NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Historical Balancing Trends
A Brief for Regulators and Policymakers

ERS Framework[1] Measure 6 – Historical Balancing/Ramping Analysis

System operators must maintain a continuous balance between generation and demand on the grid during real-time operations. The operators require some level of flexibility and control to maintain this balance. This balancing effort can be affected by characteristics of the resource mix, resources under the operator's control, demand behaviors, and other system-specific factors. While maintaining the continuous balance between generation and demand is not a new requirement for the operation of an interconnected electric system, the combination of those factors could result in periods of excessive or insufficient generation, limited availability of resource ramping capability, and other real-time conditions that cause the system operator to rely on other Balancing Authorities (BAs) for balancing.

There are various ways to mitigate balancing concerns, but it is important to identify the anticipated challenges early so that appropriate changes can be planned and implemented in a timely and reliable manner. For this reason, methods have been developed by the Essential Reliability Services (ERS) Working Group and the NERC Resources Subcommittee (RS) to help BAs identify trends and indications of potential balancing concerns. This briefing discusses the use of historical operating data by the BAs and the RS to identify trends that could become a concern. A separate briefing for forward-looking balancing trends is being developed by the ERS Working Group with the NERC Reliability Assessment Subcommittee (RAS).

The analysis method is based on a commonly used "control performance standard" called CPS1[2], which is a statistical measure of the BA's area control error variability as it relates to the interconnection frequency error. The CPS1 values reflect how well the BA maintains balance of resources and load in its area. Periods where the BA's resources are even slightly out of balance with load are directly reflected in the CPS1 values. The CPS1 values are averaged over a twelve-month rolling window and reported to NERC on a monthly basis to reflect overall performance characteristics of the BA.

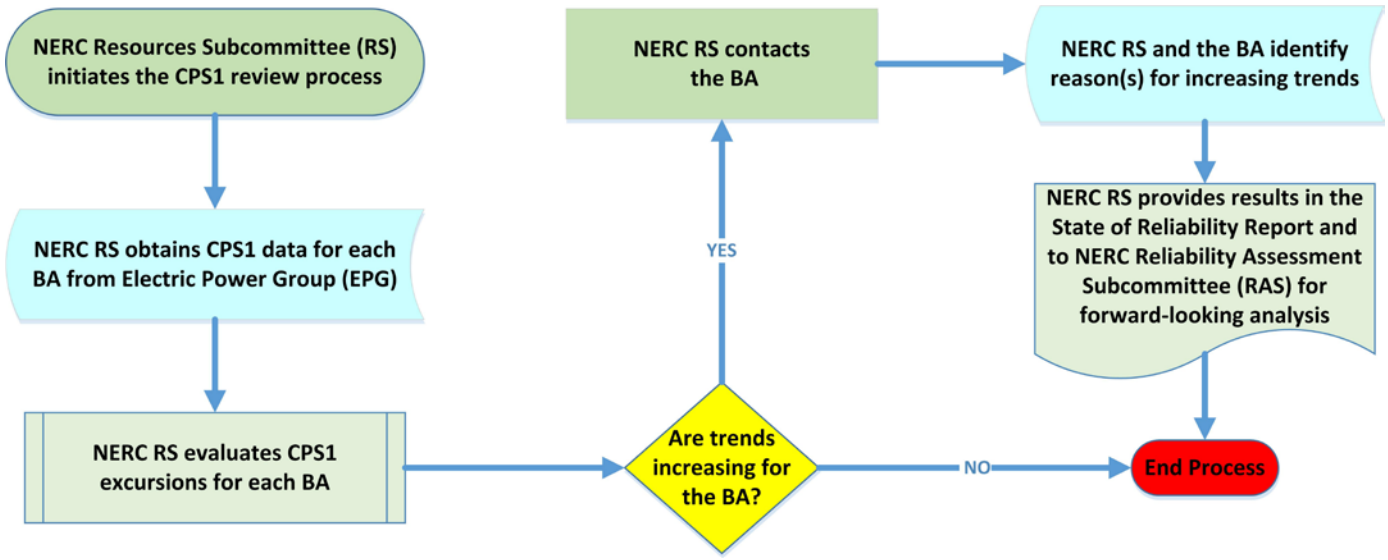
The approach used for Measure 6 is to analyze the hourly CPS1 values to identify repeated patterns of imbalance. This is done by counting the hours with low CPS1 values (indicating imbalance) and the occurrences where CPS1 values are low for periods of three consecutive hours. Working with the BAs, the RS has obtained three years of historical hourly CPS1 values and continues to receive this data on a quarterly basis. Moving forward, the RS will identify BAs that are trending toward levels where additional analysis

[1] Essential Reliability Services Working Group, Measures Framework Report, November 2015

[2] NERC Resources Subcommittee's 2011 Technical Document on Balancing and Frequency Control

and risk mitigation activities may be prudent. The RS will work with these BAs to understand the trends and discuss options for improving any ramping issues. This method of using historical data will identify ramping and balancing concerns for each BA given their unique characteristics and resources.

The ongoing process is summarized in the diagram below.



If a BA appears to be trending toward conditions where balancing could become more challenging, there are numerous alternatives to provide the BA with additional flexibility and dispatch control, such as use of more flexible resources, demand-side management, changes to operating and scheduling procedures, or changes to operation of non-dispatchable resources (both conventional and renewable) to mitigate such trends. By identifying balancing trends in advance of when they could become a potential reliability issue, BAs and system operators can plan for any changes to support the ongoing reliable operation of the Bulk Power System. A summary of interconnection results from the historical data will be included in the NERC State of Reliability Report on an annual basis.

For Further Information

Earlier work on this topic was discussed in greater detail in Chapter 2 of the ERS Whitepaper on Sufficiency Guidelines.

The ERS Working Group is currently working with the NERC Reliability Assessment Subcommittee (RAS) on the forward-looking Measure 6. This planning method, which will look at the flexibility of balancing resource and demand for future years, will be the subject of a separate Brief for Regulators and Policymakers. The RAS will summarize these results annually in the NERC Long Term Reliability Assessment Report.