

# Implementation Plan to Develop a Revised Loss Factor Rule in Compliance With Decision 790-D03-2015

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Factor Rule and Loss Factor Methodology  
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# 1 Introduction

1 On November 26, 2015, the Alberta Utilities Commission (“Commission”) issued Decision 790-D03-2015 (the “Decision”) addressing *Complaints regarding the ISO Transmission Loss Factor Rule and Loss Factor Methodology*, including directions to the AESO to change Section 501.10 of the ISO rules, *Transmission Loss Factor Methodology and Requirements* (“Loss Factor Rule”), to implement the Commission’s findings in the Decision.<sup>1</sup>

2 The Commission also directed the AESO to file by February 1, 2016, a plan (including a timeline) to develop a revised Loss Factor Rule (the “Revised Loss Factor Rule”) that implements the Commission’s findings (the “Implementation Plan”). This is the Implementation Plan prepared by the AESO in response to the Commission’s direction.

3 The Commission stated that once the Implementation Plan is reviewed and approved, the AESO will be directed to submit its Revised Loss Factor Rule in a compliance filing for Commission review and approval by a date to be determined.

## 1.1 Commission’s Directions, Findings and Guidance in Decision 790-D03-2015

4 The Commission summarized three directions to the AESO in section 1.1 of the Decision<sup>2</sup>. For convenience, the AESO will refer to those three directions as the “Incremental Methodology Direction”, the “Location Direction”, and the “Constant Load Direction”, as follows:

(a) **Incremental Methodology Direction:**

*The Commission directs the AESO to make changes to the current non-compliant Line Loss Rule replacing the current Corrected R-Matrix 50 per cent Area Load Adjustment Methodology (MLF/2) with an incremental loss factor (ILF) methodology for calculating raw loss factors using the Load Flow approach.*

(b) **Location Direction:**

*The Commission directs the AESO to make changes to the current non-compliant Line Loss Rule to specify that the location of a “generating facility,” will be the location of each metering point identifier (MPID) for a generating unit or group of generating units. ... This decision also provides for generators that own or control generating facilities to aggregate or disaggregate their generating facilities as they choose, at the same location ....*

(c) **Constant Load Direction:**

*The Commission directs the AESO to perform the ILF calculations by keeping load constant when a generation facility is (notionally) removed from the system and scaling up (i.e., notionally re-dispatching) other specific generation facilities to rebalance the system. The Commission ... directs the AESO to use energy market merit orders from the previous year (with necessary adjustments for forecasted changes in the generation mix) in order to forecast the line loss factors for the upcoming year. Instead of using twelve base cases (as currently employed by the AESO), the Commission directs that the actual merit order in*

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<sup>1</sup> Decision 790-D03-2015 at paragraph 182.

<sup>2</sup> *Ibid.* at paragraph 5.

*each of the 8,760 hours of the previous year be used for this purpose. However, if the AESO considers that a smaller number of hourly observations would not materially reduce the accuracy of line loss factors calculated by notionally re-dispatching output to rebalance the system, the AESO may propose such a smaller number of hours along with supporting statistical or other analysis.*

5 The Commission addressed and made findings in respect of a number of detailed implementation issues in section 6 of the Decision, which the AESO will refer to as indicated below:

(d) **Shift Factor Finding:**

*In view of the Commission's decision directing the AESO to use the merit order to calculate 8,760 base cases, or such lesser number of base cases as would accomplish essentially the same purpose, it may no longer be necessary or desirable for the AESO to recover the value/volume at each base case. The Commission expects the AESO to address this matter in its compliance filing.<sup>3</sup>*

(e) **Clip-and-Shift Finding:**

*The Commission agrees with the AESO's proposal to use an iterative clip and shift process as outlined in its June 19, 2015 proposed loss factor rule 501.10. ... The Commission further finds that this process should be done at the end of each year to preserve, to the extent possible, the economic signals inherent in the relative and absolute dispersion of line loss factors.<sup>4</sup>*

(f) **One-Year Average Finding:**

*The Commission finds that a five year rolling average is not a requirement of the Transmission Regulation, and in phase one of this proceeding, the Commission did not find that it was unreasonable for the AESO to calculate line losses on a one-year basis. ... The Commission anticipates that use of a historical merit order and the resulting 8,760 observations will provide a stable and realistic representation of line losses.<sup>5</sup>*

(g) **Procedure Document Finding:**

*Accordingly, the Commission finds it sufficient that the revised line loss rule make express reference to the AESO's procedure document. It is unnecessary to expressly include the AESO's procedure document in the revised line loss rule. ... The Commission encourages the AESO to provide as much information regarding the line loss calculation process as would reasonably meet the needs of market participants including, for example, the ability to independently replicate the AESO's line loss calculations, but leaves it within the AESO's discretion to determine what this should entail.<sup>6</sup>*

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<sup>3</sup> *Ibid.* at paragraph 164.

<sup>4</sup> *Ibid.* at paragraph 169.

<sup>5</sup> *Ibid.* at paragraph 172.

<sup>6</sup> *Ibid.* at paragraph 177.

