Export Loss Factors

Multiple Charge Issue

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Introduction:

Until the end of 2005, AESO uses “last MW in” and swing bus methodology for the calculation of loss factors (LF) for export and import to be consistent with the calculation of loss factors for generators and Demand Opportunity Services.

For imports and exports only two loss factors are used; namely one for off-peak and one for on peak. Therefore, for each season instead of averaging the loss factors for the high, medium and low system load conditions, loss factors are calculated for high and low system load conditions only. High system load conditions equate to “on-peak”, while low system load conditions equate to “off-peak”.

The import/export levels at which the losses are determined are based on the historic transfers that have been observed in the previous three month. The loss factors are then calculated based on the 80^{th} percentile of the metered transfer level during that period in order to represent a reasonable transfer condition.

On calculating the loss factor for BCH, the location for the injection of the “last MW in” generator is at Bus # 90000 (middle of line 1201L 500kV line on the border of the Alberta and BC provinces). The location for the Sask. Tie is at McNeil DC converter station (Bus # 1473).

Procedure:

The following is the step-by-step process for the determination of export and import loss factors:

- Obtain the most recent updated base cases for the season under consideration from our Technical services group.
- Use appropriate cases for different load conditions - utilise the peak load case for the on-peak loss factor calculation while utilise the low load case for the off-peak calculation.

- Adjust the export/import level both at BCH and SPC according to the desired amount obtained from last three month's data.
- Re-dispatch generators using the most recent official Generic Stacking Order (GSO) to obtain the export/import amount.
- Calculate export/import loss factors based on the 80th percentile of the metered transfer level during the last three month for on-peak and off-peak conditions.

Published Export LFs:

The following table summarizes the BCH tie line loss factor for on-peak and off-peak export conditions calculated in 2003-2005.

Year	Season	Time period	Export LF for BCH	
			On Peak	Off Peak
2005	Summer	2005 June 1 to 2005 August 31	16.2%	25.0%
	Spring	2005 March 1 to 2005 May 31	19.50%	23.20%
	Winter	2005 January 1 to 2005 February 28	13.70%	22.8%
2004	Winter	2004 December 1 to 2004 December 31	13.70%	22.80%
	Fall	2004 September 1 to 2004 November 30	17.00%	21.8%
	Summer	2004 June 1 to 2004 August 31	16.30%	25.7%
	Spring	2004 March 1 to 2004 May 31	15.80%	24.50%
	Winter	2004 January 1 to 2004 February 29	13.70%	25.90%
2003	Winter	2003 December 1 to 2003 December 31	16.10%	28.30%
	Fall	2003 September 1 to 2003 November 30	14.40%	24.70%
	Summer	2003 June 1 to 2003 August 31	16.21%	25.14%
	Spring	2003 March 1 to 2003 May 31	14.97%	18.36%
	Winter	2003 January 1 to 2003 February 28	21.35%	26.40%

Loss Recovery Rationale:

The application of loss factors recovers the cost of losses as a result of generation supplying load, opportunity services and export/import transactions. There is a concern among some of the stakeholders that the current loss factor methodology charges more than the export amount and it has been suggested the overcharging is twice what is should be.

AESO investigated the issue several times in 2004 and 2005 and did not find any conclusive evidence in favour of the concern. The multiple counting question has arisen again in 2005, so AESO has prepared a review of the process and has tested the process by comparing a change in losses versus recovered losses in several base case examples.

The purpose of the loss factor process is to recover the transmission losses occurring on the AIES. The following equations represent the scenario of loss recovery for export (or import) condition:

$$\text{Recovered Loss} = \sum_{i} (\text{Change in Generation}_i) \times LF_i + \text{Change in Export} \times \text{Export } LF \quad \text{(Eq.1)}$$

$$\text{Recovered Loss} = \text{Change in Loss} \quad \text{(Eq.2)}$$

Where,

Change in loss - difference in total system loss between input case and output case.

Input case - the most recent updated base cases for the season under consideration before the desired amount of export is added.

Output case – the modified input cases where the desired amount of export is added and the generators are re-dispatched.

In order to validate the results, AESO believes that if Eq.2 is satisfied then it can be concluded that the current loss factor methodology does not charge more than the required amount for losses for any export transactions. It is important to remember that the loss factors used in Eq.1 are single values for each generator for each season. These loss factor numbers were calculated once during the period 2000-2005 and these 'raw' values were to be kept fixed till the end of 2005. The application of these fixed loss factor numbers in Eq.1 might give slightly different result than the change in loss between the cases. However, the numbers obtained from Eq.1 and Eq.2 should be close in order to prove that the current loss factor methodology does not charge twice for losses.

References:

1. http://www.aeso.ca/files/Loss_Factor_Calculation_Methodology.pdf (Loss Factor Calculation Methodology_Rev3)

Example to show multiple charging does not occur:

Season	Load Condition	Change in Loss (MW)	Recovered Loss (MW)
2005 Summer	On-peak	13.9	11.3
	Off-peak	-79.7	-78.0
2005 Spring	On-peak	36.9	33.3
	Off-peak	-15.8	-9.5

Season	Load Condition	Recovered Loss (MW)	Generators' Contribution (MW)	Tie Line's Contribution (MW)
2005 Summer	On-peak	11.3	-6.2	17.5
	Off-peak	-78.0	-21.2	-56.8
2005 Spring	On-peak	33.3	21.8	11.6
	Off-peak	-9.5	2.1	-11.6

* Negative value in the chart means losses have gone down from the base case for the comparison.