2.5.3.6 The ISO, whenever possible, will increase its purchases of an Ancillary Service that can substitute for another Ancillary Service, when doing so is expected to reduce its total cost of procuring Ancillary Services while meeting reliability requirements. The ISO will make such adjustments in accordance with the following principles:

(a)   The Regulation requirement must be satisfied by Regulation bids from Resources qualified to provide Regulation;

(b)   Additional Regulation capacity can be used to satisfy requirements for any types of reserves (Spinning Reserve, Non-Spinning Reserve or Replacement Reserve);

(c)   Regulation and Spinning Reserve requirements must be satisfied by the combination of Regulation and Spinning Reserve bids;

(d)   Additional Regulation and Spinning Reserve capacity can be used to satisfy requirements for Non-Spinning Reserve and Replacement Reserve, except that any Spinning Reserve capacity that has been designated as available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency cannot be used to satisfy requirements for Replacement Reserve;

(e)   Regulation, Spinning Reserve, and Non-Spinning Reserve requirements must be satisfied by the combination of Regulation, Spinning Reserve and Non-Spinning Reserve bids;

(f)   Additional Regulation, Spinning Reserve, and Non-Spinning Reserve, and Replacement Reserve capacity can be used to satisfy requirements for Replacement Reserve except that any Spinning and Non-Spinning Reserve capacity that has been designated as available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency cannot be used to satisfy requirements for Replacement Reserve;

(g)   Total MW purchased from the Regulation, Spinning Reserve, Non-Spinning Reserve, and Replacement Reserve markets will not be changed by this Section 2.5.3.6; and

(h)   All quantities of Ancillary Services so procured must be non-negative.

<center>* * * * *</center>

2.5.15   The Spinning Reserve Auction.

Bid Information. If the bid is for the provision of Spinning Reserve from a Generating Unit or System Unit, each Scheduling Coordinator j must submit the following information for each Generating Unit or System Unit i for each Settlement Period t of the following Trading Day:

(a)   bidder name/Identification Code;

(b)   resource identification (name and Location Code);

(c)   the date for which the bid applies;

(d)   maximum operating level (MW);

(e)   minimum operating level (MW);

(f)   ramp rate (MW/min);

(g)   MW additional capability synchronized to the system, immediately responsive to system frequency, and available within 10 minutes ($Cap_{ijt}max$) for Generating Unit i, or System Unit I, from Scheduling Coordinator j, for Settlement Period t.

(h)   bid price of capacity reserved ($CapRes_{ijt}$ ($/MW));

(i)   bid price of Energy output from reserved capacity ($EnBid_{ijt}$ ($/MWh)); and

(j)   an indication whether the capacity reserved would be available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency.

If the bid is for the provision of Spinning Reserve from an external import of a System Resource, each Scheduling Coordinator j must submit the following information for each external import of a System Resource i for each Settlement Period t of the following Trading Day:

(a)   bidder name/Identification Code;

(b)   the date for which the bid applies;

(c)   ramp rate if applicable (MW/Min);

(d)   MW additional capability synchronized to the system, immediately responsive to system frequency and available at the point of interchange with the ISO Control Area, within 10 minutes ($\text{Cap}_{ijt}\text{max}$) of the ISO calling for the external import of System Resource i, from Scheduling Coordinator j, for Settlement Period t;

(e)   bid price of capacity reserved (CapRes_{ijt} ($/MW));

(f)   bid price of Energy output from reserved capacity (EnBid_{ijt} ($/MWh)); and

(g)   an indication whether the capacity reserved would be available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency.

Bid Evaluation. Based on the quantity and location of the system requirements, the ISO shall select the Generating Units, System Units and external imports of System Resources with the bids which minimize the sum of the total bids of the Generating Units, System Units and external imports of System Resources selected subject to two constraints:

(a)   the sum of the selected bid capacities must be greater than or equal to the required Spinning Reserve capacity; and

(b)   each Generating Unit's, System Unit's or external import's bid capacity must be less than or equal to that Generating Unit's, System Unit's or external import's ramp rate times 10 minutes.