**(h) Consultation Finding:**

*While the AESO is free to engage in further consultations with market participants, the Commission is not prepared to direct the AESO to do so.<sup>7</sup>*

6 Finally, the Commission issued its order and addressed the effective date for implementation of the Revised Loss Factor Rule in section 7 of the Decision, including two matters of guidance which the AESO will refer to as follows:

**(i) Effective Date Guidance:**

*Beyond directing that the AESO implement the changes ordered by the Commission and file the changed line loss rule as quickly as circumstances permit and as is reasonably possible, the Commission is without authority to alter these statutory provisions in order to expedite the effective date of the changes to the current Line Loss Rule as certain parties have requested.<sup>8</sup>*

**(j) Implementation Issues Guidance:**

*The Commission recognizes that the changes it has directed the AESO to make to the current Line Loss Rule are significant, and that related changes to the AESO's internal processes and information gathering and processing capabilities will likely also be required in order to comply with the Commission's directions. The Commission understands that these are not changes that can be implemented and operationalized in a matter of days or a few weeks. The Commission is also mindful that there may be unanticipated implementation issues or complications, technical or otherwise, which the AESO may wish to bring to the Commission's attention for further consideration and direction. The AESO has leave to do so as it considers necessary or advisable.<sup>9</sup>*

7 Where relevant, the AESO provides comments in response to these directions, findings, and guidance in this Implementation Plan.

## 1.2 Development of the Implementation Plan

8 To assist in the development of the Implementation Plan, the AESO held a consultation meeting with stakeholders on December 15, 2015, at which nine organizations were represented. The AESO presented preliminary information on its responses to the directions and findings in the Decision and discussed some elements of the Implementation Plan, including a timeline. Stakeholders provided comments during the meeting, and some provided additional comments in writing or by phone. The AESO did not conduct a formal written comment and response process, given the limited time available to prepare this Implementation Plan.

9 The AESO also submitted, by letter to the Commission on January 15, 2016,<sup>10</sup> a request for clarifications as well as information on the AESO's proposed approaches and assumptions for the Implementation Plan ("Clarification Letter"). Some of the information in the Clarification Letter will be expanded on in this Implementation Plan.

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<sup>7</sup> *Ibid.* at paragraph 181.

<sup>8</sup> *Ibid.* at paragraph 184.

<sup>9</sup> *Ibid.* at paragraph 185.

<sup>10</sup> Exhibit 790-X0445, *Request for Clarifications, and the AESO's Proposed Approaches and Assumptions for the Implementation Plan.*

10 Based on its considerations and discussion to date, the AESO is of the view that it is possible to develop the Revised Loss Factor Rule to implement the Decision's findings by January 1, 2017, although such a timeline will be challenging. The AESO provides as much detail on the implementation activities as is currently available in this Implementation Plan. However, the approaches and assumptions outlined in this Implementation Plan may change, or additional approaches and assumptions may be required, during development of the Revised Loss Factor Rule. The AESO will provide updates to the Commission and stakeholders as described in section 2.3 of this Implementation Plan.

### 1.3 Organization of This Implementation Plan

11 The remaining sections of this Implementation Plan are organized as follows:

- 2 **Implementation Strategy and Activities** — Summarizes the implementation strategy and activities for this Implementation Plan (including a timeline) to develop the Revised Loss Factor Rule that implements the Commission's findings in the Decision.
- 3 **Approaches and Assumptions** — Discusses specific aspects of the approaches and assumptions the AESO proposes to use for the implementation activities identified in this Implementation Plan.
- 4 **Responses to Commission Questions** — Summarizes the AESO's responses to the specific questions asked by the Commission in the Decision.

12 This Implementation Plan also includes an Appendix which provides the AESO's preliminary assessment of whether existing locations for which loss factors are calculated satisfy the criteria and requirements set out in the Location Direction, which is discussed more fully in section 3.

## 2 Implementation Strategy and Activities

13 The AESO has reviewed the loss factor methodology it had proposed during Module B of Proceeding 790 in light of the directions, findings and guidance provided in the Decision. Some aspects of the AESO's proposed methodology, including much of the procedure document, will be of value in implementing the Commission's directions, findings and guidance. However, some aspects of the methodology will require significant revision.

14 The AESO has developed its implementation strategy and related activities, as described more fully below, based on its current understanding of the requirements for the Revised Loss Factor Rule. The implementation strategy and activities are based on initial discussions within the AESO, with Teshmont Consultants (used by the AESO in its loss factor process), and with stakeholders.

15 For clarity, the AESO understands that the Decision does not impact the quarterly adjustment of loss factors using a calibration factor in accordance with section 33 of the *Transmission Regulation*, nor the recovery of the costs of transmission losses under the ISO tariff, in accordance with section 34 of the *Transmission Regulation*. The AESO's calibration factor process, through Rider E of the ISO tariff, and loss factor charges, through various rates of the ISO tariff, will continue both until and after the implementation of the loss factors developed in accordance with the Revised Loss Factor Rule.

### 2.1 Implementation Activities

16 At a high level, the development of the Revised Loss Factor Rule includes five areas of implementation activities, summarized below. The AESO's assumptions and proposed approaches related to these activities are provided in section 3 of this Implementation Plan.

