

**Individual or group. (36 Responses)**  
**Name (21 Responses)**  
**Organization (21 Responses)**  
**Group Name (15 Responses)**  
**Lead Contact (15 Responses)**  
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**Question 7 (29 Responses)**  
**Question 7 Comments (36 Responses)**

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Group
Arizona Public Service Company
Janet Smith
Yes
Yes
Yes
Yes
What is meant by discretely administered determination, under the heading "Frequency Obligation and Allocation" of Attachment A? Please explain.
Yes
Yes
As long as Appendix 1 interpretation remains in effect for WECC Auto Time Error Payback. WECC BAs operate in Tie-Line and Time.
AZPS has a few questions: 1) has frequency performance been affected by the on-going RBC field trial, 2) what steps will be taken to isolate this field trial from the effects of the RBC field trial, 3) will the frequency bias reduction to 0.8% of peak load include a CPS2 grace-period for thos BAs not involved in the RBC field trial?
Individual
Joe O'Brien
NIPSCO
Yes
No
Frequency Bias and Frequency Response are not the same thing and that may be why "F" & "R" were not capitalized in the present definition. I think the word "secondary" should appear per R2 finishing something like this: "to contribute to secondary (non-immediate)Interconnection frequency control.", removing Frequency Response altogether. (I do understand that you are bringing the FR and Bias closer together).
No
Yes, "Interconnection frequency", small "f".
No

Yes and no, similar to BAL-002 I think this should read "Each Balancing Authority or Reserve Sharing Group shall ....., With so many BA's I believe the RSGs will be play a big role in this compliance ... This comment applies to only R1,
Yes
I guess the ERO will calculate the Bias, interesting.
No
Yes, It was proposed that AGC be replaced by Automatic Resource Control (ARC) in the standards but did not pass. The SDT may want to monitor this related effort.
No
"Effective Date" section at the top of the Standard does not match the Implementation plan; I think there is an R4 missing in the second part of 1.3 . In the implementation plan add RSG to "Compliance with the Standards" 5 year phase-in on removing the 1% is a good idea
Individual
John Canavan
NorthWestern Energy
Yes
Yes
Yes
No
A Balancing Authority's frequency response is based upon a "median" value calculated from analyzing multiple events. Frequency response during some of these events is better than others, depending on the system conditions at the time and the amount system loading and unloaded generation online at the time of the event. Given these circumstances a BA's actual response could vary by event (better or worse than median), thus compliance measurement per event to a frequency response obligation based on the median response (over multiple events) could put BA's in non-compliant situations unjustly.
Yes
Yes
Yes
Individual
Howard F. Illian
Energy Mark, Inc.
No
Comment 1: I agree with the definition of the Single Event Frequency Response Data. Comment 2: I do not agree that the Frequency Response Measure should be the median of all SEFRD observations reported annually on FRS Form 1. Comment 3: The regression values presented on FRS Form 1 have not been calculated correctly. Comment 4: Since the FRM is going to be used to set the value for the Frequency Bias Setting and the Frequency Bias Setting represents a straight line though the origin of zero frequency error and zero megawatt error, the best representation of the data for setting this paramater can be achieved through the use of a regression. Comment 5: Only a regression will weight the impact of each SEFRD correctly. The use of median or mean will not provide the best estimate for use as the Frequency Bias Setting. Comment 6: The standard has been written to include a samplpe size (25) large enough to enable effective statistical methods of analysis. What justification is there to then ignor those well proven methods and revert to methods designed to address problems where the sample sizes are insufficient to support sound statistical analysis methods.
No
Comment 7: The definition should be: "A value, (either a fixed or variable Frequency Bias), usually expressed in MW/0.1 Hz, set into a Balancing Authority Area Control Error equation that indicates to the Balancing Authority its contribution of Frequency Response to the Interconnection. Comment 8: The Frequency Bias Setting does not allow or disallow the Frequency Response to be contributed. The BA will contribute its natural Frequency Response to the interconnection through the independent actions of its loads and generators. The only influence that the Frequency Bias Setting has is that it causes the AGC System, and hopefully other outer-loop control systems, to include that natural Frequency Response when developing control actions to implement through AGC in response to BA balancing requirements in a time frame well after the Frequency Response has been provided by the independent actions of its loads and generators.

Yes
No
<p>Comment 9: I agree that each BA should be required to provide a minimum level of Frequency Response to provide for its share of the total Frequency Response required for interconnection reliability. Comment 10: I also agree with the methods used to measure SEFRD subject to my comments on FRS Form 1. Comment 11: I do not agree that the method suggested for setting the FRO will achieve the desired goal of maintaining interconnection reliability. The measurement method offered only evaluates the supply of Frequency Response. It does not evaluate the demand (need) for Frequency Response. Since frequency error is the difference between the demand and supply any effective measure for maintaining reliability due to frequency error must include both the demand and supply parts of this balance. As a consequence, the method will be blind to changes (good or bad) in the demand for Frequency Response. Changes in the demand for Frequency Response will require subsequent changes in the supply for Frequency Response that this standard fails to address until the following year and leaves the interconnection at risk for unreliable operation. Comment 12: The requirements associated with Frequency Response as defined in this standard will not assure interconnection reliability. Frequency Response is a two part service. The first part of this service is the rate at which energy is supplied in proportion to frequency error. This first part is commonly represented as the Frequency Response and the corresponding Frequency Bias Setting. The second part of the service is the amount of capacity that the BA stands ready to supply at this stated proportion in response to frequency error. Failure to effectively specify and measure the amount of capacity that the BA stands ready to supply at the stated proportion could put the interconnection at reliability risk when the required amount of capacity is not included in the operating plan.</p>
No
<p>Comment 13: I agree that the BA shall implement the Frequency Bias Setting 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. Comment 14: I do not agree that the results from the calculation methodology detailed in Attachment A will provide the correct Frequency Bias Setting. My comments on the calculation methodology are included elsewhere in my comments on Attachment A and FRS Form 1.</p>
No
<p>Comment 15: Requirement 3 as written is unenforceable because it is too difficult to define "unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area." Comment 16: What if operation out of Tie line Bias control does not have an Adverse Reliability Impact on the Balancing Authority's Area, but does have an Adverse Reliability Impact on another BA? Comment 17: A document follows that provides an initial starting justification for the elimination of this Requirement. See following "Requirements for AGC Operation, January 25, 2011." Requirements for AGC Operation, January 25, 2011 Introduction: As of the date of these comments there are two requirements in the NERC Standards that address the operation of AGC. The first is in BAL-003-0.1b – Frequency Response and Bias, Requirement R3. R3. Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability. The second is in BAL-005-0.1b – Automatic Generation Control, Requirement R7. R7. The Balancing Authority shall operate AGC continuously unless such operation adversely impacts the reliability of the Interconnection. If AGC has become inoperative, the Balancing Authority shall use manual control to adjust generation to maintain the Net Scheduled Interchange. These requirements are misdirected and, for compliance purposes, they are difficult to measure effectively. This paper provides the technical basis for replacing these requirements with new requirements that will not only achieve the intent of these requirements, but do so in a more effective and measurable manner. Background: Automatic Generation Control (AGC) is a computer control system contained in the Control Center EMS that performs a number of critical functions related to the balancing function necessary to maintain frequency and associated reliability. Among the functions it performs are: 1) the collection of telemetered and local data useful for determining the appropriate control actions, 2) the calculation of Area Control Error (ACE), 3) determination of desired control actions that should be sent to those resources available for automatic dispatch, and 4) sending the actual control signals to implement that dispatch. Most AGC Systems have three basic modes of operation, 1) Tie-line Frequency Bias, 2) Constant Net Interchange and 3) Constant Frequency. The ACE Equation is the basis for all three modes of operation. In the Tie-line Frequency Bias mode, all of the ACE Equation is used as an input to control action determination. In the Constant Net Interchange mode, only the Tie-line Error portion of the ACE Equation is used as an input to control action determination. The Constant Net Interchange mode would normally be used when there is no information available to indicate interconnection frequency. In the Constant Frequency mode, only the Frequency Bias portion of the ACE Equation is used as an input to control action determination. The Constant Frequency mode of operation would be used when the Tie-line Error is known to be misleading, inaccurate or unavailable. It is also used when there are no tie-lines in service as in the case of a single BA interconnection or during islanded operation. AGC Systems have been used in the industry since before the development of digital computers. Initially AGC Systems did little more than send instructions to generators based on evaluation of the ACE Equation. They have become more sophisticated since their inception and implement greater complexity in their evaluations of appropriate dispatch actions to the point that they include forecasting, reliability and economics within their algorithms. Modern AGC Systems determine control actions based on the collection of much more data than is included in the ACE Equation. This additional data includes: short-term load forecasts and forecast error estimates as influenced by weather; individual</p>

non-conforming load forecasts and forecast error; forecast interchange transaction information; generating unit ramp and response rates; generating unit economic operating points including valve position; generating unit incremental economic costs including start-up and maintenance; Hydro unit river flow limits as related to the operation of other units on the same waterway; energy storage capabilities and available energy; Inadvertent Interchange energy account balances; time error; and current control performance scores. As AGC Systems have evolved, the control mode in which they are operating, Tie-line Frequency Bias, Constant Net Interchange, or Constant Frequency, provides less and less information about the control actions that they implement. In a modern AGC System the control mode provides little information about how control actions are being determined and implemented. In fact, only someone experienced in AGC programming and implementation would have the knowledge necessary to determine whether or not an AGC System is providing reasonable control actions or control actions consistent with Tie-line Frequency Bias Control. Even someone with the necessary experience observing the operation of a modern AGC System for a short period of time will be incapable of determining whether or not that system is providing effective or adequate control. Therefore, neither of the two requirements is effectively enforceable from a practical point of view. Perspective: A couple of examples are offered to add perspective to the problem. Example 1: R3 includes the requirement, "Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability." There are three conditions when operation on Tie-line Frequency Bias control may be adverse to the system or Interconnection reliability. 1. The first is when the Tie-line Error data used in the ACE Equation is incorrect. The ACE Equation will be incorrect when there are errors in the Actual or Scheduled Tie-line flow values. This condition will occur when there is telemetry failure of one or more tie-lines, when there is an unidentified scheduling error, or when there is a separation that causes a tie-line metering point to be located on a separate island due to interconnection separation or islanding. Telemetry failure will be indicated by the quality bits associated with the Tie-line telemetry. If AGC is disabled to identify a scheduling error, there should be an operating log entry. If AGC is disabled because of a separation, there will also be a log entry. 2. The second is when the actual frequency is determined to be incorrect. If measured frequency is incorrect, this condition should be indicated by an operating log entry and transfer to the redundant frequency device to provide measured frequency. When the actual frequency fails, this condition will be indicated by the quality bits associated with the measured frequency value and transfer to the redundant frequency device to provide measured frequency. 3. The third is when operation of AGC would provide control different from the desired control to address some emergency condition in the BA or elsewhere on the interconnection. If the operation of AGC would be adverse to system or Interconnection reliability and is disabled for this reason, this condition should be indicated by an operating log entry. In all cases, there should be a record of the reason for the use of other than Tie-line Frequency Bias control and records indicating the reason for the use of other control modes. In all cases, other than the third indicated above, an error in the value of ACE is the reason for not using Tie-line Bias Control and the quality bits for ACE or ACE component data should provide a reasonable explanation for the condition. The third case occurs with such infrequency that there should be no need for a special rule to address this condition. Example 2: R7 includes the requirement, "...If AGC has become inoperative, the Balancing Authority shall use manual control to adjust generation to maintain the Net Scheduled Interchange." Cases have been observed of an AGC System that does not perform as well as the manual dispatch used when the AGC System is inoperative. If a BA has a CPS1 score of 120% when using AGC and a CPS1 score of 125% when performing manual dispatch, should that BA be penalized for not having its AGC continuously operating? What is the goal? Is the goal to operate on AGC regardless of the result or is the goal to operate in a manner that provides the best measured control? Alternatives: Since these requirements are not effectively measurable or enforceable, can a requirement or requirements be written to provide an equivalent to the intent of the old requirements addressing AGC operation? The industry has three alternatives to address this issue: 1. Retain requirements that are directed at the AGC System understanding that they are effectively not measurable or enforceable. 2. Eliminate requirements that are directed at the AGC System with the understanding that they were not contributing to reliability. 3. Determine an alternative method to evaluate, measure and enforce a requirement that will achieve a goal similar to the goal originally intended by the implementation of the AGC System requirements. Elimination of the requirement is an appropriate solution. However, if it is determined that a replacement measure is required, then the solution to this problem lies with the third alternative above. Solution: There is already a requirement that effectively enforces the intent of the above requirements. Instead of requiring the BA to control in a particular manner, CPS1, BAAL and DCS require the BA to achieve specific results with their control actions. All three measures require the BA to calculate ACE using Tie-line Frequency Bias for determination of their Reporting ACE. The requirements specify that at least 50% of the data must be valid for the one-minute average data to be included in the measures. The requirements for redundant frequency measurement devices assure that the BA will have the actual frequency data available to perform the necessary calculations. The data retention requirements specify the data they must retain to demonstrate that their control achieved the stated goals. Finally, this approach is consistent with the White House Executive Order on Improving Regulation and Regulatory Review in Section 1(b)(4) stating that regulatory agencies must: "to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that the regulated entities must adopt;..."

