2018 WACM Area Loss Study

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Executive Summary

This report will cover the methodology of calculating the WACM Balancing Authority’s loss rate. The report will describe the study approach and the source of data for compilation of the study. In addition, it will explain the details and reasoning for recommending a loss rate percentage of 4.5% for the WACM Balancing Authority.
I. Introduction

The Rocky Mountain Region of Western Area Power Administration (WAPA-RMR) requires a periodic loss study to determine an accurate loss rate and losses percentage for the transmission system within the WACM Balancing Authority area (WACM BA). The Loss Study will be the basis for a potential revision of the WACM BA loss rate effective Oct. 1st.

II. Methodology

Each data set represented the WACM BA on an hourly basis. The study attempted to not exclude nor carve out any transmission within the WACM BA and get all meters within the WACM BA. The study only represented the MW losses for the WACM BA.

The energy loss of any system is equal to the difference between the output and the input for that system. The inputs are equal to the sum of all energy flow into the WACM BA. The outputs are equal to the sum of all energy flow out of the WACM BA. For all practical reasons, the inputs can be named Resources and the outputs as Obligations.

The data was analyzed using the mathematical formula below which represents the losses of the WACM BA as follows.

\[
(1) \quad \text{Losses} = \text{Resources} - \text{Obligations}
\]

Where,

\[
(1A) \quad \text{Resources} = \sum \text{WACM BA Internal Generation} + \sum \text{WACM BA Actual Tie Flow In}
\]
\[
(1B) \quad \text{Obligations} = \sum \text{WACM BA's Internal Load} + \sum \text{WACM BA Actual Ties Flow Out}
\]

To derive and calculate the percent loss for the WACM BA, the calculated losses in (1) is divided by the resources (1A) times 100.

\[
(2) \quad \text{Loss} \% = \left( \frac{\text{Resources} - \text{Obligations}}{\text{Resources}} \right) \times 100
\]
\[
(2A) \quad \text{Loss} \% = (1 - \frac{\text{Obligations}}{\text{Resources}}) \times 100
\]

Combining equations (1A), (1B), and (2A), the percent loss rate for WACM BA will be:

\[
(3) \quad \text{Loss} \% = \left(1 - \frac{\sum \text{WACM BA's Internal Load} + \sum \text{WACM BA Actual Ties Flow Out}}{\sum \text{WACM BA Internal Generation} + \sum \text{WACM BA Actual Tie Flow In}}\right) \times 100
\]

A convention was established to account for the positive and negative data. Values can be positive or negative. An example of negative generation value would be a pumped storage facility during the pumping cycle which was treated as an obligation in these calculations. Interties are normally bi-directional meaning power may flow in or out of the system. The convention adopted for this study was to treat positive tie line values as obligations and the negative tie line values as resources.
III. Data Source

The data used for this study was from a variety of sources. The WACM BA data was extracted from PI Historian, MV-90 meter data, and Energy Imbalance (EI) accounting files. This data was collected as hourly data for the entire 2017 calendar year. This gave an overall view which includes all seasons of the year.

IV. Results

A total of 8760 hourly data sets were used in calculating the loss values. Statistical analysis of the calculated loss percentage showed some anomalies ranging from -12% to +17%. Disregarding the anomalies due to meter read error, meter maintenance, and new meter installations; the remaining data sets indicated a loss percentage rate closest to 3.5%.

Input loss is a loss based on the resources of the WACM BA.

The graph below shows the distribution of calculated loss percentage rate for the data set.
The next graph shows an individualized representation of the entire year’s data set.

V. Recommendation

The current loss rate for the WACM BA is 4.5%. The results of this year’s study is in line with the past studies. Based on the engineering review and statistical analysis of the data, it is recommended to keep a loss rate percentage of 4.5% for the WACM BA.

VI. Summary and Conclusion

The Rocky Mountain Region of Western Area Power Administration requires a periodic review of its published loss rate. This loss study is conducted by the Transmission Services group to provide an updated loss rate for the Rates group. As stated above, the study made every effort to not exclude or carve out any transmission system inside WACM BA. Every effort was made to obtain the individual load serving meters for all feeder circuits within the WACM BA. This provided a detailed examination of the loss data as well as calculation of energy losses. The derivation of percentage loss in this study utilized a concept using Resources and Obligations. The study examined yearly hourly data and applied engineering and statistical analysis of the data sets and calculated results. Using 8760 discrete hours, the study computed energy losses and percentage loss rate for each individual hour. Since the largest concentration of energy losses is located between 3% and 5%, the study recommends a 4.5% loss rate for WACM BA. The recommended 4.5% loss rate is based on a sound engineering approach and a valid statistical analysis.