

# Information Document

## Calculation of Pool Price and Transmission Constraint Rebalancing Costs During a Constraint Event

### ID #2015-006R



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(s) in effect, the Authoritative Document(s) governs.

## 1 Purpose

This Information Document relates to the following Authoritative Documents<sup>1</sup>:

- Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (“Section 302.1”); and
- Section 103.4 of the ISO Rules, *Power Pool Financial Settlement* (“Section 103.4”).

The purpose of this Information Document is to provide information regarding the determination of pool price, the calculation of transmission constraint rebalancing payments and the display of information relating to the location and estimated cost of constraint events.

## 2 Inflow and Outflow Constraints

Transmission constraints are generally described as either inflow or outflow constraints.

- An inflow constraint occurs when there is insufficient in-merit generation in an area to reliably serve load, resulting in excess load in the area, and insufficient transmission capability to flow energy into the area to serve such load. In the case of an inflow constraint, the area containing excess load is considered to be located at the “downstream constraint side”, and the area outside the area containing excess load is considered to be located at the “upstream constraint side”.
- An outflow constraint occurs when there is insufficient transmission capability to permit all in-merit generators to deliver the full amount of their offered energy to the Alberta interconnected electric system. In the case of an outflow constraint, generators and, in some circumstances, importers are considered to be located at the “upstream constraint side”, while loads are considered to be located at the “downstream constraint side”.

This Information Document applies only to the mitigation of an outflow constraint, as the mitigation of an inflow constraint does not involve curtailing in-merit generation. Therefore, the mitigation of an inflow constraint does not result in transmission constraint rebalancing payments, which are described below, because dispatches or directives for transmission must-run energy from generating units located at the downstream constraint side are generally effective in mitigating an inflow constraint. Any potential impact associated with the dispatch of out-of-merit energy by way of a dispatch or directive for transmission must-run energy is offset through the use of dispatch down service.

## 3 Determination of Pool Price

The pool price is the single clearing price of energy in the Alberta electricity market, which reflects the intersection of the unconstrained supply and demand curves. When there are no constraints, the AESO dispatches up the energy market merit order to ensure supply-demand balance. The highest asset marginal price at the point of balance during a given minute determines the system marginal price upon which the AESO sets the pool price in accordance with subsection 4 of Section 201.6 of the ISO rules, *Pricing* (“Section 201.6”). As there is no curtailed generation and no transmission constraint rebalancing, the AESO sets the pool price based on the unconstrained system marginal price.

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<sup>1</sup> “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.

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In order to ensure supply-demand balance is maintained during an outflow constraint event in which in-merit energy is curtailed to mitigate a constraint, the AESO dispatches up the constrained energy market merit order, with constrained units removed, in accordance with subsection 2 of Section 203.2 of the ISO rules, *Issuing Dispatches for Energy*. The AESO IT system identifies the constrained system marginal price, which is the highest asset marginal price at the point where there is supply-demand balance in a one minute period. The AESO IT system then determines the following information in order to calculate a transmission constraint rebalancing volume for each minute during the constraint event:

- The volume of in-merit energy which has been constrained down;
- For the first hour in which there is a constraint event, the volume of the import interchange transactions that have been reduced due to an intra-Alberta constraint. During subsequent hours, a new schedule is implemented to reflect reduced available transfer capability and the constrained down import volume is considered to be zero; and
- The amount of transmission must-run energy dispatched when the system marginal price is less than or equal to the reference price.<sup>2</sup>

The transmission constraint rebalancing volume is then applied to an energy market merit order containing all supply resources, regardless of constraint conditions. The AESO IT system starts at the point in the unconstrained merit order where there is supply-demand balance, and moves down the unconstrained merit order by a volume equal to the transmission constraint rebalancing volume calculated above. By doing so, the AESO IT system determines what the system marginal price would have been if the constraint event(s) had not occurred. These are the unconstrained system marginal price values upon which pool price is set in accordance with subsection 4 of Section 201.6.

Note that transmission must-run energy dispatched in accordance with subsection 2(2)(b) of Section 302.1 may offset some or all of the volume of in-merit energy which has been constrained down, decreasing the transmission constraint rebalancing volume. The AESO dispatches other generating units off by an amount equal to the transmission must-run dispatch volume in order to balance supply and demand.<sup>3</sup> Therefore, where transmission must-run is dispatched instead of transmission constraint rebalancing, pool price is determined based on the unconstrained system marginal price values.