No

Comment 18: The Proposed Effective Date in the implementation plan is inconsistent with the Effective Date in the Draft Standard. Comment 19: The completion of the implementation plan does not occur until 2015. This lengthy plan stems from a standard that only measures reliability annually and provides only an annual window for changing plan parameters such as Minimum Frequency Response. Alternative methods that measure reliability more frequently could be implemented with a shorter implementation plan.

Group
Northeast Power Coordinating Council
Guy Zito
Refer to the response to Question 17.
Refer to the response to Question 17.
Refer to the response to Question 17.
Refer to the response to Question 17.
Refer to the response to Question 17.
Refer to the response to Question 17.
Refer to the response to Question 17.
Individual
Si Truc PHAN
Hydro-Quebec TransEnergie
No
The proposed method is good to measure frequency response at point "B". However, point "C" is not taken in consideration in this measure. As for the FRO, a N-2 criteria is more stringent for an Interconnection with less units than a large Interconnection. The risk associated with coincidental events is much higher in a large Interconnection. For this reason, we believe that N-1 criteria should be considered for a small Interconnection like Quebec.
Yes
However the "Tie Line Bias" AGC mode is not appropriate for a Single Balancing Authority operating in an Interconnection. HQT uses the Flat Frequency mode.
Individual
Isaac Read
Beacon Power Corporation
Yes
Yes
Yes
The concept of requiring each Balancing Authority to achieve some level of Frequency Response and calculate it consistently is appropriate and necessary.
Yes
As R3 has not significantly changed, will the Interpretation of Requirement 3 from BAL-003-0.1b still be applicable to BAL-003-1?
No
Why is it appropriate to delay implementation of this standard for over 12 months after applicable approval? This seems an unnecessary delay considering the intent to operate under a field test. Similarly, delaying implementation of R2 for over 2 years seems unnecessary. Based on the suggested schedule for measuring FRM and implementing Frequency Bias Settings, there may be rationale to implement the standard on the first calendar year following approval. However, delays beyond the beginning of the next calendar year should require conclusive justification.
Group
Southern Company
Cindy Martin
Yes
Comments: The Frequency Response Measure should be based on either the median or average of all SEFR's as currently defined. Due to the varied nature of frequency responsive resources online it should never be based on meeting response on a single event.
Yes

Frequency Bias Setting A value, (either a fixed or variable Frequency Bias), usually expressed in MW/0.1 Hz, set into a Balancing Authority Area Control Error algorithm equation that allows the Balancing Authority to contribute its frequency Frequency rResponse to the Interconnection. Comments: Not sure the word "allows" is the right word. Perhaps use something in terms of preventing withdrawal of Primary Frequency Response with words like "...equation that prevents the withdrawal of the Balancing Authority's Primary Frequency Response to the Interconnection."

Yes

No

Comments: Proposed Standard Comment 1: BAL-003-1, Requirement R1. The requirement should be made less prescriptive by removing references to Attachment A and FRS Form 1. The responsible entity should understand the fundamental and basic requirement – to achieve a Frequency Response Measure. Where the methodology is specified or how the BA is supposed to achieve it should be a matter of compliance and/or implementation and not a part of the basic requirement. Proposed language is as follows: Each Balancing Authority shall achieve a Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO).

No

Comments: Comment 2: BAL-003-1, Requirement R2. The requirement should be made less prescriptive by removing references to the calculation methodology and Attachment A. The responsible entity should understand the fundamental and basic requirement – to implement the Frequency Bias Setting into its Areas Control Error calculation. Proposed language is as follows: 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. Comment 3: BAL-003-1, Requirement R2 and Section 1.4 Additional Compliance Information. The SDT should consider whether or not the ERO has compliance obligations pursuant to the obligations mentioned in the proposed Standard. Requirement R2, states that the ERO should provide the BA with the Frequency Bias Setting and the specified date to begin the calculation. The R1 Supplemental Information section states that the ERO is obligated to post the official list of events. The R2 Supplemental Information section states that the ERO is obligated to validate the FRM and Frequency Bias Settings and disseminate the Frequency Bias Settings Report along with the implementation date. These obligations should be confirmed and properly incorporated into Standard if appropriate.

No

Comments: Agree only to the extent that an accurate frequency measurement is available to the BA. If not frequency measurement is available, then that should be considered an adverse condition and thus TLB is not appropriate. In other words, one small BA maintaining TLB may not cause the condition in the Glossary definition of Adverse Reliability Impact but it is still not appropriate for them to stay on TLB.

Yes

We did not want to vote on Question 7, but clicked 'yes' in error.

Individual

Bryan Taggart

Westar Energy

No

For FRM, why is median used rather than average? The method in the standard for determining FRM needs to allow for excluding some events due to non-conforming loads, scan rates, intermittent resources, large interchange ramps, etc that may cause the actual response during the 16 seconds to actually be opposite of the expected response.

No

We propose the following: A value, (either a fixed or variable), expressed in MW/0.1 Hz, set into a Balancing Authority Area Control Error equation that allows the Balancing Authority to contribute its SECONDARY Frequency Response to the Interconnection.

Yes

No

The lagging measure is a concern. The ERO should be required to provide an updated proposed/possible list of frequency events monthly so BA's can determine their FRM through out the year so corrective action can be taken if needed. Prior year events should be excluded (just to get to 25 events). This could result in begin non-compliant twice for the same events.

Yes

Yes

Yes

Yes, if field testing validates the standard.

Individual
Thomas Washburn
FMPP
Yes
Yes
Yes
No
The proposed Requirement 1 states: 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). Attachment A states that 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. Problem – by using events from last year to determine an entity's compliance with a Requirement for this year puts the entity in double jeopardy for last year's events, which were already used for compliance for last year.
Yes
Yes
Group
Santee Cooper
Terry L. Blackwell
No
We suggest the SDT consider defining SEFRD as: The calculated frequency response by a Balancing Authority for a specific frequency excursion event as identified by the ERO (or NERC). As a comment, how frequency response is calculated needs to be defined and may not always be the Net Actual Interchange (NIA) divided by the change in frequency expressed in hertz. For example, the NIA may need to be adjusted for known generation and load changes that do not represent frequency response for the period being measured such as known generation and load ramp changes. Change in frequency needs to be more specific, such as the frequency difference between B and A measured at B. If Frequency Response Obligation (FRO) is a targeted value, then perhaps the definition should be: The Balancing Authority's annual median frequency response as assigned by the ERO (or NERC). The word "contribution" should be considered to be replaced with "the balancing authority piece of the total....." The review team is concerned that the FRO and FRM definitions do not contain enough clarity as to how the BAs will be held accountable. Also, the definitions do not explain who will determine the value of each BA's FRO and the method used to determine the FRO value. Should the definition of Frequency Response Measure be a median or mean value?
No
We suggest the following changes to the definition: A value, fixed or variable, expressed in MW/0.1 hertz, as part of a Balancing Authority's Area Control Error (ACE) equation that influences its Automatic Generation Control (AGC) to provide frequency response without secondary control action withdrawing the response.
Yes
No
The concept seems reasonable but since the measure of compliance (FRM) is determined only after the 25 events are identified; it is a lagging indicator. The BA may have to ensure it measures all frequency excursions and develops its own leading indicator to ensure compliance following year end.
No
It is not clear what the methodology (should be method) is in Attachment A. Is the frequency bias setting the BA's prior year FRM with a minimum value being a percentage of estimated yearly peak load or upcoming year maximum generation? What does "provided by the ERO" mean? Perhaps it should be verified or approved by the ERO (NERC).
No
BAL-003-0, Requirement 3 requires operation of AGC on Tie Line Frequency Bias. BAL-005-0.1b, Requirement 6 requires the BA to compare total Net Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE. We suggest that Requirement 3 be restated to "shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless ....." Tie Line bias is the (Ia-Is) term and frequency bias is the -10B(Fa-Fs) term.

