Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

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[1] in effect, the authoritative document governs.

1 Purpose

This information document relates to the following authoritative documents:

- Alberta Reliability Standard EOP-011-AB-1, *Emergency Operations* ("EOP-011-AB-1");
- Section 202.2 of the ISO rules, *Short-Term Adequacy and Supply Shortfall* ("Section 202.2");
- Section 202.4 of the ISO rules, *Managing Long Lead Time Assets* ("Section 202.4");
- Section 202.6 of the ISO rules, *Adequacy of Supply* ("Section 202.6"); and
- Section 305.1 of the ISO rules, *Energy Emergency Alerts* ("Section 305.1").

This information document provides background information regarding the steps the AESO uses to manage a supply shortfall event, and the criteria for conducting short-term and long-term adequacy assessments. It also provides information on requirements contained in authoritative documents regarding energy emergency alerts. This information document is likely of most interest to market participants, pool participants, legal owners and operators of sink assets and source assets, and legal owners of electric distribution systems.

2 AESO Steps in Managing Supply Shortfall

Appendix 1- Table 1: Supply Shortfall Management of this information document identifies steps that the AESO takes when managing a supply shortfall event. Certain steps may be more effective than others based on the supply shortfall event.

The AESO continues to meet the control performance standard as defined in the *Consolidated Authoritative Document Glossary* during a supply shortfall event. If the AESO determines that a step in Appendix 1 is not effective in managing the supply shortfall event to meet the control performance standard, the AESO skips that step and proceeds with steps determined to be more effective. If the AESO skips one or more steps in Appendix 1 when managing a supply shortfall event, the AESO returns to the skipped steps and reduces the requirements for energy from later steps if time and operating conditions permit.

3 Notification of Energy Emergency Alerts

Section 305.1 focuses on who needs to communicate information related to an energy emergency alert. In comparison, Appendix 1 of EOP-011-AB-1 details the process and describes the levels the AESO uses to communicate the condition of its balancing authority area when it is experiencing an energy emergency.

Appendix 2 - Table 2: Energy Emergency Alert Notification Methods of this information document lists the process the AESO uses to notify market participants of an energy emergency alert. When the AESO notifies market participants regarding an energy emergency alert, the AESO and the market participants

[1] "Authoritative document" 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 associated regulations, and that contain binding legal requirements for either market participants or the AESO, or both. Authoritative documents include the ISO rules, the reliability standards, and the ISO tariff.

identify and discuss any work that increases the risk of tripping a generating unit, energy storage resource, or an intertie and which could subsequently be stopped.

After notifying parties of an energy emergency alert, the AESO posts notice of the energy emergency alert in the *AIES Event Log* located on the AESO website. Additionally, market participants may find useful information in the *Supply Adequacy Report* located on the AESO website.

4 Voluntary Efforts to Alleviate Supply Shortfall

The AESO may request the assistance of the following market participants in alleviating a supply shortfall event:

4.1 Pool Participants

A pool participant may, in response to the message issued pursuant to subsection 3(1) of Section 202.2, voluntarily curtail load. If a pool participant can no longer voluntarily curtail load, the AESO encourages the pool participant to provide notice to the AESO before restoring large amounts of load.

4.2 Legal Owners of Electric Distribution Systems

The AESO encourages the legal owner of an electric distribution system to make best efforts to achieve a 3% voltage reduction on the electric distribution system. The AESO encourages those who reduced voltage in response to the shortfall event to notify the AESO before restoring voltage to normal.

5 Determining Short-Term Supply Adequacy

In some situations, the amount of demand is greater than the amount of energy offered in the energy market merit order. When the AESO has issued dispatches for all energy in the energy market merit order, the interconnected electric system may experience a supply shortfall event. A supply shortfall event can be caused by events such as:

- generation contingencies;
- transmission contingencies;
- energy market deficiencies; or
- unexpected demand levels.

