Information Document
Interim Supply Cushion Directives
ID #2024-005

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 document:

- Section 206.2 of the ISO rules, *Interim Supply Cushion Directives* ("Section 206.2").

The purpose of this information document is to describe the AESO's process for the issuance and reporting of unit commitment directives under Section 206.2 and provide details on pool participant submission of costs. This document is likely of most interest to pool participants with eligible long lead time assets as is defined in the AESO's Consolidated Authoritative Document Glossary ("CADG").

2 Background

Section 206.2 facilitates the requirements and objectives of the *Supply Cushion Regulation*, AR 42/2024. Pool participants may also refer to the *Supply Cushion Regulation* for further guidance.

3 Estimated Cost Parameters and Physical Constraints Template

3.1 Template Details

Subsection 2 of Section 206.2 requires pool participants to submit to the AESO estimated cost parameters and physical constraints for eligible long lead time assets. Appendix 2 – *Estimated Cost Parameters and Physical Constraints Template* is the form by which pool participants are to submit these estimated cost parameters and physical constraints to the AESO.

The first sheet of the Estimated Cost Parameters and Physical Constraints Template titled "Template Inputs", is expected to be filled and submitted to the AESO. The second sheet of the Template, titled "Cost Estimate", can be used by a pool participant to determine estimated cost parameters and is to be submitted if requested by the AESO.

The Template Inputs tab has two sections, one with estimated cost parameters and physical constraints representative of the eligible long lead time asset, or of the eligible long lead time asset operating at minimum stable generation; the other section with estimated costs and parameter and physical constraint parameters specific to the start-up condition of the eligible long lead time asset, split into three start-up warmth categories.

3.2 Template Terms

As laid out in the Estimated Cost Parameters and Physical Constraints Template, estimated start-up costs and physical constraints may be split into "Hot", "Warm" and "Cold" categories. These categories are used to identify three different start-up modes of the eligible long lead time asset and its associated estimated cost parameters and physical constraints characteristics. Each start-up mode should be identified by the length of time that the eligible long lead time asset has been offline. The "lower limit" indicates the minimum amount of time that would have elapsed following de-synchronization for that start-up mode of operation, in hours. Hot start-up mode is considered to start immediately after the eligible long lead time

[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.

asset has reached 0 MW, and the lower limit is to be entered as 0 hours. Warm and cold start-up modes follow, with the lower limit defined by the pool participant, and are identified by a lower limit value greater than the previous start-up modes.

The definitions of “Minimum Stable Generation”, “Minimum off time”, “Maximum run up time”, “Minimum on time”, “Initial start-up time” and “Emissions Cost”, which are inputs used in the Estimated Cost Parameters and Physical Constraints Template, can be found in the CADG.

The AESO also notes that the ramp rate of an eligible long lead time asset will be the value submitted by a pool participant in ETS under subsection 6 of Section 203.1 of the ISO rules, *Offers and Bids for Energy*. Initial start-up time submitted to ETS pursuant to Section 203.1 identifies if an asset is an eligible long lead time asset.

The unit commitment process uses the lower limits and initial start-up times by start-up warmth category as submitted for each eligible long lead time asset in the Estimated Cost Parameters and Physical Constraint Template. In the rare case that an anticipated supply cushion deficit appears after the warm lower limit and within the warm initial start-up time as measured from the start of the lower limit of an eligible long lead time asset, a unit commitment directive may be issued to that asset while it is hot to minimize the supply cushion deficit.[2] This is because the initial start-up time and lower limits of an asset will result in a synchronization time which can only be addressed by issuing the unit commitment directive to the eligible long lead time asset while it is in the warmer start-up mode. In such cases, subject to subsection 5 of Section 206.2, the unit commitment directive will be issued within the last full settlement interval of the warmer start-up mode, and the initial start-up time will be the time to reach the synchronization time.

For example, consider an eligible long lead time asset that goes offline at 00:15. This asset has a hot initial start-up time of 2 hours, a warm initial start-up time of 5 hours, and a warm lower limit of 6 hours. If the unit commitment process seeks to issue a unit commitment directive for the asset to synchronize at 10:00, the directive can only be issued to the asset while it is in hot start-up mode, because, if the asset was to become warm at 6:15, there would not be the required 5 hours for the warm initial start-up time prior to the necessary synchronization at 10:00. The unit commitment directive is therefore issued while the asset is in hot start-up mode, prior to 6:00, to minimize the identified supply cushion deficit.