No
The implementation plan has specific dates for reducing the bias settings currently defined in Requirement 5 over several years. Perhaps these dates should not be specific but tied to months following regulatory approval. Attachment A should be modified to match what is in the proposed standard. The values currently shown as percent "of peak/0.1 Hz" should be changed to percent of estimated yearly peak demand per 0.1 Hz change. For BAs that do not serve native load, percent "of upcoming years maximum generation/0.1 Hz should be changed to percent of its estimated maximum generation level in the coming year/0.1 Hz change.
Individual
Chris Adams
EKPC
No
These definitions should be revised to include specifics on how to calculate each term. The FRM calculation method should take into account large non-conforming loads. A median will not reflect the true nature of the system.
No
"Frequency Bias" should not be used in the definition. "Usually" can be omitted.
Yes
No
The method for measurement is not detailed. Also, the method indicates a lagging indicator. Hows is the BA to ensure its compliance through the year?
No
The method is not clear in Attachment A.
No
Tie line bias is calculated using (NAI-NSI) while frequency bias is -10B(FA-FS).
No
Specific dates should be tied to regulatory approval.
Individual
Kathleen Goodman
ISO New Engand Inc.
No
If this is really intended to be a Field Trial, it should be written as such and the standard should not be developed or promulgated until the Field Trial has accomplished its purpose and the performance criteria and measures have been determined. The standard should be put into place later; it is premature at this time. Since this is to be a data gathering process to be used to determine appropriate performance parameters, the purpose statement of the Field Trial should be changed to read as follows: To determinerequire sufficient Frequency Response arranged by from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by responding to and arresting frequency deviations and supporting frequency until the frequency is restored to schedule. To identify and establishprovide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting and Frequency Response Obligation. We should not write the new standard and its requirements until this Field Trial work has been accomplished; to do so possibly would result in difficulty changing the standard requirements based upon Field Trial results. Further, while we do not have any issue with the general intent of the scope statement, we have a difficulty seeing the BA being the only entity held responsible for maintaining interconnection frequency and arresting frequency deviations. When there is a sudden and sizable change to system resource or demand, the first response to a frequency deviation caused by this change would be the generators' governors. This will provide a mitigating effect for the immediate seconds up to minutes. The frequency bias setting will then kick in to supplement the mitigation need. The governors are owned by the Generator Owners; the BAs do not own these facilities and hence can do little to address frequency response during this initial period. To hold only the BA responsible for maintaining interconnection frequency and arresting frequency deviations would be inappropriate. The industry needs to have a discussion to determine who should be held responsible for providing governor responses immediately following an event, and by what mechanism, and for implementing additional measures thereafter. We suggest that BAL-003 development be withheld until this discussion takes place and a decision is made on who and how the governor response shall be provided.
No
We have a difficulty seeing the BA being the only entity held responsible for maintaining interconnection frequency and arresting frequency deviations. When there is a sudden and sizable change to system resource or demand, the first response to a frequency deviation caused by this change would be the generators' governors. This will provide a mitigating effect for the immediate seconds up to minutes. The frequency bias setting will then kick in to supplement the

mitigation need. The governors are owned by the Generator Owners; the BAs do not own these facilities and hence can do little to address frequency response during this initial period.

No

Single BA Interconnections do not operate on Tie Line Bias. The requirement should be modified to accommodate this or regional variances should be written by the SDT to address existing differences. In addition this requirement, as written, does not provide for momentary cessation of AGC for any reason, nor for reasonable system maintenance, repair, or updates. As written, it seems to say that any duration of operation off Tie Line Bias is unacceptable and, thus, would be a violation.

No

We do not agree that a meaningful Implementation Plan can be developed until such time as the data gathering/field testing is completed. Therefore, we believe this Standard may be premature.

Individual

Hao Li

Seattle City Light

Yes

Yes

Yes

Yes

No

Currently a Balancing Authority has only about one month over holiday periods(December 10 to January 10) to assemble its data and calculate the Frequency Response Measure (FRM). Further, Attachment A requires the ERO to use at least 25 events for the calculation of FRM. Seattle City Light (SCL) believes that one month is insufficient time given the number of events required. So SCL recommends additional time, such as two months or to reduce the number of events to be included in annual reviews.

Yes

Yes

Individual

Kasia Mihalchuk

Manitoba Hydro

Yes

Yes

Yes

The new more likely improved method of measuring Frequency Response is welcome. This should be an improvement over the existing methods of using 1% of projected peak load, or average of DCS events. Calculating projected peaks leave lots of room for error and limiting calculations to only DCS events likely does not reflect accurate BIAS.

Yes

Yes

The implementation schedule seems reasonable.

Yes

Yes

Group

MRO's NERC Standards Review Subcommittee

Carol Gerou

No
For Frequency Response Measure, the drafting team should consider using average rather than median. Because median is literally the middle value, a Balancing Authority could have 12 really bad Single Event Frequency Response Data and still comply. Average values would prevent this from happening. Should FRM be clear that it includes at least 25 events in the definition? While that can be garnered from Attachment A, it is not specified in the Form 1 instructions. We are concerned that the regulators may argue that 25 events do not apply because an attachment is not part of the standard.
No
Given that frequency response is "contributed" long before AGC has an impact, "contribute" should probably be changed to "maintain". The goal is to ensure AGC does not withdraw frequency response and that it is maintained while frequency is depressed. We are not sure if Frequency Response has a precise enough definition and it is part of the definition of Frequency Bias Setting. The definition of Frequency Response really just reflects how it is measured. It does not define what it really is which is the dynamic response of load, generation, and other frequency responsive devices to a perturbation in frequency. The drafting team should also consider resolving the definition of Frequency Bias. Is it needed? It is often confused with Frequency Bias Setting and is often used interchangeably with Frequency Response even though the meanings are slightly different.
No
In general, we don't have significant issues with a standard that attempts to establish a minimum Frequency Response performance level. However, we caution the drafting team that the minimum level established needs to be determined based on an extensive data analysis based on the field trial, based on the Frequency Response Initiative Work Plan that NERC filed in response to the Commission's September 23 technical conference and based on the plan outlined in NERC's October 25, 2010 compliance filing.
No
In general, we don't have significant issues with a standard that attempts to establish a minimum frequency response performance level. However, we caution the drafting team that the minimum level established needs to be determined based on an extensive data analysis based on the field trial, based on the Frequency Response Initiative Work Plan that NERC filed in response to the Commission's September 23 technical conference and based on the plan outline in NERC's October 25, 2010 compliance filing. The effects of the nonconforming load should be considered in the calculation of the frequency response obligation in order to get accurate results.
No
Flexibility established in the date is better than the existing currently defined date in the standards. It is better to allow the ERO to specify the date to allow some flexibility in implementation. It appears that the responsible for identifying Frequency Bias Setting is being removed from the Balancing Authority. There is an implied obligation that the ERO will determine the Frequency Bias Setting but it is not stated explicitly. Thus, we are left wondering who has the responsibility for determining the Frequency Bias Setting. Frequency Response of the interconnection is constantly changing. As a result, the Frequency Bias Setting will never match the Frequency Response exactly. It is better to overbias than underbias to prevent withdrawal of frequency response by AGC. Historically, the 1% floor for frequency bias setting was chosen to ensure that BAs are always over-biased. The standard needs to allow some margin in the frequency bias setting to ensure that the bias setting is overbiased.
Yes
No
We agree with the plan to phase out BAL-003-0.1b R5 over a period of years rather than abruptly terminate it because it will take several years to assess the impact. We recommend a wording change to the implementation plan. Please change 'BAL-003-0 Requirement 5 should be retired as outlined in the following table,' to "BAL-003-0.1b Requirement 5 should be phased out by reducing the minimum frequency bias setting per the table." It is not clear if the minimum frequency bias setting can be modified without modifying the existing BAL-003-0.1b standard. Is this being accomplished through the field trial? The implementation plan makes no mention of a field trial. It should. Please change all BAL-003-0 to BAL-003-0.1b.
Group
LG&E and KU Energy
Brent Ingebrigtsen
No
We suggest the SDT consider defining SEFRD as: The calculated frequency response by a Balancing Authority for a specific frequency excursion event as identified by the ERO (or NERC). As a comment, how frequency response is calculated needs to be defined and may not always be the Net Actual Interchange (NIA) divided by the change in frequency expressed in hertz. For example, the NIA may need to be adjusted for known generation and load changes that do not represent frequency response for the period being measured such as known generation and load ramp changes. Change in frequency needs to be more specific, such as the frequency difference between two physical locations B and A measured at B. Frequency deviation used in the calculation needs to be the deviation observed by the BA performing the calculation. If Frequency Response Obligation (FRO) is a targeted value, then perhaps the

definition should be: The Balancing Authority's annual median frequency response as assigned by the ERO (or NERC). The word "contribution" should be considered to be replaced with "the balancing authority piece of the total....." The standard does not explain who will determine the value of each BA's FRO nor the method used to determine the FRO value. Should the definition of Frequency Response Measure be a median or mean value?

No

We suggest the following changes to the definition: 1. Delete the word "usually" 2. Replace "set into" with "as part of". 3. Replace the remainder of the sentence following "Area Control Error equation" with "that influences its Automatic Generation Control (AGC) to provide its frequency response while Interconnection frequency is not at its scheduled value" – (The frequency bias does not allow a BA to contribute its frequency response to the Interconnection. The frequency bias term only affects the AGC response of the BA, which is part of its frequency response usually minutes after the initial event and is dependent upon generation units being on AGC control and capable of responding.) 4. The suggested changes would result in the following definition: A value, (either a fixed or variable Frequency Bias), expressed in MW/0.1 hertz as part of a Balancing Authority's Area Control Error (ACE) equation that influences its Automatic Generation Control (AGC) to provide its frequency response while Interconnection frequency is not at its scheduled value.

No

The proposed purpose statement as provided in this question is not the same as the purpose statement for BAL-003-1 as posted on the Project 2007-12 page of the NERC website. The posted purpose on the NERC website is: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored. To schedule and provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting. The version posted in the question appears to correct errors in the last sentence of the purpose statement given in the project page. We do not agree with the purpose statement as posted on the project page. In addition, we suggest the following edits to what appears to be a corrected purpose statement as provided in this question: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations due to contingencies on the interconnected BES and supporting frequency until the frequency is restored to schedule. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting. As NERC/FERC has differentiated Frequency Response from Frequency Regulation, the standards addressing Frequency Response should clearly be related to unplanned contingencies occurring on the interconnected BES.

No

The concept seems reasonable but since the measure of compliance (FRM) is determined only after the 25 events are identified; it is a lagging indicator. The BA may have to ensure it measures all frequency excursions and develops its own leading indicator to ensure compliance following year end. A sample CPS bounds report should be considered, perhaps based on 2010 numbers, to demonstrate how FRM submitted would translate to FRO frequency bias settings and how it will affect the L10 values

No

It is not clear what the methodology (should be method) is in Attachment A. Is the frequency bias setting the BA's prior year FRM with a minimum value being a percentage of estimated yearly peak load or upcoming year maximum generation? What does "provided by the ERO" mean? Perhaps it should be verified or approved by the ERO (NERC).

No

BAL-003-0, Requirement 3 requires operation of AGC on Tie Line Frequency Bias. BAL-005-0.1b, Requirement 6 requires the BA to compare total Net Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE. We suggest that Requirement 3 be restated to "shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless ....." Tie Line bias is the (Ia-Is) term and frequency bias is the -10B(Fa-Fs) term. This should be coordinated with BARCSDT modifications to BAL-005.

No

The implementation plan has specific dates for reducing the bias settings currently defined in Requirement 5 over several years. Perhaps these dates should not be specific but tied to months following regulatory approval. Attachment A should be modified to match what is in the proposed standard. The values currently shown as percent "of peak/0.1 Hz" should be changed to percent of estimated yearly peak demand per 0.1 Hz change. For BAs that do not serve native load, percent "of upcoming years maximum generation/0.1 Hz should be changed to percent of its estimated maximum generation level in the coming year/0.1 Hz change

Group

Progress Energy

James Eckelkamp

No

The proposed definition for SEFRD assumes that there is no change in the Net Scheduled Interchange (NIS) as a result of the event. However, a dynamic schedule for load or generation based on data obtained with a two second scan rate will impact the NIS, and therefore the corresponding load or generation response will offset the change to NIA. Therefore, the definition of SEFRD should replace "NIA" with "change in NIA minus NIS".

