

A day in the Life....

An operators view of Tuesday 10th December 2002

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National Grid

A day in the Life.....

Why Tue 10th December?

- ◆ Highest ever demand recorded in E&W : **54430MW**
- ◆ Challenging day - exceptional level of short notice plant losses <3 hrs ahead
- ◆ Issue of Demand Control Imminent (DCI) warning



Managing Uncertainty

Operating Margin

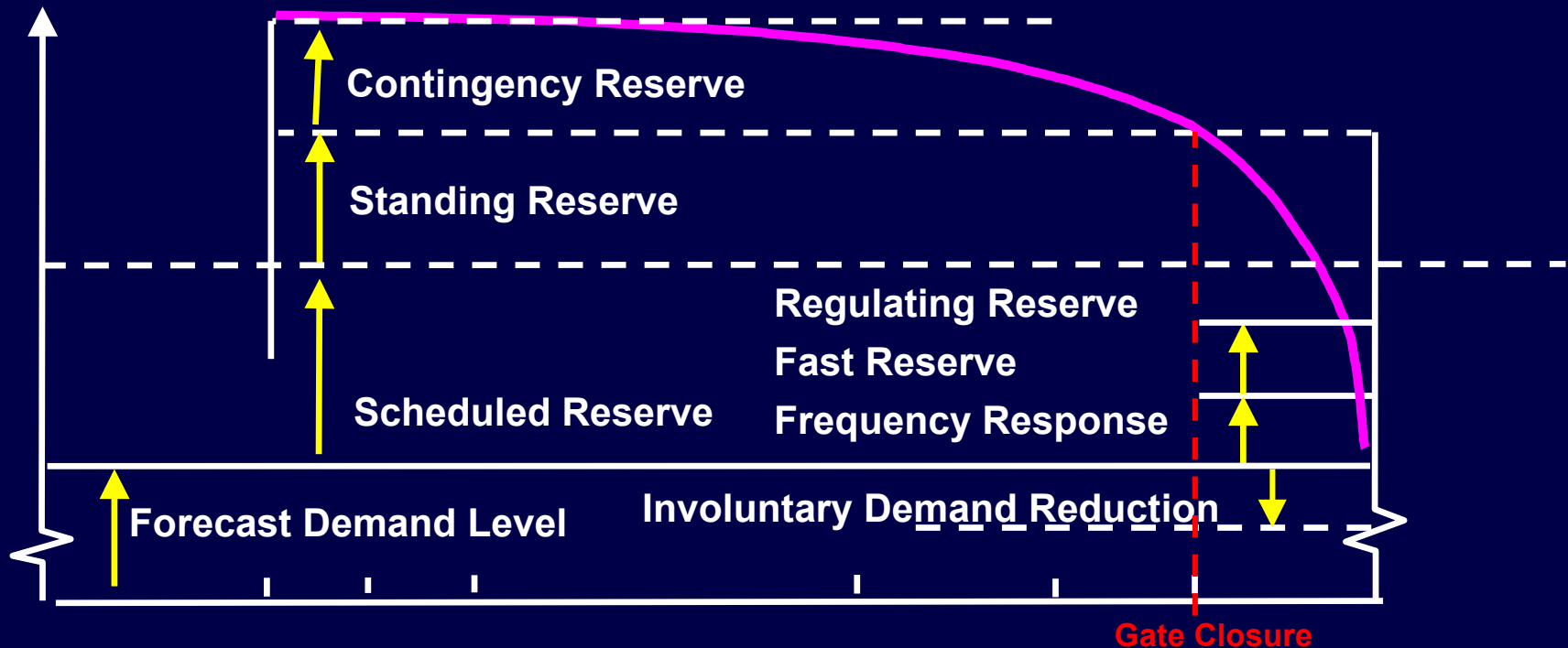
What is it....?