Other cells that are used to describe the estimated costs of the eligible long lead time asset are described in further detail below:

- No load heat rate estimate (GJ/h): indicates the gas that is required to be used by an eligible long lead time asset at any time after synchronization. This can be thought of as the gas which would theoretically be consumed while synchronized, regardless of output.
- Incremental heat rate estimate (GJ/MWh): indicates the gas that is required to produce a MW of output.
- Variable O&M cost estimate at MSG ($/hour): the variable operational and maintenance cost for the MWh produced that an eligible long lead time asset would incur over an hour while operating at minimum stable generation.
- Emissions cost estimate at MSG ($/hour): the emissions cost for the MWh produced that an eligible long lead time asset would incur over an hour while operating at minimum stable generation.

[2] The AESO notes that this process also applies after cold lower limits and within cold initial start-up times. For clarity, in the rare case that an anticipated supply cushion deficit appears after the cold lower limit and within the cold initial start-up time as measured from the start of the lower limit of an eligible long lead time asset, a unit commitment directive may be issued to that asset while it is warm to minimize the supply cushion deficit.

- Loss Factor %: can be found on the AESO website and is updated annually.
- Start-up heat (GJ): the gas which is required by an eligible long lead time asset during the initial start-up period until synchronization.
- Start-up variable O&M cost estimate ($): the variable operational and maintenance cost that would be incurred over the duration of the initial start-up period until synchronization.
- Start-up emissions cost estimate ($): the emissions cost that would be incurred over the duration of the initial start-up period until synchronization.

3.3 Template Submission and Notification

A pool participant is to submit its Estimated Cost Parameters and Physical Constraints Template, including any updates, pursuant to subsection 2 of Section 206.2, to the AESO via email at ucdirectives@aeso.ca.

The AESO expects that the estimated cost parameters and physical constraints submitted in the Estimated Cost Parameters and Physical Constraints Template will represent the typical operating characteristics under normal operating conditions of the eligible long lead asset. Temporary changes for abnormal operating conditions may not require a resubmission.

The AESO will provide written notification to a pool participant, as required under subsection 2(6) of Section 206.2, via the email address used by the pool participant to submit the Estimated Cost Parameters and Physical Constraints Template.

4 Anticipated Supply Cushion Methodology

The anticipated supply cushion is a measure of energy left in the energy market merit order. The AESO calculates the anticipated supply cushion pursuant to subsection 4 of Section 206.2 and the methodology underlying its determination of the anticipated supply cushion, as set out in Appendix 1, *Table 1: Anticipated Supply Cushion Methodology*, of this Information Document.

The AESO provides the following additional details on the methodology set out in Appendix 1 to this Information Document:

- The estimated output from wind and solar aggregated facilities is the forecast available on the AESO wind & solar forecasting webpage, using the “most likely” forecast for both the 12-hour and 7-day forecast.
- The forecast of the net interchange is modelled by the AESO using actual offers, ATC limits, and fundamental variables in Alberta and surrounding jurisdictions.
- The estimated constrained down generation is forecasted based on the wind and solar forecasts, plus system congestion and wind and solar generation from the past 72 hours.

The AESO calculates the anticipated supply cushion for each settlement interval of the current day and the next 6 days. The calculation for the anticipated supply cushion is updated frequently, approximately every 5 minutes for the current hour and for the next 71 hours, for a total of 72 hours. It is updated once per hour for the remainder of the 7-day Market Supply Cushion Report.

The Market Supply Cushion Report, available as a public “Current” report on ETS, displays the results of the anticipated supply cushion by reporting levels of market supply cushion available from 0 MW to 1000 MW+, in 200 MW increments. Further metadata information is available within the report.

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5 Unit Commitment Directives

5.1 Unit Commitment Process and Determination of Directives

When the AESO identifies any settlement interval(s) where the anticipated supply cushion is below the supply cushion threshold of 932 MW, the AESO will seek to minimize the deficit by issuing unit commitment directives to eligible long lead time assets to either come online or remain online.

The unit commitment process is an optimization process that seeks to issue a unit commitment directive or combination of unit commitment directives according to relative economic merit, while satisfying any asset constraints, to minimize supply cushion deficits identified by the anticipated supply cushion. Unit commitment directive(s) are issued to out-of-merit eligible long lead time assets, taking into account physical constraints. Once issued, a unit commitment directive will result in an eligible long lead time asset rejoining the dispatchable merit order effective at the start time identified in the directive and contributing its available capability to the anticipated supply cushion calculation, thereby minimizing the anticipated supply cushion deficit.

The AESO will determine what is the least cost unit commitment directive, or combination unit commitment directives, to be issued to the eligible long lead time assets by using both the estimated cost parameters and physical constraints submitted to the AESO by a pool participant in Appendix 2 to this Information Document.