#### 4 Calculation of Transmission Constraint Rebalancing Payments

When the AESO dispatches up the energy market merit order in order to replace in-merit generation that has been curtailed due to a constraint, those generators with offers located above the unconstrained price are eligible to receive a transmission constraint rebalancing payment determined in accordance with Section 103.4. The AESO IT system determines the energy production volume of each block of energy priced between the constrained system marginal price and the unconstrained system marginal price and multiplies that volume by the difference between the unconstrained pool price and the offer price associated with the MW level of energy provided by that eligible offer block in order to determine the amount of the transmission constraint rebalancing payment.

#### 5 Display of Real Time Information Relating to the Location and Estimated Cost of Constraint Events

Information regarding the location and estimated cost of constraint events is displayed on the AESO website once hourly pool price has been posted. Regions are as indicated by color in the map included in Appendix 1.

The following information will be displayed on the AESO website:

- (a) the estimated cost of constraints;

<sup>2</sup> The reference price is calculated in accordance with subsection 5 of Section 201.6.

<sup>3</sup> Note that dispatch down service is not dispatched when the volume of in-merit energy that has been constrained down is equal to or greater than the volume of dispatched transmission must-run energy.

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- (b) the estimated TCR charge; and
  - (c) the location of constraints
- (collectively referred to as the “real time information”).

The real time information will be displayed on the AESO website [Trading Page](#) in the form of an *Estimated Cost of Constraint Report*. See the example in Appendix 2. Historical information will be available via a historical report query.

## 6 Appendices

[Appendix 1 – Map Indicating Geographic Areas](#)

[Appendix 2 – Example Estimated Cost of Constraint Report](#)

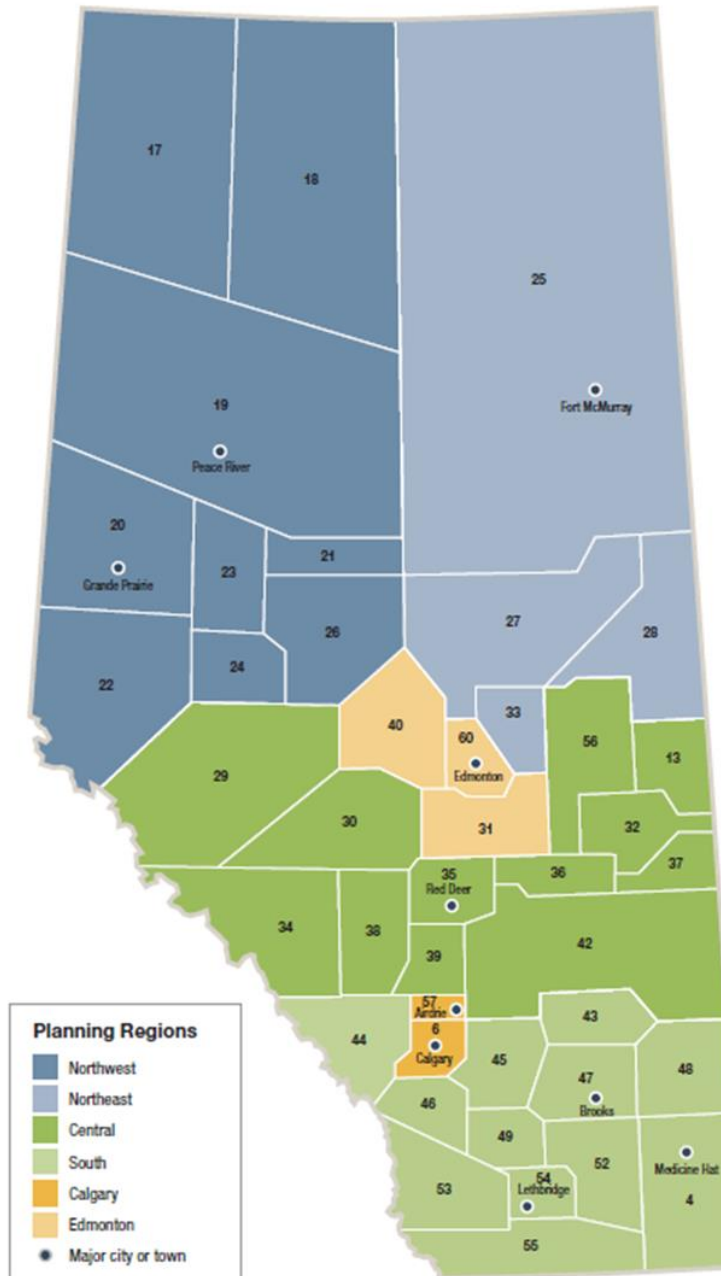
### Revision History

Posting Date	Description of Changes
2016-09-28	Administrative amendment
2015-11-26	Addition of information in sections 2, 3 and 4 and Appendices.
2015-11-04	Initial Release.

