

Meeting Notes

Balancing Authority Controls SDT — Project 2007-05

July 1, 2008 | 8 a.m.–5 p.m.

July 2, 2008 | 8 a.m.–noon

Ameren Office

St. Louis, MO

1. Administration

a. NERC Antitrust Compliance Guidelines

Andy Rodriquez reviewed the NERC Antitrust Compliance Guidelines with meeting participants.

b. Introduction of Attendees

The following members and guests were in attendance:

- Larry Akens, Chair
- Gerry Beckerle
- William DeVries
- Will Franklin
- Steve Gillespie
- Howard Illian
- Ken McIntyre
- Sydney L Niemeyer
- Kris Ruud
- Mark Thomas
- Andy Rodriquez

c. Approval of Agenda

The drafting team reviewed and approved the agenda.

d. Approval of Meeting Notes

The drafting team reviewed the meeting notes from the previous meeting and made minor corrections. Mark Thomas moved that the meeting notes be approved as modified. The motion was seconded and passed unanimously.

2. Report on Eastern Interconnect Entity

Andy Rodriguez brought this item back for discussion with NERC staff. NERC believes that it would be inappropriate for NERC to solicit the creation of an Eastern Interconnection entity, but that NERC would be fine with such an entity if it was driven by the regions. Bill DeVries volunteered to bring this back to his regional entity, and suggested others do so as well.

3. Review of SAR Comments Still Outstanding

Andy Rodriguez reported that he had not done additional reviews of the SAR. Bill DeVries reported that he spoke with others at NYISO to review their comments. Most had already been addressed. Some specific comments related to BAL-005 were expressed; specifically, in R13, there was a question as to what “hourly error checks” were; in R8, it was questioned how to measure the 99.95 percent availability. Regarding “hourly checks,” Howard Illian pointed out that some entities do hourly checks on the hour, while some entities compare all hours once per day.

4. Discussion of Coordination Efforts

Larry Akens reviewed the letter that has been developed to assign priorities to the different NERC groups (RBCSDT and FRSDT). Larry also reviewed the NAESB request for changes to the Time Error and Inadvertent standards, which include a requirement for use of a .010mHz offset and a 24-hour duration for time error corrections. Bill DeVries reiterated that we as NERC need to ensure time error corrections can be done safely and reliably; but not take a position on the actual mechanics of how to do a TEC. Howard Illian pointed out that the NAESB standard continues unilateral inadvertent payback and unbalanced schedules, which may be inappropriate. We as NERC need to ensure that we can set those rules correctly. Will Franklin pointed out that he thought TECs were inherently unreliable. Gerry Beckerle said he saw no reason for TECs anymore. Howard said that he thinks that FERC may think it is needed, but that we could demonstrate that it is not, and may actually be causing enough problems to merit elimination of TECs.

The group largely believes more discussion is merited. Howard offered to distribute some of his technical papers and draft a whitepaper based on the thoughts of the group. Andy will send out the notes from this meeting, and arrange a conference call for the team to review Howard’s work on July 25th.

5. Discussion of Homework Assignments

Larry Akens summarized the submissions from the drafting team members on BAL-005 (attached). The team continues discussion on the overall strategy for the standards. Howard Illian suggested that we could have one reserve standard that discusses frequency responsive reserves, regulating reserves, and contingency reserves; and a separate standard that combined BAL-001 and BAL-002 that define control requirements and how those reserves are used. Another option

would be to create 3 standards: frequency response reserves and how to use, regulating reserves and how to use, and contingency reserves and how to use. The team questioned FERC's request for requiring specific amounts of regulating reserve, and suggested that perhaps we should argue to FERC that meeting CPS1 would by default meet the FERC's goal. The team discussed the DCS standards, and the concept of the need to define "single largest contingency." Perhaps this really means "the largest loss of energy based on a single event?" The team also discussed Inadvertent Payback. In general the team agreed that inadvertent after the fact was not a reliability issue; large inadvertent balances were probably not a reliability issue; unilateral payback may have negative reliability impacts; bilateral inadvertent payback may cause problems, but are infrequent; CFOs probably don't know about the potential financial exposure associated with Inadvertent; and that a financial solution to inadvertent would probably be the ideal end-state. The team discussed that we may need to talk with FERC about inadvertent. Larry Akens suggested we develop our position papers further before discussing this with FERC. The team discussed how it might undertake statistical analysis and data reviews to determine the best approaches for moving forward.

