

Guidelines for Generators and Demand Side Units during Alert and Emergency States

Standing Procedure

October 2021



Executive Summary

This procedure forms part of the EirGrid Group's power system emergency response planning. It sets out the actions to be taken by Generators and Demand Side Units in response to System Alert and Emergency States. EirGrid and SONI have realigned the system states to match the requirements of the European Network Codes.

System States

The status of the system has been defined in Figure 1 with the previous system states listed on the right and the associated new system state listed on the left.

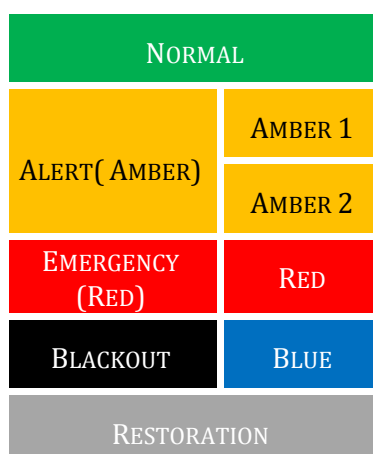


Figure 1: Realignment of System States

The main changes to the system state are;

1. Merger of amber alert 1 and amber alert 2 into the alert state,
2. Substitution of red alert for emergency alert,
3. Substitution of blue alert to blackout.

To make this transition to these new states seamless, system operators will include in brackets the colour of the state in initial correspondence. All alerts that are communicated via the EMS (Energy Management System) will remain communicated via colour.

Power system states are issued on a jurisdictional basis.

System State Conditions

The transmission system shall be in one the following states when the listed conditions are fulfilled.

NORMAL STATE	ALERT (AMBER) STATE	EMERGENCY (RED) STATE	BLACKOUT (BLUE) STATE
- The steady state system frequency - remains between 49.8 – 50.2 Hz; or - does not breach alert or emergency state thresholds. - Voltage and power flows are within the operational security limits; - Operation of the transmission system will remain within operational security limits after the activation of remedial actions following the occurrence of a contingency from the contingency list.	- The steady state system frequency is within a range of 49.5 – 50.5 Hz but has continuously been: - outside 49.75 - 50.25 Hz for a time period longer than 10 min; or - outside 49.8 - 50.2 Hz for a time period longer than 15 min; or - At least one contingency from the contingency list leads to a violation of operational security limits, even after the activation of remedial actions; or - Multiple contingencies are probable because of adverse weather; or - The jurisdictional margin is such as the tripping of the largest set, would give rise to a reasonable possibility of failure to meet the System Demand using the following formula as a guideline: $LSI > MAR$ Where: LSI = largest MW infeed to jurisdiction $MAR = [GEN + WIND/PV +/- ICF] - DEMAND + TLS$ <i>Equation definitions in Appendices</i> - The All-Island reserve capacity (FCR, FRR, or RR) is reduced by more than 20% for longer than 30 minutes and there are no means to compensate for that reduction in real-time system operation.	- It is likely/ imminent that in the period immediately ahead (i.e. in the next four hours) there is a high risk of failing to meet System Demand. - Dynamic reserves (excl. batteries) have been reduced to 70MW (50MW IE and 20MW NI). - The steady state system frequency is outside a range of 49.5 - 50.5 Hz for more than 1 min. - LSAT (realtime) continually forecasts a freq Nadir of below 49 Hz for a period of 30 min and there are no means are available to address this. - Any of the following system defence plan measures are activated; - activation of UF load shedding where frequency does not recover within +/- 500mHz less than 1 minute; or - widespread (multiple station) UV load shedding; or - activation of manual demand control; or - activation of system separation protection. - activation of emergency instruction. - There is at least one violation (base case) of voltage limits, short-circuit current limits, or current limits in terms of thermal rating (e.g. tie lines) even after the activation of remedial actions; or - There is a failure in the functioning of; - EMS and PI/ SCADA or - Phones (Corporate and Optel / Tetra) resulting in the unavailability of those tools, means and facilities for longer than 30 minutes.	- Loss of more than 50% of demand in the concerned TSO's control area; - Total absence of voltage for at least three minutes in the concerned TSO's control area, leading to the triggering of restoration plans. - Restoration Plan has been activated.