5.2 Timing of Instructions for a Unit Commitment Directive

While the AESO may identify a supply cushion deficit, it will not be addressed through the issuance of unit commitment directives until the times determined by the physical constraints of the eligible long lead time assets. The AESO delays issuing instructions for a unit commitment directive until close to the timing determined by the lower limit and initial start-up time constraints of the eligible long lead time asset receiving the unit commitment directive. If an identified supply cushion deficit is eliminated prior to the relevant initial start-up time constraint of an eligible long lead time asset, the AESO will not issue a unit commitment directive.

For a unit commitment directive requiring the eligible long lead time asset to start up at a specified time and then proceed to ramp to minimum stable generation, the AESO issue the instruction in accordance with subsection 5(6) of Section 206.2 prior to the relevant initial start-up time associated with the start-up mode warmth category of the eligible long lead time asset and commitment period that the eligible long time asset is addressing. For example, if an eligible long lead time asset with a 4-hour initial start-up time is directed to synchronize by 18:00, the unit commitment directive will be issued prior to 14:00.

For unit commitment directives that require an eligible long lead time asset to remain online, the instructions for a unit commitment directive will be generated once the long lead time asset has been subject to a dispatch to 0 MW as a result of energy offers out of merit and, if applicable, the end of a previous unit commitment directive period. These instructions may be sent prior to the top of the hour in which the eligible long lead time asset is to be subject to a 0 MW dispatch.

5.3 Delivery of Instructions for a Unit Commitment Directive

Unit commitment directives will be issued via a phone call from the AESO System Controller to the pool participant and be accompanied by an ADaMS message summarizing the instructions for a unit commitment directive. For the times that the eligible long lead time asset is to ramp up or operate due to a unit commitment directive, a corresponding “UC” dispatch instruction to the eligible long lead time asset’s minimum stable generation level will be issued through the “TMR/UC” column in ADaMS. When a unit commitment directive is over, a UC dispatch to 0 MW will be issued.

For more information regarding messages and dispatches in ADaMS, please see the *Automated Dispatch and Messaging System Participant Manual* in the help section of ADaMS.

5.3.1 ADaMS Functionality Issue

Due to the expedited timelines in which the AESO was required to integrate unit commitment directives into existing dispatch tools, there is a technical issue to note regarding the ADaMS unit commitment directive and dispatch instructions. The AESO continues to work to resolve this issue and will update market participants accordingly:

- The UC dispatch level issued to pool participants will be to the minimum stable generation value submitted in ETS. If a pool participant had submitted a minimum stable generation value of 0 MW for the first settlement interval subject to a unit commitment directive following the start time, a UC dispatch of 2 MW will be sent. AESO systems cannot accommodate a 0 MW minimum stable generation in the UC dispatch instruction and the value of 2 MW is instead used. In the case that a pool participant changes the minimum stable generation of an asset that is responding to a unit commitment directive, a new UC dispatch will not be sent. The AESO notes that settlement will be based on the eligible long lead time asset generating up to the minimum stable generation, regardless of the UC dispatch instruction level.

5.4 Pool Participant Response to a Directive

In addition to Section 206.2, pool participants that receive a unit commitment directive for an eligible long lead time asset must comply with other requirements applicable to directives including subsection 3 of Section 301.2 of the ISO rules, *ISO Directives*.

A unit commitment directive will not be cancelled after it is issued.

While subject to a unit commitment directive, the pool participant of the eligible long lead time asset will receive UC dispatch instructions to the asset's minimum stable generation level. The pool participant must meet dispatch requirements as per Section 203.4, *Delivery Requirements for Energy,* during the unit commitment directive duration for any applicable UC dispatch instructions. Prior to, during, and following a unit commitment directive, the eligible long lead time asset can be dispatched or directed for energy or ancillary services.

6 Submission of Costs Being Claimed by a Pool Participant

The following information relates to pool participant obligations under subsections 7(1) and 7(2) of Section 206.2.

The AESO expects the written request for payment required to be submitted by a pool participant under subsection 7(2) of Section 206.2 to be in the form of an invoice that conforms with the invoice requirements found in ID 2025-001, *Invoices Submitted to the AESO*. The AESO also expects that the invoice contains the following additional information:

- The time the unit commitment directive was in effect as shown by the begin time and operation end time of the unit commitment directive in the ETS unit commitment directive report;
- An itemized accounting of pre-GST incremental costs incurred in operating up to minimum stable generation in response to a unit commitment directive net of all pre-GST pool price revenue including the following:
    - Total actual costs of all variable charges under the ISO tariff applicable to the eligible long lead time asset, including any applicable loss factor charge or credit;

- Total variable operational and maintenance charges;
- Total fuel costs to start and run the eligible long lead time asset;
- Total emissions cost;
- Total incremental costs up to minimum stable generation calculated as the sum of the 4 incremental cost line items above;
- Total pool price revenue calculated as the sum of the revenue as listed in the energy payment column in the Settlement Daily Detail (Production) report in ETS for the hour(s) of the unit commitment period; and
- The subtotal calculated as total incremental costs up to minimum stable generation minus total pool price revenue.