6. Assignments and Action Items

Will Franklin will draft a new BAL-005 and distribute to the team for discussion. Howard Illian will develop a whitepaper on Time Error Correction. Andy will ask FERC about setting up some informal discussion on FERC Order 693 paragraph 428.

7. Future Meetings Not Yet Confirmed

- July 25 — 10 a.m. EDT — Conference Call to discuss Howard's paper
- August 21–22 — 8 a.m.–5 p.m., 8 a.m.–noon in Atlanta, GA at the Georgia Power offices. Larry will not be present the first day, so Gerry Beckerle will lead.
- October 2–3 — 8 a.m.–5 p.m., 8 a.m.–noon in Chicago, IL

8. Adjourn

The drafting team adjourned on Wednesday, July 2, 2008, at approximately 10:50 a.m.

BAL-005 Comments Submitted by the BACSDT Members

What do you think the title of the BAL-005 should be?

ACE Equation and Minimum BA Control Action
Area Control Error Calculation Accuracy
Area Control Error Measurement
Area Control Error
Coordinated Frequency Control
Balancing Area Control
Balancing Area Control and Monitoring
Balancing Authority Area Control
NERC Reporting ACE and Controllable Resource Control

What do you think the purpose of the BAL-005 should be?

Define the minimum requirements to achieve balance between Resources and Demand while providing a minimum frequency response to the Interconnection. Define each component of the ACE equation.

This standard establishes the requirements that a Balancing Authority must follow in order to properly balance resources and demand.

State the NERC Reporting ACE, hereafter referred on as “ACE”, equation and the requirements for the inputs to the ACE equation. The ACE Equation provides the basic measurement on the performance in each Balancing Authority in the interconnection by the Resources in their respective areas. Controllable Resources are resources that are capable of being controlled in order to meet NERC Performance Standards, such as generation or load response. The design of the ACE equation is that basic principle that for each Interconnection, the net of all interchange schedules and the net of all actual tie line flows should each equal zero at any given time.

This standard should establish the requirements for ensuring the ACE equation is as accurate as possible (realizing that the frequency bias setting is inherently inaccurate and is the responsibility of another drafting team). The goal of the ACE accuracy should be to ensure the response of the Balancing Authorities to the control error is to apply the available generation and demand resources in a way that continually corrects real-time frequency toward the scheduled frequency (providing Time Error corrections continue otherwise the scheduled frequency will always be 60 Hz) It should also specify the rules concerning generation and demand resources used to correct real-time frequency. The standard should also ensure that all facilities are located within the metered boundaries of a Balancing Authority (this is a given in light of the way Balancing Authority Areas are metered today) and that facilities added or removed from the Interconnection are coordinated to ensure the Balancing Authority is aware of their existence, have accounted for them accurately in their ACE equation, and balancing of resources and demand to correct frequency can be achieved. (Note: I purposely stayed away from the notion of frequency control. Unless we are willing to make customers notify us 20 minutes prior to a load change, we don't control frequency. We can only respond and attempt to correct it to the scheduled frequency.)

This standard establishes the requirements for a Balancing Authority's Area Control Error (ACE) calculation.

This standard should establish the requirements necessary for each Balancing Authority to accurately calculate Area Control Error (ACE) and implement Coordinated Frequency Control to support interconnection frequency.

This standard defines the responsibilities associated with providing Coordinated Frequency Control on the interconnections. These responsibilities are primarily defined by tie-line bias control using the Area Control Error (ACE) equation. The detailed implementation requirements for this equation are included in this standard. All generation, transmission, and load operating within an interconnection must be included within the metered boundaries of a Balancing Authority Area.

It seems that BAL-005 should be the fundamental standard that defines the BA and its' responsibilities. It should address how Generation, Interchange, and Load relate to a BA's system, and define how BA's treat pseudo-ties, dynamic schedules, behind the meter generation, and load management.

What do you think the requirements of BAL-005 should be?