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## Appendix 1 – Map Indicating Geographic Regions



## AESO transmission planning areas

### ➤ NUMERICAL      ➤ ALPHABETICAL

- |    |                        |    |                        |
|----|------------------------|----|------------------------|
| 4  | Medicine Hat           | 34 | Abraham Lake           |
| 6  | Calgary                | 57 | Airdrie                |
| 13 | Lloydminster           | 36 | Alliance/Battle River  |
| 17 | Rainbow Lake           | 27 | Athabasca/Lac La Biche |
| 18 | High Level             | 47 | Brooks                 |
| 19 | Peace River            | 6  | Calgary                |
| 20 | Grande Prairie         | 38 | Caroline               |
| 21 | High Prairie           | 28 | Cold Lake              |
| 22 | Grande Cache           | 39 | Didsbury               |
| 23 | Valleyview             | 30 | Drayton Valley         |
| 24 | Fox Creek              | 60 | Edmonton               |
| 25 | Fort McMurray          | 48 | Empress                |
| 26 | Swan Hills             | 53 | Fort Macleod           |
| 27 | Athabasca/Lac La Biche | 25 | Fort McMurray          |
| 28 | Cold Lake              | 33 | Fort Saskatchewan      |
| 29 | Hinton/Edson           | 24 | Fox Creek              |
| 30 | Drayton Valley         | 55 | Glenwood               |
| 31 | Wetaskiwin             | 22 | Grande Cache           |
| 32 | Wainwright             | 20 | Grande Prairie         |
| 33 | Fort Saskatchewan      | 42 | Hanna                  |
| 34 | Abraham Lake           | 21 | High Prairie           |
| 35 | Red Deer               | 18 | High Level             |
| 36 | Alliance/Battle River  | 46 | High River             |
| 37 | Provost                | 29 | Hinton/Edson           |
| 38 | Caroline               | 54 | Lethbridge             |
| 39 | Didsbury               | 13 | Lloydminster           |
| 40 | Wabamun                | 4  | Medicine Hat           |
| 42 | Hanna                  | 19 | Peace River            |
| 43 | Sheerness              | 37 | Provost                |
| 44 | Seebe                  | 17 | Rainbow Lake           |
| 45 | Strathmore/Blackie     | 35 | Red Deer               |
| 46 | High River             | 44 | Seebe                  |
| 47 | Brooks                 | 43 | Sheerness              |
| 48 | Empress                | 49 | Stavely                |
| 49 | Stavely                | 45 | Strathmore/Blackie     |
| 52 | Vauxhall               | 26 | Swan Hills             |
| 53 | Fort Macleod           | 23 | Valleyview             |
| 54 | Lethbridge             | 52 | Vauxhall               |
| 55 | Glenwood               | 56 | Vegreville             |
| 56 | Vegreville             | 40 | Wabamun                |
| 57 | Airdrie                | 32 | Wainwright             |
| 60 | Edmonton               | 31 | Wetaskiwin             |

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#### Appendix 2 – Example Estimated Cost of Constraint Report

Date (HE)	Estimated Cost (\$)	Estimated TCR Charge (\$/MWh)	Location of Constraints
01/01/9999 15	-	-	-
01/01/9999 14	0.00	0.00	-
01/01/9999 13	353.48	0.05	Region Name
01/01/9999 12	0.00	0.00	-
01/01/9999 11	3.87	0.00	Region Name
01/01/9999 10	1.15	0.00	Region Name
01/01/9999 09	1.51	0.00	Region Name
01/01/9999 08	0.00	0.00	-
01/01/9999 07	0.00	0.00	-
01/01/9999 06	0.00	0.00	-
01/01/9999 05	0.00	0.00	-
01/01/9999 04	0.00	0.00	-
01/01/9999 03	20.00	0.00	Region Name
01/01/9999 02	0.00	0.00	-
01/01/9999 01	0.00	0.00	-
01/02/9999 24	0.00	0.00	-
01/02/9999 23	0.00	0.00	-
01/02/9999 22	0.00	0.00	-
01/02/9999 21	0.00	0.00	-
01/02/9999 20	0.00	0.00	-
01/02/9999 19	0.00	0.00	-
01/02/9999 18	0.00	0.00	-
01/02/9999 17	0.00	0.00	-
01/02/9999 16	579.42	0.08	Region Name