Saturday 11th February 2012

Sam Matthews, Balancing Services Manager
Electricity Operational Forum – February 2012
Agenda

- Overview of Operating Margin & System Warnings
- Background to Saturday 11\textsuperscript{th} February 2012
  - Weather overview
  - Planning for the morning demand pickup
- Events across morning demand pickup
  - On the day generator performance
  - Demand forecasting performance
  - Reserve provider performance
- Conclusions
Operating Margin

- Level of available MWs above those required to meet forecast demand
  - derived via a statistical method to give a 1 in 365 level of security

- Required to cover
  - Plant loss
  - Plant shortfalls
  - Demand & wind forecast errors

www.nationalgrid.com/uk/Electricity/Data/reserve/ www.bmreports.com
National Grid Reserves

- Contingency Reserve
- Wind Reserve: Variable based on largest credible loss due to wind forecast error
- Regulating Reserve
- Short Term Operating Reserve
- Reserve for Low Frequency Response
- Forecast demand

Time:
- t - 24: Day Ahead
- t = 0: Real time

Operating Margin:
- Contingency generation available (24h-4h ahead) covers statistical breakdown rate.
- Can be met by additional Regulating Reserve or STOR
- Control engineer instructs to cover short term variations (<2 mins)
- Control engineer instructs to recover position after large loss (5-20 mins)
- Automatic generator response covers minor changes and helps arrest fall
System Warnings

- Inadequate System Margin (NISM)
  - OC7.4.8.5 & BC1.5.4
- High Risk of Demand Reduction (HRDR)
  - OC7.4.8.6 & BC1.5.4
- Demand Control Imminent (DCI)
  - OC6.5.2 & OC7.4.8.7
- Risk of System Disturbance
  - OC7.4.8.8

www.nationalgrid.com/uk/Electricity/Codes/gridcode
System Warnings

- **Demand Control Imminent** – OC6.5.2 & OC7.4.8.7
  - Issued “where possible”, when demand control is expected in following 30 minutes
  - Does not require a preceding NISM or HRDR

- **Risk of System Disturbance** – OC7.4.8.8
  - Issued when NGET is aware that “there is a risk of widespread and serious disturbance to whole or part” of the system
  - It “may be necessary to depart from normal Balancing Mechanism operation”
Weather & Planning overview
Background - Weather

- Forecast for week is for continuation of temperatures below normal
Background - Weather

Overnight temperatures experienced in GB

Observed Temperatures Saturday 11th Feb 2012 at Coldest Sites Versus National Average
Background - Weather

- Have observed lower GB temperatures in 2010

### Annual Minimum Recorded Temperatures

<table>
<thead>
<tr>
<th>Year</th>
<th>Temperature (Degrees)</th>
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<tr>
<td>2008</td>
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<tr>
<td>2009</td>
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<td>2010</td>
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<td>2011</td>
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<td>2012</td>
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- Charlwood
- Church Lawford
- Leeds C/F
- National Average
- Wattisham
- Wittering
- Waddington
Planning for morning pickup

- Day ahead surpluses significantly above our Operational Planning Margin Requirements (OPMR)
Planning for morning pickup

- Final Control Room Plan produced at 05:36 for the morning “2A” cardinal point (10:30am)
  - National demand estimate = 45,177MW

- Synchronising additional generation for the morning
  - to fill remaining Operating Margin requirement
  - to cover for the market imbalance (NIV is short)

- In planning timescales, no issues identified.
Morning Events
Morning Generation Losses – 07:30

Initial Analysis of cumulative losses from GB Generation on Saturday 11th February 2012

- Small level of “redecs”
- Nothing out of the ordinary at this stage
Morning Generation Losses – 08:00

Initial Analysis of cumulative losses from GB Generation on Saturday 11th February 2012

- Losses increase due to a trip and MEL to zero of other BMUs
- NGET utilised French Interconnector (500MW) – plant optimisation
- STOR instructed
Morning Generation Losses – 09:00

Initial Analysis of cumulative losses from GB Generation on Saturday 11th February 2012

- Losses increase due to short-falling generation (not generating at PN)
- NGET utilised French Interconnector (500MW EA), STOR and additional BMU
- Market due to synchronise additional generation via submission of new PN

Synchronised generation but short falling against PN
Morning Generation Losses – 09:30

Initial Analysis of cumulative losses from GB Generation on Saturday 11th February 2012

- Losses continue to increase due to short falling generation
- Additional generation about to synchronise
- STOR being utilised

- Synchronised generation but short falling against PN.
- MEL indicates will recover shortfall
Morning Generation Losses – 10:00

Initial Analysis of cumulative losses from GB Generation on Saturday 11th February 2012

- ~770MW trip
- ~440MW loss (trips from 200MW)
Morning Generation Losses

- Around 3500MW of losses across morning
  - Significantly above reserve holding requirement
- Majority of reserve now deployed (have ~500MW of STOR to cover next loss but demand is still increasing)
  - Have utilised French Interconnector commercial services
- 10:00 - Decision taken to issue system warnings
  - Risk of System Disturbance
  - Demand Control Imminent
Morning Generation Losses

10:00 - decision taken to operate outside of normal BM practice
   - Hold remaining STOR to cover next loss
   - Instruct demand control

10:01 - NGET start to issue Bid Offer Acceptances (BOAs) to multiple BMUs to synchronise to manage future uncertainty.

10:06 - start to issue demand control instructions
   - 5 DNOs (Distribution Network Operators) instructed
Demand Control

- Demand control active from 10:06
- Instructions to cease demand control from 11:15
- DCI warning ceased at 12:45
- Initial indications are ~600MW of demand control achieved by voltage reduction
  - No customers directly disconnected from returns received thus far from DNOs
  - Still waiting for a return from a DNO to allow a complete analysis of demand control performance
Demand Forecasting

- Demand shape follows previous week

- Initial estimate is demand forecast error of 700 to 900MW
  - About half due to weather forecast error

- Not considered exceptional by NGET
Reserve provider performance

- STOR provider performance considered good

STOR units with metering available. Instructed vs output

![Graph showing instructed vs output for STOR units with metering available.](image)
Conclusions

- Certain Generators have post event indicated that had problems related to cold weather
Conclusions

- GB System security was maintained and frequency was kept within licence limits across this stressed period
- Investigations continue.

Frequency across morning of Saturday 11th Feb 2012
Q&A

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