Implementation Plan

Project 2010-14.1 Balancing Authority Reliability-based Controls - Reserves

Implementation Plan for BAL-001-2 – Real Power Balancing Control Performance

Approvals Required

BAL-001-2 – Real Power Balancing Control Performance

Prerequisite Approvals

None

Revisions to Glossary Terms

The following definitions shall become effective when BAL-001-2 becomes effective:

Regulation Reserve Sharing Group: A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply the Regulating Rreserve required for all member Balancing Authorities to use in meeting applicable regulating standards.

Reserve Sharing Group Reporting ACE: At any given time of measurement for the applicable Regulation Reserve Sharing Group, the algebraic sum of the Reporting ACEs (or equivalent as calculated at such time of measurement) of the Balancing Authorities participating in the Regulation Reserve Sharing Group at the time of measurement.

Reporting ACE: The scan rate values of a Balancing Authority's Area Control Error (ACE) measured in MW, which includes the difference between the Balancing Authority's Net Actual Interchange and its Net Scheduled Interchange, plus its Frequency Bias obligation, plus any known meter error. In the Western Interconnection, Reporting ACE includes Automatic Time Error Correction (ATEC).

Reporting ACE is calculated as follows:

$$\text{Reporting ACE} = (NI_A - NI_S) - 10B\,(F_A - F_S) - I_{ME}$$

Reporting ACE is calculated in the Western Interconnection as follows:

$$\text{Reporting ACE} = (NI_A - NI_S) - 10B\,(F_A - F_S) - I_{ME} + I_{ATEC}$$

Where:

NI$_A$ (Actual Net Interchange) is the algebraic sum of actual megawatt transfers across all Tie Lines and includes Pseudo-Ties. Balancing Authorities directly connected via asynchronous ties to another Interconnection may include or exclude megawatt transfers on those Tie Lines in their actual interchange, provided they are implemented in the same manner for Net Interchange Schedule.

NI$_S$ (Scheduled Net Interchange) is the algebraic sum of all scheduled megawatt transfers, including Dynamic Schedules, with adjacent Balancing Authorities, and taking into account the effects of schedule ramps. Balancing Authorities directly connected via asynchronous ties to another Interconnection may include or exclude megawatt transfers on those Tie Lines in their scheduled Interchange, provided they are implemented in the same manner for Net Interchange Actual.

B (Frequency Bias Setting) is the Frequency Bias Setting (in negative MW/0.1 Hz) for the Balancing Authority.

10 is the constant factor that converts the frequency bias setting units to MW/Hz.

F$_A$ (Actual Frequency) is the measured frequency in Hz.

F$_S$ (Scheduled Frequency) is 60.0 Hz, except during a time correction.

I$_{ME}$ (Interchange Meter Error) is the meter error correction factor and represents the difference between the integrated hourly average of the net interchange actual (NIA) and the cumulative hourly net Interchange energy measurement (in megawatt-hours).

I$_{ATEC}$ (Automatic Time Error Correction) is the addition of a component to the ACE equation for the Western Interconnection that modifies the control point for the purpose of continuously paying back Primary Inadvertent Interchange to correct accumulated time error. Automatic Time Error Correction is only applicable in the Western Interconnection.

$$I_{ATEC} = \frac{PII_{accum}^{on/off\ peak}}{(1-Y)*H}$$ when operating in Automatic Time Error Correction control mode.

I$_{ATEC}$ shall be zero when operating in any other AGC mode.

- Y = B / B$_S$.

- H = Number of hours used to payback Primary Inadvertent Interchange energy. The value of H is set to 3.

- B$_S$ = Frequency Bias for the Interconnection (MW / 0.1 Hz).

- Primary Inadvertent Interchange (PII$_{hourly}$) is (1-Y) * (II$_{actual}$ - B * ΔTE/6)

- II$_{actual}$ is the hourly Inadvertent Interchange for the last hour.

- ΔTE is the hourly change in system Time Error as distributed by the Interconnection Time Monitor. Where:

$$\Delta TE = TE_{end\ hour} - TE_{begin\ hour} - TD_{adj} - (t)*(TE_{offset})$$

- TD_{adj} is the Reliability Coordinator adjustment for differences with Interconnection Time Monitor control center clocks.

- t is the number of minutes of Manual Time Error Correction that occurred during the hour.

- TE_{offset} is 0.000 or +0.020 or -0.020.

- PII_{accum} is the Balancing Authority's accumulated PII_{hourly} in MWh. An On-Peak and Off-Peak accumulation accounting is required.

  Where:

$$PII_{accum}^{on/off\ peak} = \text{last period's } PII_{accum}^{on/off\,peak} + PII_{hourly}$$

All NERC Interconnections with multiple Balancing Authorities operate using the principles of Tie-line Bias (TLB) Control and require the use of an ACE equation similar to the Reporting ACE defined above. Any modification(s) to this specified Reporting ACE equation that is(are) implemented for all BAs on an Interconnection and is(are) consistent with the following four principles will provide a valid alternative Reporting ACE equation consistent with the measures included in this standard.
1. All portions of the Interconnection are included in one area or another so that the sum of all area generation, loads and losses is the same as total system generation, load and losses.
2. The algebraic sum of all area Net Interchange Schedules and all Net Interchange actual values is equal to zero at all times.
3. The use of a common Scheduled Frequency FS for all areas at all times.
4. The absence of metering or computational errors. (The inclusion and use of the IME term to account for known metering or computational errors.)

