

## **Définition d'« Adequate Level of Reliability » de la NERC**



## Definition: Adequate Level of Reliability for the Bulk Electric System

**Purpose Statement:** *The definition of Adequate Level of Reliability (ALR) will be used primarily to guide NERC Reliability Standards development, but also by the NERC Performance Analysis Subcommittee and NERC reliability assessment staff to assess BES reliability and identify gaps in data. Other NERC groups, such as the Reliability Issues Steering Committee, will be able to use the document for guidance when addressing major reliability issues and prioritizing work. The definition and its supporting technical report should not be interpreted as requiring the development of specific standards or additional compliance elements. Both the definition and the technical report will be filed for information with FERC.*

### Definition

ALR is the state that the design, planning, and operation of the Bulk Electric System (BES) will achieve when the listed Reliability Performance Objectives are met. Further, Reliability Assessment Objectives included in the definition must be evaluated to assess reliability risk in support of an adequate level of reliability.

### ALR Performance Objectives

1. The BES does not experience instability, uncontrolled separation, Cascading,<sup>1</sup> or voltage collapse under normal operating conditions and when subject to predefined Disturbances.<sup>2</sup>

*The performance outcomes are:*

- *Stable frequency and voltage within predefined ranges*
- *No instability, uncontrolled separation, Cascading, or voltage collapse*

The “predefined Disturbances” in Performance Objectives 1-3 and Assessment Objectives 1 and 2 are the more probable Disturbances to which the power system is planned, designed, and operated. These Disturbances have a higher probability of occurring than other severe, low probability events; BES Facilities are designed and operated to withstand these Disturbances. An example of a predefined Disturbance is the loss of a Transmission circuit due to a lightning strike.

<sup>1</sup> NERC’s Glossary of Terms defines Cascading as: “The uncontrolled successive loss of system elements triggered by an incident at any location. Cascading results in widespread electric service interruption that cannot be restrained from sequentially spreading beyond an area predetermined by studies.”

<sup>2</sup> NERC’s Glossary of Terms defines Disturbance as: “1. An unplanned event that produces an abnormal system condition. 2. Any perturbation to the electric system. 3. The unexpected change in ACE that is caused by the sudden failure of generation or interruption of load.”

2. BES frequency is maintained within defined parameters under normal operating conditions and when subject to predefined Disturbances.

*The performance outcomes are:*

- *Stable frequency within predefined range*
- *Facility Ratings respected*
- *Frequency oscillations experience positive damping*

3. BES voltage is maintained within defined parameters under normal operating conditions and when subject to predefined Disturbances.

*The performance outcomes are:*

- *Stable voltage within predefined range*
- *Facility Ratings respected*
- *Voltage oscillations experience positive damping*

4. Adverse Reliability Impacts<sup>3</sup> on the BES following low probability Disturbances (e.g., multiple contingences, unplanned and uncontrolled equipment outages, cyber security events, and malicious acts) are managed.

*The performance outcome is to manage the propagation of frequency, voltage, or angular instability, uncontrolled separation, or Cascading.*

5. Restoration of the BES after major system Disturbances that result in blackouts and widespread outages of BES elements is performed in a coordinated and controlled manner.

*The performance outcome is to recover the BES and restore available resources and load to a stable interconnected operating state*

The Disturbances in Performance Objectives 4 and 5 cannot be predefined. For these less probable severe events, BES owners and operators may not be able to apply any economically justifiable or practical measures to prevent or mitigate their Adverse Reliability Impact on the BES despite the fact that these events can result in Cascading, uncontrolled separation or voltage collapse. For this reason, these events generally fall outside of the design and operating criteria for BES owners and operators. Less probable severe events would include, for example, losing an entire right of way due to a tornado or simultaneous or near simultaneous multiple Transmission Facilities outages due to a hurricane or other severe natural phenomena.

<sup>3</sup> NERC's Glossary of Terms defines Adverse Reliability Impact as "The impact of an event that results in Bulk Electric System instability or Cascading."

*expeditiously after a major system Disturbance.*

### **ALR Assessment Objectives**

“Adequate level of reliability” is a term used in Section 215 (c)(1) of the Federal Power Act, specifying what standards the electric reliability organization (ERO) can develop and enforce. Section 215 specifically does not authorize the ERO to develop standards related to adequacy and safety. However, this definition of ALR is meant to encompass all the duties of the ERO, including obligations to perform assessments of resource and Transmission<sup>4</sup> adequacy.

A target to achieve adequate Transmission transfer capability and resource capability to meet forecast demand is an inherent, fundamental objective for planning, designing, and operating the BES. The Assessment Objectives do not suggest that NERC Reliability Standards mandate that such additions be developed; they are not directly related to NERC’s standards development and enforcement activities.

1. BES Transmission capability is assessed to determine availability to meet anticipated BES demands during normal operating conditions and when subject to predefined Disturbances.

*The outcome is that assessment results are available to provide situational awareness for appropriate actions.*

2. Resource capability is assessed to determine availability to the BES to meet anticipated BES demands during normal operating conditions and when subject to predefined Disturbances.

*The outcome is that assessment results are available to provide situational awareness for appropriate actions.*

### **Time Periods and Performance Outcomes**

In the associated technical report supporting this definition, performance outcomes associated with each Reliability Objective are addressed in further detail based on four time frames:

**Steady State** – Time period before a Disturbance occurs and after system restoration has achieved normal operating conditions. It is a stable pre-event condition for the existing system configuration, which includes all existing BES elements, including elements on planned outage for maintenance, construction or safety purposes or unplanned outage.

<sup>4</sup> NERC’s Glossary of Terms defines Transmission as: “An interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems.”

**Transient** – Transitional time period beginning after a Disturbance in which high-speed automatic actions occur in response to the Disturbance. This time period starts at the time of the Disturbance and can continue for seconds or until a new steady state is achieved.

**Operations Response** – Time period after a Disturbance during which some automatic actions occur and operators act to minimize the impact of Disturbances and return the BES to a new steady state, if possible. This state may begin seconds after the Disturbance and continue for hours.

**Recovery and System Restoration** – Time period after a widespread outage or blackout occurs, through the initial restoration to a sustainable operating state, and recovery to a new steady state that meets reliability objectives established by the circumstances of the Disturbance.

#### **Technical Report Supporting Definition of Adequate Level of Reliability**

The associated technical report describes the relationship among Reliability and Assessment Objectives, performance outcomes, and Disturbances in greater detail. The report also provides some examples of means to meet Reliability Objectives. Reviewed together, these items provide the tools for both understanding and achieving an adequate level of reliability.