

Reserve contracts. The ISO shall contract for Voltage Support annually (or for such other period as the ISO may determine is economically advantageous) and on a daily or hourly basis as required to maintain system reliability. The ISO shall contract annually (or for such other period as the ISO may determine is economically advantageous) for Black Start Generation.

**2.5.6 Technical Requirements for Providing Ancillary Services.**

All Generating Units, System Units, Loads and System Resources providing Ancillary Services shall comply with the technical requirements set out in Sections 2.5.6.1 to 2.5.6.4 below relating to their operating capabilities, communication capabilities and metering infrastructure. No Scheduling Coordinator shall be permitted to submit a bid to the ISO for the provision of an Ancillary Service from a Generating Unit, System Unit, Load or System Resource, or to submit a schedule for self provision of an Ancillary Service from that Generating Unit, System Unit, Load or System Resource, unless the Scheduling Coordinator is in possession of a current certificate issued by the ISO confirming that the Generating Unit, System Unit, Load or System Resource complies with the ISO's technical requirements for providing the Ancillary Service concerned.

Scheduling Coordinators can apply for Ancillary Services certificates in accordance with the ISO's Protocols for considering and processing such applications. The ISO shall have the right to inspect Generating Units, Loads or the individual resources comprising System Units and other equipment for the purposes of the issue of a certificate and periodically thereafter to satisfy itself that its technical

requirements continue to be met. If at any time the ISO's technical requirements are not being met, the ISO may withdraw the certificate for the Generating Unit, System Unit, Load or System Resource concerned.

**2.5.6.1 Operating Characteristics Required to Provide Ancillary Services.** Each Generating Unit, System Unit, Load or System Resource which a Scheduling Coordinator wishes to schedule or bid to provide Ancillary Services must comply with the requirements for the specific Ancillary Service in regard to the following:

- (a) ramp rate increase and decrease (MW/minute);
- (b) power factor (leading and lagging) as required by Section 2.5.3.4;
- (c) maximum output (real and reactive);
- (d) minimum output (real and reactive);
- (e) AGC capability, control scheme, and range; and
- (f) minimum length of time the resource can be available to provide the relevant Ancillary Service.

The ISO will differentiate the operating characteristics according to the Ancillary Service being provided.

**2.5.6.2 Communication Equipment.** Unless otherwise authorized by the ISO, all Scheduling Coordinators wishing to submit an Ancillary Service schedule or bid must have the capability to submit and receive information by direct computer link. In addition, they must provide the ISO with a telephone number, fax number or other approved voice communication system such as direct line access through which Dispatch instructions for each Generating Unit, System Unit, Load and System Resource may be given if necessary. The ISO will determine which method of communication is

appropriate. Participating Generators, owners or operators of Loads and operators of System Units or System Resources whose resources are scheduled, bid in or under contract, shall ensure that there is a 24 hour personal point of contact with the ISO for the Generating Unit, System Unit, Load or System Resource. Participating Generators and operators of System Units providing Regulation shall also provide communication links meeting ISO standards for direct digital control. If any communication system becomes unavailable, the relevant Participating Generators, operators of System Units, Loads and System Resources and the ISO shall take immediate action to identify the cause of the interruption and to restore the communication system. A Scheduling Coordinator, which has scheduled or bid in or contracted for Ancillary Services shall ensure that the Generating Unit, System Unit, Load or System Resource concerned is able to receive and implement Dispatch instructions.

**2.5.6.3 Metering Infrastructure.** All Participating Generators, owners or operators of Loads and operators of System Units or System Resources which a Scheduling Coordinator wishes to schedule or bid to provide Ancillary Services shall have the metering infrastructure for the Generating Units, System Units, Loads or System Resources concerned which complies with requirements to be established by the ISO relating to:

- (a) meter type;
- (b) meter location;
- (c) meter reading responsibility;
- (d) meter capability in regard to AGC response; and

- (e) any other aspect of metering infrastructure required by the ISO under this ISO  
Tariff.

**2.5.7.4.5** Scheduling Coordinators' bidding or self-provision of Ancillary Services according to this section 2.5.7.4 shall be consistent with the ISO Protocols.

**2.5.8 The Bidding Process.**

The ISO shall operate a competitive Day-Ahead and Hour-Ahead market to procure Ancillary Services. It shall purchase Ancillary Services capacity at least cost to End-Use Customers consistent with maintaining system reliability. Any Scheduling Coordinator representing Generating Units, System Units, Loads or external imports of System Resources may bid into the ISO's Ancillary Services market provided that it is in possession of a current certificate for the Generating Units, System Units, external imports of System Resources or Loads concerned.