The AESO assesses short-term adequacy to determine the likelihood of a supply shortfall event in upcoming settlement periods. If the short-term adequacy assessment indicates that a supply shortfall event is likely to occur, then the AESO takes steps to maintain regulating reserves and avoid shedding firm load.

6 Long Lead Time Asset Priority Order for Supply Shortfall

The AESO issues directives to long lead time assets, if a short-term adequacy assessment leads the AESO to take the steps outlined in subsection 3(2) of Section 202.2. The AESO issues directives in the following priority order:

(a) shortest start-up time;

(b) largest incremental availability capability;

(c) shortest minimum run time; and

(d) lowest loss factor.

7 Short-Term Adequacy Assessment Assumptions

The AESO makes certain assumptions when conducting the calculation described in subsection 3 of Section 202.6, including using a forecast output from aggregated facilities containing wind and solar, persisting current values for price-responsive loads and behind-the fence generation for the next 36 hours, and then applying a fixed number for the remainder of the 7-day period based on statistical data. Appendix 3 provides details of the calculations and methodologies underlying the AESO's supply adequacy-related forecasts and reports.

8 Long Term Adequacy Reporting

The AESO posts a quarterly report to the AESO website every February, May, August, and November, that contains long-term adequacy metrics. The long term adequacy metrics include: new generation projects and retirements, a reserve margin, a supply cushion, and the 2-year probability of supply adequacy shortfall. Appendix 3 – *Table 3: Calculations and Methodologies Regarding Supply Adequacy* provides details on the calculations and methodologies underlying the AESO's supply adequacy-related forecasts and reports.

8.1 New Generation Projects and Retirements Metric

The new generation projects and retirement metrics classify projects into four tables based on their status. The tables include the sponsor, project name, fuel type and unit capacity, and either the announced in-service date or the retirement date. Projects are classified in tables as follows:

(a) generation projects under active construction, as determined by the AESO;

(b) generation projects which have received government permits or approvals to proceed from the Electric Utilities Board, Alberta Utilities Commission or other Alberta agencies;

(c) generation projects which have a connection application before the AESO or have been publicly announced and have an ongoing commitment to proceed, as determined by the AESO; and

(d) existing generating assets which are known to be retiring as indicated by the public announcements of the owners of such assets or by other publicly available sources of information.

The AESO may provide additional public generation project information regarding the magnitude of the impact of a project on long term adequacy. The AESO may also identify potential impediments to the timely completion and connection of the projects.

8.2 Reserve Margin Metric

The reserve margin metric is a comparison of generation supply and demand during annual peak demand in Alberta. This metric is a calculation of the installed generation capacity and future generation capacity, accounting for seasonal hydro capacity and generation with on-site load, at the time of system peak that is in excess of the system annual peak demand, expressed as a percentage of the system peak. Three forecast reserve margins are presented, each with different future supply additions. The different supply additions correspond to the stage of the generation projects in the new generation projects and retirements metric. The metric may be calculated with or without intertie capacity, as appropriate for the specific study, since full import capability may not always be available at the time of system peak

demand.

8.3 Long Term Adequacy Metrics Report

The long-term adequacy metrics report illustrates the ability of installed generation capacity and future generation capacity, accounting for seasonal hydro capacity and generation with on-site load, to meet peak demand on a daily basis. This metric includes existing generation and generation under construction, less announced retirements, but it does not include transmission outages unless a generator, energy storage resource, or aggregated facility submits an outage or derate. A deficiency of supply to meet daily peak demand does not mean a supply shortfall exists as there may be intermittent output from resources such as wind, solar, or imports available to meet demand. Any confidential information used in the metric is only shown in aggregate form.

8.4 2-year Probability of Supply Adequacy Shortfall Metric

The 2-year probability of supply adequacy shortfall metric provides information on potential energy supply shortfall events during the 2-year period on a rolling quarterly basis in terms of number of hours of supply shortfalls, largest supply shortfall hour in MW, and total MWh not served. The calculated total MWh not served represents the cumulative total of MW of demand not served during each hour of all supply shortfall events modeled during the 2-year period.

