

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

BAL-012-1 - Operating Reserve Planning Standard Background Document

January 2012

RELIABILITY | ACCOUNTABILITY



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Introduction

This document provides background on the development of BAL-012-1, Operating Reserve Planning (ORP) proposed standard. The intent is to explain the rationale and considerations for the requirements and their associated compliance information.

The original Standards Authorization Request (SAR) directed the drafting team to consider the following directives points from FERC Order 693:

- Include a continent-wide Contingency Reserve policy, which should include uniform elements (definitions and requirements).
- Include a requirement that explicitly provides that Demand Side Management (DSM) may be used as a resource for Contingency Reserves.
- Recognizes the loss of Transmission, as well as generation; thereby providing a realistic simulation of possible events that might affect the Contingency Reserves.

This standard was developed to require a Balancing Authority (BA) to develop and document plans that will detail its appropriate mix of Operating Reserves. Each plan will detail the specific amounts of Operating Reserves based on the Load characteristics and magnitude, topology, and mix of resources available in the region, and to ensure adequate Regulating Reserve (RR), Contingency Reserve (CR), and Frequency Responsive Reserve (FRR) to maintain Balancing Authority Load/resource balance in support of Interconnection frequency.

Formal reserve planning has been considered for a long time by the operating entities under NERC, going back to Policy 1. NERC Policy 1 required, “The minimum reserve requirement for the group, its allocation among members, the permissible mix of Operating Reserve – Spinning and Operating Reserve – Supplemental (non-spinning) that may be included in Contingency Reserve, and the procedure for applying Contingency Reserve in practice, and the limitations, if any, upon the amount of interruptible Load that may be included.” BAL-012-1 takes the planning for Operating Reserves and divides them into the individual components to provide visibility and accountability.

Operating Reserves are an absolute requirement to maintain a reliable Interconnection. It is important that all BAs have long-range plans for Operating Reserves to allow arrangements in terms of contracts, agreements, and testing to meet their long-range forecasts. Requiring BAs to develop these Operating Reserve plans will identify gaps and will require the BAs to resolve these gaps. For example, some of the BAs may not have the necessary data on their units to allow them to project the required amount of unit headroom needed to provide a level of Frequency Responsive Reserve (FRR). Some BAs may determine after testing that their system does not have the ability to provide the required FRR or the economics may force them to consider alternatives; such as purchasing FRR from other BAs or customers.

Each BA's different system characteristics will necessitate that the plans will be different and; therefore, a one-size fits all Operating Reserve standard was discussed, but dismissed by the standard drafting team as unworkable. The team decided to make a general framework that would instruct that each BA will develop a plan that meets the requirements of their particular area. The team also discussed that a new type of Reserve Sharing Group or Frequency Response Sharing Group, may become necessary when BAL-003-1 becomes an approved standard. Historically, many BAs have formed Contingency Reserve Sharing Groups to comply with BAL-002-0. Some BAs may choose to form a Frequency Response Sharing Group to achieve compliance with BAL-003-1.

Background and Rationale by Requirement

Requirement 1

R1. Each Balancing Authority shall, once each calendar year, with no more that 15 calendar months between intervals, document its annual plan for Regulating Reserve used to manage the Balancing Authority's Area Control Error (ACE) addressing each of the following:

- 1.1.** The determination of the Balancing Authority's regulating margin.
- 1.2.** The types of resources and the portion of their capacity included in the regulating margin.
- 1.3.** The control of supply and demand resources; such as generators, controllable Loads, and energy storage devices.
- 1.4.** The incorporation of energy exports and imports by entities within the Balancing Authority Area and with other Balancing Authorities, including an assessment of the Balancing Authority's resources to meet the net-ramping requirement associated with these transactions.
- 1.5.** The characteristics: Such as capabilities, constraints and volatilities, of the regulating resources operating inside the Balancing Authority Area.
- 1.6.** The characteristics: Such as capabilities, constraints and volatilities, of the Load operating inside the Balancing Authority Area.
- 1.7.** The exclusion of any shared portions of regulating resources included in another Balancing Authority's Regulating, Contingency, or Frequency Responsive Reserve plans.

Background and Rationale

Requirement R1 is intended to ensure that each BA has a documented plan to carry sufficient Regulating Reserves to be able to balance supply and demand within their BA Area, as required

by BAL-001-1. In addition, each BA's plan for Regulating Reserves must account for their individual systems requirements due to differences in size, as well as differences in types of resources and Load characteristics that may be unique to their particular BA Area.

Requirement 2

R2. Each Balancing Authority and Reserve Sharing Group shall, once each calendar year, with no more than 15 calendar months between intervals, document its annual plan for Contingency Reserve used to recover from Balancing Contingency Events addressing each of the following:

- 2.1.** The determination of the Balancing Authority's or Reserve Sharing Group's Contingency Reserve margin.
- 2.2.** The types of resources and the portion of their capacity capable of reducing the Balancing Authority's Area Control Error in response to each of the following:
 - 2.2.1.** Balancing Contingency Event.
 - 2.2.2.** Events associated with Energy Emergency Alert 2. And
 - 2.2.3.** Events associated with Energy Emergency Alert 3.
- 2.3.** The control of supply and demand resources such as generators, controllable Loads, and energy storage devices.
- 2.4.** The incorporation of energy import and export schedules by entities within the Balancing Authority Area and with other Balancing Authorities.
- 2.5.** The characteristics: Such as capabilities, constraints and volatilities, of the supply resources operating inside the Balancing Authority Area.
- 2.6.** The characteristics: Such as capabilities, constraints and volatilities, of the load operating inside the Balancing Authority Area.
- 2.7.** The exclusion of any portion of shared contingency resources included in another Balancing Authority's Regulating, Contingency, or Frequency Responsive Reserve plans.
- 2.8.** The amount of the Balancing Authority's or Reserve Sharing Group's resources that can be reduced in response to a Large Loss of Load Event.

