) if all scheduled uses of transmission service fit within the total transfer capability, all are accepted (in other words, there is no Congestion);
- (b) if all scheduled uses of transmission service do not fit within the total transfer capability, scheduled uses of non-firm Existing Rights and non-firm Non-Converted Rights will be curtailed, pro rata, to the extent necessary. If the remaining scheduled uses of transmission service still do not fit within the total transfer capability, scheduled uses of conditional firm Existing Rights and conditional firm Non-Converted Rights will be curtailed (based upon the levels of priority expressed in the Schedules in terms of near-zero priced Adjustment Bids as described in SP 7.2.2 (c)) to the extent necessary;
- (c) if Congestion still exists after curtailing all non-firm and conditional firm uses of transmission service under Existing

Contracts, the remaining transmission capacity (that is not the subject of firm Existing Rights and firm Non-Converted Rights) is priced based upon Adjustment Bids. To the extent there are insufficient Adjustment Bids to fully mitigate the remaining Congestion, the default Usage Charge will apply and the ISO will curtail ISO transmission service (in other words, new firm uses), pro rata, to the extent necessary; and

- (d) if Congestion still exists after curtailing ISO new firm uses, scheduled uses of firm Existing Rights and firm Non-Converted Rights will be curtailed (based upon the priorities expressed in the Schedules in terms of high priced Adjustment Bids as described in SP 7.2.2 (a)) to the extent necessary.

## **SP 7.5 The ISO's Real-Time Process**

Consistent with SP 7.4.4, the ISO will honor those scheduling flexibilities that may be exercised by holders of Existing Rights and Non-Converted Rights through their respective SCs during the ISO's real-time processes to the extent that such flexibilities do not interfere with or jeopardize the safe and reliable operation of the ISO Controlled Grid or Control Area operations. The real-time processes described in SP 7.5.1 and SP 7.5.2 will occur during the three hours following the ISO's receipt of Preferred Hour-Ahead Schedules (that is, from two hours ahead of the start of the Settlement Period through the end of such Settlement Period).

### **SP 7.5.1 Inter-Control Area Changes to Schedules that Rely on Existing Rights**

Changes to Schedules that occur during the ISO's real-time processes that involve changes to ISO Control Area imports or exports with other Control Areas (that is, inter-Control Area changes to Schedules) will be allowed and will be recorded by the ISO based upon notification received from the SC representing the holder of the Existing Rights or Non-Converted Rights. The ISO must be notified of any such changes to external import/export schedules. The ISO will receive notification of real time changes to external import/export schedules, by telephone, from the SC representing the holder of the Existing Rights or Non-Converted Rights. The timing and content of any such notification must be consistent with the instructions previously submitted to the ISO by the Responsible PTO in accordance with the SBP. The ISO will manually adjust the SC's schedule to conform with the other Control Area's net schedule in real time, and the notifying SC will be responsible for and manage any resulting Energy imbalance. These Imbalance Energy deviations

will be priced and accounted to the SC representing the holder of Existing Rights or Non-Converted Rights in accordance with the SABP.

**SP 7.5.2      Intra-Control Area Changes to Schedules that Rely on Existing Rights**

Changes to Schedules that occur during the ISO's real-time processes that do not involve changes to ISO Control Area imports or exports with other Control Areas (that is, intra-Control Area changes to Schedules) will be allowed and will give rise to Imbalance Energy deviations. These Imbalance Energy deviations will be priced and accounted to the SC representing the holder of Existing Rights or Non-Converted Rights in accordance with the SABP.

**SP 8            OVERGENERATION MANAGEMENT**

**SP 8.1        Real Time Overgeneration Management**

Overgeneration management in real time will be conducted in accordance with the DP.