- ◆ Level of available MWs above those required to meet demand
- ◆ Required to cover
 - ◆ Plant loss
 - ◆ Plant shortfall
 - ◆ Demand forecast error
- ◆ Required from 24hrs ahead to real time



Operating Margin - what is it

◆ Types and Time-frames



Operating margin is demand dependent and varies throughout the day.

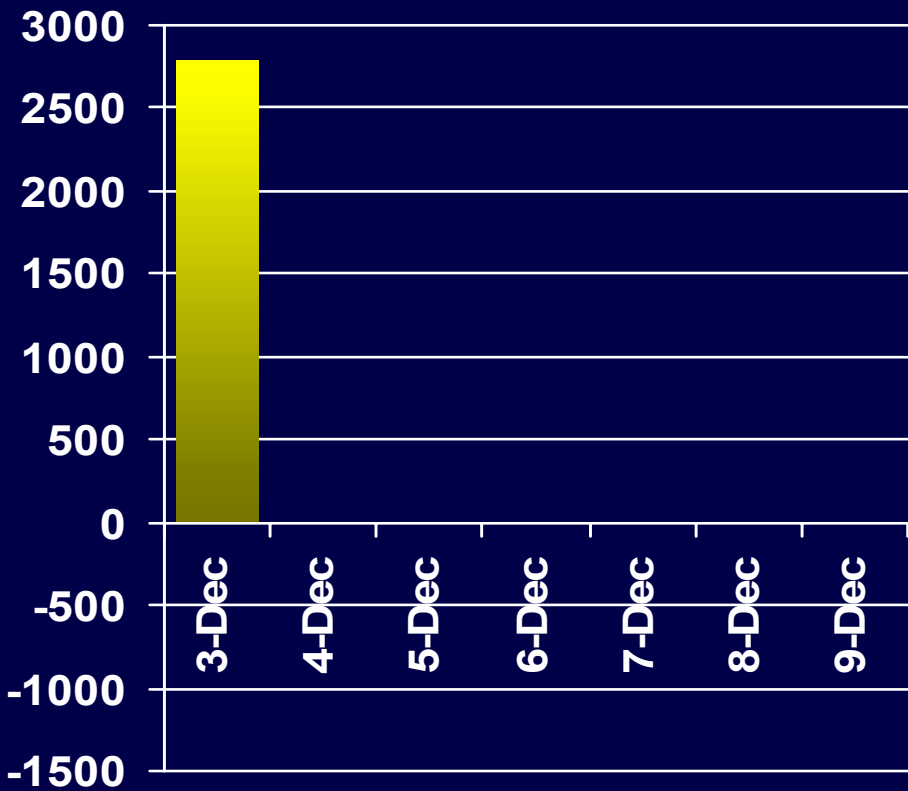




03-Dec	04-Dec	05-Dec	06-Dec	07-Dec	08-Dec	09-Dec	10-Dec
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Surplus above Operating Margin for Tuesday 10th Dec

