

Technical Rationale

Project 2023-01 EOP-004 IBR Event Reporting

Reliability Standard EOP-004-5 | July 2023

EOP-004-5 – Event Reporting

Introduction

This document is the technical rationale and justification for Reliability Standard EOP-004-5 and includes the rationale for changes in the current proposed version, as well as previous versions of the standard. It is intended to provide stakeholders and the ERO Enterprise with an understanding of the revisions, technology and technical concepts of Reliability Standard EOP-004-5. This is not a Reliability Standard and should not be considered mandatory and enforceable.

Background

The SAR proposes enhancements to EOP-004-4 (EOP-004) focused on ensuring timely reporting by industry to the Electric Reliability Organization (ERO) Enterprise through reporting of events involving inverter-based resources (IBRs). The project will address the issue that reporting of generation loss events, per the current EOP-004, uses relatively large size thresholds more suitable for synchronous generation. However, NERC and the Regional Entities have analyzed multiple widespread solar PV loss events (some also involving other generation losses as well) across a large number of resources that did not meet the EOP-004 criteria. These events have highlighted systemic reliability risks posed by IBRs that should be reported by applicable entities. This project will modify the existing generation loss criteria so it is more suitable and appropriate for reporting IBR events and so it aligns with past large-scale disturbances analyzed by the ERO. Without these improvements, the ERO must lean on ad hoc reporting per the NERC Event Analysis Process, which is voluntary in nature and involves significantly longer reporting timelines. The EOP-004 standard should be aligned with this process from a reporting size criteria perspective. As reported in numerous ERO disturbance reports, access to data useful for event analysis and risk mitigation following large-scale disturbances has been challenging for IBRs. This has resulted in data unavailability and overwriting by affected facilities since the ERO Enterprise is unable to send requests for information in a timely manner (i.e., must wait for the brief report to be submitted by the associated Reliability Coordinator first). Improved reporting will enable quicker response to widespread IBR loss events and ultimately lead to improved performance of the generation fleet through more detailed analysis and coordination with affected entities, where applicable.

Rationale for Attachment 1

The purpose of the EOP-004-5 is to improve the reliability of the Bulk Electric System (BES) by requiring the reporting of events by Responsible Entities. The event reporting thresholds of Attachment 1 require updating for IBRs as discussed in the background section.

Section 1: IBR generation loss threshold

Rationale for “aggregated generation loss of \geq 500 MW threshold”

- The term “loss” includes instances the IBR unit(s) trips offline, or there is a full or partial reduction of active power output (MW). This threshold is not meant to report losses due to weather patterns, lack of wind, change in irradiance, fuel unavailability, curtailment, or a temporary reduction in active power output due to expected operation of the IBR unit(s).
- The SDT determined the 500 MW threshold from the ERO Event Analysis Process (Category 1i) should be utilized for consistency.
- Using the 500 MW threshold for Category 1i events, there have been approximately 11 events reported from January 2020 to June 2023 via the ERO Event Analysis Process. Meaning there have been 11 reported IBR generation loss events over 3.5 years, or about 3 events per year across North America. The SDT believes this is not an over-reporting of events, and the 500 MW threshold seems reasonable for EOP-004-5.
- The SDT considered, and decided against, using a percentage threshold based on the Balancing Authority (BA) generation capacity in the BA’s footprint. For example, a 25,000 MW IBR generation capacity with 2% threshold would equate to a 500 MW IBR generation loss. Using a percentage threshold would need to be recalculated on a reoccurring basis by the BA as new IBR facilities come online.
- SDT agreed that the 500 MW criteria should be based on aggregate IBR output instead of the number of individual units lost. This is due to time constraints of submitting the EOP Event Reporting Form, or DOE OE-417 form. Determining which IBR units experienced generation loss should be left to the ERO Event Analysis Process instead of extending the timeline for initial reporting.

Rationale for “30 second period”

- SDT reduced the duration from one minute for traditional generation loss to 30 seconds for IBR events. The reasoning is that the calculation from traditional generation loss is usually based on breaker openings and resources disconnecting from the BES. However, this calculation method requires analyzing aggregated Telemetry data for IBR MW output and deriving maximum loss over a shorter period of time.
- A one minute duration could lead to more events detected that are a result of normal IBR output fluctuation due to change in wind, cloud cover, irradiance, ramping due to curtailment, etc. These are non-events and we should be focused on events that have a quicker drop in output due to a system disturbance.
- Allowing at least 30 seconds allows for multiple Telemetry data samples to occur and accounts for delay in Telemetry data.

Rationale for “Telemetry data”

- The BA is able to monitor the generation assets to which they have visibility.
- BA visibility includes all BES generation resources, and may include some BPS generation (connected at transmission <100kV) including IBR generation.
- By utilizing Telemetry data (e.g. SCADA tags), the aggregated IBR generation loss value does not distinguish between BES and BPS resources, and does not distinguish between the MW capability values of each Facility. Meaning a 50 MVA Facility, which is less than the current BES 75 MVA threshold, is not explicitly excluded from the aggregated calculation.

Consequential/non-consequential interruption (generation loss)

- The BA may not be able to distinguish between consequential and non-consequential generation loss within a 24-hour reporting window. Therefore, this delineation was not included in the requirement language. The determination of consequential/non-consequential generation loss would therefore be determined in the Event Analysis Process.
- Non-consequential interruption (generation loss) is described in the Event Analysis Process as, “the interruption of resources caused by action of control systems on the resources in response to perturbations in voltage and/or frequency on the Interconnection, not including the control actions of a RAS”.
- Failure of Telemetry data from IBR units triggering the reporting threshold may be excluded from reporting requirement.

Section 2: DC Tie Line loss threshold

- SDT determined the 500 MW threshold from the Event Analysis Process (Category 1j) should remain for consistency.