No
A bias, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the interconnection, and prevent response withdrawal through secondary control systems. The changes suggested are to clarify that biasing of the ACE equation "allow[s]" primary frequency response to continue beyond the initial event window by accounting for it in the ACE input to secondary control systems (i.e. AGC). It's important to note that Primary Frequency Response will occur no matter what the Bias value is set to in the ACE equation, and biasing "supports" the response until the frequency is restored".
Yes
No
Progress Energy believes the Eastern Interconnection does not have the same issues with frequency experienced in the other two interconnections, and that load response is significant enough in the interconnection to arrest and stabilize frequency as long as BAs do not withdraw that effect (accurate biasing of the ACE equation). We also believe this standard should reference standrd PRC-024 related to accurate relay settings to allow out of bounds operations related to frequency and voltage deviations.
Yes
Yes
No
We agree with the graduated implementation for the FRO portion of the standard, but feel NERC needs to losen the minimum frequency bias requirement immediately so that it matches the newly required frequency response. There are also other areas within the EMS the besides BA's frequency bias that should be addressed such as secondary frequency response systems that should also be included in this standard. Additionally, if the industry was truly concerned with matching bias values to actual response, they would swich to variable frequency bias. Variable bias requires additional up front work along with general maintenance, but it truly is the best way to accurately bias the ACE equation.
Individual
JC Culberson
ERCOT
No
The definition of SEFRD will not work as described for a single BA Interconnection. There is no change in NI for frequency deviations. Similarly, the definition assumes all response is provided by change in Interchange and does not really reflect the frequency response of a contingent BA. Either the definition needs to be changed to accommodate single BA Interconnections (such as ERCOT and Hydro Quebec), or regional variances for them need to be written by the SDT. A BA's frequency response is composed of load frequency response, governor response, and, for BAs external to the resource loss, change in Net Interchange. Some approximation may be achieved by recognizing that the magnitude of frequency deviation is attenuated by load frequency response and governor response (or frequency activated demand response to reduce load). The definition of FRM specifies the median of all SEFRD observations reported annually. What is the technical basis for selecting the median rather than the mean? The definition of FRO raises questions. The discretely administered determination of FRO described in the draft Attachment A sets too stringent a requirement; particularly for the smaller Interconnections which may also have large size generation resources just as do the larger Interconnections. To "assure that Point C will not encroach on the first step UFLS" is significantly more stringent than existing and historical performance for those smaller Interconnections. Such assurance will assuredly prove to be very expensive. In fact, we question the need to define FRM and FRO since they can easily be stipulated in the standard requirements. Having them defined and added to the ever-growing NERC glossary creates unnecessary work to maintain the glossary, unless these terms are used by other NERC standards for which consistent meaning need to be established. For example, R1 can easily be reworded as: "R1: Each Balancing Authority shall achieve a median of all Single Event Frequency Response Data observations reported annually on FRS Form 1 that is equal to or more negative than its contribution obligation to the total aggregate Frequency Response needed for reliable operation of an Interconnection assigned by the ERO." Similar wording changes can be made to the FRS Form 1 to eliminate the need to define these two terms. Further, the Attachment A states that the SDT is evaluating a risk based approach to establishing an Interconnection Frequency Response Obligation which can be based on a probability function. If the N-2 criteria is established, it will be unlikely to be possible to change that if the new approach is viewed as a reduction in required performance. As an example, in the ERCOT Interconnection, it is recognized that the present level of required frequency responsive reserve cannot in all scenarios assure that Point C will not encroach the first step of UFLS. The system conditions that exist for the encroachment to occur represent a small likelihood and would require the N-2 contingency to occur on something like the minimum hour of the minimum load day of the year. It has occurred one time in the history of ERCOT. Thus, it is less than once in ten years based upon actual history. The cost of precluding such an event would be astronomical.

No
The definition appears to be accurate, but where is “fixed” and “variable” Frequency Bias defined in the context of these requirements? Should it be Frequency Bias Setting, instead? “Fixed” seems to be straightforward, but what is “variable”? How often must Frequency Bias Setting change in order to be considered to be “variable”?
No
If this is really intended to be a Field Trial, it should be written as such and the standard should not be developed or promulgated until the Field Trial has accomplished its purpose and the performance criteria and measures have been determined. We request that the results of the Field Trial should be published and discussed BEFORE any changes are made. The standard should be put into place later; it is premature at this time. Since this is to be a data gathering process to be used to determine appropriate performance parameters, the purpose statement of the Field Trial should be changed to read as follows: To determine require sufficient Frequency Response arranged by from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by responding to and arresting frequency deviations and supporting frequency until the frequency is restored to schedule. To identify and establish provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting and Frequency Response Obligation. We should not write the new standard and its requirements until this Field Trial work has been accomplished; to do so possibly would result in difficulty changing the standard requirements based upon Field Trial results. Further, while we do not have any issue with the general intent of the scope statement, we have a difficulty seeing the BA being the only entity held responsible for maintaining interconnection frequency and arresting frequency deviations. When there is a sudden and sizable change to system resource or demand, the first response to a frequency deviation caused by this change would be the generators’ governors. This will provide a mitigating effect for the immediate seconds up to minutes. The frequency bias setting will then kick in to supplement the mitigation need. The governors are owned by the Generator Owners; the BAs do not own these facilities and hence can do little to address frequency response during this initial period. To hold only the BA responsible for maintaining interconnection frequency and arresting frequency deviations would be inappropriate. The industry needs to have a discussion to determine who should be held responsible for providing governor responses immediately following an event, and by what mechanism, and for implementing additional measures thereafter. We suggest that BAL-003 development be withheld until this discussion takes place and a decision is made on who and how the governor response shall be provided.
No
The SRC agrees that a Frequency Response of some minimum level for each Interconnection should be achieved. However, the measure as described does not apply to all Interconnections. It does not apply to single BA Interconnections such as ERCOT and Hydro Quebec. This requirement should be added later—not included now; and it should clarify what the BA must do and what the response providers must do. BAs do not own and operate the resources. An entity which does own or operate the resources may also be registered as a BA, but an entity which does not own or operate resources may also be registered as a BA. Therefore, it is important to detail what a BA must do and also to detail what the resource owner or operator must do. The resource owner may be registered as a GO or a TO or even a DP. The resource operator may be registered as a GOP, a TOP, or a LSE. The BA must establish an operations plan, using data provided to it by the resource owners and or operators, that will meet the performance requirements. The BA must then deploy the proper amount of response through AGC or verbal instructions to supplement the automatic responses that the resources will provide, must calculate the actual responses after-the-fact, and report the performance as required. The resources must, as standards already provide, comply with the deployments and instructions provided by the BA. However, if an entity which is functioning as a BA does not own its resources, nor does it directly operate those resources, the BA cannot ensure the achievement. The standard must not create an organizational or contractual arrangement that dictates how the compliance is provided. It should state what must be done, not how. If entities choose to write and enter into such arrangements, that should be permissible, but not required. Specific to R1, the wording does not correspond to the figures shown in the FRS (Form 1) in that the FRM (the median) is -14.5 whereas the FRO is -15.8. The FRO is more negative than the FRM, which does not seem to correspond to what’s stipulated in R1 (FRM to be equal or more negative than its FRO).
No
It is not clear how the ERO uses the FRM to determine the required Frequency Bias Settings. It should not be necessary for the ERO to do the determination for all the Interconnections. There are already in place methods for this by the existing ERCOT and WECC Interconnections. The SRC suggests that the ERO may not be the appropriate technical entity. The ERO may be the appropriate entity to serve as the receiver of the forms and analyze results for the Eastern Interconnection, but existing processes are already in place elsewhere. It should be sufficient that those processes continue and submit copies of Form 1 to the ERO. This may also be appropriate for Hydro Quebec. In addition, whichever entity determines the Frequency Bias Setting must provide implementation time for the BAs to implement the settings. The proposed language says only that the BA shall implement it on the date specified, but it doesn’t address the need for that date to include some implementation time.
No
Single BA Interconnections do not operate on Tie Line Bias. The requirement should be modified to accommodate this or regional variances should be written by the SDT to address existing differences. In addition this requirement, as written, does not provide for momentary cessation of AGC for any reason, nor for reasonable system maintenance, repair, or updates. As written, it seems to say that any duration of operation off Tie Line Bias is unacceptable and, thus,

would be a violation.
No
What is the technical basis for the phase-out schedule? Making the standard requirements effective earlier than the schedule shown could result in the unintended consequence of non-compliance enforcement for performance that is caused by the change rather than by the non-performance of the functional entity. Also, the effective dates given in the Implementation differ from those in the draft standard. Different requirement numbers are expressed in each. Some of the implementation steps (retiring R5 of BAL-003-0) presented in the implementation plan start as early as May 2011. We do not believe that the BAL-003-1 standard will be approved by the industry or the NERC BoT at that time and that does not even take into account regulatory approval (or 12 months after BoT adoption in those jurisdictions where no regulatory approval is required). How can a standard begins to phase out while the successor standard is not anywhere near becoming effective? If the SDT wants to propose a gradual replacement of the current R5, we would suggest that the phase-out steps be tied to the date that the standard becomes effective.
Individual
Howard Rulf
We Energies
No
For Frequency Response Measure, the drafting team should consider using average rather than median. Because median is literally the middle value, a Balancing Authority could have 12 really bad Single Event Frequency Response Data points and still comply. Average values would prevent this from happening. Should FRM be clear that it includes at least 25 events in the definition? While that can be garnered from Attachment A, it is not specified in the Form 1 instructions. We are concerned that the regulators may argue that 25 events do not apply because an attachment is not part of the standard.
No
Given that frequency response is "contributed" long before AGC has an impact, "contribute" should probably be changed to "maintain." The goal is to ensure AGC does not withdraw frequency response and that it is maintained while frequency is depressed. We are not sure if Frequency Response has a precise enough definition and it is part of the definition of Frequency Bias Setting. The current NERC Glossary definition of Frequency Response really just reflects how it is measured, it does not define Frequency Response. Frequency Response is the dynamic real power response of load, generation, and other devices to a perturbation in frequency. The drafting team should also consider resolving the definition of Frequency Bias. Is it needed? It is often confused with Frequency Bias Setting and is often used interchangeably with Frequency Response even though the meanings are slightly different.
No
In general, we don't have significant issues with a standard that attempts to establish a minimum Frequency Response performance level. However, we caution the drafting team that the minimum level established needs to be determined based on an extensive data analysis, field trial data, the Frequency Response Initiative Work Plan that NERC filed in response to the Commission's September 23 technical conference, and the plan outlined in NERC's October 25, 2010 compliance filing.
No
In general, we don't have significant issues with a standard that attempts to establish a minimum frequency response performance level. However, we caution the drafting team that the minimum level established needs to be determined based on an extensive data analysis, field trial data, the Frequency Response Initiative Work Plan that NERC filed in response to the Commission's September 23 technical conference, and the plan outline in NERC's October 25, 2010 compliance filing.
No
Flexibility established in the date is better than the existing currently defined date in the standards. It is better to allow the ERO to specify the date to allow some flexibility in implementation. It appears that the responsibility for identifying Frequency Bias Setting is being removed from the Balancing Authority. There is an implied obligation that the ERO will determine the Frequency Bias Setting but it is not stated explicitly. Thus, we are left wondering who has the responsibility for determining the Frequency Bias Setting. Frequency Response of the interconnection is constantly changing. As a result, the Frequency Bias Setting will never match the Frequency Response exactly. It is better to over-bias than under-bias to prevent withdrawal of frequency response by AGC. Historically, the 1% floor for frequency bias setting was chosen to ensure that BAs are always over-biased. The standard needs to allow some margin in the frequency bias setting to ensure that the bias setting is over-biased.
Yes
No
We agree with the plan to phase out BAL-003-0.1b R5 over a period of years rather than abruptly terminate it because it will take several years to assess the impact. We recommend a wording change to the implementation plan. Please change 'BAL-003-0 Requirement 5 should be retired as outlined in the following table,' to "BAL-003-0.1b Requirement 5 should be phased out by reducing the minimum frequency bias setting per the table." It is not clear if the minimum frequency bias setting can be modified without modifying the existing BAL-003-0.1b standard. Is this being