**SP 9            DAY/HOUR-AHEAD ANCILLARY SERVICES MANAGEMENT**

**SP 9.1        Bid Evaluation and Scheduling Principles**

The ISO will evaluate Ancillary Services bids based on the following principles:

- (a) the ISO will not differentiate between bidders other than through reserve (Regulation and Operating Reserves) price and capability to provide the reserve service, and the required locational mix of services;
- (b) to minimize the costs to users of the ISO Controlled Grid, the ISO will select the bidders with lowest bids for reserve which meet its technical requirements, including location and operating capability;
- (c) the ISO will (to the extent available) procure sufficient Ancillary Services to meet its technical requirements as defined in the ASRP;
- (d) the ISO will evaluate and price only those Ancillary Services bids received in accordance with the SBP;
- (e) the ISO will require SCs to honor their Day-Ahead Ancillary Services schedules and/or bids when submitting their Hour-

Ahead Ancillary Services schedules and/or bids (i.e., if a SC bids (or, conversely, self-provides) a specific Ancillary Service in a Settlement Period in the Day-Ahead Market, that SC will not be allowed to self-provide (or, conversely, bid) the same Ancillary Service in the same Settlement Period in the Hour-Ahead Market, except for any difference between its Day-Ahead and Hour-Ahead requirements for the same Ancillary Service for the same Settlement Period, in which case the difference can be either bid or self-provided);

- (f) due to the design of the ISO's scheduling software, the ISO will not take into account Usage Charges in the evaluation of Ancillary Services bids or in price determination and, in the event of Congestion in the Day-Ahead Market or Hour-Ahead Market, Ancillary Services will be procured and priced on a Zonal basis; and
- (g) due to the design of the ISO's scheduling system, any specific resource can bid to supply a specific Ancillary Service or can self-provide such Ancillary Service but cannot do both in the same Settlement Period.

## **SP 9.2 Sequential Evaluation of Bids**

- (a) When SCs bid into the Regulation, Spinning Reserve, Non-Spinning Reserve and Replacement Reserve markets, the same resource capacity may be offered into more than one of these Ancillary Services markets at the same time. The ISO will evaluate bids in the reserve markets for Regulation, Spinning Reserve, Non-Spinning Reserve and Replacement Reserve sequentially and separately in the following order:
  - (i) Regulation
  - (ii) Spinning Reserve
  - (iii) Non-Spinning Reserve
  - (iv) Replacement Reserve
- (b) SCs are allowed to specify different reserve prices and different Energy prices for each Ancillary Service they bid. SCs can bid the same resource capacity into any one or all of the Ancillary Service markets they desire. Any resource capacity accepted by the ISO in one of these reserve markets will be deducted from the resource capacity bid into the other reserve markets.



### **SP 9.3      Scheduling Ancillary Services Resources**

- (a) SCs are allowed to self-provide all or a portion of the following Ancillary Services to satisfy their obligations to the ISO:
  - (i) Regulation;
  - (ii) Spinning Reserve;
  - (iii) Non-Spinning Reserve; and
  - (iv) Replacement Reserve.
- (b) The ISO will reduce the quantity of Ancillary Services it competitively procures by the corresponding amount of the Ancillary Services that SCs self-provide.
- (c) The ISO shall prepare supplier schedules for Ancillary Services (both self-provided and purchased by the ISO) for the Day-Ahead Market and the Hour-Ahead Market.
- (d) The Ancillary Services schedules shall contain the information set out in the SBP for each Settlement Period of the following Trading Day in the case of the Day-Ahead schedules or for a specific Settlement Period in the case of Hour-Ahead schedules.
- (e) Once the ISO has given SCs notice of the Day-Ahead and Hour-Ahead schedules, these schedules represent binding commitments made in the reserve markets between the ISO and the SCs concerned.
- (f) Any minimum Energy output associated with Regulation and Spinning Reserve services shall be the responsibility of the SC, as the ISO's auction does not compensate the SC for the minimum Energy output of its Generating Units or System Unit, if any, bidding to provide these services. Accordingly, the SCs shall adjust their Balanced Schedules to accommodate the minimum Energy outputs required by the Generating Units or System Units, if any, included in the Ancillary Services schedules.
- (g) SCs providing one or more of the Ancillary Services cannot change the identification of the Generating Units or System Units, if any, or Curtailable Demands offered in the Day-Ahead Market, in the Hour-Ahead Market, or in the Real Time Market (except with respect to System Units, if any, in which case SCs are required to identify and disclose the resource specific information for all Generating Units and Curtailable Demands

constituting the System Unit scheduled or bid into the ISO's Day-Ahead Market and Hour-Ahead Market as required in SP 3.3.2(e)).

