

EIM Losses #2

Step 1: Introduction and Education

Objective

- Inform BPA stakeholders of how losses are handled in the EIM
- Identify EIM charge codes that are impacted by losses
- Determine Bonneville's current practices regarding transmission losses

"Bonneville will discuss with stakeholders the extent to which the EIM's handling of losses should lead to changes in Bonneville's current practices regarding transmission losses, or what new opportunities are available for more efficient repayment of losses. This may include the potential for moving to a practice which losses are only settled financially instead of a physical repayment. Decision in this process will likely influence and/or be memorialized in the BP-22 and TC_22 cases." (Excerpt from ROD)

Transmission vs. EIM Losses

- **Transmission Losses:** Losses produced by the use of the FCRTS and recovered based on scheduled demand
- **EIM Losses:** A mechanism to account for and ensure that 1) the total Balancing Authority Area (BAA) losses have been planned and provided for prior to each hour and 2) that the impact of the EIM market awards/dispatches on losses are taken into considering in the market solution and Locational Marginal Prices (LMP)

EIM Base Losses

- In the EIM, each participating Balancing Authority Area (BAA) is expected to submit hourly base schedules for resources and interchange to meet the expected demand forecast (*a.k.a. load forecast*) of the BAA
- The demand forecast for the BAA includes load and losses
- Similar to today, the majority of BAA losses (i.e., base losses) are planned for and supplied prior to the hour as part of the base scheduling activity

EIM Incremental Losses

- The Locational Marginal Prices (LMP) produced by the EIM include the Marginal Cost of Losses (MLC) at each pricing node, relative to the cost of providing energy to the weighted/distributed load reference bus
- As such, as the market is running, it is taking into consideration the cost of marginal (incremental) losses at each LMP node in its optimization

EIM Load Base Schedule

- For settlement of load imbalance, an hourly Load Base Schedule (LBS) is calculated by the market

$$\text{LBS} = \text{Sum}(\text{GENbase}) - \text{Sum}(\text{INTbase}) - \text{Demand Forecast} * \text{Loss\%}$$

Where:

- **GENbase:** Generation Base Schedules
- **INTbase:** Interchange Base Schedules
- **Loss%:** Provided by each EIM Entity for their BAA - can be a static value or a lookup table that contains different values for hour of day and day of week

EIM Load Meter

- A Load Meter (LM) for the BAA must be submitted by the EIM Entity (EESC) ATF
- A “top down” approach is generally used

$$\text{LM} = \text{Sum}(\text{GENmeter}) - \text{Sum}(\text{INTmeter}) - \text{Losses}$$

Where:

- **GENmeter:** Generator/Resource meter
- **INTmeter:** Interchange meter
- **Losses:** Typically calculated using the same loss% that was used when establishing the Load Base Schedule (LBS)

Uninstructed Imbalance Energy (UIE)

- Uninstructed Imbalance Energy (CC64750) for Load is calculated as follows:

$$\text{UIEload} = \text{LBS} - \text{LM} \leftarrow \text{Hourly Settlement}$$

- Hourly Load Aggregation Point (LAP) LMP is used for load UIE settlement
- If the same loss% is used for both the LBS calculation and the LM submittal, it should help minimize the UIE for load charges and allow them to be more easily shadowed

Unaccounted for Energy (UFE)

- Unaccounted for Energy (CC64740) uses the hourly LAP LMP and is calculated as follows:

$$\mathbf{UFE = Sum(GEN_{meter}) - Sum(INT_{meter}) - LM - NALosses}$$

- NALosses: actual losses calculated using an AC Power Flow (ACPF) from the EIM's Network Analysis application
- Differences between the loss% used in the LBS and LM calculations and actual losses (via ACPF) will be captured in UFE.

Real-Time Marginal Losses Offset

- Marginal Loss Charges are implicitly collected by the CAISO in the Real-Time settlement
- There are no holders of rights to receive Real-Time Marginal Loss revenues so they are accumulated in special and separate BAA neutrality accounts
- Allocated to the associated EESC of an EIM BAA in Real Time Marginal Losses Offset (CC 69850)

* The product of (1) the contribution of that BAA's Transmission Constraints to the marginal Loss component of the LMP at each resource location in the EIM Area and (2) the imbalance energy at that resource location

Imbalance Energy Offset(RTIEO)

- Real-Time Imbalance Energy Offset (CC64770) is intended to help ensure that the EESC is revenue neutral
- RTIEO: If the Sum(IIE, UIE, UFE, GHG) less Congestion and Losses does not = \$0, charges or payments will be made to the EESC
- Large errors in UIE_{load} or UFE will ultimately be reconciled for in 64770
- The financial value of EIM Transfers is also included in RTIEO, unless an EIM Entity has chosen to settle ETSRs through the market

EIM Losses Summary

- The EIM does not provide system or BAA losses, but takes them into consideration when ensuring each BAA is balanced prior to the hour
- The EIM also takes into consideration marginal (a.k.a. incremental) losses that result from market awards and dispatches
- Losses are embedded in load UIE, UFE, and RTIEO
- Bonneville will need to determine how it calculates the loss percentages used by the EIM