



# Changes to Transmission Loss Factors Methodology

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## DISCUSSION PAPER

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## 1. Executive Summary

The AESO hosted a stakeholder session on loss factor methodology on June 23, 2010. The AESO presented high level ideas on incorporation of high voltage direct current (HVDC) losses into the loss factor software along with treatment of Transmission Must Run (TMR), new generator and Demand Opportunity Services (DOS).

The AESO invites all stakeholders to provide written comments on the proposed conceptual loss factor methodologies for incorporating HVDC technology into the Alberta Interconnected Electric System presented at the session. The AESO also invites all stakeholders to suggest any alternative methodology, along with their supporting rationale, they would like to see studied. Feedback is also solicited on the treatment of TMR changes, new generators and the appropriate capacity factor to use for new DOS in Loss Factor methodologies.

The AESO will conduct studies for incorporating the HVDC losses into the loss factor software and the results will be presented to stakeholders in October 2010. The AESO will make the necessary revisions to ISO Rule 9.2 based on the outcome of this consultation process.

## 2. Purpose

The purpose of this discussion paper is to solicit input from stakeholders on proposed changes to Loss Factor calculation methodologies that are required in order to incorporate HVDC technology into the Alberta Interconnected Electric System. The AESO welcomes feedback from stakeholders on the loss factor methodologies to be studied and to also to provide comments on the treatment of Transmission Must Run changes, the addition of new generators and the appropriate capacity factor to use for new Demand Opportunity Services (DOS) in Loss Factor methodologies.

## 3. Guiding Principles

- The AESO and stakeholders will act in good faith and in a fair and respectful manner.
- The AESO has very specific obligations contemplated in various Acts and Regulations. The AESO must ensure the safe and reliable operation of the Alberta Interconnected Electric System (“AIES”) and promote a fair, efficient and openly competitive market for electricity.
- A comprehensive, inclusive, transparent, fair and efficient consultation process that is understood and accepted by all parties.
- AESO information will be made available in a manner that stakeholders can readily understand and with adequate time for review and consideration.

- An effective consultation process will involve a full discussion of the views of the stakeholders, to enable the AESO to make the best decision possible in the context of the AESO mandate.
- The AESO will consider all feedback by stakeholders in response to this Paper, but will only incorporate feedback that is within the stated scope of the underlying initiative. The AESO commits that any material changes to the stated scope of the initiative will be consulted on with stakeholders.

## 4. Introduction / Background

In the process of transferring energy over the Alberta Interconnected Electric System (AIES), some energy is lost to the atmosphere in the form of heat. In Alberta, the cost of these losses is paid for by transmission connected generators, Opportunity Service, and Import and Export Service (Transmission Regulation AR 174/2004).

Total AIES system losses are calculated by subtracting metered energy delivered from the system, including point-of-delivery and exports, from metered energy delivered to the system, including point-of-service and imports. Loss factors are representative of the impact on system losses by each generator or group of generators.

A calibration factor is used as a means of reconciling the costs paid by generators, importers and exporters and opportunity services customers, against the actual costs of transmission line losses. The difference is either refunded to or recovered from the contributor.

Legally binding loss factors are used in the AESO's settlement process and locked in at January 1<sup>st</sup> for the following year. Non-binding loss factors are set for five years into the future. The goal of loss factors is to create location based, long-term signals to be factored into business decisions for generators considering investment in Alberta's electricity market.

Alberta introduced a new transmission loss factor methodology in 2006, based on the 2004 Transmission Regulation. Changes were made in 2007 and 2008 to incorporate new consideration in the 2007 Transmission Regulation. The current model is known as 50% Area Load Methodology Using Corrected Loss Matrix.

The addition of generators and loads to the system, the completion of major transmission enhancements, and changes to the technology and voltage levels used on the system are all changes that affect losses on the system. The loss factor methodology and process are updated as required to reflect these types of new circumstances.

The potential impact of planned addition of critical infrastructure and specifically HVDC technology identified in the [AESO's 2009 Long-term Transmission System Plan](#) on losses must be reflected in the loss factor calculation methodology. The incorporation of HVDC technology into the Alberta Interconnected Electric System requires changes to the current loss factor calculation methodology. Other considerations are the need to address the treatment of Transmission Must Run changes, new generators and the appropriate capacity factor to use for new Demand Opportunity Services (DOS) in the methodology.

In keeping with the AESO's commitment to timely, open and transparent communication and consultation practices, stakeholders are provided regular opportunities to review and provide feedback on the loss factor methodology and process.