#### **SP 9.4 Ancillary Service Bid Evaluation and Pricing Terminology**

Unless otherwise specifically described herein, the following terminology will apply:

- $CapRes_{ijt}$  = the Ancillary Service reserve reservation bid price (in \$/MW).
- $Cap_{ijtmax}$  = the maximum amount of reserve that can be scheduled by the ISO with respect to a SC's bid of that resource to supply Ancillary Services (in MW).
- $Cap_{ij}$  = that portion of an Ancillary Services bid (in MW), identified in the ISO's evaluation process, that may be used to meet the ISO's *Requirement* for a particular Ancillary Service ( $Cap_{ijt} \leq Cap_{ijtmax}$ ).
- Requirement* = the total amount of reserve that must be scheduled for a particular Ancillary Service required by the ISO in a Settlement Period (in MW).
- $i, j, t$  = Generating Unit i, Scheduling Coordinator j, Settlement Period t.

#### **SP 9.5 Regulation Bid Evaluation and Pricing**

##### **SP 9.5.1 Regulation Bid Evaluation**

- (a) Based on the quantity and location of the system requirements, the ISO will select Generating Units and System Units with the Regulation bids which minimize the sum of the total Regulation bids of the Generating Units and System Units selected subject to two constraints:
- (i) the sum of the selected amounts of Regulation bid must be greater than or equal to the required amount of Regulation; and
  - (ii) the amount of Regulation bid for each Generating Unit or System Unit must be less than or equal to that Generating Unit's or System Unit's ramp rate times 10 minutes.

- (b) The total Regulation bid for each Generating Unit or System Unit is calculated by multiplying the reserve reservation bid price by the amount of Regulation bid. Subject to any locational requirements, the ISO will accept winning Regulation bids in accordance with the following criteria:

$$\text{Min} \sum_{i,j} \text{TotalBid}_{ijt}$$

subject to

$$\sum_{i,j} \text{Cap}_{ijt} \geq \text{Requirement}_t$$

and

$$\text{Cap}_{ijt} \leq \text{Cap}_{ijt} \text{ max}$$

where:

$$\text{TotalBid}_{ijt} = \text{Cap}_{ijt} * \text{CapRes}_{ijt}$$

$$\text{Requirement} = \text{Amount of upward and downward movement (Regulation) required by the ISO.}$$

## SP 9.5.2 Regulation Price Determination

The price payable to SCs for Regulation made available for upward and downward movement in accordance with the ISO's Ancillary Services schedules will, for each Generating Unit and System Unit concerned, be the zonal Market Clearing Price for Regulation calculated as follows:

$$\text{Pagc}_{ijt} = \text{MCP}_{xt}$$

where:

the zonal Market Clearing Price ( $\text{MCP}_{xt}$ ) for Regulation is the highest priced winning reservation bid of a Generating Unit or System Unit serving Demand in Zone X based on the reservation bid price (i.e.,  $\text{MCP}_{xt} = \text{Max} (\text{CapRes}_{ijt})$  in Zone X for Settlement Period t). In the absence of Inter-Zonal Congestion, the zonal Market Clearing Prices will be equal.

## SP 9.6 Spinning Reserves Bid Evaluation and Pricing

### SP 9.6.1 Spinning Reserves Bid Evaluation

- (a) Based on the quantity and location of the system requirements, the ISO will select the Generating Units and System Units with the Spinning Reserve bids which minimize

the sum of the total Spinning Reserve bids of the Generating Units and System Units selected subject to two constraints:

- (i) the sum of the selected amounts of Spinning Reserve bid must be greater than or equal to the required amount of Spinning Reserve; and
  - (ii) the amount of Spinning Reserve bid for each Generating Unit or System Unit must be less than or equal to that Generating Unit's or System Unit's ramp rate times 10 minutes.
- (b) The total Spinning Reserve bid for each Generating Unit or System Unit is calculated by multiplying the reserve reservation bid price by the amount of Spinning Reserve bid. Subject to any locational requirements, the ISO will select the winning Spinning Reserve bids in accordance with the following criteria:

