

BAL-003 - Attachment A Background Document

Introduction

This draft document provides background to explain the requirements in the draft Frequency Response Standard (BAL-003-1). This document will evolve on the basis of Industry comments on the standard and is expected to become Attachment A to the standard.

Requirement 1

R1. Each Balancing Authority shall achieve a Frequency Response Measure (FRM) (as detailed in Attachment A and calculated on FRS Form 1) that is equal to or more negative than its Frequency Response Obligation (FRO).

Frequency Bias Setting vs. Frequency Response

The Frequency Response Measure (FRM) for the upcoming year is based on the same data collected for the Balancing Authorities' annual Frequency Bias Setting calculation. A final listing of official events to be used in the calculation will be available from NERC by December 10 each year. Once a list is distributed to Balancing Authorities, each BA has one month to assemble its data and calculate the FRM.

The ERO will use the following criteria for the selection of events to be analyzed.

1. At least 25 events will be used for the calculation of FRM. If a year occurs in which there are not 25 events that meet the remaining criteria below, then the most recent 25 events (as defined below) will be used for determination of an entity's compliance with the FRM requirement and storage of SEFRD.
2. Two limits will be used to determine if a frequency event has occurred for the purposes of determining FRM:
 - a. The frequency at the arresting frequency (Point C) must exceed the frequency deviation event threshold specified for the Interconnection. (As of 2010, the governor deadband setting for the Eastern and Western Interconnections will be assumed to be near or greater than 36 MHz, although there is no stated requirement defined in NERC standards). The Point C value is the minimum of frequency samples within 8 seconds after the start of the rapid change in frequency.
 - b. The time from the start of the rapid change in frequency until the point at which Frequency has largely stabilized should be less than 18 seconds.
3. Typically, the Point A frequency should be relatively steady and near 60.000 Hz. Point A is computed as an average over the period from -16 seconds to 0 seconds before initial frequency decline.

4. Any indication or evidence of a secondary event occurrence after Point C should be reviewed for inclusion based on having sufficient information to perform a full analysis of the event.
5. Events occurring during periods in which either significant interchange schedule ramping or load ramping is likely, should be excluded if other events are available for measurement purposes.

Additional events included in Frequency Response survey for interconnection analysis: The ERO has the discretion to request a frequency survey for events that differ significantly from criteria 3, 4, or 5. These events will not be included on FRS Form 1 used for calculation of frequency response.

The report will be done via FRS Form 1.

Sliding of the reporting deadline from that found in previous versions of BAL-003 is due to the increased number of samples required and is intended to avoid burdening NERC and the Balancing Authorities with working over holiday periods for no added value to reliability.

Frequency Bias Settings and acceptable Frequency Response are negative numbers by definition. In other words, as frequency drops, the Balancing Authority is expected to contribute MWs to the Interconnection (or take fewer MWs in).

The current BAL-003 has a minimum Frequency Bias Setting (in MW/0.1Hz) that is in absolute terms equal to 1% of the Balancing Authority's projected peak. An early researcher¹ noted that the ideal state is where the Frequency Bias Setting is exactly equal to natural Frequency Response. Researchers have also noted that over-bias is preferable to under-bias. The current – (1% of peak) /0.1Hz floor for the Frequency Bias Setting is significantly more negative than most Balancing Authorities' natural Frequency Response. This can lead to over-control, particularly in the Eastern Interconnection, and force the industry to require too much secondary control resulting in degraded performance and increased operating cost compared to requiring an appropriate balance of primary and secondary control.

Changes to the Frequency Bias Setting that move it closer to the natural Frequency Response will improve the quality and accuracy of ACE and all ACE based systems and measures, including: the CERTS Automatic Frequency Events Identification and Frequency Response Evaluation System; the CPS1 measure; the CPS2 measure; the DCS measure; the BAAL measure; and, AGC Systems in general.