accomplished through the field trial? The implementation plan makes no mention of a field trial. It should. Please change all BAL-003-0 to BAL-003-0.1b
Group
Midwest ISO Standards Collaborators
Jason Marshall
No
For Frequency Response Measure, the drafting team should consider using average rather than median. Because median is literally the middle value, a Balancing Authority could have 12 really bad Single Event Frequency Response Data and still comply. Average values would prevent this from happening. Should FRM be clear that it includes at least 25 events in the definition? While that can be garnered from Attachment A, it is not specified in the Form 1 instructions. We are concerned that the regulators may argue that 25 events do not apply because an attachment is not part of the standard.
No
Given that frequency response is "contributed" long before AGC has an impact, "contribute" should probably be changed to "maintain". The goal is to ensure AGC does not withdraw frequency response and that it is maintained while frequency is depressed. We are not sure if Frequency Response has a precise enough definition and it is part of the definition of Frequency Bias Setting. The definition of Frequency Response really just reflects how it is measured. It does not define what it really is which is the dynamic response of load, generation, and other frequency responsive devices to a perturbation in frequency. The drafting team should also consider resolving the definition of Frequency Bias. Is it needed? It is often confused with Frequency Bias Setting and is often used interchangeably with Frequency Response even though the meanings are slightly different.
No
In general, we don't have significant issues with a standard that attempts to establish a minimum Frequency Response performance level. However, we caution the drafting team that the minimum level established needs to be determined based on an extensive data analysis based on the field trial, based on the Frequency Response Initiative Work Plan that NERC filed in response to the Commission's September 23 technical conference and based on the plan outlined in NERC's October 25, 2010 compliance filing.
No
In general, we don't have significant issues with a standard that attempts to establish a minimum frequency response performance level. However, we caution the drafting team that the minimum level established needs to be determined based on an extensive data analysis based on the field trial, based on the Frequency Response Initiative Work Plan that NERC filed in response to the Commission's September 23 technical conference and based on the plan outline in NERC's October 25, 2010 compliance filing.
No
Flexibility established in the date is better than the existing currently defined date in the standards. It is better to allow the ERO to specify the date to allow some flexibility in implementation. It appears that the responsible for identifying Frequency Bias Setting is being removed from the Balancing Authority. There is an implied obligation that the ERO will determine the Frequency Bias Setting but it is not stated explicitly. Thus, we are left wondering who has the responsibility for determining the Frequency Bias Setting. Frequency Response of the interconnection is constantly changing. As a result, the Frequency Bias Setting will never match the Frequency Response exactly. It is better to overbias than underbias to prevent withdrawal of frequency response by AGC. Historically, the 1% floor for frequency bias setting was chosen to ensure that BAs are always over-biased. The standard needs to allow some margin in the frequency bias setting to ensure that the bias setting is overbiased.
Yes
No
We agree with the plan to phase out BAL-003-0.1b R5 over a period of years rather than abruptly terminate it because it will take several years to assess the impact. We recommend a wording change to the implementation plan. Please change 'BAL-003-0 Requirement 5 should be retired as outlined in the following table,' to "BAL-003-0.1b Requirement 5 should be phased out by reducing the minimum frequency bias setting per the table." It is not clear if the minimum frequency bias setting can be modified without modifying the existing BAL-003-0.1b standard. Is this being accomplished through the field trial? The implementation plan makes no mention of a field trial. It should. Please change all BAL-003-0 to BAL-003-0.1b.
Group
FirstEnergy
Sam Ciccone
Yes
For the definition of FRM, we are not clear as to the rationale for choosing the median value instead of the mean.
Yes
Although we support the definition, we suggest the word "contribute" be changed to "maintain".

Yes
No
We cannot agree at this time since Attachment A of the materials posted do not include sufficient details regarding the calculations used. Furthermore, there is no obligation imposed on the ERO to provide neither a reasonable time frame for implementation of the Frequency Bias Setting nor a requirement for the ERO to follow the methodology detailed in Attachment A. The team should consider adding a requirement for the ERO or clarifying where this obligation is covered in NERC's Rules of Procedure.
Yes
Although we mostly agree with the requirement, we believe it can be improved. We suggest that the team add wording in the requirement to allow for brief periods where meters or communication channels fail and trip the AGC off Tie Line Bias. In most areas, if merely one BA trips off bias it would not have an adverse affect on BES reliability and furthermore, the BA can take alternative measures for these periods such as manual AGC. We suggest the team add wording similar to the second sentence of requirement R7 of BAL-005 which states: "If AGC has become inoperative, the Balancing Authority shall use manual control to adjust generation to maintain the Net Scheduled Interchange."
No
We believe that the implementation plan should include information regarding the field trial and how it fits in with the phase-in implementation. It appears as though the field trial is being conducted based on 2010 data and will be concluded upon completion of the development of the standard but we think this could be clarified. Furthermore, as stated in the process manual, a field test "should include at a minimum the data collection and analysis or field test plan, the implementation schedule, and an expectation for periodic updates of the results." The field test information posted is not clear on the implementation schedule of the field test as well as when and how periodic updates will be available.
Group
Bonneville Power Administration
Denise Koehn
No
FRO definition – BPA feels uncomfortable supporting this standard when the ERO is given a blank check to FRO. The methodology for determining the FRO must be spelled out in detail in order to allow all entities an opportunity to comment on that methodology.
Yes
Yes
No
BPA agrees that there should be a minimum level of Frequency Response, but disagree with the way the measure is obtained in the requirement. • R1 – BPA suggests replacing "achieve" with "calculate". Achieve: indicates it is a performance. • R1 – BPA does not agree with the requirements in Attachment A not being in the standard. These should not be modified without full review and voting by members. • R1 – BPA believes that there should be more description on Variable Bias. What variable bias number should we use: average, minimum, peak for the event? BPA feels that the peak bias of each event would be appropriate.
No
R2 – BPA believes that the ERO should not be providing the BA the Frequency Bias Settings for the BA. R2 points to Attachment A as having the calculation methodology, but there is no methodology spelled out in Attachment A, there are simply data requirements, delta frequency that will be included in surveys, tools to be used, etc. The statement 'natural frequency response' is in Attachment A many times, but it is never spelled out. What is meant by this phrase. This differs dramatically depending on when the event occurs due to different generating patterns, different types of load (frequency responsive versus not frequency responsive), etc. The methodology needs to spell out how this will be taken into account when calculating the correct frequency bias. Secondly, how would this be done for variable bias?
No
R3. BPA does not believe this standard should dictate the control mode for AGC. That is better suited to be in BAL-001 and should not be repeated in this standard – the ACE used for reporting is spelled out in BAL-001 R1 and is also discussed in BAL-005 R6. R3 should be removed from this standard, not modified to fit with what is stated in BAL-001 or BAL-005.
No
From a compliance perspective, it is administratively very burdensome to have portions of two different versions of a standard applicable at the same time, as specified in the Implementation Plan for BAL-003-1. This type of structure adds an additional layer of complexivty to all parts of the compliance administration process. as necessary to distinguish

between the separate versions of the standard. Rather than create and prolong this type of situation over a 4 year time period, BPA asks that BAL-003-0 be retired in its entirety and that the contents of BAL-003-1 be expanded to also include R5, as specified in BAL-003-0. This change resolves the identified issues while also ensuring that all requirements of BAL-005 are in effect, as originally intended. The Implementation Plan for BAL-003-1 also includes a proposal to modify the specified limiting percentage of Native Load on a sliding scale over a 4 year time period. BAL-003-3 R5, as approved, explicitly specifies 1% as a minimum value for monthly average Frequency Bias Setting. As such, changing this value results in a change in the requirement itself. Instead of being done through an Implementation Plan, these types of changes should be made as specific modifications to the requirement in question. To resolve this issue, BPA asks that the sliding scale specified for percentage of peak load specified in the Implementation Plan be incorporated directly into BAL-003-1 as a part of the specified text of R5. This change meets the intended goal of applying a sliding scale to this value over time while assuring that the underlying change is implemented as a change to the requirement through the Standards Development Process.

Individual

Thad Ness

American Electric Power

Yes

No

If “the proposed standard’s intent is to collect data needed to accurately analyze existing Frequency Response, set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation”, it appears the current and stated definition is precluding the process for determination of the Frequency Bias Setting itself. I believe it is too early to state in definition the frequency bias setting to be based on MW/0.1 Hz, when this appears to be more of the expected response. Using the word usually does not appear to be defining anything. To eventually get to an acceptable performance measure with reliability basis the project needs to be expanded to also address associated governor droop issues, which inherently affect response. When the current definition references using “either a fixed or variable Frequency Bias”, it does not state whether or not to be applied in the calculation to either load or generation. The current Standard uses 1% of yearly estimated peak demand for BAs that serve load, when the actual load at time of disturbance could be greatly different. Response is more directly related to the amount of Generation on-line and active AGC within the BA at time of trip. MW/0.1 Hz states more of expected result of response than defining Frequency Bias Setting.

No

AEP believes the statement should read “To require sufficient Frequency Response from governors and AGC of Generators within the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to schedule. To provide consistent methods for measuring Frequency Response from governors and AGC of Generators within the Balancing Authority for determining the overall Frequency Bias Setting threshold. Since Generators are directly responsible for response, applicability must be added to Generator Operators.

No

Between the definition and the requirement in Attachment A, it is unclear if FRM is a reliability-supported, performance-based measure, or instead, if it is a calculated number based on previous performance. As written, it is unclear if this is a performance-based requirement, or simply a calculation that should be utilized in some way. In any event, the requirement needs to be re-written to clarify its intent.

No

It appears this standard deviates from past practice for calculating frequency bias. It is unclear how this might affect the CPS Bounds L10 calculation.

Yes

No

It is unprecedented that an implementation plan would require following some (but not all) requirement(s) within multiple versions of the same standard. This would make following the standard very difficult. Having to piece together multiple documents into a coherent requirement would be very difficult to achieve. There needs to be a definitive start and stop date for each version, rather than a phase in and phase out across multiple versions. We disagree with setting preselected dates beginning months away. Timing should be driven by applicable regulatory approval, as opposed to dates which appear to be arbitrarily selected. Going from 100% of the load-based, frequency bias calculation to 0% is unclear without correlating it to something else being phased in over time. It is very hard to follow how BAL-003-0 R5 relates to BAL-003-1. More work needs to be done by the SDT to explain how these relate to one another.