#### 2.1.1 Assemble Input Data

17 The Revised Loss Factor Rule requires two main sets of input data:

- (i) 8,760 hours of energy market merit order volumes for all energy sources on the transmission system, identified at their associated points of supply; and
- (ii) 8,760 hours of load volumes for all energy sinks on the transmission system, identified at their associated points of delivery.

18 The data will be assembled from the most recent 12-month period prior to the beginning of the loss factor implementation process. For development of the 2017 loss factors, the AESO proposes to use data from January to December of 2015.

19 The Commission directed the AESO to use 8,760 historical hours of energy market merit order volumes in the Constant Load Direction. As historical energy market merit order volumes reflect weekday-weekend patterns and weather-related patterns, it is the AESO's view that the use of 8,760 historical hours of load volumes from the same period will align with those patterns.

20 The historical energy market merit order data will be adjusted to incorporate the addition of new generating assets and known changes at individual points of supply (terminations, reductions, and increases in capacity). Merit order volumes will reflect the full available capacity of each source asset in each operating block in each historical hour. Where blocks of available capacity are offered as operating reserves, those blocks will be included at the top of the merit order. Where a source asset does not submit operating blocks, a single block representing actual production will be used instead. For imports over interties, available transfer capacity which is not scheduled will be added as an import block at the top of the merit order. This approach should generally result in a merit order that resembles that which the

AESO uses in the actual operation of the transmission system, consistent with the Commission's discussion related to the Constant Load Direction<sup>11</sup>.

- 21 The historical load data will also be adjusted to incorporate the addition of new loads and known changes at individual points of delivery (terminations, reductions, and increases in capacity). Historical load volumes will be further adjusted to reflect the system load for the forecast loss factor year. Load volumes, after being adjusted for new loads and known changes, will be increased or decreased proportionally in every hour such that total load, in MWh, matches forecast system load, in MWh, for the forecast loss factor year.
- 22 The input data will be assembled into two tables. The merit order table will include all source asset volumes in each hour of the forecast year, with every volume associated with a measurement point on the transmission system. All merit order table volumes will be sorted in order of increasing offer price. The load table will similarly include all sink asset volumes in each hour of the forecast year, with every volume associated with a measurement point on the transmission system.
- 23 As each volume in the merit order table will be associated with a measurement point, the merit order table will reflect any aggregations or disaggregations of generating facilities permitted in accordance with the Location Direction<sup>12</sup>. To allow the assembly of the merit order table, the AESO will require all requests for aggregation or disaggregation to be received by March 31, 2016, for the calculation of 2017 loss factors. Aggregations will be addressed by combining similarly-priced operating blocks for the source assets being aggregated. Disaggregations will be addressed by creating two or more operating blocks out of each historical operating block, in proportion to the available capacities of the disaggregated generating facilities.
- 24 The AESO treats hourly generation and load data at individual measurement points as confidential information which should not be made publicly available. The AESO understands that hourly data for individual measurement points is commercially sensitive, as the provision of such information could result in harm to a market participant's competitive position by disclosing patterns and trends that could be used to the advantage of a competitor. Accordingly, hourly input data for the loss factor calculation will not be made publicly available.

### **2.1.2 Create Topology Cases**

- 25 The loss factor calculation requires the topology of the transmission system to be established for the forecast year, such that transmission system losses can be assessed. The AESO proposes to create 12 monthly topology cases. It is the AESO's view that 12 monthly topology cases will provide increased resolution of topology changes, which will be more consistent with the use of 8,760 hours of merit order and load volumes.
- 26 Each topology case will include all system developments and connection projects that are expected to be in service on the first of the month. For new facilities, the forecasted in-service dates will be based on the AESO's project queue as of March 31 of the year before the loss factor year. The AESO is currently reviewing the criteria to be used to determine when a system development or connection project is included in a topology case. Under the current MLF/2 loss factor methodology, a connection project is included only if the AESO has accepted a connection proposal for that project (that is, the project is in stage 3 of the connection process or later). Increasing the threshold to a later stage of the connection process may provide a more realistic basis for the topology cases.

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<sup>11</sup> Decision 790-D03-2015 at paragraph 146.

<sup>12</sup> *Ibid.* at paragraph 119.

27 Consistent with requirements of subsection 31(2)(c) of the *Transmission Regulation*, the topology cases will assume all transmission facilities are in service and no abnormal operating conditions exist.

28 The topology cases will be provided as 12 power flow base case files, one for each month of the loss factor year. The base cases will continue to be considered Critical Energy Infrastructure Information (CEII) data and therefore treated as confidential information by the AESO. As such, the topology cases will only be available to persons who (1) at the discretion of the AESO have demonstrated a legitimate need, and (2) have executed a non-disclosure agreement (NDA). The AESO generally considers use of the topology cases for the analysis and verification of loss factors to be a legitimate need.

### 2.1.3 *Develop Software and Scripts*

29 The AESO will continue to use Siemens PSS/E power system simulation software to calculate transmission system losses based on the input data and topology cases. The software and scripts are generally expected to follow steps similar to the procedure document filed by the AESO during Module B of Proceeding 790. However, calculating losses for 8,760 hourly observations will require significant effort to fully automate the operation of the PSS/E software, including more robust error handling and automation of file loading and additional logging.

