

Information Documents are not authoritative. Information Documents are for information purposes only and are intended to provide guidance. In the event of any discrepancy between an Information Document and any Authoritative Document(s) in effect, the Authoritative Document(s) governs.

1 Purpose

This Information Document relates to the following Authoritative Documents¹:

- Section 205.1 of the ISO rules, *Offers for Operating Reserve*;
- Section 205.2 of the ISO rules, *Issuing Dispatches for Operating Reserve*;
- Section 205.3 of the ISO rules, *Restatements for Operating Reserve* (“Section 205.3”);
- Section 205.4 of the ISO rules, *Regulating Reserve Technical Requirements and Performance Standards*;
- Section 205.5 of the ISO rules, *Spinning Reserve Technical Requirements and Performance Standards*; and
- Section 205.6 of the ISO rules, *Supplemental Reserve Technical Requirements and Performance Standards*.

The purpose of this Information Document is to assist pool participants in understanding the operating reserve market. This Information Document is likely of most interest to market participants who currently provide or may in future provide operating reserve.

2 What is Operating Reserve?

Operating reserve acts as a safety net, making extra power available to help instantaneously balance supply of and demand for electricity in real time, and stabilizing and protecting the interconnected electric system in the event of unforeseen problems affecting generating pool assets.

Operating reserve can come from generating units or from load (i.e. consumers of electricity) that is curtailed.

There are two types of operating reserve: regulating reserve and contingency reserve. Contingency reserve is further separated into spinning reserve and supplemental reserve (known in some jurisdictions outside Alberta as non-spinning reserve). Each type of operating reserve performs a unique function and has unique technical requirements.

Regulating reserve is used to provide a balance between generation and load within the Alberta balancing authority area, while maintaining the interchange schedule on the interconnections with British Columbia and Montana at a frequency of 60 Hz. Further details on regulating reserve can be found in ID #2013-006R, *Regulating Reserve*.

Contingency reserve is used to restore the balance between the supply of and demand for electricity to the electric system following a contingency or unforeseen event threatening the reliable operation of the electric system. Contingencies can include events such as the sudden loss of a generating unit, an unanticipated increase in demand, or the disconnection of one of the interconnections that links Alberta to a neighboring jurisdiction.

¹ “Authoritative Documents” is the general name given by the AESO to categories of documents made by the AESO under the authority of the *Electric Utilities Act* and regulations, and that contain binding legal requirements for either market participants or the AESO, or both. AESO Authoritative Documents include: the ISO rules, the Alberta reliability standards, and the ISO tariff.

Contingency reserve is the real power that, in accordance with subsection 7(1) of Sections 205.5 and 205.6 of the ISO rules, must be delivered to the interconnected electric system within ten (10) minutes of a directive to provide the real power to replace a loss of supply on the system. In addition to responding to a directive, spinning reserve also automatically responds to a change in the interconnected electric system frequency. This type of operating reserve can be provided by the supply side of the system (legal owners of generating units willing to supply power) and the demand side of the system (large electricity customers willing to reduce their demand on the system in response to a loss of supply). Additional details on spinning reserve and supplemental reserve, which are the two types of contingency reserve, can be found in ID #2013-007R, *Contingency Reserve*.

2.1 Active and Standby Reserve

The AESO procures active and standby volumes of each type of operating reserve described above. The AESO uses the terms “active” and “standby” to differentiate the timing and order in which dispatches for operating reserve are issued.

The AESO procures enough active operating reserve to meet the volume requirements set out by Alberta Reliability Standard BAL-002-WECC-AB-2, *Contingency Reserve*. Normally, all active reserve volumes are dispatched to ensure these requirements are met at all times.

The purpose of standby operating reserve is to provide additional operating reserve for use when the volume available from active operating reserve assets is not sufficient to meet the real-time operating and reliability requirements of the interconnected electric system. Often, this insufficiency occurs when an active asset has a forced outage and is unable to provide the active reserve volume that the AESO has procured. The AESO issues dispatches for all pool assets in the active portfolio before issuing dispatches for any pool assets from the standby portfolio. There is a standby portfolio of pool assets for each type of operating reserve procured in the operating reserve market.