Background and Rationale

Requirement R2 is intended to ensure that each BA shall have a documented plan to carry sufficient Contingency Reserves to restore the balance of supply and demand within their individual BA Area. The requirement also requires the BA to support System frequency based on maintaining ACE within acceptable limits under credible Contingency Events, as defined within BAL-002-2.

Requirement 3

- R3.** Each Balancing Authority and Frequency Response Sharing Group shall, once each calendar year, with no more than 15 calendar months between intervals, document its annual plan for Frequency Responsive Reserve to arrest frequency change during imbalance events addressing each of the following:
- 3.1.** The Frequency Response Obligation (FRO) assigned to the Balancing Authority or Frequency Response Sharing Group.
 - 3.2.** The minimum amount and capability of resources required to meet the Balancing Authority's or Frequency Response Sharing Groups FRO.
 - 3.3.** The Frequency Responsive capabilities of generation operating inside the Balancing Authority Area or Frequency Response Sharing Group.
 - 3.4.** The Frequency Responsive capabilities of Load operating inside the Balancing Authority Area or Frequency Response Sharing Group.
 - 3.5.** The Frequency Responsive capabilities of energy storage devices operating inside the Balancing Authority Area or Frequency Response Sharing Group.
 - 3.6.** The exclusion of any portion of shared Frequency Responsive resources included in another Balancing Authority's Regulating, Contingency, or Frequency Responsive Reserve plans.
 - 3.7.** The amount of Frequency Responsive Reserve provided through contractual agreements.

Background and Rationale

Requirement R3 is intended to ensure that each BA shall have a documented plan to carry sufficient Frequency Responsive Reserves to maintain system frequency within limits, as defined within BAL-003-1.

Requirement 4

- R4.** Each Reserve Sharing Group or Frequency Response Sharing Group shall have a signed agreement among the participating Balancing Authorities addressing each of the following:
- 4.1.** The minimum reserve requirement for the group.
 - 4.2.** Allocation of reserves among members.
 - 4.3.** The procedure for activating reserves.
 - 4.4.** Reporting and recordkeeping processes.

Background and Rationale

Requirement R4 is intended to determine whether a Balancing Authority (BA) is part of a Reserve Sharing Group. This requirement allows for Reserve Sharing Groups to be formed to meet the requirements of BAL-002-2 and BAL-003-1. It requires an agreement in which the minimum criteria needed in the agreement is detailed, as well as the criteria auditors will be able to use to identify the roles of the participating Balancing Authorities.

Requirement 5

R5. Each Balancing Authority shall perform at least a weekly review of its operational plan(s) for the next seven days for Regulating Reserve, Contingency Reserve, and Frequency Responsive Reserve to ensure sufficient reserves are available to support reliable operation of the Bulk Electric System.

Background and Rationale

Requirement R5 is to ensure that a BA reviews and updates its plan, as necessary, on at least a weekly basis for the next seven calendar days for Regulating, Contingency, and Frequency Responsive Reserves.

Each BA will have plans for Regulating, Contingency, and Frequency Responsive Reserves which takes into account specification given in Requirements R1, R2, and R3. Requirement R4 requires the BA to review that all three types of reserves are appropriately accounted for based on the planned mix of resources, and necessary adjustments are made to the plan in the Operation Planning time horizon.

Requirement 6

R6. Each Balancing Authority shall estimate and assess, on at least an hourly basis, that it has sufficient Regulating Reserve, Contingency Reserve, and Frequency Responsive Reserve to meet its reserve plan(s) to ensure reliable operation of the Bulk Electric System.

Background and Rationale

There have been requirements or policies on reserves for a long time, but there has never been a requirement to specifically examine reserves in the Real-time horizon. It is easy to plan for reserves in the long-term horizon. It is a little harder to plan reserves next day (operations planning) and even more complex to plan and assess reserves in the Real-time environment.

Requirement R5 requires a BA to review reserves in the Real-time environment and make the adjustments, as needed, to account for items such as: Loss of planned resources, unexpected changes in Loads, forecast errors, unexpected generating unit limitations, etc.

Requirement 7

- R7.** Each Balancing Authority shall evaluate that its aggregate amount of planned Regulating Reserve, Contingency Reserve, and Frequency Responsive Reserve margin(s,) above and below its forecasted demand, is within the operating limits of its resources dedicated to meet its plan to ensure reliable operation of the Bulk Electric System.

Background and Rationale

The SDT discussed at length that the quantity for each type of reserve (regulating, contingency, and frequency responsive) must be uniquely identified. For example, a MW amount from an individual resource could be allocated only for one type of reserve. Another example, FRR may be substituted for CR, but most likely the reverse would not be true. In addition, each different type of reserve may be needed during Contingencies which strongly supports that double counting would lead to less reliability. All three types of reserves could be from a single resource, provided that they are uniquely identified to meet the individual Operating Reserve requirements.