- R1. All generation, transmission, and load operating within an Interconnection must be included within the metered boundaries of a Balancing Authority Area.**
 - R1.1. Each Generator Operator with generation facilities operating in an Interconnection shall ensure that those generation facilities are included within the metered boundaries of a Balancing Authority Area.**
 - R1.2. Each Transmission Operator with transmission facilities operating in an Interconnection shall ensure that those transmission facilities are included within the metered boundaries of a Balancing Authority Area.**
 - R1.3. Each Load-Serving Entity with load operating in an Interconnection shall ensure that those loads are included within the metered boundaries of a Balancing Authority Area.**

On the surface this requirement appears straight forward and easy to measure. After all, with boundary metering how could any generation, transmission, or load not be in a balancing authority area. The fact is that it is very difficult to show that equipment is located within the metered boundary of a Balancing Authority Area especially if you are the generator operator or the Load Serving Entity. The boundary metering data to substantiate compliance is located on the balancing authority's and transmission operator's energy management systems. Even extreme efforts to show the GPS locations of metering equipment and the various facilities on a geographical map have met with resistance from compliance monitors that the map actually substantiates the compliance. The reliability issue here is the addition of equipment to, or retirement of equipment from, the system without the knowledge of the balancing authority. This requirement should be **revised** to require written notice by the Generator Owner, Transmission Owner, Distribution Provider, or Load Serving Entity to the Host Balancing Authority prior to connecting or disconnecting substations, generating units, or generating plants to the Bulk Electric System. In addition, a requirement should be added for the Balancing Authority to verify the change has been received and equipment changes are located within their metered boundary.

What is the measurement? How do you prove or demonstrate? Are not all three subrequirements duplicate of each other?

R2. Each Balancing Authority shall maintain Regulating Reserve that can be controlled by AGC to meet the Control Performance Standard.

This requirement should be **kept, moved to BAL-002 or a new Regulation Resources standard, and revised** to state “Regulating Resources” with a footnote that specifies resources as generation or demand. In addition, the term AGC should be changed to ARCS (automatic resource control system) to allow for the use of demand resources. In addition, we should give consideration to a requirement for Generation Owners, Generation Operators, and Load Serving Entities to make resources available to the Balancing Authority for Regulating Resources consistent with the rules of their market or the rules of the Balancing Authority including the operating characteristics of each type of resource. As a future consideration, this will drive modeling requirements for demand resources that will need to be included when the characteristics of these resources are fully developed and known. In addition, there should be a requirement in BAL-002 or a new Regulation Resources standard that requires generating units used to have governors with set at 5% droop. At a minimum, the applicability should be to generating units of a reasonable size (greater than 10 MWs was a guideline in the policies). FE’s FERC comment, “FirstEnergy suggests that all generators and technically qualified DSM that participate in energy markets should install automatic generation control as a condition of market participation. In non-market areas, FirstEnergy suggests that balancing authorities could meet requirements through bilateral contracts or the normal scheduling process and suggests that the Commission might have to assert its jurisdiction and order technically qualified DSM providers to install automatic generation control at their facilities. FirstEnergy states that further work would need to be conducted on the technical qualifications and capacity thresholds that would control whether installation of automatic generation control would be required.” This means that we feel that automatic resource control should only be required on resources (generation or demand) operating in a market system when they choose to participate in the market and their bid is accepted into an ancillary service market where they are providing a service requiring automatic control and the generator owner or Load Serving Entity is compensated for providing that service. For non-market Balancing Authorities the same goal would be achieved through contracting for this service. The difficulty here is market behavior. The interconnection needs and must have operating reserves and governor response. If the market does not produce the right pricing signals, generator and demand resource owners will choose not to provide these services which will jeopardize the reliability of the interconnection. Under the Section 215, Subsection f, paragraph 2 which states, “This section does not authorize the ERO or the Commission to order the construction of additional generation or transmission capacity or to set and enforce compliance with standards for adequacy or safety of electric facilities or services.”, NERC as the ERO cannot set or enforce compliance with standards for adequacy. This severely inhibits our ability as a drafting team to require reserve or governor response adequacy. It may be difficult to ensure the reliability of the BES without this type of requirement.

Another option could be one standard that would cover all Operating Reserves; Regulation, Frequency Responsive, and Contingency. Leaving it here amounts to double jeopardy, both here and in BAL-001. If you have to have regulating reserve to maintain CPS performance, then it has to be controlled by AGC.

R3 A Balancing Authority providing Regulation Service shall ensure that adequate metering, communications, and control equipment are employed to prevent such service from becoming a Burden on the Interconnection or other Balancing Authority Areas

This requirement should be **kept, moved to BAL-002 or a new Regulation Resources standard, and revised** by deleting the word “adequate”.