3 Procurement in the Operating Reserve Market

Under Alberta’s current electricity market structure, the AESO is the sole buyer of operating reserve. The AESO’s objective is to procure operating reserve in a transparent, competitive, and well-documented manner.

Each day the AESO procures operating reserve (regulating reserve, spinning reserve and supplemental reserve) for the Alberta market from pool participants through Alberta Watt Exchange Limited (“Watt-Ex”), an online exchange. Watt-Ex enters into an Ancillary Services Exchange Customer Agreement with all of its customers, including the AESO and pool participants that supply operating reserve, or their agents.

The Watt-Ex platform is operated by a for-profit third party clearing house. The exchange offers complete transparency of all transactions to all pool participants, but allows sellers to remain anonymous to one another and to the buyer.

3.1 Block Procurement

The AESO’s approach to buying operating reserve is described as block procurement. Operating reserve is purchased in four (4) time offer blocks, as follows:

- (a) On peak means the period from 07:00 to 22:59:59;
- (b) Off peak means the period from 00:00 to 06:59:59 and from 23:00 to 23:59:59;
- (c) AM super peak means the period from 05:00:00 to 07:59:59; and
- (d) PM super peak includes the period from 16:00:00 to 23:59:59 in November, December and January and in all other months the period from 17:00:00 to 23:59:59.

The volumes procured in each of these offer blocks are consistent across all hours in the block.

Only active regulating reserve is purchased for super peak blocks, while all three (3) types of operating reserve (i.e. regulating, spinning and supplemental) are procured for the on peak and off peak time blocks.

3.2 Forecasting

The *7 Day Forecast of Operating Reserves Volumes* report can be found under [Market and System Reporting](#) on the AESO website. This report estimates the volume of operating reserve the AESO anticipates will be required from the current day to seven (7) days forward. The forecast is updated daily and the volumes procured each day can change according to the forecast.

The following example describes how the AESO procures active regulating reserve based on the data from September 21, 2011 (see Table 1 below). As described above, active regulating reserve is procured for four (4) time blocks – on peak, off peak, AM super peak, and PM super peak. The AESO first procures the minimum volume forecast in each of the on peak and off peak time blocks. In the example portrayed in Table 1, the AESO would procure 135 MW for the off peak time block and 150 MW for the on peak time block. The AESO then procures the additional active regulating reserve volume for the AM super peak and the PM super peak time blocks. In the example portrayed in Table 1, the AESO would procure 65 MW for the AM super peak time block and 20 MW for the PM super peak time block.

Table 1: Forecast of Operating Reserve Volumes – Example

Date	Time Period	Active			Standby		
		RR	SR	SUP	RR	SR	SUP
09/21/2011	00:00 to 00:59:59	135	225	225	100	105	35
09/21/2011	01:00 to 01:59:59	135	225	225	100	105	35
09/21/2011	02:00 to 02:59:59	135	225	225	100	105	35
09/21/2011	03:00 to 03:59:59	135	225	225	100	105	35
09/21/2011	04:00 to 04:59:59	135	225	225	100	105	35
09/21/2011	05:00 to 05:59:59	200	225	225	100	105	35
09/21/2011	06:00 to 06:59:59	200	225	225	100	105	35
09/21/2011	07:00 to 07:59:59	215	257	257	100	105	45
09/21/2011	08:00 to 08:59:59	150	257	257	100	105	45
09/21/2011	09:00 to 09:59:59	150	257	257	100	105	45
09/21/2011	10:00 to 10:59:59	150	257	257	100	105	45
09/21/2011	11:00 to 11:59:59	150	257	257	100	105	45
09/21/2011	12:00 to 12:59:59	150	257	257	100	105	45
09/21/2011	13:00 to 13:59:59	150	257	257	100	105	45
09/21/2011	14:00 to 14:59:59	150	257	257	100	105	45
09/21/2011	15:00 to 15:59:59	150	257	257	100	105	45
09/21/2011	16:00 to 16:59:59	150	257	257	100	105	45
09/21/2011	17:00 to 17:59:59	170	257	257	100	105	45