Individual

Greg Rowland

Duke Energy

No
The definition of SEFRD would conflict with any alternative measurement of frequency response. The SEFRD makes no provision for the impacts of generation loss experienced by a contingent BA, impacts of non-conforming loads, or impacts of schedule ramps. The FRM also makes no such provisions. The resulting FRM for a BA experiencing one or more of these impacts for one or more SEFRDs will be skewed and completely miss the intended measurement of the BA's response to frequency excursions. In addition, as it is not yet clear how provision of Frequency Response by one BA to meet a portion of another BA's requirement would be achieved, Duke Energy cannot say that a simple measure of the NIA against the frequency deviation will capture the net of the response desired. Regarding the definition of FRO, the industry should agree on the methodology which would be used for the ERO to determine the response desired for the Interconnection that is used for allocation of the FRO, and not leave it as a parameter subject to change outside of the standards process. The definition is only acceptable if the assignment by the ERO is based upon a methodology supported by the industry and subject to change only through the standards process.
No
Duke Energy would suggest not using "Frequency Bias" in the definition of "Frequency Bias Setting". In addition, Duke Energy would like to point out that ACE does not allow Frequency Response; response will occur with or without the ACE equation. The Frequency Bias Setting is needed so that the AGC does not negate what may be provided in frequency response. The bias component of ACE provides the feedback so that a BA may sustain the intended amount of response with secondary control as long as Actual Frequency deviates from Scheduled Frequency. Duke Energy would suggest the following: "A fixed or variable value usually expressed in MW/0.1 Hz, set into a Balancing Authority Area Control Error equation to bias the control of resources so that Interconnection frequency is driven toward the Scheduled Frequency."
Yes
No
Duke Energy agrees that a BA should be required to achieve a minimum level of Frequency Response, however Duke Energy believes the method for measurement needs improvement – please see comments to 1 and 2 above. Duke Energy agrees with the concept that a Balancing Authority should be required to achieve a minimum level of Frequency Response however the method for measurement should also allow exclusion of certain events, such as when the frequency deviation is associated with the BA's contingent loss of generation, or when an event is coincident with a significant change in ramped interchange. It is not clear how the FRO will be determined – Duke Energy believes that the industry should agree on the methodology which would be used for the ERO to determine the response desired for the Interconnection and how the allocation for the FRO would be determined for each Balancing Authority. The calculation of FRO allocation (in Attachment 1) is not clear on whether the peak load and generation data used is historic data or forecasted data. It is also not clear how the assignment of the FRO would accommodate a mid-year change in Balancing Authority size or other attribute that could change the calculated response. Duke Energy questions if a BA providing better response than its allocated FRO in any year should be held to achieving that in the following year – Duke Energy believes that should be the decision of the BA if it chooses to achieve more than the minimum requirement applied to others.
No
Duke Energy believes that this needs to be restated. Will the ERO perform the calculations to determine each BA's Bias? Will the ERO provide ample time between publication of the settings and the date of implementation? If effective coordinated secondary control is desired, other related operational parameters (e.g., L10) need to be set at the same time. Since measurement and reporting of operational performance is primarily on a monthly basis (e.g., CPS1/CPS2), the implementation date should be on or near the first of a month, but during normal working hours (so that adequate support personnel are available).
No
Duke Energy agrees to the simple statement posed in the question; however, the requirement goes beyond that by using a defined term, Adverse Reliability Impact, which has a relatively narrow focus on extreme conditions. If a single BA lost a significant amount of its tie-line telemetry or its frequency sources, cascading outages and/or grid separation would not necessarily be imminent but it would be imprudent to remain in Tie Line Bias mode. Go back to the original language for the requirement – "Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability."
No
Duke Energy does not agree with having prescribed dates for the gradual reduction of the minimum Frequency Bias Setting, as the implementation may drive significant issues which could delay, or halt the implementation at a certain level. It is not clear what process would be used to give the "go-ahead" to move to the next level (agree?).
Group
SPP Standards Development
Robert Rhodes
No
In the past tie line flow changes that did not have the expected response for the given frequency deviation have been

excluded from the determination of Frequency Bias. It appears that this exclusion does not carry forth in the determination of Frequency Response Measure. Therefore, non-conforming loads, intermittent resources and other events/issues within a Balancing Authority could very well mask its natural frequency response thereby setting the Balancing Authority's Frequency Bias and its Frequency Response Obligation incorrectly. Then the Balancing Authority is obligated to respond and will be measured for compliance against an incorrect value. This being the case, we can support the definition of Single Event Frequency Response Data but have reservations about Frequency Response Measure and Frequency Response Obligation.

No

We would suggest inserting 'secondary' in front of Frequency Response at the end of the sentence and delete 'Frequency Bias' following 'variable' at the beginning of the sentence.

Yes

Yes

No

We would suggest ending the sentence at the second ERO, deleting the phrase '...to ensure effective coordinated secondary control, using the results from the calculation methodology detailed in Attachment A.' This phrase is more of an explanation of why this is being done rather than a part of an actual requirement.

Yes

Yes

Individual

LeRoy Patterson

Patterson Consulting, Inc.

No

SEFRD: From the definition, it is not clear whether SEFRD is a Balancing Authority's 1) data collected for each frequency event, 2) calculated Frequency Response for a selected event, 3) Net Actual Interchange divided by the change in frequency for a selected event, or 4) some combination of these interpretations. If the SDT determines that adjustments to Net Actual Interchange should be made such as adjustments for joint-owned generation and non-conforming loads as suggested in the field test document, then since this definition requires Frequency Response to be determined from Net Actual Interchange, this definition would require changing to allow those adjustments. I suggest defining SEFRD as "The individual sample of event data from a Balancing Authority that is necessary to calculate its Frequency Response on FRS Form 1, expressed in MW/0.1Hz." FRM: This definition and its calculation in FRS Form 1 do not match. FRS Form 1 calculates FRM as "The median of Single Event Frequency Response Data observations reported annually on FRS Form 1 [for events external to the Balancing Authority]." (Brackets added for emphasis.) The FRS Form 1 calculation appears more appropriate based on data collected, since data are not reported and calculations are not adjusted to compensate for contingencies within the Balancing Authority. Regardless, the difference between definition and calculation makes it impossible for a Balancing Authority to know the expected performance measure. FRO: The definition should be changed to remove the opposing concepts of performance and obligation. For example: FRO is defined to be "The Balancing Authority's contribution to the total aggregate Frequency Response..." FRM, not FRO, is the Balancing Authority's contribution toward the aggregated Frequency Response. FRO is "The Balancing Authority's allocation of the interconnection's required Frequency Response..." or "The Balancing Authority's required Frequency Response needed for reliable operation of an Interconnection ..."

Yes

No

The purpose should not expect Frequency Response to maintain frequency beyond a few minutes, perhaps 15 minutes for example. This purpose statement suggests the requirements will be "...to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and support frequency until the frequency is restored to schedule..." The phrase "until the frequency is restored to schedule" is problematic since regulation must bring frequency to schedule. Frequency Response, and the associated requirements, should not be expected to substitute for poor regulation beyond the first few minutes.

No

Requiring a Balancing Authority to provide Frequency Response and measuring that Frequency Response consistently, is critical to maintaining reliability. The requirement is long overdue and the concept is a good one. The method for measurement in FRS Form 1 is not consistent with the definition of FRM. The desired "averaging" of input data over specific time ranges by the Balancing Authority as it completes FRS Form 1 appears only in the background and instructions for FRS Form 1. Since this "instruction" document will not be a part of the standard, it is not obvious that Balancing Authority's will be compelled to provide consistent data. Therefore, the standard will fail to achieve the

stated purpose of providing "...consistent methods for measuring Frequency Response...". Attachment A, other than the section providing guidance regarding event selection, appears to be explanatory, contextual, and instructional in content. These aspects are important, but should not be requirements. Attachment A should include only the event selection process and calculations associated with requirements, including an explanation of what is necessary if variable Frequency Bias Settings are implemented. If other "requirements" are included in Attachment A, they should be moved to the standard. FRS Form 1 should be an attachment to the standard as this form contains and performs the required calculations. The remaining information in Attachment A should become either a standalone (technical) document, or be combined with information such as "FRS Form 1 Background and Instructions" and renamed. As further clarification regarding the ambiguity identified in the previous paragraph, Attachment A could be interpreted as additional requirements on the Balancing Authority, ERO, or both. The language and scope is not sufficiently clear to identify whether statements are informative or requirements. This lack of clarity makes it impossible for entities to identify requirements, acquire appropriate tools and resources related to requirements, and to provide suitable performance to meet requirements. For example, the statement "A final listing of official events to be used in the calculation will be available from NERC by December 10 each year." may be intended as a requirement rather than a statement suggesting a typical schedule. Further, if the previous statement is a typical schedule, then the statement "The ERO will use the following criteria for the selection of events to be analyzed." could be interpreted as merely the typical process to be used, but not a binding one.

No

The concept of requiring a Balancing Authority to implement its Frequency Bias Setting at a specific time and using a specific calculation is meaningful. This requirement is not clearly worded, however. If the intent of Requirement 2 is to identify "...when the Balancing Authority must implement its Frequency Bias Setting..." the requirement should stop after "...on the date specified by the ERO." The remaining portion of the requirement explains the need for the requirement and should be moved to supporting material. Attachment A does not have a "calculation methodology" associated with the Frequency Bias Setting unless the language describing historical practice and the benefits of moving a Frequency Bias Setting closer to a Balancing Authority's natural Frequency Response are intended to constitute a "calculation methodology." FRS Form 1 has the "calculation methodology" of using the minimum (since the value is negative) of last year's FRM, next year's FRO, and percentage of next year's peak load or generation. Attachment A does not mention this methodology and the requirement does not mention FRS Form 1. The clause "..., using the results from the calculation methodology detailed in Attachment A." appears to place an obscure requirement on the ERO since the ERO is the entity providing the Frequency Bias Setting to be implemented by the Balancing Authority. If the ERO is intended to use the value from FRS Form 1, after verifying data and calculations, then state that expectation explicitly and clearly. Otherwise, the ERO could set Frequency Bias Settings in another manner after observing the Form 1 values. The requirement for the ERO to provide a Frequency Bias Setting to each Balancing Authority begs the question of how variable bias will be implemented. Historically, the Balancing Authority implements its algorithm with oversight from NERC (Resources Subcommittee). The manner and expectation for providing data and algorithms related to variable bias are inadequate.

No

While this requirement is in the existing standard, it places a significant reporting burden on a Balancing Authority to demonstrate compliance during audits for little reliability gain. In addition for single Balancing Authority interconnections, operating in this AGC mode is functionally equivalent to operating in flat frequency mode. This may cause some interconnections to seek a variance, just to avoid compliance complications. Perhaps this requirement could be replaced with a requirement for Balancing Authorities to contribute to frequency performance as well as balance commitments and resources, or to calculate the ACE it uses to report in other standards in a specific manner. As written, it could be interpreted to create a violation when AGC suspends or is offline.