R4 A Balancing Authority providing Regulation Service shall notify the Host Balancing Authority for whom it is controlling if it is unable to provide the service, as well as any Intermediate Balancing Authorities.

This requirement should be **kept, moved to BAL-002 or a new Regulation Resources standard, and revised** by deleting the word “Host.” The definition of Host Balancing Authority in the NERC Glossary is not applicable in this situation.

R5 A Balancing Authority receiving Regulation Service shall ensure that backup plans are in place to provide replacement Regulation Service should the supplying Balancing Authority no longer be able to provide this service.

This requirement should be **kept, moved to BAL-002 or a new Regulation Resources standard, and revised** to state “A Balancing Authority receiving Regulation Service shall ensure that backup plans are in place and implemented to provide replacement Regulation Service whenever the supplying Balancing Authority is no longer able to provide this service.”

R6 The Balancing Authority’s AGC shall compare total Net Actual Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority’s ACE. Single Balancing Authorities operating asynchronously may employ alternative ACE calculations such as (but not limited to) flat frequency control. If a Balancing Authority is unable to calculate ACE for more than 30 minutes it shall notify its Reliability Coordinator.

This requirement should be kept and broken into 3 separate requirements-one describing the ACE equation for use in a synchronous balancing authority area, one for use in an asynchronous balancing authority area, and one for the inability to calculate ACE. The inability to calculate an ACE should be reported much sooner than 30 minutes realizing that ACE typically uses a lot of inputs that are prone to communication channel blips. In real-time operations, 30 minutes is a long time. The impact on reliability of a system that can be down for 30 minutes before being reported is questionable as a reliability standard. In addition, the term AGC should be changed to ARCS (automatic resource control system) or some other appropriate identifier to allow for the use of demand resources and break the historical link between AGC and ACE calculation.

In addition, the Transmission Operator Metering equipment errors impact the accuracy of the ACE equation. We should consider a new requirement for the TOP to report problems with metering that impact the ACE Calculation to the BA as soon as issues are known. Also, with the advent of very large Balancing Authority Areas such as MISO and the development of Local Balancing Authorities, we should consider a new requirement for the Local Balancing Authority or Local Control Center to report problems with metering that

impact the ACE Calculation to the BA as soon as issues are known.

Should be more developed and replace the ACE equation requirement in BAL-001, R1.

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.

This requirement should be **retired** provided the drafting team is convinced that the BAL-001 is sufficient to ensure frequency is optimally maintained. It is worth noting that CPS is typically tracked in real-time by a Balancing Authority, so concern about CPS being an after the fact measure, in most cases, is unfounded.

Should state what it means by operate AGC continuously, including references to other permissible resources. Should not duplicate BAL-003, R3 and create a potential for double jeopardy. R7. As long as AGC is operable, The Balancing Authority shall operate AGC continuously unless the operator has a reasonable belief that such operation would adversely impacts the reliability of the Interconnection. During this period of time ACE should still be calculated. If AGC has become inoperative, the Balancing Authority shall use manual control to adjust generation to maintain the Net Scheduled Interchange.

R8 The Balancing Authority shall ensure that data acquisition for and calculation of ACE occur at least every six seconds.

This requirement should be **retired** provided the drafting team is convinced that the BAL-001 is sufficient to ensure frequency is optimally maintained. If they can meet Control Performance Standards with a 10 second scan, they should be allowed to do it. On the other hand, specifying a scan rate is appropriate if it is needed to ensure an accurate measurement of Control Performance.

Combine with R16?

R8.1 Each Balancing Authority shall provide redundant and independent frequency metering equipment that shall automatically activate upon detection of failure of the primary source. This overall installation shall provide a minimum availability of 99.95%.

This requirement should be **kept and revised** to state, "Each Balancing Authority shall provide redundant and independent frequency metering equipment for ACE calculation that shall automatically activate upon detection of failure of the primary source." The requirement for the overall installation to provide a minimum availability of 99.95% should be retired. If an entity can meet CPS without this measure of availability, then they should not be required to provide this type of availability.

Should be combined with R17. Should further define and clarify meaning of "failure of the primary source". Minimum availability over what period of time? Is this related to R8? Should it be added to R17?

R9 The Balancing Authority shall include all Interchange Schedules with Adjacent Balancing Authorities in the calculation of Net Scheduled Interchange for the ACE equation.