09/21/2011	18:00 to 18:59:59	170	257	257	100	105	45
09/21/2011	19:00 to 19:59:59	170	257	257	100	105	45
09/21/2011	20:00 to 20:59:59	170	257	257	100	105	45
09/21/2011	21:00 to 21:59:59	170	257	257	100	105	45
09/21/2011	22:00 to 22:59:59	170	257	257	100	105	45
09/21/2011	23:00 to 23:59:59	155	225	225	100	105	35

3.3 Timing of Operating Reserve Procurement

Operating reserve is procured one (1) day in advance of when it is required. Procurement does not occur on weekends and holidays; therefore, procurement for the weekend (Saturday, Sunday and Monday) takes place on Friday. Since the market is closed on Sunday, Monday is included in the weekend. On holidays, the AESO procures operating reserve on the last business day before the holiday. If a holiday occurs in conjunction with a weekend, then the AESO procures operating reserve for the holiday in addition to the weekend.

The daily schedule for offer submission is set by Watt-Ex. Watt-Ex receives submissions from 09:00 am through to 10:10 am as follows:

- (a) in the case of offers for active regulating reserve for the on peak and off peak periods, no later than 09:10 am on the business day before the day that the offer is effective;
- (b) in the case of offers for active regulating reserve for the super peak periods, no later than 09:20 am on the business day before the day that the offer is effective;
- (c) in the case of offers for active spinning reserve, no later than 09:30 am on the business day before the day that the offer is effective;
- (d) in the case of offers for active supplemental reserve, no later than 09:40 am on the business day before the day that the offer is effective;
- (e) in the case of offers for standby regulating reserve, no later than 09:50 am on the business day before the day that the offer is effective;
- (f) in the case of offers for standby spinning reserve, no later than 10:00 am on the business day before the day that the offer is effective; and
- (g) in the case of offers for standby supplemental reserve, no later than 10:10 am on the business day before the day that the offer is effective.

The order of market closure is related to the technical requirements for each product. Regulating reserve has the strictest technical requirements and is therefore the highest value product. Supplemental reserve has the least restrictive technical requirements and is therefore the lowest value product.

The sequential closing of the market ensures that if a pool participant fails to sell their entire highest value product (e.g., regulating reserve), they have an opportunity to sell any remaining capacity in other operating reserve markets (e.g., spinning reserve, then supplemental reserve).

3.4 Pricing

(a) Active Reserve Market

The AESO bids for a volume of operating reserve defined as either on peak, off peak, AM super peak, or PM super peak, at a price that is at a discount (lower) or at a premium (higher) to the pool price.

Pool participants submit their price and quantity offers into the operating reserve market for each product at a discount or a premium to the pool price, referred to as indexing to the pool price. When the market closes, offers are sorted based on price, and the lowest priced offers that fill the AESO's bid quantity are selected. The highest priced offer that satisfies the quantity required is referred to as the marginal or clearing offer.

For active operating reserve, a pool participant is paid the pool price plus the equilibrium price. The equilibrium price is the average of the AESO bid price and the marginal offer.

Equilibrium Price = (Bid + Marginal Offer)/2

The seller is not required to pay the AESO if pool price + \$X is negative. For example, for an equilibrium price of \$X, the AESO pays Max (0, pool price + \$X) times quantity.

When the AESO issues a directive for contingency reserve or a dispatch for regulating reserve to a pool participant to provide the real power offered for operating reserve, the pool participant is paid the current pool price for the real power they are providing, in addition to the payment they receive for providing the operating contingency reserve.