- ◆ Tuesday 3rd
- ◆ Surplus: +2800MW

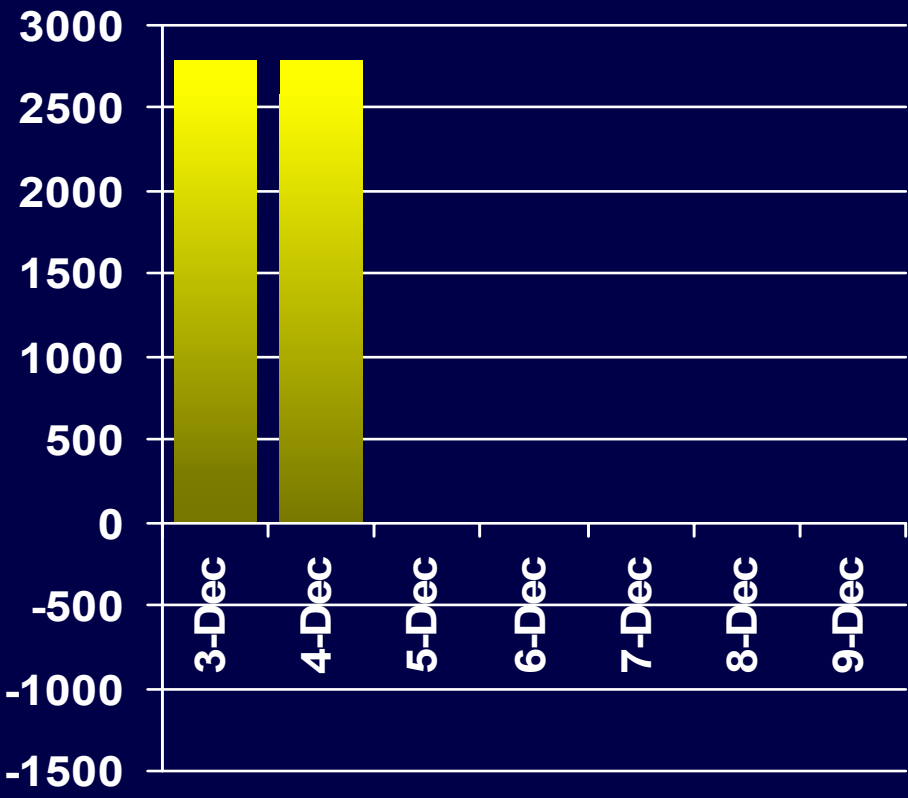


Notes.....

- ◆ *The story so far.....*
- ◆ *Weather very mild*
- ◆ *Previous max. demand 51.5GW (3rd Jan 02)*

03-Dec	04-Dec	05-Dec	06-Dec	07-Dec	08-Dec	09-Dec	10-Dec
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Surplus above Operating Margin for Tuesday 10th Dec