The total bid for each Generating Unit, System Unit or external import of a System Resource is calculated by multiplying the capacity reservation bid price by the bid capacity. Thus, subject to any locational requirements, the ISO will select the winning Spinning Reserve bids in accordance with the following criteria:

$$Min \sum_{i,j} Totalbid_{ijt}$$

Subject to

$$\sum_{i,j} Cap_{ijt} \geq Requirement_t$$

$and\ Cap_{ijt} \leq Cap_{ijt}max$

Where

$TotalBid_{ijt} = Cap_{ijt} * CapRes_{ijt}$

$Requirement_t$ = the amount of Spinning Reserve capacity required

Price Determination. The price payable to Scheduling Coordinators for Spinning Reserve Capacity made available in accordance with the ISO's Final Day-Ahead Schedules shall, for each Generating Unit or external import of a System Resource concerned be the zonal market clearing price for Spinning Reserve calculated as follows:

$Psp_{xt} = MCP_{xt}$

Where the zonal market clearing price (MCP_{xt}) for Spinning Reserve is the highest priced winning Spinning Reserve capacity bid in Zone X based on the capacity reservation bid price, i.e.:

$MCP_{xt} = Max(CapRes_{ijt})$ in zone x for Settlement Period t

The ISO's auction does not compensate a Scheduling Coordinator for the minimum Energy output of Generating Units, System Units or System resources bidding to provide Spinning Reserve. Therefore, any minimum Energy output associated with Spinning Reserve selected in the ISO's auction is the responsibility of the Scheduling Coordinator selling the Spinning Reserve.

The price payable to Scheduling Coordinators for Spinning Reserve Capacity not included in the ISO's Final Day-Ahead Schedules but made available in accordance with amended Ancillary Services supplier schedules issued in accordance with Section 2.5.21 shall be the bid price of the Spinning reserve capacity reserved ($CapRes_{ijt}$($/MW)).

2.5.16 The Non-Spinning Reserve Auction.

<u>Bid information</u>. If the bid is for the provision of Non-Spinning Reserve from a Generating Unit or System Unit, each Scheduling Coordinator j must submit the following information for each Generating Unit or System Unit i for each Settlement Period t of the following Trading Day:

(a)   bidder name/Identification Code;

(b)   Generating Unit or System Unit identification (name and Location Code);

(c)   the date for which the bid applies;

(d)   maximum operating level (MW);

(e)   minimum operating level (MW);

(f)   ramp rate (MW/Min);

(g)   the MW capability available within 10 minutes ($Cap_{ijt}max$);

(h)   the bid price of the capacity reserved ($CapRes_{ijt}$($/MW));

(i)   time to synchronization following notification (min);

(j)   the bid price of the Energy output from the reserved capacity ($EnBid_{ijt}$($/MWh)); and

(k)   an indication whether the capacity reserved would be available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency.

If the bid is for the provision of Non-Spinning Reserve from an external import of a System Resource, each Scheduling Coordinator j must submit the following information for each external import of a System Resource i for each Settlement Period t of the following Trading Day:

(a)   bidder name/Identification Code;

(b)   the date for which the bid applies;

(c)   ramp rate if applicable (MW/Min);

(d)   the MW capability available at the point of interchange with the ISO Control Area, within 10 minutes ($Cap_{ijt}max$) of the ISO calling for the external import of System Resource I, from Scheduling Coordinator j, for Settlement Period t;

(e)   the bid price of the capacity reserved ($CapRes_{ijt}$($/MW)); and

(f)   the bid price of Energy output from reserved capacity ($EnBid_{ijt}$($/MWh)); and

(g)   an indication whether the capacity reserved would be available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency.

If the bid is for the provision of Non-Spinning Reserve from a Load located within the ISO Control Area, each Scheduling Coordinator j must submit the following information for each Load i for each Settlement Period t of the following Trading Day:

(a)   bidder name/Identification Code;

(b)   Load identification name and Location Code;

(c)   the date for which the bid applies;

(d)   Demand reduction available within 10 minutes ($Cap_{ijt}max$);

(e)   to interruption following notification (min);

(f)   maximum allowable curtailment duration (hr);

(g)   the bid price of the capacity reserved ($CapRes_{ijt}$($/MW));

(h)   the bid price for Demand reduction from the reserved capacity ($EnBid_{ijt}$($/MWh));

(i)   an indication whether the capacity reserved would be available for Demand reduction only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency.

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Bid Evaluation. Based on the quantity and location of the system requirements, the ISO shall select the Generating Units, System Units, Loads or external imports of System Resources with the bids which minimize the sum of the total bids of the Generating Units, System Units, Loads or external imports of System Resources selected subject to two constraints:

(a)   the sum of the selected bid capacities must be greater than or equal to the required Non-Spinning Reserve capacity; and

(b)   each Generating Unit's, System Unit's, Load's or external import's bid capacity must be less than or equal to that Generating Unit's, System Unit's, Load's or external import's ramp rate (or time to interruption in the case of a Load offering Demand reduction) times the difference between 10 minutes and the time to synchronize in the case of a Generating Unit or System Unit or to interruption in the case of a Load. The total bid for each Generating Unit, System Unit, Load or external import of a System Resource is calculated by multiplying the capacity reservation bid by the bid capacity.