30 The software and scripts will also need to accommodate dispatching up the energy market merit order as required by the Constant Load Direction. Initial settings, changes to settings during solution attempts, and solution tolerance limits will also be reviewed during the software development. The AESO is investigating whether voltage profiling can be automated through establishing standard limits in PSS/E.

31 The AESO notes that completing the simulations required by 8,760 hourly observations and about 130 source assets is expected to require 30 to 60 days of computation time to provide loss factors for one year, assuming a fully-automated simulation procedure and reasonable levels of parallel processing. No manual intervention can be accommodated within the computation procedure.

32 Including supply and load data for 8,760 hours will intrinsically include peak load hours as well as hours where available supply is limited due to generator maintenance or other outages. The AESO expects that, when large generators are disconnected as part of the loss factor calculation and the system is rebalanced by dispatching up the merit order, there will be hours when supply is insufficient to balance load. The AESO proposes that any such hour (when supply is insufficient to balance load) will be excluded from the loss factor calculations for all generators. In the AESO's view, reducing load to rebalance the system will inherently reduce losses and distort the loss factor calculation compared to calculations for smaller generators that do not result in insufficient supply in that hour. Excluding the hour only for the affected generator could bias the average loss factor by removing high load hours, which are typically associated with high losses, from the calculations for larger generators. Therefore, in the AESO's view, it is appropriate to exclude an hour when supply is insufficient to balance load with any generator removed, for all generators.

33 Any hour in which PSS/E is unable to simulate a solution that reaches tolerance will be excluded from the loss factor calculation for that generator. The AESO is of the view that such unsolvable hours will be more randomly distributed across hours and across generators, and there will likely be no inherent bias created if those hours are excluded for individual generators only.

34 The AESO expects that both hours with insufficient supply and unsolvable hours will be relatively infrequent in the context of the 8,760 raw loss factors being calculated for each generator. The AESO will monitor and record the frequency of both hours with insufficient supply and unsolvable hours, during the development of the loss factor calculation methodology during 2016.

35 The software and script development activity will result in a procedure or other document referred to in the Revised Loss Factor Rule that describes the calculation details implemented through software. The

procedure document will be comparable in scope and detail to the procedure document<sup>13</sup> submitted by the AESO during Module B of Proceeding 790.

#### **2.1.4 Submit Revised Rule**

36 In its compliance filing, the AESO will file a Revised Loss Factor Rule comparable in scope and detail to the proposed Loss Factor Rule<sup>14</sup> submitted by the AESO during Module B of Proceeding 790. The Revised Loss Factor Rule will incorporate the directions, findings and guidance in the Decision as well as any additional changes arising from the implementation activities.

#### **2.1.5 Calculate Loss Factors**

37 Once the software and scripts have been completed, the AESO will calculate 2017 loss factors in accordance with the Revised Loss Factor Rule for each service to which loss factors will apply. Because of the potential extended time it will take to calculate loss factors in accordance with the Revised Loss Factor Rule as discussed in section 2.1.3 above, the AESO may begin calculating loss factors prior to completion of the review of the Revised Loss Factor Rule by the Commission. The AESO expects that stakeholders will request information on the revised loss factors for their services as soon as practical.

38 The AESO notes that it is possible that the experience gained by completing the Revised Loss Factor Rule calculation process may result in refinements to the rule or the procedure document or may reveal shortcomings of the software or scripts that may need to be addressed during implementation.

## **2.2 Timeline**

39 As noted previously, it is the AESO's view that an effective date of January 1, 2017 for loss factors determined in accordance with the Revised Loss Factor Rule is challenging but possible. The high-level timeline to achieve such an effective date is illustrated in Figure 1 below.

40 Although the activities in Figure 1 are generally shown as being sequential, an individual activity may extend for a longer period of time than shown. Also, some activities may start earlier than shown, and some may not need to be completed until later than shown. For example, developing the specifications for the software and scripts may begin while input data is still being assembled, although the programming cannot be finalized until the input data set is essentially complete. As well, the creation of the 12 topology cases may extend for a few months beyond the completion date illustrated in Figure 1, as the timeline can be maintained as long as the content and format of the topology cases has been developed and completely specified to allow programming and scripting to be effectively developed.

41 In summary, while there is a certain amount of flexibility in starting and ending the activities shown, it is the AESO's view that the general sequence of activities illustrated in Figure 1 is reasonable.