$$\text{Min} \sum_{i,j} \text{Totalbid}_{ijt}$$

subject to

$$\sum_{i,j} \text{Cap}_{ijt} \geq \text{Requirement}_t$$

and

$$\text{Cap}_{ijt} \leq \text{Cap}_{ijt\text{max}}$$

where:

$$\text{TotalBid}_{ijt} = \text{Cap}_{ijt} * \text{CapRes}_{ijt}$$

$$\text{Requirement} = \text{Amount of Spinning Reserve required by the ISO.}$$

#### SP 9.6.2 Spinning Reserves Price Determination

The price payable to SCs for Spinning Reserve made available in accordance with the ISO's Ancillary Services schedules shall, for each Generating Unit and System Unit concerned, be the zonal Market Clearing Price for Spinning Reserve calculated as follows:

$$P_{spijt} = MCP_{xt}$$

where:

the zonal Market Clearing Price ( $MCP_{xt}$ ) for Spinning Reserve is the highest priced winning reservation bid of a Generating Unit or System Unit serving Demand in Zone X based on the reservation bid price (i.e.,  $MCP_{xt} = \text{Max}(\text{CapRes}_{ijt})$  in Zone X for Settlement Period t). In

the absence of Inter-Zonal Congestion, the zonal Market Clearing Prices will be equal.

## SP 9.7 Non-Spinning Reserves Bid Evaluation and Pricing

### SP 9.7.1 Non-Spinning Reserves Bid Evaluation

- (a) Based on the quantity and location of the system requirements, the ISO shall select the Generating Units, System Units and Curtailable Demands with the Non-Spinning Reserve bids which minimize the sum of the total Non-Spinning Reserve bids of the Generating Units, System Units and Curtailable Demands selected subject to two constraints:
  - (i) the sum of the selected amounts of Non-Spinning Reserve bid must be greater than or equal to the required amount of Non-Spinning Reserve; and
  - (ii) the amount of Non-Spinning Reserve bid for each Generating Unit, System Unit, or Curtailable Demand amount of Non-Spinning Reserve bid must be less than or equal to that Generating Unit's, System Unit's, or Curtailable Demand's Non-Spinning Reserve available (or available for reduction) in 10 minutes.
- (b) The total Non-Spinning Reserve bid for each Generating Unit, System Unit or Curtailable Demand is calculated by multiplying the reserve reservation bid price by the amount of Non-Spinning Reserve bid. Subject to any locational requirements, the ISO will accept the winning Non-Spinning Reserve bids in accordance with the following criteria:

$$\text{Min} \sum_{i,j} \text{Totalbid}_{ijt}$$

subject to

$$\sum_{i,j} \text{Cap}_{ijt} \geq \text{Requirement}_t$$

and

$$\text{Cap}_{ijt} \leq \text{Cap}_{ijt}^{\text{max}}$$

where:

$$\text{TotalBid}_{ijt} = \text{Cap}_{ijt} * \text{CapRes}_{ijt}$$

$$\text{Requirement} = \text{Amount of Non-Spinning Reserve required by the ISO.}$$

### **SP 9.7.2 Non-Spinning Reserves Price Determination**

The price payable to SCs for Non-Spinning Reserve made available in accordance with the ISO's Ancillary Services schedules shall, for each Generating Unit, System Unit or Curtailable Demand concerned, be the zonal Market Clearing Price for Non-Spinning Reserve calculated as follows:

$$P_{nonsp_{ijt}} = MCP_{xt}$$

where:

the zonal Market Clearing Price ( $MCP_{xt}$ ) for Non-Spinning Reserve is the highest priced winning reservation bid of a Generating Unit, System Unit or Curtailable Demand serving Demand in Zone X based on the reservation bid (i.e.,  $MCP_{xt} = \text{Max}(CapRes_{ijt})$  in Zone X for Settlement Period t). In the absence of Inter-Zonal Congestion, the zonal Market Clearing Prices will be equal.