¹ Cohn, Nathan. *Control of Generation and Power Flow on Interconnected Systems*. (New York: John Wiley & Sons, 1966)

Frequency Bias Setting Floor

The FR SDT is proposing a gradual transition to bring Frequency Bias Settings and natural Frequency Response closer. The Frequency Response Field Test Document describes the gradual replacement of a floor by natural Frequency Response for Frequency Bias Setting.

Frequency Response Obligation and Allocation

The SDT is initially proposing that the Interconnection Frequency Response Obligation (FRO) be a discretely administered determination.

For this administered approach each Interconnection will have a target contingency protection criteria based on the largest category C event (N-2). The protection criteria will assure that Point C will not encroach on the first step UFLS.

Under development – The SDT is evaluating a risk based approach to establishing an Interconnection Frequency Response Obligation which can be based on a probability function.

The ERO and the NERC RS will manage the administrative procedure to assign an FRO to each BA for the upcoming year.

Each Balancing Authority will receive a proportional slice of the Interconnection's Frequency Response Obligation based on $(\text{peak generation} + \text{peak load})/2$. The reasoning for this allocation method is that Balancing Authorities carry differing proportions of load and generation. In fact, some Balancing Authorities have only load with no native generation, while others have only generation with no native load. One of the reasons for using 2010 event data as part of a field trial of the standard is to evaluate the allocation methodology.

Methods of Obtaining Response

A Balancing Authority may elect to fulfill its Frequency Response Obligation by participating as a member of a Reserve Sharing Group.

There are two considerations under the option of meeting compliance by participation in a Reserve Sharing Group (RSG). First, although spinning reserve is not a part of this standard, it should be noted that RSGs typically define the amount of spinning reserve carried by Balancing Authorities. Second, allowing the RSG option addresses the FERC Order No. 693 directive to define methods of obtaining frequency response.

As long as all BAs within the RSG use the same events for calculating FRM, BAs within the RSG may allocate a portion of their FRM to another RSG participant.

The SDT is soliciting comments on methods of obtaining Frequency Response to meet the Order 693 directive (markets, incentive programs, tariff changes, interconnection agreements, innovative technology, resource standard).

Measure and Compliance Information

This will be added in the second posting.

Requirement 2

R2. Each Balancing Authority shall implement the Frequency Bias Setting (fixed or variable) provided by the ERO into its Area Control Error (ACE) calculation beginning on the date specified by the ERO to ensure effective coordinated secondary control, using the results from the calculation methodology detailed in Attachment A.

Background and Rationale

The traditional process for implementing new Frequency Bias Settings is for Balancing Authorities to submit their upcoming annual Frequency Bias Setting value by January 1. NERC and the Resources Subcommittee validate Frequency Bias Setting values, perform error checking and use these values to calculate L10 values for CPS2. Once the L10 values are validated, NERC posts the L10 values and sends a letter to Balancing Authorities giving a date on which to implement the new Frequency Bias Settings. This data collection and validation process can take up to two months. It is expected NERC will send out the L10 and Frequency Bias Setting notification generally in February for March 1 implementation.

Measure and Compliance Information

This will be added in the second posting.

Requirement 3

R3. Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Bias, unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area.

Background and Rationale

This requirement has existed in NERC Policy 1 and BAL-003 for years. Operating out of Tie Line Bias control can lead to uncoordinated control that may result in unreliable operations.

Measure and Compliance Information

This will be added in the second posting.

Requirement 4

R4. Each Balancing Authority that is performing Overlap Regulation Service shall increase its Frequency Bias Setting in its ACE calculation by combining the Frequency Bias Settings for the entire Balancing Authority Area being controlled.

Background and Rationale

This requirement has existed in NERC Policy 1 and BAL-003 for years. Overlap regulation service provides ACE control for compliance from another BA authority performing the overlap service thus the frequency bias used by the BA purchasing the service needs to be added to the providers frequency bias which will provide the ACE control for the Balancing Authority. Supplemental service is a schedule to provide a portion of the control for another BA using a portion of the ACE which does not require changing the frequency bias.

Measure and Compliance Information

This will be added in the second posting.