This requirement should be kept.

This is an important part of the basis ACE equation.

R9.1 Balancing Authorities with a high voltage direct current (HVDC) link to another Balancing Authority connected asynchronously to their Interconnection may choose to omit the Interchange Schedule related to the HVDC link from the ACE equation if it is modeled as internal generation or load.

This requirement should be **kept and revised** to state, “Balancing Authorities with a high voltage direct current (HVDC) link to another Balancing Authority connected asynchronously to their Interconnection shall account for this interchange in the ACE equation in a way that maintains the accuracy of ACE.” We should not care how they account for this interchange, only that it is accounted for and accounted for correctly in the ACE calculation.

Should be included in Requirement or Standard for the ACE equation.

R10 The Balancing Authority shall include all Dynamic Schedules in the calculation of Net Scheduled Interchange for the ACE equation.

This requirement should be **kept and revised** to state, “The Balancing Authority with Dynamic Schedules or Pseudo Ties shall account for this interchange in the ACE equation in a way that maintains the accuracy of ACE.” In addition, we may want to develop rules around the use of Dynamic Schedules and Pseudo Ties provide we can stick to what needs to be done and not how to do it unless the “how to” is necessary to ensure reliability.

Should be included in Requirement or Standard for the ACE equation.

R11 Balancing Authorities shall include the effect of ramp rates, which shall be identical and agreed to between affected Balancing Authorities, in the Scheduled Interchange values to calculate ACE.

This requirement should be **kept**. Ramp rates have become a reliability issue under some of the market rules. We should discuss the need for requirements for providing adequate ramping capability to ensure reliability.

R12 Each Balancing Authority shall include all Tie Line flows with Adjacent Balancing Authority Areas in the ACE Calculation.

This requirement should be **kept**

Should this be in the INT standards?

R12.1 Balancing Authorities that share a tie shall ensure Tie Line MW metering is telemeter to both control centers, and emanates from a common, agreed-upon source using common primary metering equipment. Balancing Authorities shall ensure that megawatt-hour data is telemeter or reported at the end of each hour.

This requirement should be **revised** to state that both control centers use the same Tie Line MW value when calculating ACE. How they accomplish that is up to them. In addition this requirement should be split into two requirements – one for the MW values and the other for the MWH values.

R12.2 Balancing Authorities shall ensure the power flow and ACE signals that are utilized for

calculating Balancing Authority performance or that are transmitted for Regulation Service are not filtered prior to transmission, except for the Anti-aliasing Filters of Tie Lines.

This requirement should be **split** into two requirements – one for the power flow and ACE signals used for calculating BA performance are not filtered and the other for not filtering Regulation service information. The regulation service requirement should be moved to **BAL-002 or a new Regulation Resources standard.**

R12.3 Balancing Authorities shall install common metering equipment where Dynamic Schedules or Pseudo-Ties are implemented between two or more Balancing Authorities to deliver the output of Jointly Owned Units or to serve remote load.

This requirement should be **kept** and revised to state, “Balancing Authorities shall install common metering equipment where Dynamic Schedules or Pseudo-Ties are implemented between two or more Balancing Authorities to deliver the output of generation or to serve load to ensure an accurate ACE calculation.”

R13 Each Balancing Authority shall perform hourly error checks using Tie Line megawatt-hour meters with common time synchronization to determine the accuracy of its control equipment. The Balancing Authority shall adjust the component (e.g., Tie Line meter) of ACE that is in error (if known) or use the interchange meter error (I_{ME}) term of the ACE equation to compensate for any equipment error until repairs can be made.

This requirement should be **kept**.

Should give guidance on what are acceptable methods. Each hour or on an hourly basis? Should each hour’s MWh value should be compared to the integrated value of that hour’s control signals? Eliminate first sentence? Leave starting at: As a minimum...

R14 The Balancing Authority shall provide its operating personnel with sufficient instrumentation and data recording equipment to facilitate monitoring of control performance, generation response, and after-the-fact analysis of area performance. As a minimum, the Balancing Authority shall provide its operating personnel with real-time values for ACE, Interconnection frequency and Net Actual Interchange with each Adjacent Balancing Authority Area.