**2.5.9 Provision of System Information to Market Participants.**

By 6:00 p.m. two days prior to the Trading Day, the ISO shall make available to Scheduling Coordinators general system information including those items of

The ISO will verify and respond to submitted schedules in accordance with Appendix E and the ISO Protocols.

**2.5.20.7 Acceptance of Self Provided Ancillary Service Schedules.** The ISO will refuse to accept self provided Ancillary Service schedules only to the extent that they fail to meet requirements contained in this ISO Tariff. In particular, self provided Ancillary Service schedules must satisfy the following conditions:

- (a) the Scheduling Coordinator has a current certificate of technical eligibility for the Generating Units, System Units, Loads or System Resources selected for the Ancillary Services in question;
- (b) to the extent not provided under (a), the Generating Units, System Units, Loads and System Resources have the instrumentation, communication and metering equipment necessary to permit the ISO to dispatch the offered Ancillary Services and verify that the services have been provided;
- (c) the scheduling information provided by the Scheduling Coordinator is deemed to be valid in accordance with Appendix E and the ISO Protocols;
- (d) the Generating Units, System Units, Loads or System Resources meet the ISO's locational requirements for the Ancillary Services; and
- (e) for self-provided Ancillary Services delivered from another control area, that, under Existing Contracts, the Scheduling Coordinator has arranged for the firm transmission of the Ancillary Services to the point of interconnection between the other control area and the ISO Controlled Grid.

**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 and System Units 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 and System Units are operating at a point away from their Set Point. The ISO shall then adjust the output of Generating Units and System Units available (either providing Spinning Reserve, Non-Spinning Reserve or offering Supplemental Energy) to return the Regulation Generating Units and System Units to their Set 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, 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, the ISO shall not discriminate between Generating Units, System Units, Loads and System Resources other than based on price, and the effectiveness (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

If the net quantity of Imbalance Energy in the five (5) minute period t is negative then

$$P5Min_t = Min(EnBid_t)$$

In the event of Inter-Zonal Congestion, the ISO will develop a dispatch price curve, and an Ex Post Five Minute Price  $P5Min_{xt}$ , for each Zone where congestion exists.

The Hourly Ex Post Price in each zone will equal the Energy weighted average of the twelve (12) Five Minute Ex Post Prices in each Zone, calculated as follows:

$$PHourExPost_x = \frac{\sum_{t=1}^{12} (P5Min_{xt} * SysDev)_t}{\sum_{t=1}^{12} SysDev_t}$$

Where:

$PHourExPost_x$  = Hourly Ex Post Price in Zone x

$P5Min_{xt}$  = Five minute Ex Post Price in Zone x in period t

$SysDev_t$  = the absolute difference (whether positive or negative) between (the deviation between scheduled and metered Demand) and (the deviation between scheduled and metered Generation) in five (5) minute period t in Zone x.

If the ISO declares a System Emergency, e.g. during times of supply scarcity, and involuntary load shedding occurs during the real time dispatch, the ISO shall set the Hourly Ex Post Price at the Administrative Price.

**2.5.24 Verification of Performance of Ancillary Services.**

Availability of both contracted and self provided Ancillary Services shall be verified by the ISO by unannounced testing of Generating Units, System Units, Loads and System Resources,

by auditing of response to ISO Dispatch instructions, and by analysis of the appropriate Meter Data. Participating Generators, owners or operators of Loads, operators of System Units or System Resources and Scheduling Coordinators shall notify the ISO immediately whenever they become aware that an Ancillary Service is not available in any way. All Participating Generators, owners or operators of Loads and operators of System Units or System Resources shall check, monitor and/or test their system and related equipment routinely to assure availability of the committed Ancillary Services. These requirements apply whether the Ancillary Services are contracted or self provided. For a duration specified by the ISO, the ISO may suspend the technical eligibility certificate of a Scheduling Coordinator for a Generating Unit, System Unit, Load or System Resource, which repeatedly fails to perform. The ISO shall develop measures to discourage repeated non-performance on the part of both bidders and self providers.

The ISO shall monitor the performance of a MSS via a Metered Subsystem Regulation Error (MSRE). The MSRE is obtained by comparing the sum of the metered power flows at the MSS interface points to the sum of the MSS's power scheduled or instructed at these same interface points. The ISO may bias the MSRE for purposes of testing or control of Ancillary Services provided by the MSS. The MSRE shall incorporate this bias.

The MSRE shall be reported to the ISO on a real time basis, and checked at five minute intervals to determine whether the MSS meets specified performance criteria.

The ISO has authority to suspend MSS control and direct, via communications with the MSS operator, the operation of units within the MSS if such control is necessary to maintain ISO Controlled Grid reliability.

If the MSS operator does not conform with Good Utility Practice, the ISO may suspend MSS control until the MSS operator demonstrates the ability and willingness to conform with Good Utility Practice.