Generating Station Required Response

Each station is to respond as per its own procedure. Station staff are required to respond to the respective alert received as follows.

ALERT (AMBER) STATE	EMERGENCY (RED) STATE
1. Relevant management to be notified. 2. Fax machine/e-mail/EDIL to be monitored for further NCC/CHCC instructions. 3. Any routine operations with an associated element of risk to cease. 4. On-load testing of relays, protection or other equipment to cease. 5. All work on or near plant or controls or auxiliaries to cease. 6. Any unauthorised minor maintenance being done on non-running but available plant to be finished and plant cleared for running. 7. Review readiness to maximise. 8. Operators to be on the alert for a system emergency. 9. Operators to ensure that the generating units MW and Mvar declarations are attainable. 10. Do not perform any fuel changeovers unless instructed to do so by NCC/CHCC 11. Hydro stations should take whatever actions are necessary to increase capacity over the peak. Actual output should be agreed with NCC/CHCC based on making best use of each hydro station during the alert. 12. Stations to reduce house load between 17:00 and 19:00.	1. Immediately implement (Amber) Alert responses. 2. Prepare to immediately implement MW dispatch instruction from NCC/CHCC. 3. Prepare to immediately implement reactive power instruction from NCC/CHCC. 4. Prepare to initiate run up if not currently on load. 5. Station staff should inform NCC/CHCC as to the length of time gas turbines can maintain peaking load.

DSU Required Response

DSU staff are required to respond to the respective alert received as follows.

ALERT (AMBER) STATE	EMERGENCY (RED) STATE
1. Shift Manager to be notified. 2. Fax machine/e-mail/EDIL to be monitored for further NCC/CHCC instructions. 3. Any routine operations with an associated element of risk to cease. 4. Any testing to cease. 5. Any minor maintenance being done to be finished and DSU prepared to normal operation. 6. Be ready to receive instruction via EDIL (or secondary communication channel) if requested. 7. Operators to be on the alert for a system emergency. 8. Operators to ensure that the Availability (and Generation Achieved) MW declarations are attainable and maximise their availability. 9. Issue notification to all Individual Demand Sites (IDS) about possible Demand Response event.	1. Immediately implement Amber Alert responses. 2. Once DSU receives instruction from NCC/CHCC, immediately instruct all IDS to delivery Energy Reduction to the last declared availability MW declaration. 3. DSU Operator to prepare for possible mains loss to ensure continuous operation of their control centre.

Requirements

The TSO business process BP_SO_09.2 Declaration of the System Alerts¹ and the documents referenced in the following table govern the Northern Ireland System Alert process.

Document Title	Description
SONI Grid Code	Operating Code No. 3 ("OC3") sets out the different types of reserve which make up the Operating Margin that the TSO may use in the Control Phase.
COMMISSION REGULATION (EU) 2017/1485 establishing a guideline on electricity transmission system operation	TITLE 1 OPERATIONAL SECURITY REQUIREMENTS The SO GL provides harmonised rules on system operation for transmission system operators (TSOs). CHAPTER 1 details the system states that all TSOs are required to assess their systems against.
COMMISSION REGULATION (EU) 2017/2196 establishing a network code on electricity emergency and restoration	SYSTEM DEFENCE PLAN - Is activated when the power system is in an Emergency state. RESTORATION PLAN - Is activated when the power system is in a Restoration state. Both Plans aim to return the power system to the normal state
Operating Security Standards Ireland Operating Security Standards and Northern Ireland	EirGrid plc and SONI Ltd (the Transmission System Operators for Ireland and Northern Ireland), cooperate to ensure the all-island transmission system is operated in a secure and reliable manner.

¹ https://www.sem-o.com/documents/general-publications/BP_SO_09.2-Declaration-of-System-Alerts.pdf