This requirement should be **revised** to state, “The Balancing Authority shall provide its operating personnel with instrumentation and data recording equipment to monitor control performance and generation response and support after-the-fact analysis of area performance.” The second sentence of this requirement should be **retired** as it address the how to monitor control performance, generation response, and after-the-fact analysis of area performance. If this how section is needed for after-the-fact analysis and data the related data reporting conformity it should be moved to a standard on that topic.

R15 The Balancing Authority shall provide adequate and reliable backup power supplies and shall periodically test these supplies at the Balancing Authority’s control center and other critical locations to ensure continuous operation of AGC and vital data recording equipment during loss of the normal power supply.

This requirement should be **revised** to state, “The Balancing Authority shall provide backup power supplies and shall periodically test these supplies at the Balancing Authority’s control center and other locations used to ensure the continuous ability to correct frequency to the scheduled value during the loss of the normal power supply.”

Does this need more concise wording?

R16 The Balancing Authority shall sample data at least at the same periodicity with which ACE is calculated. The Balancing Authority shall flag missing or bad data for operator display and archival purposes. The Balancing Authority shall collect coincident data to the greatest practical extent, i.e., ACE, Interconnection frequency, Net Actual Interchange, and other data shall all be sampled at the same time.

This requirement should be **kept** and broken into three separate requirements. (Note: periodicity is determined by the entity’s scan rate used to meet Control Performance Standards. See R8)

R17 Each Balancing Authority shall at least annually check and calibrate its time error and frequency devices against a common reference. The Balancing Authority shall adhere to the minimum values for measuring devices as listed below:

| Device | Accuracy |
|----------------------------------|------------------------|
| Digital frequency transducer | ≤ 0.001 Hz |
| MW, MVAR, and voltage transducer | ≤ 0.25 % of full scale |
| Remote terminal unit | ≤ 0.25 % of full scale |
| Potential transformer | ≤ 0.30 % of full scale |
| Current transformer | ≤ 0.50 % of full scale |

The first sentence of this requirement should be **revised** to state, “Each Balancing Authority shall at least annually check and calibrate its control center time error and control center frequency devices used to calculate ACE against a common reference. ACE input devices that are out of calibration by more than 0.001 Hz shall be repaired to achieve the required 0.001 Hz accuracy or replaced with devices that achieve the required 0.001 Hz accuracy.” The remainder of the requirement should be **retired**. It relates to the days when control centers used strip charts and analog meters. Also, if we maintain this, are we requiring a meter accuracy that exceeds the accuracy of the ACE equation itself?

Should this be combined with R8.1. Eliminate all reference to devices other than frequency devices; move elsewhere?

Additional Comments Regarding Requirements

Require all resources synchronized to the interconnection to provide frequency response with a droop setting between 4% and 5% and a performance between 3% and 7.5% on average. Each resource will have a maximum unintentional governor dead band of +/- 0.036 Hz and zero intentional dead band. Frequency response is the change, with no manual intervention, of a Resource’s real power output in direct response to a deviation from scheduled frequency.

I think we should focus on balancing resources and demand and move the ACE requirements to a new standard. ACE is a very important component and I think it deserves its own standard. If we create a new ACE standard we should take out all the ACE requirements within BAL-005 (R8-R14, R16) and move them to this new standard. R15 doesn’t seem to fit in this standard at all, it would be better fit in a standard that focuses on infrastructure and redundancy. I don’t think R17 fits in this standard at all, it is focused on data quality and the rest of the standard is focused on BA Control.

All Resources without a waiver must operate with governors in-service and free to respond to all frequency deviations without “outer-loop” control action of the resource’s process. The frequency response of the

governor should be allowed to continue for the entire time frequency is off schedule. The resource must report to the BA anytime its governor is out-of-service.

