**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

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| **Standards for Business Practices and Communication Protocols for Public Utilities** | **)** **)** **)** | **Docket No. RM05-5-000** |

# COMMENTS OF THE NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

The North American Electric Reliability Council is pleased to provide these comments in response to the Commission's Notice of Proposed Rulemaking in Docket RM05-5-000, "Standards for Business Practices and Communication Protocols for Public Utilities." In its proposed rule, the Commission is proposing to amend its regulations to incorporate by reference standards promulgated by the North American Energy Standards Board's (NAESB's) Wholesale Electric Quadrant (WEQ) dealing with: Open Access Same-Time Information Systems (OASIS) business practice standards, including posting requirements for Order No. 2003 generator interconnection agreements and procedures; OASIS Standards and Communication Protocols and Data Dictionary; and business practice standards for Coordinate Interchange, Area Control Error (ACE) Equation Special Cases, Manual Time Error Correction, and Inadvertent Interchange Payback.

NERC generally supports the industry's efforts in standardizing business practices through the North American Energy Standards Board. NERC requests that the Commission defer action on three of the business practices in order to allow time for the industry to complete its consideration of whether these practices should be repromulgated as NERC reliability standards.

NERC works closely with NAESB. NERC became a member of NAESB this year, as well as a member of NAESB's Wholesale Electric Quadrant's Executive Committee. Recently, NERC and NAESB formed several joint subcommittees and task forces to ensure close coordination when NERC and NAESB are developing reliability standards and business practices that complement each other. Furthermore, the NERC and NAESB staffs communicate regularly and attend the meetings of both organizations.

Some of the standards contained in the Commission's proposed rulemaking originated from NERC's Operating Policies. When NERC began converting these policies into its "Version 0" reliability standards, NERC technical subcommittees identified several policies as possible business practices. During the drafting of the final language of the new reliability standards, NERC removed those policies and submitted them to the NAESB Wholesale Electric Quadrant for its development into business practices standards. Those business practices became a part of NAESB's "Version 0" business practice standards that are included in the Commission's proposed rule.

The development of NERC's "Version 0" reliability standards was a massive undertaking done in a compressed time frame. NERC and NAESB understood that adjustments in the allocation of responsibility for standards would be necessary over time, and the organizations have developed mechanisms for dealing with those needed adjustments.

Not long after the NERC board approved the new reliability standards in February 2005, NERC technical subcommittees began a careful review of all the standards to make sure they were complete and well coordinated with NAESB's Version 0 business practice standards. As a result of that review, the NERC Operating Committee has identified three NAESB business practice standards that directly affect the generation balance and frequency of the

Interconnection. For that reason, the Operating Committee believes those three business practices should become NERC reliability standards. Specifically, these are:

1. Area Control Error (ACE) Equation Special Cases (WEQBPS – 003-000),
2. Inadvertent Interchange Payback (WEQBPS – 005-000), and
3. Manual Time Error Correction (WEQBPS – 004-000).

To provide additional insight into the role these standards play in the Interconnection's generation-load balance and frequency, these comments begin with a general explanation of area control error (ACE) and how it is calculated. Next comes a review of each of the three NAESB standards to explain how it affects the ACE calculations.

**The ACE Equation — General Discussion**

The Balancing Authorities within an Interconnection are collectively responsible for maintaining the balance of generation and load within that Interconnection. They do this by monitoring the flow over their tie lines and Interconnection frequency, and calculating their individual area control error, or ACE (which provides an indication of the how well each Balancing Authority has balanced its load and generation), using the following formula:

$$ACE = (NI_A - NI_S) - 10\beta(f_A - f_s) - I_{ME}$$

where:

$NI_A$ is the algebraic sum (net) of actual flows on all tie lines.

$NI_S$ is the algebraic sum (net) of scheduled flows on all tie lines.

ß is the Frequency Bias Setting (MW/0.1 Hz) for the Balancing Authority. The constant factor 10 converts the frequency setting to MW/Hz.

$f_A$ is the actual Interconnection frequency.

> $f_S$ is the scheduled frequency. $f_S$ is normally 60 Hz but may be offset to effect manual time error corrections.
>
> $I_{ME}$ is the meter error correction factor typically estimated from the difference between the integrated hourly average of the net tie line flows ($NI_A$) and the hourly net interchange demand measurement (megawatthour). This term should normally be very small or zero.

The ACE, in turn, drives the Balancing Authority's generation control systems. NERC standard BAL-001, "Real Power Balancing Control Performance," establishes the acceptable limits for ACE. Interconnection frequency is proportional to the generation-load balance, and by keeping their ACE within the limits established by BAL-001, the Balancing Authorities ensure that the Interconnection's frequency is kept within an acceptable operating range. If the frequency becomes too low, underfrequency relays will automatically disconnect customers from the grid to keep the frequency from degrading to the point that generating units trip off line to protect themselves from permanent damage. Generators will also disconnect if the frequency goes too high.

What follows is an explanation of how each of the NAESB standards affects Interconnection load-generation balance and frequency.

**1. Area Control Error (ACE) Equation Special Cases (WEQBPS – 003-000)**

This standard explains how a Balancing Authority can incorporate four types of dynamic (real-time) interchange into the Balancing Authority's ACE algorithm: (1) pseudo-ties, (2) dynamic schedules, (3) supplemental regulation services, and (4) load or generation transfer by telemetry. Because these are essentially interchange schedules that vary in real time, they directly change the value of $NI_S$ in the ACE equation. This, in turn, affects the control signals that the Balancing Authority sends to its generators providing regulation service, and, hence, affects Interconnection frequency.