Thus subject to any locational requirements, the ISO will accept the winning Non-Spinning Reserve bids in accordance with the following criteria:

$$Min \sum_{i,j} Totalbid_{ijt}$$

Subject to

$$\sum_{i,j} Cap_{ijt} \geq Requirement_t$$

$$Cap_{ijt} \leq Cap_{ijt}max$$

Where

$$TotalBid_{ijt} = Cap_{ijt} * CapRes_{ijt}$$

$Requirement_t$ = the amount of Non-Spinning Reserve capacity required

Price Determination. The price payable to Scheduling Coordinators for Non-Spinning Reserve Capacity made available in accordance with the ISO's Final Day-Ahead Schedules shall for each

Generating Unit, System Unit, Load or external import of a System Resource concerned be the zonal market clearing price for Non-Spinning Reserve calculated as follows:

$Pnonsp_{xt} = MCP_{xt}$

Where the zonal market clearing price (MCP_{xt}) for Non-Spinning Reserve is the highest priced winning Non-Spinning Reserve bid in Zone X based on the capacity reservation bid price, i.e.:

$MCP_{xt} = Max(CapRes_{ijt})$ in zone x for Settlement Period t.

The price payable to Scheduling Coordinators for Non-Spinning Reserve Capacity not included in the ISO's Final Day-Ahead Schedules but made available in accordance with amended Ancillary Services supplier schedules issued in accordance with Section 2.5.21 shall be the bid price of the Non-Spinning Capacity reserved ($CapRes_{ijt}(\$/MW)$).

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2.5.22   Rules For Real Time Dispatch of Imbalance Energy Resources.

2.5.22.1   Overview. During real time, the ISO shall dispatch Generating Units, Loads and System Resources to procure Imbalance Energy. In addition, the ISO may also need to purchase additional Ancillary Services if the services arranged in advance are used to provide Imbalance Energy, and such depletion needs to be recovered to meet reliability contingency requirements.

2.5.22.2 General Principles. The ISO shall base real time dispatch of Generating Units, System Units, Loads and System Resources on the following principles:

(a)   the ISO shall dispatch Generating Units, System Units, and System Resources providing Regulation service to meet NERC and WSCC Area Control Error (ACE) performance requirements;

(b)   once ACE has returned to zero, the ISO shall determine whether the Regulation Generating Units, System Units, and System Resources are operating at a point away from their preferred operating point. The ISO shall then adjust the output of Generating Units, System Units, and System Resources available (either providing Spinning

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Reserve, Non-Spinning Reserve, Replacement Reserve or offering Supplemental

Energy) to return the Regulation Generating Units, System Units, and System

Resources to their preferred operating points to restore their full regulating margin;

(c)   the ISO shall dispatch Generating Units, System Units, Loads and System Resources

only to meet its Imbalance Energy requirements. The ISO shall not dispatch such

resources in real time for economic trades either between Scheduling Coordinators or

within a Scheduling Coordinator portfolio;

(d)   subject to Section 2.5.22.3.2 and its subparts, the ISO shall select the Generating

Units, System Units, Loads and System Resources to be dispatched to meet its

Imbalance Energy requirements based on a merit order of Energy bid prices;

(e)   subject to Section 2.5.22.3.2 and its subparts, the ISO shall not discriminate between

Generating Units, System Units, Loads and System Resources other than based on

price, and the effectiveness (e.g., location and ramp rate) of the resource concerned to

respond to the fluctuation in Demand or Generation;

(f)   Generating Units, System Units, Loads and System Resources shall be dispatched

during the operating hour only until the next variation in Demand or the end of the

operating hour, whichever is sooner. In dispatching such resources, the ISO makes no

further commitment as to the duration of their operation, nor the level of their output or

Demand, except to the extent that a Dispatch instruction causes Energy to be delivered

in a different BEEP Interval.

2.5.22.3   **Ancillary Services Dispatch.** The ISO may dispatch Generating Units, Loads,

System Units and System Resources contracted to provide Ancillary Services (either procured

through the ISO's competitive market, or self provided by Scheduling Coordinators) to supply

Imbalance Energy.

2.5.22.4   During normal operating conditions, the ISO shall dispatch the following

resources to supply Imbalance Energy: (i) those Generating Units, Loads, System Units and

System Resources having offered Supplemental Energy bids, (ii) those Generating Units, Loads,

System Units and System Resources contracted to provide ~~Regulation and~~ Replacement Reserve and (iii), those Generating Units, Loads, System Units and System Resources that have contracted to provide Spinning and Non-Spinning Reserve, except for those resources that have indicated that the capacity reserved would be available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency. In the event of an unplanned Outage, a Contingency or a threatened or actual System Emergency, the ISO may also dispatch all other Generating Units, Loads, System Units and System Resources contracted to provide Spinning Reserve or Non-Spinning Reserve to supply Imbalance Energy. If a Generating Unit, Load, System Unit or System Resource, which is supplying Operating Reserve, is dispatched to provide Imbalance Energy, the ISO shall replace the Operating Reserve from the same or another resource within the time frame specified in the WSCC guidelines.