The attestation, in the form of Appendix 1 – Form of Costs Attestation under Section 206.2, should only be completed and attested to by a corporate officer of the pool participant or a corporate officer of the legal owner, in accordance with subsection 7(3) of Section 206.2, once all incremental costs related to a unit commitment directive have been incurred by the pool participant.

The AESO expects that a separate Form of Costs Attestation and written request for payment will be completed and submitted for each separate unit commitment directive that was issued to a pool participant of an eligible long lead time asset. This means that pool participants should submit a separate written request, in the form of an invoice, and attestation for each asset directed on, and for each unit commitment directive, even if more than one directive was issued on the same day. For clarity, if a pool participant was issued a unit commitment directive to operate an asset from 12:00 – 14:00 on January 1, and was also issued a separate unit commitment directive to operate the same asset from 14:00 – 16:00 later on January 1, the AESO expects two separate invoices and attestations to be submitted. Likewise, if a pool participant was issued unit commitment directives to operate two different assets during the same or overlapping periods, the AESO would also expect two separate invoices and attestations to be submitted.

The written request for payment and the completed attestation should be submitted in accordance with subsection 7(5) of Section 206.2 and at one time to the AESO via email at ucdirectives@aeso.ca. Written requests for payment will not be processed without the submission of the completed attestation.

Submission of Appendix 3 - *Actual Incremental Costs Calculation Template* is not required unless requested by the AESO to assist in understanding the costs being claimed by the pool participant as set out in subsection 7(2)(c) of Section 206.2.

In the rare case that the metered volumes of an eligible long lead time asset that had been subject to a unit commitment directive are updated after the AESO's payment to the pool participant has been processed, the AESO expects a pool participant to submit a new attestation and invoice so that the AESO can process the revised cost of the unit commitment directive and payment due to the pool participant.

Pool participants will see any payments as a result of the submissions of actual costs for unit commitment directives on the pool participant's pool statement. An ETS report, titled UC Summary Report found under the historical settlement reports (public), detailing the payment summary for the aggregated costs associated with unit commitment directives will be populated following the processing of payments.

7 Unit Commitment Directives Report

A report titled Unit Commitment Directives is available as a public current and historical ETS report. A unit commitment directive record is made available once a unit commitment directive has been issued.

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Appendices

Appendix 1 – *Table 1: Anticipated Supply Cushion Methodology*

Appendix 2 – *Estimated Cost Parameters and Physical Constraints Template*

Appendix 3 – *Actual Incremental Costs Calculation Template*

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Revision History

Posting Date	Description of Changes
2025-10-23	Updates to the Cost Estimates Sheet of Appendix 2 - Estimated Cost Parameters and Physical Constraints Template to clarify that start-up costs are the costs that would be incurred over the duration of the initial start-up period until synchronization.
2025-04-22	Updates to subsections 3.2, 5.2, 6 and 7 following final Alberta Utilities Commission approval of revised Section 206.2, and to clarify the use of “initial start-up time” and reporting of Unit Commitment Directives. Update to Appendix 2 – Estimated Cost Parameters and Physical Constraints Template to include minimum off time, minimum on time and initial start-up time as hourly values.
2025-02-05	Updates to clarify the written request for payment of unit commitment directives, including reference to ID #2025-001, *Invoices Submitted to the AESO*. Updates regarding current ADaMS functionality issue and removal of resolved ADaMs issues. Addition of Section 7 – Unit Commitment Directives Report. Other administrative edits.
2024-08-22	Updates to clarify functionality in ADaMS; inputs provided by pool participants via Appendix 2 and “initial start-up time” in ETS.
2024-06-21	Initial release.

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Appendix 1

Table 1: Anticipated Supply Cushion Methodology

Rule provision in Section 206.2	Nature of forecast or assessment	Calculation and methodology requirements
Subsection 3(1)	Methodology underlying the determination of the anticipated supply cushion	The AESO will, at a minimum every hour, calculate the anticipated supply cushion 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 on-site generation that supplies behind-the-fence load; minus (d) minimum of forecasted net interchange or zero, where imports are a negative value and exports are priced at $999.99 and curtailed at the top of the merit order; minus (e) the hourly forecast of Alberta Internal Load; minus (f) the AESO's estimated contingency reserve requirement that will be supplied by generators; minus (g) estimated constrained down generation.

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Appendix 2 – *Estimated Cost Parameters and Physical Constraints Template*

Posted on the AESO website as a separate Excel workbook.

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Appendix 3 – *Actual Incremental Costs Calculation Template*

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