The AESO may establish other metrics deemed appropriate for the assessment of long-term adequacy in Alberta. The other metrics may not necessarily be published in the quarterly report but would assist the AESO in fulfilling its obligations under subsection 6(1) of Section 202.6 and under the *Electric Utilities Act*.

The AESO updates the long-term adequacy metric methodology as appropriate. Generally, the methodology:

(a) covers the key elements which directly or indirectly measure long-term adequacy;

(b) is relatively simple to understand and promotes understanding of the energy market;

(c) to the extent possible, is based on publicly available and verifiable information; and

(d) provides an outlook on long-term adequacy.

9 Long Term Adequacy Threshold Determination and Use

The AESO assumes an average hourly Alberta internal load and uses a one in 10-year one-hour supply shortfall to calculate the long-term adequacy threshold, as per the methodology in subsection 6(1) of Section 202.6. An example of the calculation for an average load of 8000 MW produces a one in 10-year one-hour supply shortfall equivalent to 800 MW (8000 MW / 10 years). Applying this over a 2-year period produces a threshold value of 1600 MWh (800 MWh x 2 years).

10 Long Term Adequacy Threshold Actions

The AESO may procure the following services if the long term adequacy threshold is exceeded:

(a) load shed – the AESO contracts with pool participants for the right to curtail load in certain circumstances and under specific terms and conditions.

(b) self-supply and back-up generation – the AESO contracts with the legal owners of self-supply and back-up generating units for the ability to call on such generating units to provide energy to the system. The contracted generating units normally only produce energy solely for use at the generation site, or are normally available to provide back-up

supply when there is an outage at the generation site, and would not otherwise have been available to participate in the energy market.

(c) emergency portable generation – the AESO would contract with the legal owners of emergency portable generating units for the ability to call on such generating units to provide energy to the system. Emergency portable generating units are portable units that are not currently located in Alberta but which can be interconnected on short notice if a suitable site is available.

11 Calculations and Methodologies Regarding Supply Adequacy

Appendix 3 – Table 3: Calculations and Methodologies Regarding Supply Adequacy provides details of the calculations and methodologies underlying the forecasts and reports referenced in subsection 5 of Section 202.6.

12 Directions to Generate Energy in Excess of Maximum Capability

During a supply shortfall event, a market participant with a source asset that can exceed a single contingency of 466 MW may receive a directive to generate energy in excess of its maximum capability. When this occurs, the AESO notifies the market participant verbally and no Automated Dispatch and Messaging System notification is sent.

The market participant is expected to follow the verbal directive. Directives to generate energy in excess of maximum capability are based on energy requirements to maintain system reliability.

Appendix 4 – Table 4: Calculations for Determining Generation Levels for Source Assets that can Exceed 466 Maximum Capability provides the calculations that the AESO uses when issuing these directives during a supply shortfall event.

Appendices

Appendix 1 – Table 1: Supply Shortfall Management

Appendix 2 – Table 2: Energy Emergency Alert Notification Methods

Appendix 3 – Table 3: Calculations and Methodologies Regarding Supply Adequacy

Appendix 4 – Table 4: Calculations for Determining Generation Levels for Source Assets that can Exceed 466 Maximum Capability

Revision History

Posting Date	Description of Changes
2025-11-17	Amended *Appendix 1* which list the steps taken to manage supply shortfall events. The following changes were made: • Removed Step 10: Issue directives for dispatched contingency reserves in excess of the contingency reserve requirement. • Moved Step 11 to Step 7: Issue directives for out-of-market energy from long lead time assets.

Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

Posting Date	Description of Changes
	• Added Step 8: Issue directives to available source assets that can exceed a single contingency of 466 MW for energy in excess of their Maximum Capability. • Added Step 17: Consider reducing Path 83 imports if multiple generators are limited from generating above maximum capability. • Renumbered steps if their position was affected by the changes. Other changes to the document: • Added Section 12 Directions to Generate Energy in Excess of Maximum Capability. • Section 8.3 was renamed to reference long-term adequacy metrics. • Added Appendix – 4 Table 4: Calculations for Determining Generation Levels for Source Assets that can Exceed 466 MW Maximum Capability. • Minor clarity related changes were also made.
2024-06-26	Revised Appendix 3 to clarify and ensure increased accuracy in supply adequacy related calculation. Removed the specific number used for persistent values in section 7 to ensure alignment with the methodology of Appendix 3 related to subsection 3 of Section 202.6 of the ISO rules.
2024-04-05	Administrative amendments to align with the Energy Storage ISO Rule amendments.
2023-03-06	Administrative updates to correct section references in Appendix 3.
2022-12-20	Addition of subsection 11 and Appendix 3 to include supply adequacy-related calculations and methodologies associated with Section 202.6 of the ISO rules, *Adequacy of Supply*, per AUC Decision 27604-D01-2022 (October 26, 2022); Revised subsections 8.2 and 8.3 to remove the exclusion of wind and solar generation from the calculations and methodologies relating to long-term adequacy of supply; conducted administrative updates.
2021-12-22	Revised Appendix 1 to align with newly issued EOP-011-AB-1. Consolidated the provisions of ID 2012-024R into this ID in Section

Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

Posting Date	Description of Changes
	3 and added Appendix 2. Amended to align with AESO drafting principles and conducted administrative updates.
2018-09-04	Updates to reflect addition of solar and clarify assumptions for short term adequacy assessments.
2015-10-19	Addition of Step 20, Appendix 1, Table 1, requesting BC emergency energy.
2013-12-20	Admin update to remove, re-organize and clarify information. Addition of long-term supply adequacy sections relating to Section 202.6 of the ISO rules.
2013-07-26	Reordered steps in Table 1 to reflect more efficient process
2013-06-24	Changes to steps in Table 1 to reflect more efficient process
2013-01-08	Initial release

Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

Appendix 1
Table 1: Supply Shortfall Management

The AESO performs the following steps in managing a supply shortfall event as outlined in section 2 of this information document. The AESO follows these steps in reverse order when returning to normal operations after a supply shortfall event.

(1)	The AESO, performs a short-term adequacy assessment in accordance with subsection 2 of Section 202.2, when the short-term adequacy program issues an alarm.
(2)	Perform planning steps, which may include: (a) if step 9 is anticipated to be reached, cancel transmission maintenance to remove generation constraints or increase import available transfer capability on all interconnections with neighbouring balancing authorities; (b) if it is assessed that shedding of firm load is likely to occur, and sufficient time is available for a public appeal to reduce electrical energy consumption to reduce load, arrange for AESO Corporate Communication to issue a public appeal; (c) allow for 1 hour notice if it is anticipated that the demand opportunity service 1 hour loads are to be curtailed in step 10; (d) determine in which future hours during the potential supply shortfall export available transfer capability on all interconnections with neighbouring balancing authorities are to be posted to 0 MW in step 6 so new export available transfer capability levels can be posted 1 hour in advance; (e) if the AESO reasonably anticipates an Energy Emergency Alert 1 or 2 is likely to be reached, notify the adjacent balancing authorities; and (f) allow for 1 hour notice if it is anticipated that the AESO Voluntary Load Curtailment Program loads are to be issued dispatches to terminate load in step 13.
(3)	Issue a dispatch to terminate dispatch down service with respect to a directive for energy from a long lead time asset.
(4)	Internal notifications within the AESO.
(5)	Declare Energy Emergency Alert 1 in accordance with EOP-011-AB-1.
(6)	Reduce export available transfer capability to zero on all interconnections with neighbouring balancing authorities and post the updated available transfer capability to the AESO website.
(7)	Issue directives for out-of-market energy from long lead time assets.
(8)	Issue directives to available source assets that can exceed a single contingency of 466 MW to generate energy in excess of their Maximum Capability.
(9)	Declare Energy Emergency Alert 2 in accordance with EOP-011-AB-1.
(10)	Curtail demand opportunity service loads.