1. Each BA shall use the following equation for determine the ACE used for compliance reporting:.....
2. Balancing Authorities shall ensure the power flow and ACE signals that are utilized for calculating Balancing Authority performance or that are transmitted for Regulation Service are not filtered prior to transmission, except for the Anti-aliasing Filters of Tie Lines.
3. If a Balancing Authority is unable to calculate ACE for more than 30 minutes it shall notify its Reliability Coordinator.
4. The Balancing Authority shall ensure that data acquisition for and calculation of ACE occur at least every six seconds.
5. Each Balancing Authority shall provide redundant and independent frequency metering equipment that shall automatically activate upon detection of failure of the primary source. This overall installation shall provide a minimum availability of 99.95%.
6. The Balancing Authority shall include all Interchange Schedules with Adjacent Balancing Authorities in the calculation of Net Scheduled Interchange for the ACE equation except as noted below:
 1. Balancing Authorities with a high voltage direct current (HVDC) link to another Balancing Authority connected asynchronously to their Interconnection may choose to omit the Interchange Schedule related to the HVDC link from the ACE equation if it is modeled as internal generation or load.
7. The Balancing Authority shall include all Dynamic Schedules in the calculation of Net Scheduled Interchange for the ACE equation.
8. Each Balancing Authority shall include all Tie Line flows with Adjacent Balancing Authority Areas in the ACE calculation.
9. Balancing Authorities that share a tie shall ensure Tie Line MW metering is telemeter to both control centers, and emanates from a common, agreed-upon source using common primary metering equipment.
10. Balancing Authorities shall install common metering equipment where Dynamic Schedules or Pseudo-Ties are implemented between two or more Balancing Authorities to deliver the output of Jointly Owned Units or to serve remote load.
11. Each Balancing Authority shall perform hourly error checks using Tie Line megawatt-hour meters with common time synchronization to determine the accuracy of its control equipment.
12. The Balancing Authority shall adjust the component (e.g., Tie Line meter) of ACE that is in error (if known) or use the interchange meter error (IME) term of the ACE equation to compensate for any equipment error until repairs can be made.
13. The Balancing Authority shall provide its operating personnel as a minimum, real-time values for ACE, Interconnection frequency and Net Actual Interchange with each Adjacent Balancing Authority Area.
14. The Balancing Authority shall sample ACE input data at least at the same periodicity with which ACE is calculated.
15. The Balancing Authority shall flag missing or bad ACE input data for operator display and archival purposes.
16. If the Balancing Authority has missing or bad ACE input data, it shall collect coincident data to the greatest practical extent.
17. Each Balancing Authority shall at least annually check and calibrate its frequency devices used as ACE

data against a common reference.

1. All generation/transmission/load within metered boundary.
2. Accuracy requirements for generation/transmission/load real-time metering
3. Use of common real-time metering by adjacent BAs
4. Use of BAs Frequency Bias calculated per FRSSDT methodology
5. Special ACE cases as related to Supplemental Regulation, Dynamic Transfer of load and Dynamic Transfer of generation. {Supplemental Regulation should allow use of pseudo-tie methodology}
6. Accuracy requirements for frequency input to ACE equation [Coordinating Frequency Control portion]
7. Frequency of recalculation of ACE values
8. Performance-based method for calculation of minimum Regulating Reserve [per FERC Order 693]

The requirements should mostly relate to how a BA ensures it isn't adversely impacting the interconnection as a whole, while referring to the respective standards for CPS and DCS. This also must include the same type of requirements related to what data is used, the quality and redundancy of the data, and coordination with neighboring BA's.

Do you think the ACE Equation should be in BAL-005? BAL-001? Somewhere else?

Initially I thought it should be located in BAL-001. But, as I worked through the requirements contained in this standard, I became more convinced that it belongs in BAL-005. At a minimum, the accuracy elements should be included in BAL-005.

I believe the ACE equation should be defined in BAL-005.

The ACE equation should be stated once, including special cases, along with the requirements to ensure it is calculated accurately. If BAL-005 defines and establishes the accuracy of the ACE components, then the equation should be stated here.

Since the ACE is used in the other BAL standards, I believe the BAL-005 should be the fundamental standard for the BA, the fundamental BA metric (ACE) should be in BAL-005. Of course, this makes the structure of the BAL series a little awkward.

I think the ACE should be in its own standard, due to its importance and the fact that it is referred to by multiple standards.

The ACE equation should be only in BAL-005.

Other Comments

The BAL suite of standards should work as a unit that has no overlap between the individual standards. This suite of standards should also be consistent with the methods of operation in effect today such as market and non-market operations.

Market design will not financially penalize resources that are not providing correct frequency response to the Interconnection.

In real time, each BA will calculate expected frequency response in MW/0.1 Hz for each resource. When the sum of the expected frequency response is below their minimum frequency response requirement, they must arrange for additional frequency response service.

The BAL-005 should be focused on the elements related to ACE input data acquisition, computation, and processing. The other requirements in the existing BAL-005 should be moved to other standards or a new one (DCS?) related to reserves.