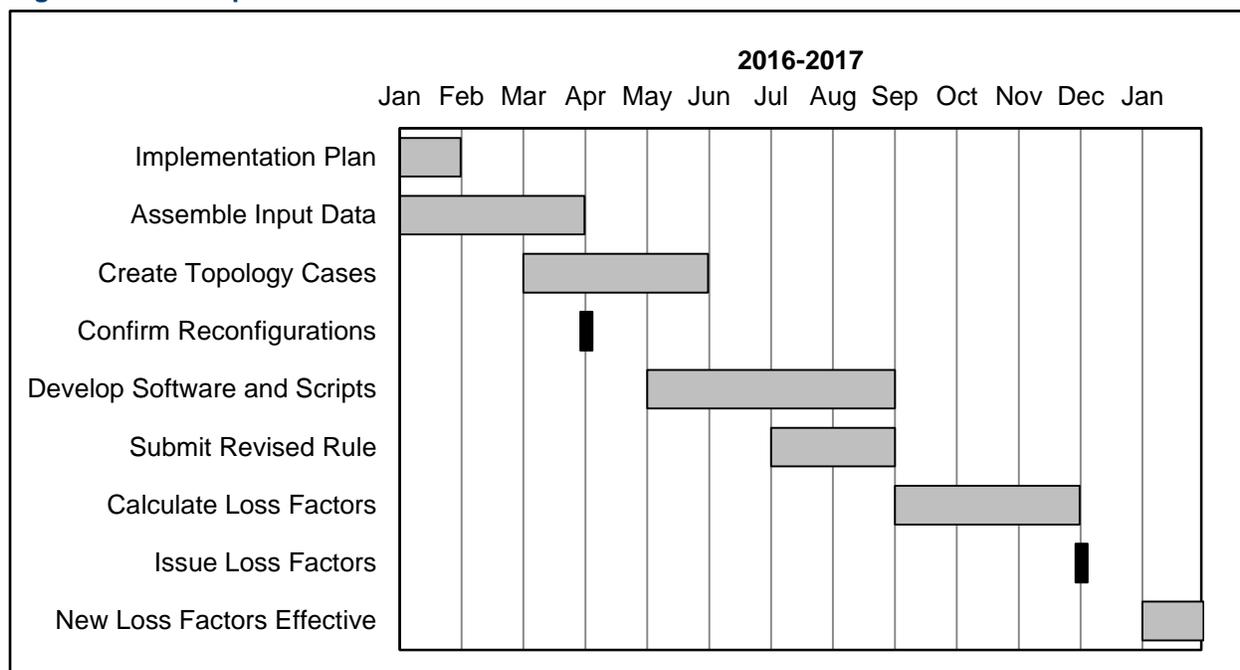
42 Note that the activity dates are based on the current understandings and assumptions of the AESO, some of which are discussed in more detail in section 3 of this Implementation Plan.

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<sup>13</sup> Exhibit 790-X0347.

<sup>14</sup> Exhibit 790-X0345.

**Figure 1 Implementation Timeline for Revised Loss Factor Rule**



43 The AESO will monitor the progress of implementation activities with respect to achieving the proposed effective date of January 1, 2017. If the AESO determines at any time that a January 1, 2017 effective date is no longer achievable, it will promptly advise the Commission and stakeholders of this conclusion such that alternatives can be explored.

### 2.3 Updates and Stakeholder Engagement

44 The AESO will file quarterly updates with the Commission on this Implementation Plan, which will report progress on the implementation activities described in section 2.1 above.

45 The Consultation Finding stated, “While the AESO is free to engage in further consultations with market participants, the Commission is not prepared to direct the AESO to do so.” Although it has not been directed to consult, the AESO will consider whether consultation with stakeholders during the implementation activities will be effective in achieving a January 1, 2017 effective date for the Revised Loss Factor Rule.

### 3 Approaches and Assumptions

46 While developing this Implementation Plan, the AESO applied certain approaches and made certain assumptions regarding details of the Commission’s directions, findings and guidance. Some of these approaches and assumptions have already been discussed in section 2 or were discussed in the Clarification Letter. Other approaches and assumptions identified to date are discussed briefly below.

47 Several of the approaches and assumptions relate to the Location Direction. To assist the Commission and stakeholders, the AESO has prepared a preliminary assessment of generating facilities for which loss factors have been determined in prior years using the MLF/2 methodology. The assessment is attached as an Appendix to this Implementation Plan. The assessment indicates the number of generating units or aggregated generating facilities<sup>15</sup> (“AGFs”) for which individual loss factors have previously been calculated, and whether those generating units or AGFs currently meet the location-related criteria and requirements set out in the Decision (as discussed in (a) and (b) below). Although the information provided is preliminary and not meant to be a final or definitive list, it illustrates the potential magnitude of aggregations that could occur as a result of the Decision

#### 3.1 Criteria to be Eligible for Aggregation

48 (a) As discussed in the Clarification Letter<sup>16</sup>, the AESO understands that generating units and AGFs are eligible for aggregation of their outputs if they are:

- at a single physical location;
- owned or controlled, managed, and operated by the same entity; and
- part of a single economic enterprise or undertaking and not independent, standalone businesses.

49 (b) The AESO further understands that the aggregation of eligible generating units or AGFs is a choice available to a market participant, and that choice will require the generating facility to satisfy the following one-to-one correspondence:

1	1	1	1	1	1 set of
loss	=	measurement	=	generating	=
factor	=	point	=	energy market	=
	=	facility	=	supply point	=
	=	asset	=	price-quantity	pairs

50 The AESO assumes that the correspondence indicated between measurement point and energy market supply point does not require that they be the same physical point, but requires that a single measurement point be associated with one and only one energy market supply point.