### **SP 9.8 Replacement Reserves Bid Evaluation and Pricing**

#### **SP 9.8.1 Replacement Reserves Bid Evaluation**

- (a) Based on the quantity and location of the system requirements, the ISO shall select the Generating Units, System Units and Curtailable Demands with the Replacement Reserve bids which minimize the sum of the total Replacement Reserve bids of the Generating Units, System Units and Curtailable Demands selected subject to two constraints:
  - (i) the sum of the selected amounts of Replacement Reserve bid must be greater than or equal to the required amount of Replacement Reserve; and
  - (ii) the amount of Replacement Reserve bid for each Generating Unit, System Unit or Curtailable Demand must be less than or equal to that Generating Unit's, System Unit's or Curtailable Demand's Replacement Reserve available (or available for reduction) in 60 minutes.
- (b) The total Replacement Reserve bid for each Generating Unit, System Unit or Curtailable Demand is calculated by multiplying the reserve reservation bid price by the amount of Replacement Reserve bid. Subject to any locational requirements, the ISO will select the winning Replacement Reserve bids in accordance with the following criteria:

$$\text{Min} \sum_{i,j} \text{Totalbid}_{ijt}$$

subject to

$$\sum_{i,j} \text{Cap}_{ijt} \geq \text{Requirement}_t$$

and

$$\text{Cap}_{ijt} \leq \text{Cap}_{ijt}^{\text{max}}$$

where:

$$\text{TotalBid}_{ijt} = \text{Cap}_{ijt} * \text{CapRes}_{ijt}$$

$$\text{Requirement} = \text{Amount of Replacement Reserve required by the ISO.}$$

### SP 9.8.2 Replacement Reserves Price Determination

The price payable to SCs for Replacement Reserve made available in accordance with the ISO's Ancillary Services schedules shall, for each Generating Unit, System Unit or Curtailable Demand concerned, be the zonal Market Clearing Price for Replacement Reserve calculated as follows:

$$\text{Prepres}_{ijt} = \text{MCP}_{xt}$$

where:

the zonal Market Clearing Price ( $\text{MCP}_{xt}$ ) for Replacement Reserve is the highest priced winning reservation bid of a Generating Unit, System Unit or Curtailable Demand serving Demand in Zone X based on the reservation bid price (i.e.,  $\text{MCP}_{xt} = \text{Max}(\text{CapRes}_{ijt})$  in Zone X for Settlement Period t). In the absence of Inter-Zonal Congestion, the zonal Market Clearing Prices will be equal.

### SP 9.9 Existing Contracts – Ancillary Services Accountability

Certain Existing Contracts may have requirements for Ancillary Services which differ from the requirements of this SP 9. Each PTO will be responsible for recovering any deficits or crediting any surpluses associated with differences in assignment of Ancillary Services requirements, through its bilateral arrangements or its Transmission Owner's Tariff. The ISO will not undertake the settlement or billing of any such differences under any Existing Contract.

## **SP 10 DAY/HOUR-AHEAD INTER-ZONAL CONGESTION MANAGEMENT**

### **SP 10.1 Congestion Management Assumptions**

The Inter-Zonal Congestion Management process is based upon the following assumptions:

- (a) Inter-Zonal Congestion Management will ignore Intra-Zonal Congestion. Intra-Zonal Congestion will be managed in real time;
- (b) Inter-Zonal Congestion Management will use a DC optimal power flow (OPF) program that uses linear optimization techniques with active power (MW) controls only; and
- (c) transmission capacity reserved under Existing Contracts will not be subject to the ISO's Congestion Management procedures.

### **SP 10.2 Congestion Management Process**

- (a) Inter-Zonal Congestion Management will involve adjusting Schedules to remove potential violations of Inter-Zonal Interface constraints, minimizing the redispatch cost, as determined by the submitted Adjustment Bids that accompany the submitted Schedules.
- (b) Inter-Zonal Congestion Management will not involve arranging or modifying trades between SCs. Each SC's portfolio will be kept in balance (i.e., its Generation plus external imports, as adjusted for Transmission Losses, and Inter-Scheduling Coordinator Trades (whether purchases or sales) will still match its Demand plus external exports) after the adjustments. Market Participants will have the opportunity to trade with one another and to revise their Schedules during the first Congestion Management iteration in the Day-Ahead Market, and between the Day-Ahead Market and Hour-Ahead Market.
- (c) Inter-Zonal Congestion Management will also not involve the optimization of SC portfolios within Zones (where such apparently non-optimal Schedules are submitted by SCs). Adjustments to individual SC portfolios within a Zone will be either incremental (i.e., an increase in Generation and external imports and a decrease in Demand and external exports) or decremental (i.e., a decrease in Generation and external



imports and an increase in Demand and external exports), but not both.

