System Events of 27th May

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DSWG meeting
16th July 2008
Agenda

- Introduction
- Time Line of Events
- Feedback from Demand Side
Introduction

- Exceptional Loss of 1582MW within two minutes
  - 11:34am – loss of 345MW
  - 11:36am – loss of 1237MW
- Frequency
  - Initial Frequency drop to 49.14Hz
  - Lowest recorded point = 48.795Hz
    - 581MW of automatic low frequency demand control
  - Below 49.5Hz for 9 minutes
  - Outside operational limits (49.8Hz) for 11 min
Overview of frequency event

27th May 2008 - Overview

- First Loss (345MW)
- Second Loss (1237MW)

Loss of 1582MW within 2 minutes

Below 49.5 Hz for 9 minutes
Below 49.8 Hz for 11 minutes

Further event

48.795Hz

49.14Hz
Near Simultaneous loss

- Several losses through the morning
- Major loss of two units in two minutes, 1582MW
- OCGT’s on LF settings of 49.6 / 49.5Hz initiate
- Control Room take additional actions to recover
  - Additional STOR instructed (~1000MW)
- When combined with earlier losses, lead to complete erosion of reserve
Summary of Recovery

- Control Room took the following additional action on frequency reaching 48.8Hz
  - 2 minutes later, decision to instruct one stage of demand reduction
  - 9 DNO’s (1200MW) of Demand Control by Voltage Reduction

- Frequency Recovers
  - Outside Operational Limits for 11 minutes
  - Control Room manage recovery to avoid any high frequency events
  - Response recovered in 15 minutes by Control Room to secure for next largest loss
  - Within 40 minutes – DNO’s instructed to restore automatically disconnected demand
Post Recovery of Frequency

- Control Room
  - Demand automatically disconnected by LF instructed to be restored within 40 minutes
  - 485MW BMU instructed to synch at 12:59
  - 11:52am – Control Room start to contact EMCs to make additional plant available
    - Instructions issued to bring a number of units to a state of readiness
- HRDR issued
Evening Peak

Summary of Operating Margin leading up to Evening Peak Demand

-900MW
-180MW
-100MW
-350MW
-250MW
-690MW
-600MW
-1200MW
-300MW
-250MW

Significant capacity losses

Day ahead
0546hrs
0824hrs
1132hrs
1217hrs
1313hrs
1351hrs
1450hrs

Contingency Avail
Additional Plant Avail
Contingency Required

nationalgrid
Evening Peak

- Further generation losses occurred across afternoon
- Demand Control reduced as demand falls and additional generation synchronises
- All feasible plant ordered
- All Demand Control lifted by 18:07
- No system warnings in force from 19:00
Summary of events

- Loss of two units totalling 1582 MW within two minutes was exceptional.
- The dual challenge of a major system disturbance and the generation loss pattern represented a significant challenge to the Control Room.
- Demand Control measures remained in place to secure the system balance through the afternoon.
Historical Context of major loss

Significant Losses greater than 500MW since May 1998

Frequencies return above 49.5Hz within 60 seconds as required by GBSQSS

Near-Simultaneous loss of 1582MW

27th May Total Excursion
Focus of Current Work

- Initial report sent to OFGEM / BERR on 13th June 2008

- Additional Information being sought from DNOs:
  - performance of embedded plant
  - performance of Low Frequency Demand Disconnection Scheme
  - actual demand relief delivered by manually instructed Demand Control

- It is expected that any operational/technical lessons for future will be reported to Energy Emergency Executive Committee (E3C) and Grid Code Review Panel (GCRP)
Input from Demand Side

- Exceptional event, broadly things worked as expected.
- Interim report available on our website:
  http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/associateddocs/
- Any further information relating to the third frequency dip, e.g. trips of embedded generation would be welcome
- Questions