The general process for trading on Watt-Ex is illustrated in this example:

The AESO needs to buy 100 MW of on peak spinning reserve and the AESO's bid price is \$10. Here are the offers:

- Offer 1: 10 MW at -\$10 (Pool Price plus -\$10)
- Offer 2: 30 MW at -\$5 (Pool Price plus -\$5)
- Offer 3: 40 MW at \$0 (Pool Price plus \$0)
- Offer 4: 10 MW at \$5 (Pool Price plus \$5)
- Offer 5: 10 MW at \$10 (Pool Price plus \$10)
- Offer 6: 25 MW at \$15 (Pool Price plus \$15)
- Offer 7: 30 MW at \$20 (Pool Price plus \$20)

In this example, the marginal offer is Offer 5 (\$10) because it is the last offer, when combined with Offers 1, 2, 3 and 4, that makes up the quantity of 100 MW the AESO requires. The equilibrium price is then calculated as the average of the AESO's bid and the marginal offer. In this example, the equilibrium price is $(\$10 + \$10)/2 = \$10$.

For on-peak hour ending X, pool price is \$31. The payment the AESO makes to pool participants providing active operating reserve for hour ending X is $\$10 + \$31 = \$41/\text{MW}$.

If the pool participant subsequently receives a directive or, in the case of regulating reserve, is receiving a control signal, the pool participant also receives the pool price for the real power provided.

(b) Standby Reserve Market

The standby market utilizes a two-part pricing model with a premium price and an activation price.

- (i) Premium Price – the price paid to the seller to provide the AESO the option to call on the operating reserve if required.
- (ii) Activation Price – the price paid to the seller if the AESO issues a dispatch for the operating reserve.

The AESO clears the market using a blended price formula, which ranks the standby offers based on the following algorithm:

$$\text{Blended Price} = \text{Premium} + (\text{Activation \%} \times \text{Activation Price})$$

Activation percentages are based on historical product activation rates for on peak and off peak hours. They are subject to change as market conditions change. If there is a change, the AESO gives notice to market participants.

If two (2) blended prices are equal, the AESO selects the offer that was submitted to the Watt-Ex system first until its quantity requirements are filled.

When the contingency reserve provider receives a directive to provide a quantity of contingency reserve, the provider continues to receive the activation price and also receives the pool price for the real power provided.

After a dispatch for regulating reserve, the provider continues to receive the activation price and also receives the pool price for the real power provided.

The standby operating reserve merit order sorts all the standby quantities procured for each product from lowest activation cost to highest activation cost. The lowest cost quantities are activated first. The AESO only issues dispatches for the quantity required to address the deficiency in active operating reserve.

(c) Operating Reserve Settlement

Watt-Ex serves as a clearing house for operating reserve the AESO procures on the exchange. Sellers receive payment directly from Watt-Ex for operating reserve sold, and in turn, the AESO receives an invoice from and settles financially with Watt-Ex.

(d) Internal Controls for Procurement of Operating Reserve

The procurement of operating reserve is governed by formal AESO internal policies. Once a year, or whenever changes to any relevant policies occur, AESO Commercial Services staff are required to sign an acknowledgement letter indicating they have read, understood, and are in compliance with the policies that govern Commercial Services practices.

On a daily basis, the AESO's Settlement and Risk department monitors trading activity and notifies Commercial Services if irregularities occur. Watt-Ex transactions are scrutinized for compliance with the Watt-Ex commercial agreement and all internal risk management guidelines.

4.5 Trade Cancellations

A trade cancellation can occur in the active and standby markets for any product for reasons outlined in the Watt-Ex Agreement.

5 Dispatches and Directives

The AESO issues dispatches and directives by way of the Automated Dispatch and Messaging System. However, if the Automated Dispatch and Messaging System is unavailable, the secondary means of communication between the AESO and market participants is via telephone.