- (d) If Adjustment Bids are exhausted before Congestion is eliminated, the remaining Schedules will be adjusted *pro rata* except for those uses of transmission service under Existing Contracts, which are curtailed in accordance with SP 7.3 and SP 7.4.

### **SP 10.3 Congestion Management Pricing**

- (a) The Adjustment Bids that the SCs submit constitute implicit bids for transmission between Zones on either side of a Congested Inter-Zonal Interface. The ISO's Inter-Zonal Congestion Management process will allocate Congested transmission to those users who value it the most and will charge all SCs for their allocated usage of Congested Inter-Zonal Interfaces on a comparable basis. All SCs within a Zone will see the same price for transmitting Energy across a Congested Inter-Zonal Interface, irrespective of the particular locations of their Generators, Demands and external imports/exports.
- (b) The ISO will determine the prices for the use of Congested Inter-Zonal Interfaces using the Adjustment Bids. The ISO will collect Usage Charges from SCs for their Scheduled use of Congested Inter-Zonal Interfaces. If Adjustment Bids are exhausted and Schedules are adjusted *pro rata*, the highest Hourly Ex Post Price for the relevant Settlement Period will apply.
- (c) The ISO will rebate the Congestion revenues collected through the Usage Charges to the PTOs which own the Congested Inter-Zonal Interface in proportion to their respective ownership rights.

## **SP 11 CREATION OF THE REAL TIME MERIT ORDER STACK**

### **SP 11.1 Sources of Imbalance Energy**

The following Energy Bids will be considered in the creation of the real time merit order stack for Imbalance Energy:

- (a) Supplemental Energy bids submitted in accordance with the SBP;

- (b) Ancillary Services Energy bids (except for Regulation) submitted for specific Ancillary Services in accordance with the SBP for those resources which have been selected in the ISO's Ancillary Services auction to supply such specific Ancillary Services; and
- (c) Ancillary Services Energy bids (except for Regulation) submitted for specific Ancillary Services in accordance with the SBP for those resources which SCs have elected to use to self-provide such specific Ancillary Services and for which the ISO has accepted such self-provision.

## **SP 11.2      Stacking of the Energy Bids**

The sources of Imbalance Energy described in SP 11.1 will be arranged in order of increasing Energy bid prices, without regard to the source of the Energy bid, to create a merit order stack for use in accordance with the DP. In the event of Inter-Zonal Congestion, separate merit order stacks will be created for each Zone. The information in the merit order stack shall be provided to the real time dispatcher through the BEEP (Balancing Energy and Ex-Post Pricing) software.

Where, in any Settlement Period, the highest decremental Energy Bid in the merit order stack is higher than the lowest incremental Energy Bid, the BEEP software will eliminate the overlap by determining a target price for all those incremental and decremental bids which fall within the overlap. All decremental Energy Bids higher than the target price will be decreased to the target price. All incremental Energy Bids lower than the target price will be increased to the target price.

References to incremental Energy Bids include references to Demand reduction bids, and for the purpose of applying this algorithm a reduction in Demand shall be treated as an equivalent increase in Generation.

## **SP 11.3      Use of the Merit Order Stack**

The merit order stack, consisting of all of the Supplemental Energy and Ancillary Services Energy bids described in SP 11.1, can be used to supply Energy for:

- (a) satisfying needs for Imbalance Energy (differences between actual and scheduled Generation, Demand and external imports/exports) in real time;

- (b) managing Inter-Zonal Congestion in real time;
- (c) supplying Energy necessary to allow resources providing Regulation service to return to the base point of their regulating ranges in real time;
- (d) recovering Operating Reserves utilized in real time;
- (e) procuring additional Voltage Support required from resources beyond their power factor ranges in real time; and
- (f) managing Intra-Zonal Congestion in real time after use of available Adjustment Bids.

## **SP 12      AMENDMENTS TO THE PROTOCOL**

If the ISO determines a need for an amendment to this Protocol, the ISO will follow the requirements as set forth in Section 16 of the ISO Tariff.