**2.5.25 Periodic Testing of Units.**

The ISO may test Generating Units, System Units, Loads and System Resources in the manner described herein. The frequency of testing shall be within such timeframes as are reasonable under all the circumstances. Scheduling Coordinators shall manage the resulting Energy output if notification of testing permits the Energy to be scheduled. If a Generating Unit, System Unit, Load, or System Resource fails to meet requirements in a test under this section, the ISO shall notify the relevant Participating Generator, owner or operator of Loads, System Units or System Resources, or Scheduling Coordinator of such failure as soon as reasonably practicable after the completion of the test. Failure to meet requirements shall lead to the penalties described in Section 2.5.26.

**2.5.25.1 Regulation.** The ISO shall continuously monitor the response of a Generating Unit or a System Unit to the ISO's Regulation instructions in order to determine compliance with Dispatch instructions.

**2.5.25.2 Spinning Reserve.** The ISO shall test the Spinning Reserve capability of a Generating Unit, System Unit or System Resource by issuing unannounced Dispatch instructions requiring the Generating Unit, System Unit or System Resource to ramp up to its ten minute capability. The ISO shall measure the response of the Generating Unit,

**2.5.25.6 Black Start.** The ISO may test the Black Start capability of a Generating Unit by issuing unannounced dispatch instructions requiring the Generating Unit to start on a Black Start basis. The ISO shall measure the response of the Generating Unit to determine compliance with the terms of the Black Start contract. The Scheduling Coordinator or Black Start Generator as stated in Section 2.5.27.6 for the Generating Unit shall be paid the Generating Unit's contract price for the output under the Black Start test.

**2.5.26 Penalties for Failure to Pass Tests and Rescission of Payment for Non-Delivery.**

**2.5.26.1 Penalties for Failure to Pass Tests.** A Generating Unit, Curtailable Demand, System Unit or System Resource that fails an availability test, as determined under criteria to be established by the ISO, shall be deemed not to have been available to provide the Ancillary Service concerned or the relevant portion of that Service for the entire period the Generating Unit, Curtailable Demand, System Unit or System Resource was committed to provide the Service, unless appropriate documentation (i.e., daily test records) confirming the availability of that service during the committed period(s) is presented to the ISO. The "committed period" is defined as the total of all the hours/days the Generating Unit, Curtailable Demand, System Unit or System Resource was scheduled by the ISO to provide the Ancillary Service beginning from: (i) the last successful availability test; or (ii) the last time the Generating Unit, Curtailable Demand, System Unit or System Resource actually provided Energy or reduced Demand as part of the Ancillary Service; whichever results in a shorter committed period. The Scheduling Coordinator for a Generating Unit, Curtailable Demand, System Unit or System Resource that fails an availability test shall not be entitled to payment for the Ancillary Service concerned for the

committed period and adjustments to reflect this shall be made in the calculation of payments to  
the Scheduling Coordinator,

provided that any such penalty shall be reduced to reflect any adjustment made over the duration of the committed period under Section 2.5.26.2 or 2.5.26.3.

System Units engaged in Literal Self Provision of Ancillary Services, In-Kind Self-Provision of Ancillary Services, or providing Ancillary Services to the ISO are subject to the same testing, compensation, and penalties as are applied to individual Generating Units engaged in In-Kind Self Provision or provision of Ancillary Services. To perform testing, the ISO will bias the MSS's MSRE to test the responsiveness of the System Unit.

**2.5.26.2 Rescission of Payments for Unavailability.** If capacity scheduled into the ISO's Ancillary Services markets from a Generating Unit, Curtailable Demand, System Unit or System Resource is unavailable during the relevant Settlement Period, then payments will be rescinded as described herein. For self-provided Ancillary Services, the payment obligation shall be equivalent to that which would arise if the Ancillary Services had been bid into each market in which they were scheduled.

**2.5.26.2.1** If the ISO determines that a Scheduling Coordinator has supplied Uninstructed Imbalance Energy to the ISO during a Settlement Period from the capacity of a Generating Unit or System Resource that is obligated to supply Spinning Reserve, Non-Spinning Reserve, or Replacement Reserve to the ISO during such Settlement Period, payments to the Scheduling Coordinator representing the Generating Unit or System Resource for the Ancillary Service capacity used to supply Uninstructed Imbalance Energy and for Energy supplied from such capacity shall be eliminated to the extent of the deficiency, except to the extent (i) the deficiency in the availability of Ancillary Service capacity from the Generating Unit or System Resource is attributable to control exercised by the ISO in that Settlement Period through AGC operation, an RMR Dispatch Notice, or dispatch to avoid an intervention in

Market operations or to prevent a System Emergency; or (ii) a penalty is imposed under Section 2.5.26.1 with respect to the deficiency.