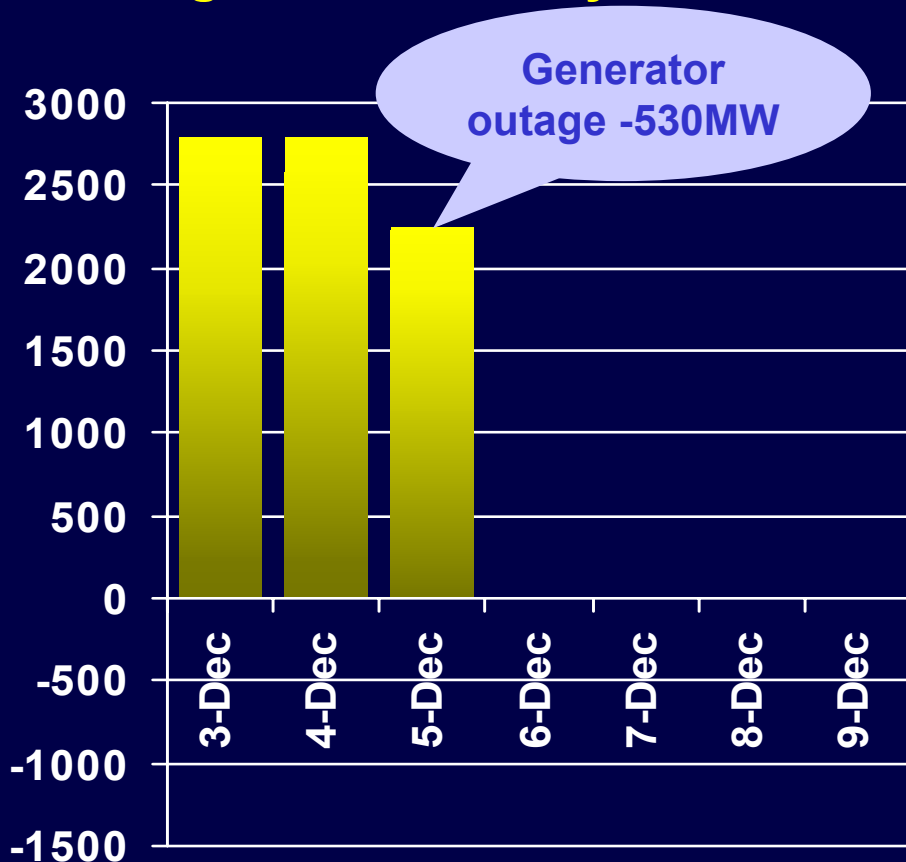


- ◆ Tuesday 3rd
- ◆ Wednesday 4th
- ◆ **Surplus: +2800MW**

Notes.....

- ◆ *No significant changes by Wednesday*

Surplus above Operating Margin for Tuesday 10th Dec



- ◆ Tuesday 3rd
- ◆ Wednesday 4th
- ◆ Thursday 5th
- ◆ **Surplus: +2300MW**

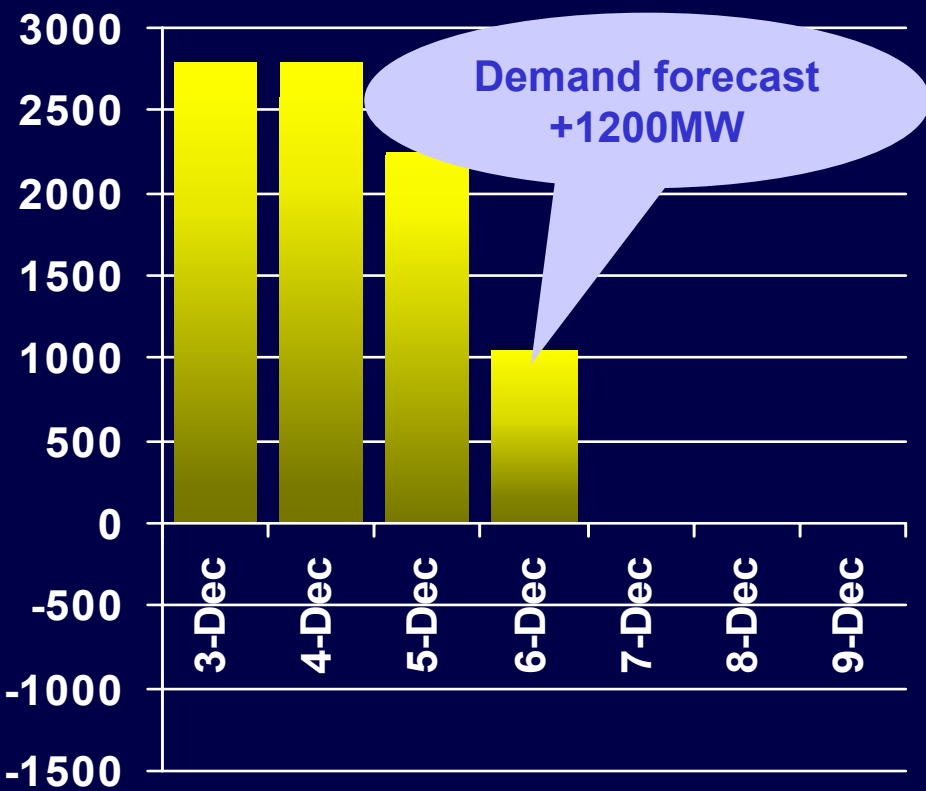
Notes.....