The AESO uses a two-step process to contact pool participants providing operating reserve:

1) Dispatch for Operating Reserve

The AESO sends a dispatch for operating reserve to notify the pool participant to maintain additional capacity on its pool asset to ensure it can provide the additional real power to the interconnected electric system. The dispatch contains the following information for spinning reserve, supplemental reserve, and regulating reserve: the pool asset, the type of operating reserve, the amount of MW to be supplied, and the date and time the dispatch takes effect.

For regulating reserve, the additional capacity is the regulating reserve range. The generating unit provides real power within that range as directed by the automatic generation control.

2) Directive for Contingency Reserve

If required, the AESO sends a contingency reserve directive to a previously dispatched pool participant to notify the pool participant to provide the additional real power to the interconnected electric system.

Under normal market conditions, the contingency reserve directive is effective for one (1) hour. Under abnormal market conditions, such as supply shortfall, the AESO may issue an operating reserve directive for more than one (1) hour.

If the asset is not able to respond to a directive, the pool participant is required to: provide notice to the AESO as soon as practicable pursuant to subsections 4(1) and 4(2) of Section 301.2 of the ISO rules, *ISO Directives*; submit a restatement to reflect the operating state of the pool asset pursuant to subsection 3(3) of Section 205.3 of the ISO rules, *Restatements for Operating Reserve*; and potentially submit a force majeure report if the failure to respond to the a directive is a result of a force majeure as outlined in the Watt-Ex Agreement.

(a) Conscripted of Operating Reserve

The AESO may conscript non-contracted operating reserve by issuing a directive when all contracted operating reserve has been dispatched in accordance with Section 301.2 of the ISO rules, *ISO Directives*. If the AESO deems this out of market action to be necessary, the conscripted generator would receive a directive. The market participant is compensated according to the terms of the ISO tariff (Section 11) for the non-contracted amount provided.

(b) Concurrent Energy and Operating Reserve

If the AESO issues dispatches for a pool asset to provide both operating reserve capacity and energy in the energy market for the same period, then the AESO deducts the MW quantity of such operating reserve capacity from the available capability of the pool asset for the purposes of determining the MW quantity of the energy market dispatch.

(c) Non-compliance with a Dispatch or Directive

Failure to respond to a dispatch in accordance with the performance requirements in Sections 205.4, 205.5 and 205.6 of the ISO rules could result in remedies under the Watt-Ex Agreement, (i.e. claw back of payment to the pool participant for the operating reserve during the hour in question and assessment of liquidated damages).

Failure to respond to a directive in accordance with the performance requirements in Sections 205.5 and 205.6 of the ISO rules could result in remedies under the Watt-Ex Agreement, (i.e. a claw back of payment to the pool participant for the operating reserve during the hour in question, assessment of liquidated damages), and pursuit of the event as a contravention of one of these ISO rules.

When failure to comply with a dispatch or directive is a result of an event of force majeure (as defined in the Watt-Ex Agreement) and the pool participant notifies the AESO within two (2) business days of the occurrence, then both liquidated damages and pursuit as an ISO rule contravention may be waived. However, payment may still be clawed back for the service not provided.

6 Restatements and Substitutions

Pool participants that are providing operating reserve may restate the quantity of MW they are able to provide in accordance with subsections 3(1) and 3(2) of Section 205.3 of ISO rules and must restate the quantity of MW in certain circumstances in accordance with subsection 3(3) of Section 205.3 of ISO rules.

A pool participant may be pre-approved to substitute operating reserve from one pool asset to another within its portfolio under certain circumstances as outlined in subsection 4 of Section 205.3 of ISO rules. An asset that is pre-approved to provide a type of operating reserve can only substitute with other assets within its portfolio that are also approved to provide that type of operating reserve. The pre-approval is a standing arrangement unless there is a compliance issue or a change to the asset that will affect the operating reserve capability. In any event, the substituted volume should not exceed the asset's qualified capacity for the type of reserve.

Revision History

Posting Date	Description of Changes
2016-09-28	Administrative amendments
2014-12-23	Initial Release