(11)	Cancel transmission maintenance.
(12)	Request legal owners of an electric distribution system institute a 3% distribution voltage reduction.
(13)	Issue dispatches to terminate load in the AESO's voluntary load curtailment program as identified by the AESO internal procedures.
(14)	If available transfer capability is limited because of the lack of offers for fast frequency response service, then disregard this constraint and increase the posted Alberta-BC and Alberta-Montana interconnection import available transfer capability up to the limit as if all available fast frequency response is available. This step is performed as operating conditions allow.
(15)	If import available transfer capability is available, permit intra-hour interchange transactions up to the posted import available transfer capability limit.
(16)	Declare Energy Emergency Alert 3 in accordance with EOP-011-AB-1.
(17)	If multiple generators were directed above Maximum Capability as per Step 8, but were limited due to Path 83 scheduled imports, consider reducing Path 83 imports to allow for additional increases above Maximum Capability.
(18)	Issue directives for supplemental reserves.
(19)	Issue directives for spinning reserves.
(20)	If there is available capacity on the interconnections, request emergency energy from Saskatchewan.
(21)	If there is available capacity on the interconnections, request emergency energy from British Columbia.
(22)	If there is available capacity on the interconnections, request emergency energy from the Northwest Power Pool.
(23)	Issue a directive to curtail firm load and set pool price to $1000/MWh

Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

Appendix 2
Table 2 – Energy Emergency Alert Notification Methods

Party to be Notified	Notification Method
All market participants with bids or offers in the energy market merit order	Automated Dispatch and Messaging System
Legal owners or operators of transmission facilities	Phone call or posting electronic notifications
Adjacent balancing authorities and adjacent reliability coordinators	Phone call or posting electronic notifications
Legal owners or operators of electric distribution systems that are responsible for implementing firm load curtailment procedures	Phone call
Other entities that the AESO determines may be impacted by the state of supply shortfall	Phone call

Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

Appendix 3
Table 3: Calculations and Methodologies Regarding Supply Adequacy

Rule provision in Section 202.6	Nature of forecast or assessment	Calculation and methodology requirements
Subsection 2	Prescribed methodology for forecasting supply adequacy	The AESO will forecast supply and load using the peak demand hour of every day for a 2-year period, calculated as the sum of the following: (a) the maximum capability from all generating units and energy storage resources in Alberta with a maximum capability equal to or greater than 5 MW; plus (b) an estimate of the output from aggregated facilities; plus (c) import available transfer capability on interconnections with a program that increases available transfer capability; minus (d) declared generating unit derates; minus (e) any capacity of generating units which are affected by transmission constraints; minus (f) anticipated generating unit derates; minus (g) the daily forecast Alberta internal load; minus (h) operating reserves requirements; plus (i) price responsive load; plus (j) aggregate planned outage, unplanned outage and forced outage records for load; plus

Rule provision in Section 202.6	Nature of forecast or assessment	Calculation and methodology requirements
		(k) load for demand opportunity service
Subsection 3	Assessment of short-term adequacy of supply, including a real-time adequacy assessment	The AESO will, every hour, and at a minimum, complete a real-time adequacy assessment for each settlement interval of the current day and for the 6 remaining days of the forecast scheduling period on the day preceding that current day, calculated as the sum of the following: (a) available capability from all source assets, excluding wind and solar aggregated facilities and import assets, in Alberta with a maximum capability equal to or greater than 5 MW with an initial start-up time less than or equal to one hour or with a submitted start time at or before the period being assessed; plus (b) estimated output from wind and solar aggregated facilities; plus (c) estimated amount of price responsive load; plus (d) estimated amount of demand opportunity service load that is to be curtailed; plus (e) estimated on-site generation that supplies behind-the-fence load; plus (f) import available transfer capability on the interties; minus (g) the hourly forecast of Alberta internal load; minus (h) the AESO's estimated contingency reserve requirement supplied by generators; minus