- ◆ *Dungeness B22 outage - surplus down 530MW*





Surplus above Operating Margin for Tuesday 10th Dec



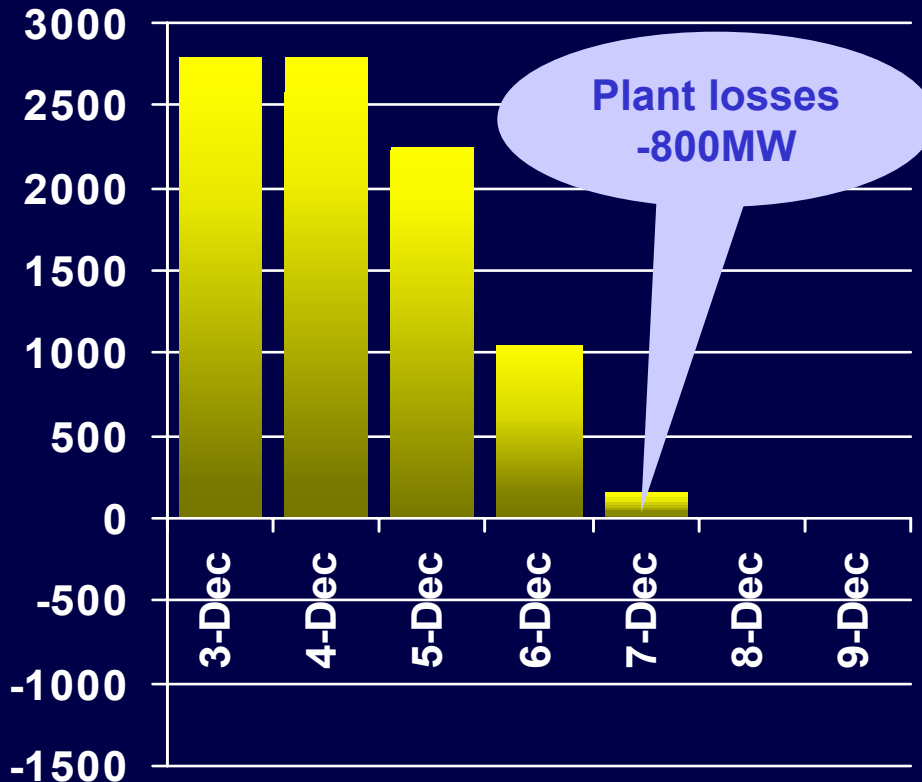
- ◆ Tuesday 3rd
- ◆ Wednesday 4th
- ◆ Thursday 5th
- ◆ Friday 6th
- ◆ **Surplus: +1000MW**

Notes.....

- ◆ Cold weather front predicted
- ◆ Demand forecast increase by 1200 MW



Surplus above Operating Margin for Tuesday 10th Dec



- ◆ Tuesday 3rd
- ◆ Wednesday 4th
- ◆ Thursday 5th
- ◆ Friday 6th
- ◆ Saturday 7th
- ◆ **Surplus: +160MW**

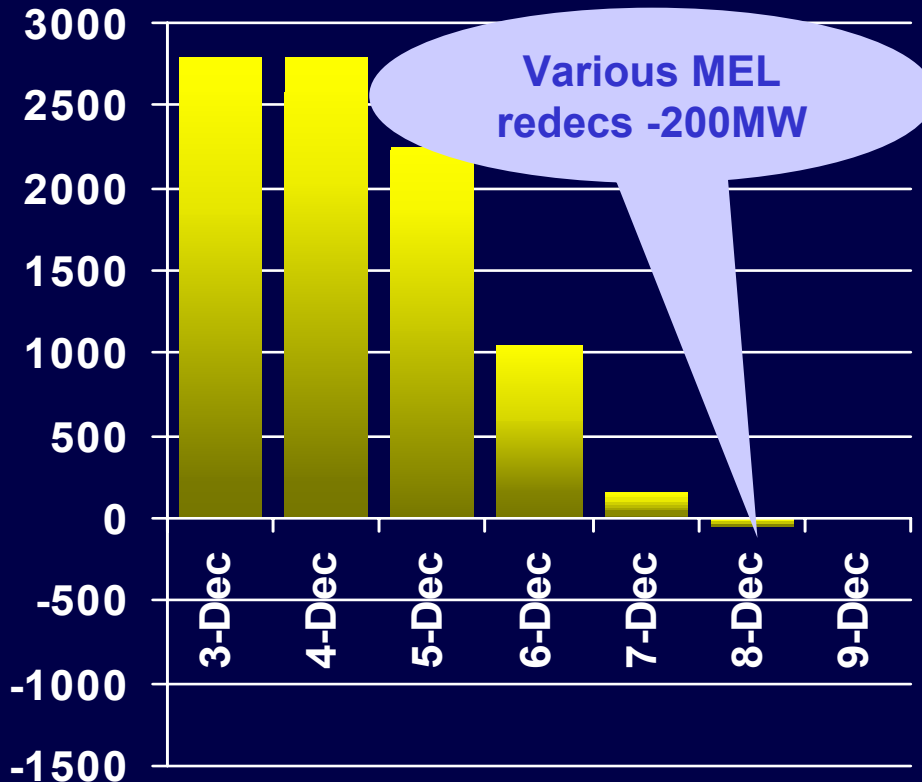
Notes.....