## 5. Policy Coherence

The Transmission Regulation 86/2007, Part 6 gives the AESO authority to calculate and recover the cost of losses on the Alberta Interconnected Electric System

Under this authority, the AESO has put into effect ISO Rule 9.2 that describes the process and methodology used to calculate and allocate costs to generators, importers, exporters and opportunity service customers

The use of HVDC technology is referenced in the Provincial Energy Strategy (issued December 11, 2008) as part of the requirement to build Critical Transmission Infrastructure (CTI) in the province.

## 6. Loss Factor Methodology and Process

Current loss factor calculation methodology is based on 50% of area load using 12 base case load flows over four seasons at three loading levels. The base load flow loss factor is equal to 50% of rate of change of losses with AIES load. Imports are treated as generators and imports and exports recover transmission losses to the point of connection in Alberta.

The following are proposed loss factor calculation methodologies that address the addition of HVDC to the Alberta Interconnected Electric System:

### 6.1 Treatment of HVDC in Loss Factor Process – Solution – Method 1

DC scheduled flow is established by the System Operator and DC power is controlled to schedule within measuring tolerances. For any given total system North-South flow, increasing DC schedules reduces AC flows, creating an optimum loss operating condition.

### 6.2 Treatment of HVDC in Loss Factor Process – Solution – Method 2

DC is replaced with AC circuit of identical power flow losses. Load flow loss factors will recover equivalent DC losses. This method allows for the retention of some location-based signal. Additional effort will be required to set up base case load flows.

### 6.3 Treatment of HVDC in Loss Factor Process – Solution – Method 3

Develop specific methodology for DC. DC is likely to be operated to minimize total system losses subject to system constraints. DC dispatch could be tied to individual generator dispatch. Significant effort would be required to develop the methodology and software. The changes to methodology could be implemented for the 2015 loss factors.

### 6.4 Transmission Must Run (TMR) changes

The AESO welcomes feedback from stakeholders on how TMR changes should be incorporated into Loss Factor methodology. Suggested options are to treat TMR as existing generators using historical data, or to treat them as a transmission facility using forecasted data.

### 6.5 Addition of new generation facilities

The AESO welcomes feedback from stakeholders on how new generation facilities should be included to more accurately determine loss factors. Suggested options are to use the 1/3 or 2/3 inclusion or 0 MW generator output for the fractional season. Currently, a non-zero output is used as per AESO rule 9.2 for the whole season if the generator is expected to come on line before middle of the season. If a generator comes on line after middle of the season it is modeled in the next season. Please see Appendix 6, Transmission Loss Factor Methodology And Assumptions for details including the AESO definition of season.

### 6.6 Treatment of new Demand Opportunity Services (DOS)

The AESO welcomes feedback from stakeholders on what capacity factor should be used in incorporating new DOS into loss factor methodology. Suggested options are to have the customer provide forecasted usage or to use the average of existing DOS loads.

## 7. Next Steps

The AESO invites all stakeholders to provide written comments on the proposed conceptual loss factor methodologies to be tested and other issues described in this document. The AESO also invites all stakeholders to indicate any other methodology they would like to see studied along with the supporting rationale for the requested study methodology. Stakeholders are asked to provide their feedback using the comment matrix provided by the deadline of July 30, 2010.

Based on the feedback received from stakeholders, loss factor methodology(ies) will be selected for study using a small test system. The results from these studies will then be presented to stakeholders and further consultation will be undertaken to discuss the results of the studies. One methodology will be selected to apply to the calculation of future loss factors and the AESO will make the necessary revisions to ISO Rule 9.2 through regular ISO Rule stakeholder consultation process.

**The AESO looks forward to receiving feedback from stakeholders on each stage of this process.**

<b>Select and test methodologies</b>	
July 30, 2010	Deadline for submission of stakeholders comments on proposed methodologies and well as any new suggestions
Start July 30,	methodology(s) to study based on stakeholder feedback

2010	
August 3, 2010	Set up small test system – no resemblance to AIES Determine loss factors with small test system for each method.
Finish October 1, 2010	Present results of studies to stakeholders Discuss results of studies and select one methodology to apply to Loss Factors in consultation with stakeholders
<b>Produce Five Year Non-Binding Loss Factors</b>	
November 15, 2010	Patch existing software with selected methodology
	Re-publish non-binding 2014 Loss Factors for selected methodology
	Update and test software (4 to 6 months)
	Test with 2015 non-binding loss factors
<b>Update Loss Factor Software</b>	
Mid - April 2011	Update and test with new software 2011 binding (no DC)
	Test with 2015 non-binding loss factors
	Start production 2016 non-binding loss factors

## 8. Appendix

- [ISO Rule 9.2](#)
- [Appendix 6, ISO Rule](#)