**2.5.26.2.2** If the metered Demand of a Curtailable Demand is insufficient to deliver the full amount of the Non-Spinning and Replacement Reserve to which that Curtailable Demand is obligated in that Settlement Period, then the related capacity payments will be rescinded to the extent of that deficiency as explained in Section 2.5.26.2.4 and 2.5.26.2.5, unless a penalty is imposed on that Curtailable Demand for that Settlement Period under Section 2.5.26.1.

**2.5.26.2.3** The payment for Energy to be eliminated shall be determined in accordance with Section 11.2.4.1.

**2.5.26.2.4** The payment for Ancillary Service capacity otherwise payable under Section 2.5.27.2, 2.5.27.3, and/or 2.5.27.4 shall be reduced by the product of the applicable prices and the amount of Ancillary Service capacity from which the Generating Unit, Curtailable Demand, System Unit or System Resource has supplied Uninstructed Imbalance Energy. If a Scheduling Coordinator schedules Ancillary Services through both the Day-Ahead and Hour-Ahead Markets, capacity payments due the Scheduling Coordinator from each market will be rescinded in proportion to the amount of capacity sold to the ISO in each market. The amount of capacity for which payments will be rescinded shall equal the value  $UnavailAncServMW_{xt}$ , as defined in Section 11.2.4.1, applied to each Generating Unit, System Unit and System Resource supplying the Ancillary Service or the value  $UnavailDispLoadMW_{xt}$ , as also defined in Section 11.2.4.1, applied to the Curtailable Demand supplying the Ancillary Service.

rescinded. If the same Ancillary Service is scheduled in both the Day Ahead and Hour Ahead Markets, than payments shall be rescinded in proportion to the amount of each Ancillary Service scheduled in each market.

**2.5.26.4** Penalties applied pursuant to Section 2.5.26.1, and payments rescinded pursuant to Section 2.5.26.2 and 2.5.26.3 shall be redistributed to Scheduling Coordinators in proportion to ISO Control Area metered Demand and scheduled exports for the same Trading Day.

**2.5.27 Settlements For Contracted Ancillary Services.**

Based on the prices and quantities determined in accordance with this Section, the ISO shall operate a daily Settlement function for Ancillary Services it contracts for with Scheduling Coordinators.

The ISO shall calculate imbalances between scheduled, instructed and actual quantities of Energy provided based upon Meter Data obtained pursuant to Section 10. Schedules between Control Areas shall be deemed as being delivered in accordance with Good Utility Practice. The difference between actual and scheduled interchange shall then be addressed in accordance with the WSCC and NERC inadvertent interchange practices and procedures. Following this practice, all dynamic schedules for Ancillary Services provided to the ISO by other Control Areas shall be deemed delivered to the ISO. The difference between the Energy requested by the ISO and that actually delivered by the other Control Area shall then be accounted for and addressed through the WSCC and NERC inadvertent interchange practices and procedures.

Separate payments shall be calculated for each Settlement Period  $t$  for each Generating Unit, System Unit, System Resource and Curtailable Demand. The ISO shall

then calculate a total daily payment for each Scheduling Coordinator for all the Generating Units, System Units, System Resources and Curtailable Demands that it represents for each Settlement Period  $t$ .

The settlements for the Hour-Ahead markets shall be calculated by substituting Hour-Ahead prices in the relevant formulae and deducting any amounts due to the ISO from Scheduling Coordinators who buy back in the Hour-Ahead Market Regulation, Spinning Reserve, Non-Spinning Reserve or Replacement Reserve capacity they sold to the ISO in the Day-Ahead Market.

**2.5.27.1 Regulation.**

**Quantities.** The following quantity definitions shall be used for each Scheduling Coordinator in the settlement process:

$AGCQDA_{xt}$  = the Scheduling Coordinator's total quantity of Regulation capacity in Zone X sold through the ISO auction, and scheduled Day-Ahead  $j$  for Settlement Period  $t$ .

$EnQUnst_{xt}$  = Uninstructed Imbalance Energy increase or decrease in Zone X in real time Dispatch for Settlement Period  $t$ , determined in accordance with the ISO Protocols.

**Prices.** The prices in the Settlement process for Regulation shall be those determined in Section 2.5.14.

*Adjustment:* penalty described in Section 2.5.26.1.

$PAGCDA_{xt}$  = the market clearing price, PAGC, in Zone X for Regulation capacity in the Day-Ahead market for Settlement Period  $t$ .

**Payments.** Scheduling Coordinators for Generating Units providing Regulation capacity through the ISO auction shall receive the following payments for Regulation:

$$AGCPay_{xt} = AGCQDA_{xt} * PAGCDA_{xt} - Adjustment$$