#### 3.2 Specific Inclusions for a Single Physical Location

51 (c) Subject to certain circumstances described below, the AESO will consider generating units to be at a single physical location as referenced in (a) above when they are connected to the transmission system at the same electrical bus. Consistent with the Commission’s findings at paragraph 119 of the Decision, any direct costs of implementing changes such that generating units are physically connected at the same bus will be borne by the market participant.

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<sup>15</sup> Aggregated generating facility, as defined by the AESO, means an aggregation of generating units, including any reactive power resources, which: (i) the ISO designates; and (ii) are situated in the same proximate location at one or more point of connections. An aggregated generating facility comprises multiple small generating units operated collectively as a single generating facility, and at present applies only to wind farms with multiple wind-powered generators. The acronym “AGF” will be used to distinguish an aggregated generating facility as defined by the AESO from the aggregation of generating units discussed in Decision 790-D03-2015.

<sup>16</sup> Exhibit 790-X0445 at paragraph 32.

- 52 (d) The AESO further interprets a single physical location as referenced in (a) above to include:
- generating units within an industrial system, while acknowledging that such generating units may sometimes be some distance apart;
  - generating units on an electric distribution system downstream of a single point of delivery, where the owner of the electric distribution system holds a system access service agreement under Rate STS for the flow of electricity from the electric distribution system to the transmission system; and
  - generating units within the City of Medicine Hat.

### 3.3 Eligibility for Aggregation of PPA Units

- 53 (e) For the reasons outlined in the Clarification Letter<sup>17</sup>, generating units held by a single PPA Buyer will be eligible for aggregation, while generating units held by different PPA Buyers will not be eligible for aggregation even if those generating units are subject to common offer control.

### 3.4 Bow River Hydro System Offered as One Source Asset

- 54 (f) For the reasons outlined in the Clarification Letter<sup>18</sup>, the AESO proposes to include provisions in the Revised Loss Factor Rule that will allow the Bow River Hydro System to continue to be offered as one source asset in the energy market, while receiving a separate loss factor at each of the eleven hydroelectric plants that comprise the Bow River Hydro System.

### 3.5 Generation Connected to an Electric Distribution System

- 55 (g) For the reasons outlined in the Clarification Letter<sup>19</sup>, the AESO proposes to include provisions in the Revised Loss Factor Rule that will allow a generating facility to connect to an electric distribution system and also offer into the energy market as a source asset.

### 3.6 Relief for Hardship or Unnecessary Costs

- 56 (h) For the reasons outlined in the Clarification Letter<sup>20</sup>, the AESO proposes to include provisions in the Revised Loss Factor Rule that will allow non-compliance with the location-based criteria and requirements set out in (a) and (b) above, in circumstances where severe hardship or unnecessary costs will otherwise be imposed.

### 3.7 Market Participant Obligations Regarding Aggregation

- 57 (i) A market participant will be required to continue to comply with applicable provisions of the *AESO Measurement System Standard* for any measurement points associated with any generating units or AGFs that aggregate or disaggregate. The market participant will be responsible for any direct costs of maintaining compliance for any aggregated or disaggregated measurement points.
- 58 (j) For a requested aggregation or disaggregation of generating units or AGFs, the AESO will require sufficient notice from a market participant to plan and implement any required physical reconfiguration, as well as to review and revise any affected measurement point definition records. If practical, aggregation will be implemented through totalized billing rather than physical reconfiguration. Similarly, if practical, disaggregation will be implemented using existing metering facilities where available. The AESO will assess requests for aggregation or disaggregation on a case-by-case basis, at least until greater familiarity with the process is developed.

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<sup>17</sup> *Ibid.* at paragraphs 34-41.

<sup>18</sup> *Ibid.* at paragraph 42(a).

<sup>19</sup> *Ibid.* at paragraph 42(b).

<sup>20</sup> *Ibid.* at paragraph 42(c).

- 59 (k) Aggregation or disaggregation of generating units or AGFs may have implications for market participants under the ISO tariff, including:
- impacts on the substation fraction used for billing of associated services under Rate DTS;
  - impacts on construction contributions;
  - impacts on generating unit owner's contributions and annual refunds; and
  - changes to system access service agreements.

60 The market participant will be responsible for any direct costs or impacts arising under the ISO tariff as a result of any aggregation or disaggregation of generating units or AGFs.

### 3.8 Determination of Net-to-Grid Values Based on Merit Order Volumes

- 61 (l) Under the current MLF/2 loss factor methodology, the AESO determines net-to-grid dispatch values to represent net supply to the transmission system at the measurement points defined in the measurement point definition records. With the use of 8,760 hours of historical energy market merit order volumes, it is not practical to determine net-to-grid values through manual analysis. The AESO will develop an approach to address this matter as part of the software and scripts for the loss factor calculations.

### 3.9 Treatment of Facilities Beyond the Measurement Point

- 62 (m) The AESO will also review the treatment of facilities beyond the measurement point in the identification of transmission system losses in the loss factor calculation. The AESO had previously proposed including facilities beyond the measurement point in the topology cases and using a facility property to identify those facilities which should be included in the identification of transmission system losses. The AESO will reassess whether this approach remains practical with the use of 8,760 hours of historical energy market merit order volumes. The AESO will develop an approach to address this matter as part of the software and scripts for the loss factor calculations.