Rule provision in Section 202.6	Nature of forecast or assessment	Calculation and methodology requirements
		(i) estimated constrained down generation.
Subsection 4	Specified long-term adequacy metrics	N/A, see subsections below
Subsection 4(a)	Metric listing Alberta electrical generation projects and retirements	The AESO will, on a quarterly basis, report on a metric consisting of a non-confidential list of Alberta electrical generation projects and retirements, including the following relevant information for each listed project: (a) name; (b) proponent; (c) size in MW; and (d) estimated year of completion.
Subsection 4(b)	Metric of forecast reserve margin	The AESO will report on a metric consisting of forecast reserve margin, which will (a) have a minimum 5-year forecast period; and (b) be calculated using a methodology that (i) is a measure, expressed in percentage terms, representing the amount of generation capacity at the time of system peak that is in excess of the annual peak demand; (ii) utilizes AESO load forecasts; (iii) utilizes existing generating unit capacity information such as maximum capability and the generation forecast capacity published as part of the metric referenced in subsection 4(a) of Section 202.6; (iv) accounts for behind-the-fence load and generation capacity; (v) adjusts for hydro generation available at the time of system peak; (vi) incorporates interconnection capacity; and

Rule provision in Section 202.6	Nature of forecast or assessment	Calculation and methodology requirements
		(vii) may reflect more than a single supply and load scenario for the system.
Subsection 4(c)	Metric of supply cushion	The AESO will report on a supply cushion metric that provides a 2-year forecast of available daily generation capacity and peak demand that will (a) be measured in MW; and (b) be calculated using a methodology that (i) incorporates generating unit capacity information such as the maximum capability of generating units; (ii) utilizes AESO load forecasts; (iii) incorporates daily average planned outages and derates as reported by pool participants in their planned outage scheduling submissions as well as a nominal average unplanned outage and forced outage rate; (iv) accounts for behind-the-fence load and generation capacity; (v) adjusts for hydro generation available at the time of daily system peak; (vi) excludes interconnection capacity; and (vii) excludes existing generation that is contractually available but that does not participate in the energy market.

Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

Rule provision in Section 202.6	Nature of forecast or assessment	Calculation and methodology requirements
Subsection 4(d)	Metric of probability of supply adequacy shortfall	The AESO will report on a 2-year probability of supply adequacy shortfall metric that will (a) provide a probabilistic assessment of a state of supply shortfall over the next 2 years; (b) be calculated using a methodology that (i) utilizes AESO load forecasts; (ii) utilizes existing generating unit capacity information such as maximum capability and the metric referenced in subsection 4(a) of Section 202.6; (iii) incorporates hourly planned outages and derates as reported by pool participants in their planned outage scheduling submissions; (iv) incorporates interconnection capacity estimates; and (v) utilizes a distribution of outcomes for the following inputs: (A) intermittent or energy limited resources; and (B) unplanned outages and forced outages.

Information Document
Adequacy, Supply Shortfall and Energy Emergency Alerts
ID #2012-006R

Appendix 4
Table 3: Calculations for Determining Generation Levels for Source Assets that can Exceed 466 MW Maximum Capability[1]

Path Status	Calculation
Path 1 and Path 83 in service and Path 83 Import is **less than or equal to** 220 MW	1400 MW + (BC/MATL Net Schedule Import) = Most Single Severe Contingency level
Path 1 and Path 83 in service and Path 83 Import is **greater** than 220 MW	-1 x BC/MATL Net Schedule Import + 3.4 x (MATL Net Schedule Import) + 220 MW = Most Single Severe Contingency level
Path 1 In service and Path 83 Out of Service	1150 MW + (BC Net Schedule Import) = Most Single Severe Contingency level
Path 1 and Path 83 Out of Service	Most Single Severe Contingency (with Armed FFR)[2]

Note:

1. Area planning studies are used to determine which assets can be directed above 466MW.
2. An additional 50 MW may be added to the Most Single Severe Contingency.