NERC is also developing a Dynamic Transfers Catalog that will ensure that:

- Balancing Authorities are accounting for transfers in the same way;
- Dynamic transfers are handled correctly in the ACE equations;
- Dynamic transfers are properly tagged.

NERC proposes to transfer this NAESB standard business practice on ACE Equation Special Cases to NERC.

**2. Inadvertent Interchange Payback (WEQBPS – 005-000)**

It is impossible to keep load and generation in perfect balance continuously. Though every Balancing Authority calculates its ACE from moment to moment to capture changes in actual interchange and frequency ($NI_A$ and $f_A$), the generators within the balancing areas providing regulation service based on the ACE cannot change their output instantaneously. This generation-load mismatch will cause the actual interchange ($NI_A$) to vary from the scheduled interchange ($NI_S$), and this difference, measured over time, is called *inadvertent interchange*. NERC standard BAL-006, "Inadvertent Interchange," requires every Balancing Authority to maintain an inadvertent interchange balance.

Inadvertent interchange is not a bilateral value between Balancing Authorities, but rather the degree to which a particular Balancing Authority has under- or over-generated and relied on the Interconnection (in essence, the aggregate of all other Balancing Authorities) to make up the difference. This balancing error will vary for every Balancing Authority, but over time, it will usually tend to accumulate in either the positive (over-generation) or negative (under-generation) direction. In other words, each Balancing Authority either "owes" or "is owed" energy to or from the Interconnection (all other Balancing Authorities) over time.

For many years, Balancing Authorities have accounted for and repaid their inadvertent interchange with in-kind energy, where "in-kind" is defined as either on-peak or off-peak. These inadvertent interchange payback requirements were included in NERC's Operating Policies. The payback can be performed in one of two ways:

**Unilateral payback between the Balancing Authority and the Interconnection.** This payback is performed by unilaterally "scheduling" interchange to or from the Interconnection. Because this interchange is not bilateral (it is not with another Balancing Authority that would offset its generation in an equal and opposite direction), it will cause the frequency in the Interconnection to change. Also, because the interchange is not tagged, there is no way to curtail it to mitigate transmission congestion. Therefore, the NERC Operating Policies had established limits on the magnitude of unilateral payback to ensure that it did not adversely affect Interconnection reliability either by causing excessive flows on the transmission system or causing a significant shift in Interconnection frequency.

**Bilateral payback.** This is essentially a scheduled interchange between two Balancing Authorities whose inadvertent interchange balances happen to be of the opposite sign. This interchange is the same as an economy interchange, but the energy is posted to the Balancing Authorities' inadvertent interchange accounts. There is no limit on the magnitude of this type of inadvertent interchange, and it has no effect on Interconnection frequency, but it must be tagged so that it is eligible for curtailment as needed to mitigate transmission congestion.

NERC proposes to transfer these NAESB business practice standards on inadvertent in-kind energy payback to NERC because these practices can affect Interconnection frequency and transmission line flows; however, we believe that NAESB should continue to define the on- and

off-peak time periods. Furthermore, we believe that financial settlements for inadvertent payback, if developed, should be NAESB business practice standards.

**3. Manual Time Error Correction (WEQBPS – 004-000)**

The accumulation of inadvertent interchange and its associated frequency error will cause a time error to accumulate on clocks that depend on power line frequency as their time standard. Thus, the time error[1] is a good way to measure the accumulated energy imbalance in the Interconnection.

To correct the Interconnection imbalance and correct the time error, each Interconnection has designated a Reliability Coordinator to serve as the Interconnection time monitor. Once the time error in the Interconnection exceeds a pre-determined limit, the time monitor orders all Balancing Authorities to change their scheduled frequency, $f_A$, in the ACE equation by 0.02 Hz. NERC proposes to transfer this NAESB business practice standard to NERC.

**Transferring Standards from NAESB to NERC**

NERC requests that the Commission defer acting on these three business practices, pending the industry's further work on these issues. The NERC and NAESB staffs have discussed this proposed transfer. NERC believes that, given the industry support expressed so far for the transfer and the strong partnership that has developed between NERC and NAESB, NAESB will work with NERC to effectuate this transfer. The Commission's deferring action will permit the industry to complete the process of determining whether the identified standards

[1] The difference between the time on clocks that use power line frequency and the time maintained by the National Institute of Standards and Technology in Boulder, Colorado.

should be included within NERC's reliability standards. Deferring action will also permit NERC and NAESB to complete the actions needed to effectuate the transfer.

NERC is actively pursuing the development of these items as reliability standards and is now drafting Standards Authorization Requests for all three standards. Once these SARs have received industry consensus, NERC will submit the SARs to the NERC, NAESB, and the ISO-RTO Council Joint Interface Committee, and request that the Joint Interface Committee assign the development of the standards to NERC. NERC will also submit a request to NAESB to remove these items from its Wholesale Electric Quadrant Standards (with the exception that NAESB should continue to define the on- and off-peak periods as explained above). In the meantime, the Balancing Authorities are following these standards today, and NERC expects them to continue to adhere to the provisions of these three items as they are transferred to reliability standards.

**Conclusion**

NERC requests that the Commission defer action on its proposal to amend its regulations to incorporate by reference the three NAESB WEQ standards identified above, with the exception that NAESB should continue to define the on- and off-peak periods. These standards directly affect the calculation of ACE, and therefore the reliability of the bulk electric system. NERC is now preparing to incorporate these standards into its collection of reliability standards.

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