2.5.22.3.1   Dispatch of Competitively Procured and Self-Provided Ancillary Services.
Generating Units and Loads selected in the ISO competitive auction or self-provided shall be dispatched based on their Energy bid prices as described in their Ancillary Service schedule and their effectiveness, subject to the limitation on the Dispatch of Spinning Reserve and Non-Spinning Reserve set forth in Section 2.5.22.3.

2.5.22.3.2   Dispatch of Self Provided Ancillary Services. Where a Scheduling Coordinator has chosen to self provide the whole of the additional Operating Reserve required to cover any Interruptible Imports which it has scheduled and has identified specific Generating Units, Loads, System Units or System Resources as the providers of the additional Operating Reserve concerned, the ISO shall Dispatch only the designated Generating Units, Loads, System Units or System Resources in the event of the ISO being notified that the Interruptible Import is being curtailed. For all other Ancillary Services which are being self provided the Energy Bid shall be used to determine the position of the Generating Unit, Load, System Unit or System Resource in the merit order for real time Dispatch, subject to the limitation on the Dispatch of Spinning Reserve and Non-Spinning Reserve set forth in Section 2.5.22.3.

* * * * *

2.5.22.5 Information used in the Real Time Dispatch. The ISO shall place all the bid price information (except for Regulation bid prices and Adjustment Bids carried forward from the Day-Ahead and Hour-Ahead Markets) received from available Generating Units, Loads, System Units and System Resources in a database for use in real time Dispatch of Balancing Energy. The database shall indicate:

(a)   Generating Unit/Load/ System Unit/ System Resource name;

(b)   congestion zone;

(c)   quantity bid;

(d)   normal ramp rate;

(e)   price;

(f)   whether the Generating Unit/ Load/ System Unit/ System Resource has been contracted to provide any Ancillary Services and/or Supplemental Energy, and, if so, which ones.

The quantity blocks shall be ordered in a merit order stack of ascending incremental and descending decremental price bids. Energy bids associated with Spinning and Non-Spinning Reserve shall be included in the merit order stack during normal operating conditions unless the capacity associated with such bids has been designated as available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency.

2.5.22.6   Real Time Dispatch. The ISO shall select the least-cost Generating Unit, Load, System Unit or System Resource that is effective to meet Imbalance Energy requirements in real time, subject to the limitation on the Dispatch of Spinning Reserve and Non-Spinning Reserve set forth in Section 2.5.22.3. The ISO shall determine that additional output is needed if the current output levels of the Regulation Generating Units, System Units, and System Resources exceed their preferred operating points by more than a specified threshold (to be determined by the ISO).

The ISO shall determine that less output is needed if the output levels of the Regulation Generating Units, System Units, and System Resources fall below their preferred operating points by more than a specified threshold (to be determined by the ISO). To minimize the cost of providing Imbalance Energy:

(a)   if additional Energy output, or Demand reduction, is needed, the ISO shall Dispatch additional output or reduce Demand from Generating Units, Loads, System Units or System Resources in ascending order of their incremental Supplemental Energy bid prices (or, for Generating Units, Loads, System Units and System Resources providing Ancillary Services, their Energy Bid prices).

(b)   if the ISO is required to reduce Energy output from Generating Units, Loads, System Units or System Resources, the ISO shall dispatch down Generating Units, Loads, System Units and System Resources in descending order of their decremental Supplemental Energy bid prices (or, for Generating Units, Load, System Units and System Resources providing Ancillary Services their Energy Bid prices).

Once a bid has been accepted by the ISO, the database shall be adjusted to reflect the change in status of the bid. Once a decremental bid has been used by the ISO, it will then be included in the incremental part of the database with an incremental bid equal to its decremental price bid. Once an incremental bid has been used by the ISO it will then be included in the decremental part of the database with a decremental bid equal to its incremental price bid. In the event that the ISO subsequently needs to decrement output, it will initially decrement the Generating Units, Loads, System Units or System Resources incremented previously, and then continue down the merit order of the decremental bids.

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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. <u>This merit order stack will be arranged without regard to the source of the Energy bid except that Energy bids associated with Spinning and Non-Spinning Reserve shall not be included in the merit order stack during normal operating conditions if the capacity associated with such bids has been designated as available to supply Imbalance Energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency. In the event of an unplanned Outage, a Contingency or threatened or actual System Emergency, all Energy bids associated with Spinning and Non-Spinning Reserve may be included in the merit order stack.</u> 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~~ <u>as</u> described in SP 11.<u>2</u>~~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.