- ◆ Further ~800 MW plant losses on Saturday (IRNPS-2, KINO-1)





Surplus above Operating Margin for Tuesday 10th Dec



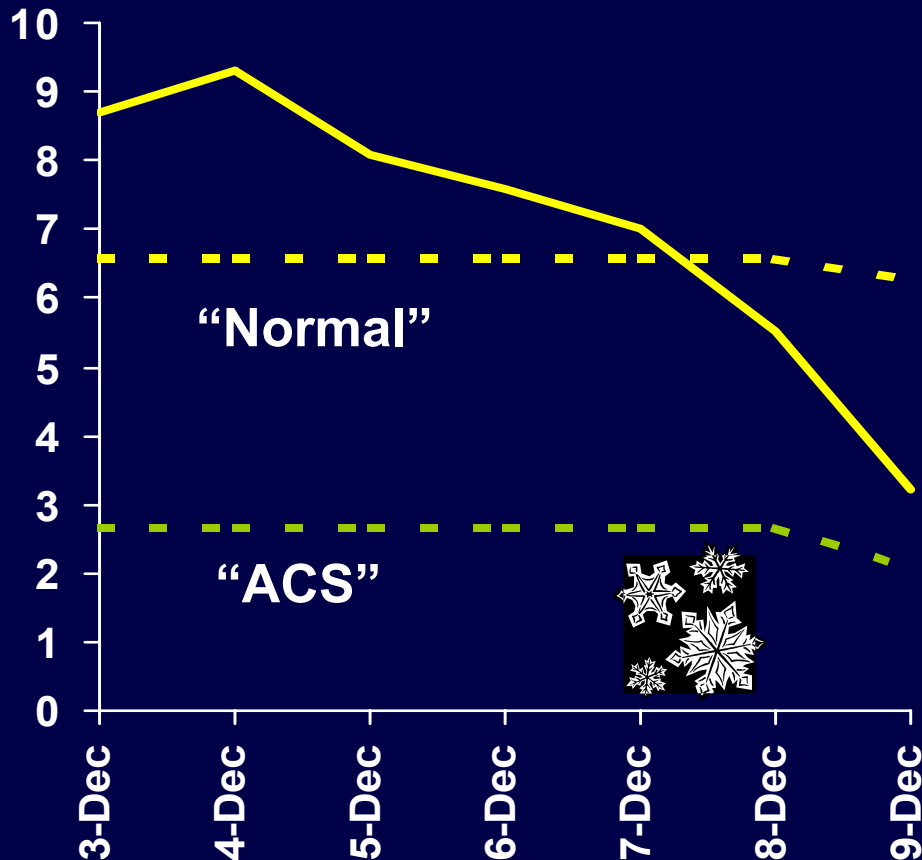
- ◆ Tuesday 3rd
- ◆ Wednesday 4th
- ◆ Thursday 5th
- ◆ Friday 6th
- ◆ Saturday 7th
- ◆ Sunday 8th
- ◆ **Surplus: -50MW**

Notes.....