No

The implementation plan should address implementing these requirements at the same time for all Balancing Authorities within an interconnection, regardless of regulatory approvals. The present implementation plan will require some Balancing Authorities within an interconnection to operate to the new standard while other Balancing Authorities operate to the old standard if multiple regulatory jurisdictions exist as they do within two interconnections. This could lead to uncoordinated and unreliable operation within an interconnection.

Group

IRC Standards Review Committee

Albert DiCaprio

No

The definition of SEFRD will not work as described for a single BA Interconnection. There is no change in NI for frequency deviations. Similarly, the definition assumes all response is provided by change in Interchange and does not really reflect the frequency response of a contingent BA. Either the definition needs to be changed to accommodate single BA Interconnections (such as ERCOT and Hydro Quebec), or regional variances for them need to be written by the SDT. A BA's frequency response is composed of load frequency response, governor response, and, for BAs external to the resource loss, change in Net Interchange. Some approximation may be achieved by recognizing that the magnitude of frequency deviation is attenuated by load frequency response and governor response (or frequency activated demand response to reduce load). The definition of FRM specifies the median of all SEFRD observations

reported annually. What is the technical basis for selecting the median rather than the mean? The definition of FRO raises questions. The discretely administered determination of FRO described in the draft Attachment A sets too stringent a requirement; particularly for the smaller Interconnections which may also have large size generation resources just as do the larger Interconnections. To “assure that Point C will not encroach on the first step UFLS” is significantly more stringent than existing and historical performance for those smaller Interconnections. Such assurance will assuredly prove to be very expensive. In fact, we question the need to define FRM and FRO since they can easily be stipulated in the standard requirements. Having them defined and added to the ever-growing NERC glossary creates unnecessary work to maintain the glossary, unless these terms are used by other NERC standards for which consistent meaning need to be established. For example, R1 can easily be reworded as: “R1: Each Balancing Authority shall achieve a median of all Single Event Frequency Response Data observations reported annually on FRS Form 1 that is equal to or more negative than its contribution obligation to the total aggregate Frequency Response needed for reliable operation of an Interconnection assigned by the ERO.” Similar wording changes can be made to the FRS Form 1 to eliminate the need to define these two terms. Further, the Attachment A states that the SDT is evaluating a risk based approach to establishing an Interconnection Frequency Response Obligation which can be based on a probability function. If the N-2 criteria is established, it will be unlikely to be possible to change that if the new approach is viewed as a reduction in required performance. As an example, in the ERCOT Interconnection, it is recognized that the present level of required frequency responsive reserve cannot in all scenarios assure that Point C will not encroach the first step of UFLS. The system conditions that exist for the encroachment to occur represent a small likelihood and would require the N-2 contingency to occur on something like the minimum hour of the minimum load day of the year. It has occurred one time in the history of ERCOT. Thus, it is less than once in ten years based upon actual history. The cost of precluding such an event would be astronomical.

No

The definition appears to be accurate, but where is “fixed” and “variable” Frequency Bias defined in the context of these requirements? Should it be Frequency Bias Setting, instead? “Fixed” seems to be straightforward, but what is “variable”? How often must Frequency Bias Setting change in order to be considered to be “variable”?

No

If this is really intended to be a Field Trial, it should be written as such and the standard should not be developed or promulgated until the Field Trial has accomplished its purpose and the performance criteria and measures have been determined. We request that the results of the Field Trial should be published and discussed BEFORE any changes are made. The standard should be put into place later; it is premature at this time. Since this is to be a data gathering process to be used to determine appropriate performance parameters, the purpose statement of the Field Trial should be changed to read as follows: To determine require sufficient Frequency Response arranged by from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by responding to and arresting frequency deviations and supporting frequency until the frequency is restored to schedule. To identify and establish provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting and Frequency Response Obligation. We should not write the new standard and its requirements until this Field Trial work has been accomplished; to do so possibly would result in difficulty changing the standard requirements based upon Field Trial results. Further, while we do not have any issue with the general intent of the scope statement, we have a difficulty seeing the BA being the only entity held responsible for maintaining interconnection frequency and arresting frequency deviations. When there is a sudden and sizable change to system resource or demand, the first response to a frequency deviation caused by this change would be the generators’ governors. This will provide a mitigating effect for the immediate seconds up to minutes. The frequency bias setting will then kick in to supplement the mitigation need. The governors are owned by the Generator Owners; the BAs do not own these facilities and hence can do little to address frequency response during this initial period. To hold only the BA responsible for maintaining interconnection frequency and arresting frequency deviations would be inappropriate. The industry needs to have a discussion to determine who should be held responsible for providing governor responses immediately following an event, and by what mechanism, and for implementing additional measures thereafter. We suggest that BAL-003 development be withheld until this discussion takes place and a decision is made on who and how the governor response shall be provided.

No

The SRC agrees that a Frequency Response of some minimum level for each Interconnection should be achieved. However, the measure as described does not apply to all Interconnections. It does not apply to single BA Interconnections such as ERCOT and Hydro Quebec. This requirement should be added later—not included now; and it should clarify what the BA must do and what the response providers must do. BAs do not own and operate the resources. An entity which does own or operate the resources may also be registered as a BA, but an entity which does not own or operate resources may also be registered as a BA. Therefore, it is important to detail what a BA must do and also to detail what the resource owner or operator must do. The resource owner may be registered as a GO or a TO or even a DP. The resource operator may be registered as a GOP, a TOP, or a LSE. The BA must establish an operations plan, using data provided to it by the resource owners and or operators, that will meet the performance requirements. The BA must then deploy the proper amount of response through AGC or verbal instructions to supplement the automatic responses that the resources will provide, must calculate the actual responses after-the-fact, and report the performance as required. The resources must, as standards already provide, comply with the deployments and instructions provided by the BA. However, if an entity which is functioning as a BA does not own its resources, nor does it directly operate those resources, the BA cannot ensure the achievement. The standard must not

create an organizational or contractual arrangement that dictates how the compliance is provided. It should state what must be done, not how. If entities choose to write and enter into such arrangements, that should be permissible, but not required. Specific to R1, the wording does not correspond to the figures shown in the FRS (Form 1) in that the FRM (the median) is -14.5 whereas the FRO is -15.8. The FRO is more negative than the FRM, which does not seem to correspond to what's stipulated in R1 (FRM to be equal or more negative than its FRO).

No

It is not clear how the ERO uses the FRM to determine the required Frequency Bias Settings. Please clarify. Also, it should not be necessary for the ERO to do the determination for all the Interconnections. There are already in place methods for this by the existing ERCOT and WECC Interconnections. The SRC suggests that the ERO may not be the appropriate technical entity. The ERO may be the appropriate entity to serve as the receiver of the forms and analyze results for the Eastern Interconnection, but existing processes are already in place elsewhere. It should be sufficient that those processes continue and submit copies of Form 1 to the ERO. This may also be appropriate for Hydro Quebec. In addition, whichever entity determines the Frequency Bias Setting must provide implementation time for the BAs to implement the settings. The proposed language says only that the BA shall implement it on the date specified, but it doesn't address the need for that date to include some implementation time.

No

Single BA Interconnections do not operate on Tie Line Bias. The requirement should be modified to accommodate this or regional variances should be written by the SDT to address existing differences. In addition this requirement, as written, does not provide for momentary cessation of AGC for any reason, nor for reasonable system maintenance, repair, or updates. As written, it seems to say that any duration of operation off Tie Line Bias is unacceptable and, thus, would be a violation.

No

What is the technical basis for the phase-out schedule? Making the standard requirements effective earlier than the schedule shown could result in the unintended consequence of non-compliance enforcement for performance that is caused by the change rather than by the non-performance of the functional entity. Also, the effective dates given in the Implementation differ from those in the draft standard. Different requirement numbers are expressed in each. Some of the implementation steps (retiring R5 of BAL-003-0) presented in the implementation plan start as early as May 2011. We do not believe that the BAL-003-1 standard will be approved by the industry or the NERC BoT at that time and that does not even take into account regulatory approval (or 12 months after BoT adoption in those jurisdictions where no regulatory approval is required). How can a standard begins to phase out while the successor standard is not anywhere near becoming effective? If the SDT wants to propose a gradual replacement of the current R5, we would suggest that the phase-out steps be tied to the date that the standard becomes effective.

Individual

RoLynda Shumpert

South Carolina Electric and Gas

No

We suggest the SDT consider defining SEFRD as: The calculated frequency response by a Balancing Authority for a specific frequency excursion event as identified by the ERO (or NERC). As a comment, how frequency response is calculated needs to be defined and may not always be the Net Actual Interchange (NIA) divided by the change in frequency expressed in hertz. For example, the NIA may need to be adjusted for known generation and load changes that do not represent frequency response for the period being measured such as known generation and load ramp changes. Change in frequency needs to be more specific, such as the frequency difference between B and A measured at B. If Frequency Response Obligation (FRO) is a targeted value, then perhaps the definition should be: The Balancing Authority's annual median frequency response as assigned by the ERO (or NERC). The word "contribution" should be considered to be replaced with "the balancing authority piece of the total....." The review team is concerned that the FRO and FRM definitions do not contain enough clarity as to how the BAs will be held accountable. Also, the definitions do not explain who will determine the value of each BA's FRO and the method used to determine the FRO value. Should the definition of Frequency Response Measure be a median or mean value? May need to clarify what FRS stands for.

We suggest the following changes to the definition: 1. Delete "Frequency Bias" in the parenthetical expression – ("Frequency Bias" should not be used to define Frequency Bias) 2. Delete the word "usually" 3. Replace "set into" with "as part of" as defined in BAL-001. 4. Replace the remainder of the sentence following "Area Control Error equation" with "that influences its Automatic Generation Control (AGC) to provide its frequency response while Interconnection frequency is not at its scheduled value" – (The frequency bias does not allow a BA to contribute its frequency response to the Interconnection. The frequency bias term only affects the AGC response of the BA, which is part of its frequency response usually minutes after the initial event and is dependent upon generation units being on AGC control and capable of responding.) 5. The suggested changes would result in the following definition" A value, fixed or variable, expressed in MW/0.1 hertz as part of a Balancing Authority's Area Control Error (ACE) equation that influences its Automatic Generation Control (AGC) to provide its frequency response while Interconnection frequency is not at its scheduled value.