### 3.10 Energy Market Merit Order

- 63 (n) New source assets will be inserted into the energy market merit order based on the average of price-quantity blocks offered by sources assets of similar technology. For example, merit order offer blocks for a new simple cycle gas turbine will be based on the average of merit order offer blocks for existing simple cycle gas turbines.
- 64 (o) For the reasons outlined in the Clarification Letter<sup>21</sup>, the AESO proposes to use the merit order that existed at 30:00 minutes past the hour (sometimes referred to as the “bottom of the hour”) for each hour of historical data.

### 3.11 Expected Steps for the Loss Factor Calculation Methodology

- 65 (p) The AESO expects the loss factor calculation methodology to generally reflect the following steps:
- (i) calculate a raw loss factors for each source asset in each of 8,760 hours, discarding hours with insufficient supply or that are unsolvable as discussed in section 2.1.3;
  - (ii) calculate the volume-weighted average loss factor for each source asset as discussed in the Clarification Letter<sup>22</sup>;

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<sup>21</sup> *Ibid.* at paragraph 46(a).

- (iii) apply a single shift factor to all average loss factors to ensure recovery of the forecast annual transmission system losses, in accordance with the Shift Factor Finding; and
- (iv) use an iterative clip and shift process to ensure loss factors are within the collars specified in the *Transmission Regulation*, in accordance with the Clip-and-Shift Finding.

### 3.12 Continued Use of Loss Factor Adjustment Provisions

66 (q) The Revised Loss Factor Rule will include provisions for adjusting final loss factors similar to those included in the proposed Loss Factor Rule<sup>23</sup> filed in Module B of Proceeding 790, namely, when the final loss factor for a source asset changes by 0.25 or more percentage points or when the average loss factor for the transmission system changes by 0.25 or more percentage points.

67 The approaches and assumptions discussed above reflect the AESO's current evaluation of what is required for the development of the Revised Loss Factor Rule in response to the Decision. As these approaches and assumptions may change, or additional approaches and assumptions may be required, during development of the Revised Loss Factor Rule, the AESO will address any such changes or additions as described in section 2.3 above.

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<sup>22</sup> *Ibid.* at paragraphs 22-28.

<sup>23</sup> Exhibit 790-X0345 at subsection 2(3).

## 4 Responses to Commission Questions

68 In several sections of the Decision, the Commission requested that the AESO respond to certain questions or suggested the AESO could provide additional information in its compliance filing.

69 However, the AESO is of the view that it will be helpful to both the Commission and stakeholders for preliminary responses and additional information to be provided as part of this Implementation Plan. The AESO accordingly addresses the Commission's requests and suggestions below.

70 In paragraph 120 of the Decision, the Commission stated:

*In reaching the conclusions in this decision, the Commission has not considered how the definition of location should apply to units subject to a power purchase arrangement. The Commission expects the AESO to address this issue prior to, or at the time of, its compliance filing.*

71 The AESO responded to this request in the Clarification Letter<sup>24</sup> and summarized its consideration of this issue in subsection 3.3(e) above.

72 In paragraph 128 of the Decision, the Commission stated:

*And second, notwithstanding the ability of eligible generators to annually reconfigure the location at which line loss factors would be calculated for the output they produce, the Commission's expectation is that this option is unlikely to be exercised very frequently once each generator has established its preferred initial MPID configuration under the revised rule. Should this expectation prove to be incorrect, and the AESO begin to experience difficulties, including materially higher costs, in administering its methodology because of frequent changes in the locations at which loss factors are to be determined, not to mention the competitive impacts of greater volatility in the resulting loss factors themselves, the Commission is prepared to reconsider this aspect of its decision following implementation of the revised rule.*

73 The AESO commented on requests for aggregation and disaggregation of generating units or AGFs in subsection 3.7(j) above. The AESO proposes that requests for aggregation or disaggregation be assessed on a case-by-case basis, at least initially. The AESO will monitor the frequency of requests for aggregation and disaggregation and advise the Commission if the requests begin to create difficulties or result in materially increased administrative costs for the AESO.

74 In paragraph 160 of the Decision, the Commission stated:

*The Commission recognizes that moving from 12 base cases to 8,760 base cases (even if the latter already exist in the form of the historical merit order, and new merit orders are automatically created every hour) would not be without administrative ramifications for the AESO. Conducting a 'but-for' analysis for each generating facility at each MPID 8,760 times a year could impose additional costs upon the AESO. These might include the need for software upgrades, modeling refinements, and/or new information processing systems and capabilities, and additional human resources to implement and manage these changes. The process of moving to 8,760 base cases per year for purposes of*

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<sup>24</sup> Exhibit 790-X0445 at paragraphs 34-41.

*implementing the revised loss factor methodology may also further delay the effective date of the changed rule.*

75 In section 2 of this Implementation Plan, the AESO has outlined implementation activities that can result in revised loss factors being implemented on January 1, 2017. Although the analysis of 8,760 hours of data for each source asset will require procedure refinements and additional resources, the AESO does not consider the additional requirements to be a material barrier to implementation.