Interconnection: When capitalized, any one of the four major electric system networks in North America: Eastern, Western, ERCOT and Quebec.

The existing definition of Interconnection should be retired at midnight of the day immediately prior to the effective date of BAL-001-2, in the jurisdiction in which the new standard is becoming effective.

The proposed revised definition for "Interconnection" is incorporated in the NERC approved standards, detailed in Attachment 1 of this document.

Applicable Entities

Balancing Authority

Regulation Reserve Sharing Group

Applicable Facilities
N/A

Conforming Changes to Other Standards

None

Effective Dates

BAL-001-2 shall become effective as follows:

> First day of the first calendar quarter that is twelve months beyond the date that this standard is approved by applicable regulatory authorities, or in those jurisdictions where regulatory approval is not required, the standard becomes effective the first day of the first calendar quarter that is twelve months beyond the date this standard is approved by the NERC Board of Trustees, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.

Justification

The twelve-month period for implementation of BAL-001-2 will provide ample time for Balancing Authorities to make necessary modifications to existing software programs to perform the BAAL calculations for compliance.

Retirements

BAL-001-0.1a – Real Power Balancing Control Performance should be retired at midnight of the day immediately prior to the effective date of BAL-001-2 in the particular jurisdiction in which the new standard is becoming effective.

Attachment 1
Approved Standards Incorporating the Term "Interconnection"

BAL-001-0.1a — Real Power Balancing Control Performance
BAL-002-0 — Disturbance Control Performance
BAL-002-1 — Disturbance Control Performance
BAL-003-0.1b — Frequency Response and Bias
BAL-004-0 — Time Error Correction
BAL-004-1 — Time Error Correction
BAL-004-WECC-01 — Automatic Time Error Correction
BAL-005-0.1b — Automatic Generation Control
BAL-006-2 — Inadvertent Interchange
WECC Standard BAL-STD-002-1 - Operating Reserves
CIP-001-1a — Sabotage Reporting
CIP-001-2a— Sabotage Reporting
CIP–002–4 — Cyber Security — Critic a l Cyber Asset Identification
CIP–005–3a — Cyber Security — Electronic Security Perimeter(s)
COM-001-1.1 — Telecommunications
EOP-001-2b — Emergency Operations Planning
EOP-002-2.1 — Capacity and Energy Emergencies
EOP-002-3 — Capacity and Energy Emergencies
EOP-003-1 — Load Shedding Plans
EOP-003-2— Load Shedding Plans
EOP-004-1 — Disturbance Reporting
EOP-005-1 — System Restoration Plans
EOP-005-2 — System Restoration from Blacks tart Resources
EOP-006-1 — Reliability Coordination — System Restoration
EOP-006-2 — System Restoration Coordination
FAC-008-3 — Facility Ratings
FAC-010-2 — System Operating Limits Methodology for the Planning Horizon
FAC-011-2 — System Operating Limits Methodology for the Operations Horizon
INT-005-3 — Interchange Authority Distributes Arranged Interchange
INT-006-3 — Response to Interchange Authority
INT-008-3 — Interchange Authority Distributes Status
IRO-001-1.1 — Reliability Coordination — Responsibilities and Authorities
IRO-001-2 — Re liability Coordination — Responsibilities and Authorities
IRO-002-1 — Reliability Coordination — Facilities
IRO-002-2 — Reliability Coordination — Facilities
IRO-004-1 — Reliability Coordination — Operations Planning
IRO-005-2a — Reliability Coordination — Current Day Operations

IRO-005-3a — Reliability Coordination — Current Day Operations

IRO-006-5 — Reliability Coordination — Transmission Loading Relief

IRO-006-EAST-1 — TLR Procedure for the Eastern Interconnection

IRO-014-1 — Procedures, Processes, or Plans to Support Coordination Between Reliability Coordinators

IRO-014-2 — Coordination Among Reliability Coordinators

IRO-015-1 — Notifications and Information Exchange Between Reliability Coordinators

IRO-016-1 — Coordination of Real-time Activities Between Reliability Coordinators

MOD-010-0 — Steady-State Data for Transmission System Modeling and Simulation

MOD-011-0 — Regional Steady-State Data Requirements and Reporting Procedures

MOD-012-0 — Dynamics Data for Transmission System Modeling and Simulation

MOD-013-1 — RRO Dynamics Data Requirements and Reporting Procedures

MOD-014-0 — Development of Interconnection-Specific Steady State System Models

MOD-015-0 — Development of Interconnection-Specific Dynamics System Models

MOD-015-0.1 — Development of Interconnection-Specific Dynamics System Models

MOD-030-02 — Flowgate Methodology

PRC-001-1 — System Protection Coordination

PRC-006-1 — Automatic Underfrequency Load Shedding

TOP-002-2a — Normal Operations Planning

TOP-004-2 — Transmission Operations

TOP-005-1.1a — Operational Reliability Information

TOP-005-2a — Operational Reliability Information

TOP-008-1 — Response to Transmission Limit Violations

VAR-001-1 — Voltage and Reactive Control

VAR-001-2 — Voltage and Reactive Control

VAR-002-1.1b — Generator Operation for Maintaining Network Voltage Schedules