Yes

No
The concept seems reasonable but since the measure of compliance (FRM) is determined only after the 25 events are identified; it is a lagging indicator. The BA may have to ensure it measures all frequency excursions and develops its own leading indicator to ensure compliance following year end. A sample CPS bounds report should be considered, perhaps based on 2010 numbers, to demonstrate how FRM submitted would translate to FRO frequency bias settings and how it will affect the L10 values.
No
It is not clear what the methodology (should be method) is in Attachment A. Is the frequency bias setting the BA's prior year FRM with a minimum value being a percentage of estimated yearly peak load or upcoming year maximum generation? What does "provided by the ERO" mean? Perhaps it should be verified or approved by the ERO (NERC). We suggest defining the date as by the end of the first business day following the deadline for Frequency Bias Setting implementation.
No
BAL-003-0, Requirement 3 requires operation of AGC on Tie Line Frequency Bias. BAL-005-0.1b, Requirement 6 requires the BA to compare total Net Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE. We suggest that Requirement 3 be restated to "shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless .....". Tie Line bias is the (Ia-Is) term and frequency bias is the -10B(Fa-Fs) term. This should be coordinated with BARCSDT modifications to BAL-005.
No
The implementation plan has specific dates for reducing the bias settings currently defined in Requirement 5 over several years. Perhaps these dates should not be specific but tied to months following regulatory approval. Attachment A should be modified to match what is in the proposed standard. The values currently shown as percent "of peak/0.1 Hz" should be changed to percent of estimated yearly peak demand per 0.1 Hz change. For BAs that do not serve native load, percent "of upcoming years maximum generation/0.1 Hz should be changed to percent of its estimated maximum generation level in the coming year/0.1 Hz change.
Group
ENBALA Power Networks
Rob Coulbeck
Yes
No
: ENBALA would modify the above as follows: A value, (either a fixed or variable Frequency Bias), usually expressed in MW/0.1 Hz, set into a Balancing Authority Area Control Error algorithm equation that allows the Balancing Authority AGC System to ignore the export or import caused by the Primary Frequency Response.
Yes
ENBALA strongly agrees that a Frequency Response standard is necessary to ensure reliable operation of the bulk power system. We fully support all efforts to understand the declining trend, and the development of accurate models, of Frequency Response in each Interconnection.
Yes
ENBALA does believe that a BA should be responsible for a minimum level of Frequency Response as calculated on Form 1 and reflected in its FRO. Furthermore, we feel that additional data collected on the frequency nadir, such as the metric suggested in the recent Lawrence Berkeley National Laboratory of nadir-based frequency response, would be useful in assessing the current inertial response capabilities and level of risk for under-frequency load shedding.
Yes
Yes
Yes
Individual
Todd Bennett
Associated Electric Cooperative, Inc.
No
1) SEFRD - I had to read this definition several times because "The individual sample of event data" is actually an internally calculated value derived from a set of event sample data, and not really a "sample" value at all. So, I believe the SEFRD definition needs further work. 2) FRM is defined by undefined terms "FRS" and "FRS Form 1". 3) FRO – fine 4) FRS – "Frequency Response Survey"
No

1) SEFRD - I had to read this definition several times because "The individual sample of event data" is actually an internally calculated value derived from a set of event sample data, and not really a "sample" value at all. So, I believe the SEFRD definition needs further work.

Yes

Yes

Yes

Individual

Mark Thompson

Alberta Electric System Operator

No

The frequency response has 2 aspects: arresting frequency deviation (Point C) and deviation where frequency has settled (Point B). The proposed SEFRD and FRM seem all based on the Point B, however the intention in purpose statement is towards Point C... It is not clear to AESO that these proposed SEFRD and FRM based on settled frequency deviation (Point B) are technically sufficient to address the concern of arresting frequency deviation (Point C).

Yes

Yes

The purpose statement mentioned arresting deviation, restored to schedule and frequency bias setting, which are all at different time frames. The AESO suggests that NERC provide some clarification of the relationships for the different time frames.

Yes

The AESO agrees that there should be certain minimum requirement(s) of Frequency Response. In Attachment A, it mentioned that it will be based on the protection criteria and Point C, and the FRM is determined based on the settled deviation. The AESO suggests that the SDT describe how the FRM be related with the FRO as they are determined by different time frames. The AESO suggests NERC investigate the measure and method of separate FRM / FRO for different time frames, or provide technical evidence that the proposed FRM / FRO can also address the technical concerns in different time frames.

Yes

The AESO suggests that the standard should provide a description on how the ERO would determine the frequency bias setting and the relation to the FRO.

Yes

Individual

Dan Rochester

Independent Electricity System Operator

No

We concur with the definitions for SEFRD, FRM and FRO but do not believe that the latter two terms (FRM and FRO) need to be defined since they can easily be stipulated in the standard requirements. Having them defined and added to the ever-growing NERC glossary creates unnecessary work to maintain the glossary, unless these terms are used by other NERC standards for which consistent meaning need to be established. For example, R1 can easily be reworded as: "R1: Each Balancing Authority shall achieve a median of all Single Event Frequency Response Data observations reported annually on FRS Form 1 that is equal to or more negative than its contribution obligation to the total aggregate Frequency Response needed for reliable operation of an Interconnection assigned by the ERO." Similar wording changes can be made to the FRS Form 1 to eliminate the need to define these two terms.

Yes

No

We do not have any issue with the general intent of the scope statement, but have a difficulty in seeing the BA being the only entity held responsible for maintaining interconnection frequency and arresting frequency deviations. When there is a sudden and sizable change to system resource or demand, the system frequency will change. The first

response to such deviation would be the generators' governors. This will provide a mitigating effect for the immediate seconds up to minutes. The frequency bias setting will then kick in to supplement the mitigation need. To hold only the BA responsible for maintaining interconnection frequency arresting frequency deviations would be only part of the solution. The industry needs to have a discussion to determine who should be held responsible for providing governor responses, and by what mechanism. We suggest that BAL-003 development be withheld until this discussion takes place and a decision is made on who and how the governor response shall be provided.

Yes

We agree with the BA being one of the responsible entities to achieve a minimum level of FR, and the method of measurement. However, R1 does not correspond to the figures shown in the FRS (Form 1) in that the FRM (the median) is -14.5 whereas the FRO is -15.8. The FRO is more negative than the FRM, which does not seem to correspond to what's stipulated in R1 (FRM to be equal or more negative than its FRO).

Yes

Yes

No

We have a difficulty understanding the basis for some of the dates in the implementation plan. Some of the implementation steps (retiring R5 of BAL-003-0) start as early as May 2011. We do not believe that the BAL-003-1 standard will be approved by the industry or the NERC BoT at that time and that does not even take into account regulatory approval (or 12 months after BoT adoption in those jurisdictions where no regulatory approval is required). How can a standard begins to phase out while the successor standard is not anywhere near becoming effective? If the SDT wants to propose a gradual replacement of the current R5, we would suggest that the phase-out steps be tied to the date that the standard becomes effective.

Individual

Alice Ireland

Xcel Energy

Group

SERC OC Standards Review Group

Gerald Beckerle

No

We suggest the SDT consider defining SEFRD as: The calculated frequency response by a Balancing Authority for a specific frequency excursion event as identified by the ERO (or NERC). As a comment, how frequency response is calculated needs to be defined and may not always be the Net Actual Interchange (NIA) divided by the change in frequency expressed in hertz. For example, the NIA may need to be adjusted for known generation and load changes that do not represent frequency response for the period being measured such as known generation and load ramp changes. Change in frequency needs to be more specific, such as the frequency difference between B and A measured at B. If Frequency Response Obligation (FRO) is a targeted value, then perhaps the definition should be: The Balancing Authority's annual median frequency response as assigned by the ERO (or NERC). The word "contribution" should be considered to be replaced with "the balancing authority piece of the total....." The review team is concerned that the FRO and FRM definitions do not contain enough clarity as to how the BAs will be held accountable. Also, the definitions do not explain who will determine the value of each BA's FRO and the method used to determine the FRO value. Should the definition of Frequency Response Measure be a median or mean value?

No

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(AGC) to continue to provide its frequency response while Interconnection frequency is not at its scheduled value.
Yes
No
The concept seems reasonable but since the measure of compliance (FRM) is determined only after the 25 events are identified; it is a lagging indicator. The BA may have to ensure it measures all frequency excursions and develops its own leading indicator to ensure compliance following year end. A sample CPS bounds report should be considered, perhaps based on 2010 numbers, to demonstrate how FRM submitted would translate to FRO frequency bias settings and how it will affect the L10 values.
No
It is not clear what the methodology (should be method) is in Attachment A. Is the frequency bias setting the BA's prior year FRM with a minimum value being a percentage of estimated yearly peak load or upcoming year maximum generation? What does "provided by the ERO" mean? Perhaps it should be verified or approved by the ERO (NERC).
No
BAL-003-0, Requirement 3 requires operation of AGC on Tie Line Frequency Bias. BAL-005-0.1b, Requirement 6 requires the BA to compare total Net Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE. We suggest that Requirement 3 be restated to "shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless ....." Tie Line bias is the (Ia-I <sub>s</sub> ) term and frequency bias is the -10B(Fa-F <sub>s</sub> ) term. This should be coordinated with BARCSDT modifications to BAL-005.
The implementation plan has specific dates for reducing the bias settings currently defined in Requirement 5 over several years. Perhaps these dates should not be specific but tied to months following regulatory approval. Attachment A should be modified to match what is in the proposed standard. The values currently shown as percent "of peak/0.1 Hz" should be changed to percent of estimated yearly peak demand per 0.1 Hz change. For BAs that do not serve native load, percent "of upcoming years maximum generation/0.1 Hz should be changed to percent of its estimated maximum generation level in the coming year/0.1 Hz change.
Group
Kansas City Power & Light
Michael Gammon
Yes
Yes
No
This purpose statement presumes that each Balancing Authority (BA) will have generation online to meet a predetermined frequency response obligation. There are many small BA's that do not have any generation online and rely on load regulation agreements and energy agreements to provide their energy needs during parts of the year. This purpose statement would not allow a BA to operate without generation online.
No
This requirement presumes that each Balancing Authority (BA) will have generation online to meet a predetermined frequency response obligation. There are many small BA's that do not have any generation online and rely on load regulation agreements and energy agreements to provide their energy needs during parts of the year. This requirement would not allow a BA to operate without generation online. Under Requirement 1, item 2a in Attachment A suggests governor deadband as 36MHz (Megahertz). Suggest what is intended is 36mHz (millihertz). The Frequency Response Obligation determination for the interconnection as described in Attachment A is a crude method and will result in obligations that will exceed the FRO that is intended. This will result in additional cost to BA's that is unnecessary to achieve the purpose of maintaining sufficient generation online to arrest frequency degradation events caused by loss of generating resources. The current NERC method for calculating a BA's actual frequency response are inaccurate and provide misleading guidance in the actual frequency response of a BA. These methods need considerable improvement before any attempts to hold a BA to an expected level of frequency response as this proposal has stated.
No
The Frequency Response Obligation determination for the interconnection as described in Attachment A is a crude method and will result in obligations that will exceed the FRO that is intended. This will result in additional cost to BA's that is unnecessary to achieve the purpose of maintaining sufficient generation online to arrest frequency degradation events caused by loss of generating resources. The current NERC method for calculating a BA's actual frequency response are inaccurate and provide misleading guidance in the actual frequency response of a BA. These methods need considerable improvement before any attempts to hold a BA to an expected level of frequency response as this proposal has stated.
No
The impact of operating in an inappropriate AGC control mode is bigger than the BA's own balancing area. The control of the area affects other BA's around a BA and if enough BA's are involved, can affect an interconnection. Recommend

the requirement be modified to consider the reliability impact on its own balancing area, the balancing areas of adjacent BA's and the interconnection.

No

How can hard dates for the phasing out of the current R5 be in the implementation plan for a standard under development? The concept of phasing out R5 and phasing in R2 could be done, however, this would take considerable thought as to how to implement that. This current proposed implementation plan should be carefully reconsidered.