76 In paragraph 161 of the Decision, the Commission stated:

*In view of these (and possibly other) potential impacts of employing the actual merit order (i.e., hourly output re-dispatch) instead of load scaling to rebalance the system every time a ‘but-for’ analysis is conducted for each generating facility on the system, the Commission requests that the following additional information, including recommendations as applicable, be provided by the AESO prior to making its compliance filing:*

- *What are the ramifications of the Commission’s direction to use 8,760 base cases in terms of the AESO’s operational processes including additional labour, equipment, processing and implementation time frames and associated costs in determining the required annual line loss factors using the Load Flow ILF method, the MPID (as adopted above by the Commission) as the location for measurement and the 8,760 merit orders to redispatch generation in the ‘but-for’ analysis?*
- *Is there a number of base cases less than 8,760 per year that would provide almost the same potential accuracy (e.g., a margin of error equal to X standard deviation(s) from the mean annual loss factor for each generating facility, or plus or minus some fraction of the mean annual loss factor for each generating facility, 95 times out of 100) in estimating an annual line loss factor for each individual generating facility uniquely associated with a single MPID as would 8,760 base cases?*
- *The AESO’s reasoning and the statistical analysis it employed (to be provided in full) in arriving at this smaller number of base cases.*
- *The AESO’s reasoning and, if applicable, the statistical analysis it employed (to be provided in full) in choosing between (1) a smaller, but still reasonably representative, number of actual merit orders per year (e.g., one merit order for the off peak, peak and super peak load hours on the system per day, or those three merit orders for those three hours in a given period of somewhat longer duration, say, between one day and one week, that respectively correspond to the off peak, peak and super peak load hours for each such period) and (2) a modified GSO or “averaged” or otherwise “representative” merit order for that number of base cases selected per day, per week or per month.*
- *The AESO’s estimated savings in time, human resources and financial expense associated with a recommended number of base cases less than 8,760.*
- *The AESO’s best estimate of when the revised line loss rule and loss factor methodology, including a process that relies on a recommended smaller number of base cases than 8,760, could be ready for implementation.*

77 In the AESO’s view, the major impact of using 8,760 hours of data in the loss factor calculation is increased computation time and the requirement for complete automation of the calculation. The AESO does not anticipate significantly-increased ongoing cost or resource requirements, compared to the annual cost of the prior MLF/2 methodology. In the AESO’s view, it is difficult to statistically estimate a lower number of data points that will provide almost the same potential accuracy, given its limited experience with the hourly constant-load methodology. In the AESO’s view, the use of more than a few hundred data points will similarly require complete automation of the process. As well, creating a smaller

set of representative data points will add its own complexities, which may offset any resource savings from the reduced number of data points.

78 Given that the AESO is of the view that revised loss factors could be implemented on January 1, 2017, and that few, if any, savings will accrue from a smaller set of data points, the AESO proposes to develop and implement a loss factor calculation based on 8,760 hours of data.

79 In paragraph 164 of the Decision, the Commission stated:

*In view of the Commission's decision directing the AESO to use the merit order to calculate 8,760 base cases, or such lesser number of base cases as would accomplish essentially the same purpose, it may no longer be necessary or desirable for the AESO to recover the value/volume at each base case. The Commission expects the AESO to address this matter in its compliance filing.*

80 In subsection 3.11(p) above, the AESO outlined a loss factor calculation methodology that included use of a single shift factor after calculating a volume-weighted average loss factor for each source asset. The AESO expects that using 8,760 hours of data will provide sufficient robustness that single hours of anomalous raw loss factors will not significantly affect the average results.

81 In paragraph 178 of the Decision, the Commission stated:

*The Commission encourages the AESO to provide as much information regarding the line loss calculation process as would reasonably meet the needs of market participants including, for example, the ability to independently replicate the AESO's line loss calculations, but leaves it within the AESO's discretion to determine what this should entail.*

82 While the AESO will not make the hourly input data used in the loss factor calculation publicly available as discussed in subsection 2.1.1 above, other approaches to provide transparency, clarity, and certainty of the loss factor calculations will be considered and may be discussed with stakeholders.

83 In paragraph 186 of the Decision, the Commission stated:

*The Commission notes that the AESO has several options at its disposal, such as lengthening the time that the 2015 loss factors are in place and specifying that the initial term for the new loss factors would remain in effect for more than 12 months. This would allow the AESO to return to its practice of applying loss factors on a calendar year basis after the initial term of the loss factors calculated under the changed line loss rule.*

84 As discussed above, at this time the AESO is of the view that revised loss factors based on the Revised Loss Factor Rule can be implemented on January 1, 2017, which avoids the need to vary from a calendar year basis for applying loss factors. If, during the implementation activities, it appears that a January 1, 2017 date is no longer achievable, the AESO will advise the Commission and stakeholders. In such circumstances, the AESO will consider the option of applying loss factors for an initial term of more than 12 months and subsequently returning to applying loss factors on a calendar year basis.