- ◆ ~ -200MW MEL redecs

But it had been getting colder...

Actual Temperatures

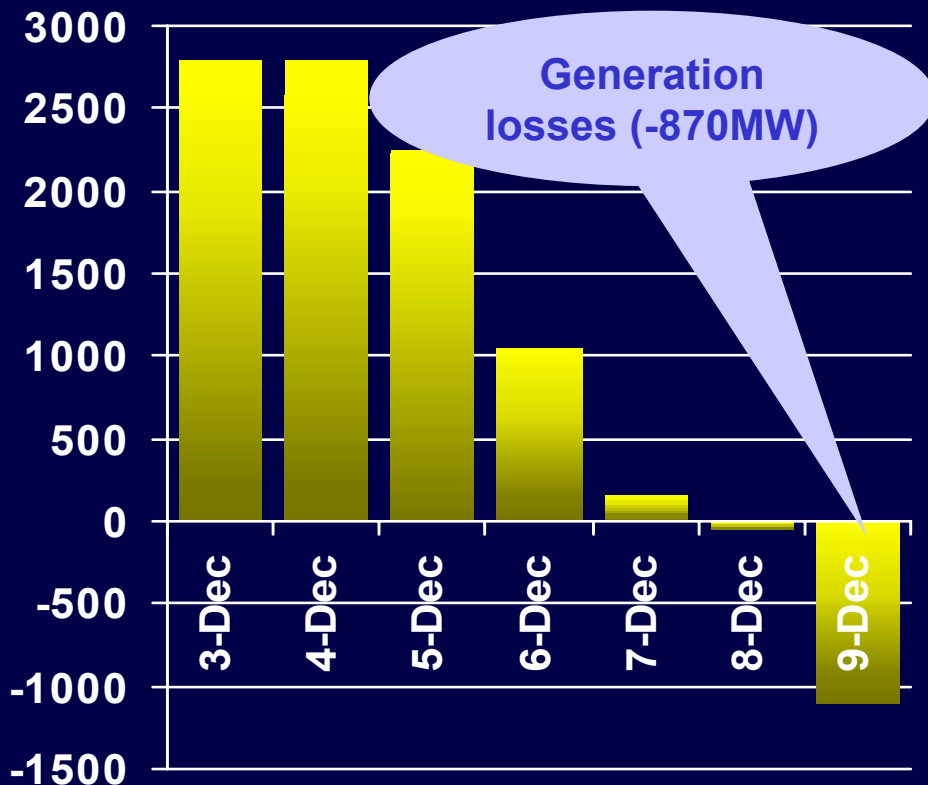


- ◆ Temperatures fell during the week
- ◆ Saturday: below “normal” temperatures
- ◆ Sunday: approaching ACS
- ◆ Wind chill made it seem colder.....





Surplus above Operating Margin for Tuesday 10th Dec



- ◆ Wednesday 4th
- ◆ Thursday 5th
- ◆ Friday 6th
- ◆ Saturday 7th
- ◆ Sunday 8th
- ◆ Monday 9th (2pm)
- ◆ **Surplus : -1050MW**

Notes.....

- ◆ More generation losses! (High Marnham 2/5 and Ironbridge 2)
- ◆ Margin still above NISM level - just...

03-Dec

04-Dec

05-Dec

06-Dec

07-Dec

08-Dec

09-Dec

10-Dec



Monday 9th December.....

- ◆ Much colder than previous week.
- ◆ 3 BMUs were warmed for the peak on Mon 9 Dec (LITTD1/2 & FAWL-3).
- ◆ New record demand set at **52.7 GW**
- ◆ Number of generation losses (~1.3GW) during afternoon
- ◆ 3GW total losses for the day but managed within the operating margin with no need for any system warnings (e.g. NISM, HRDR, DCI).



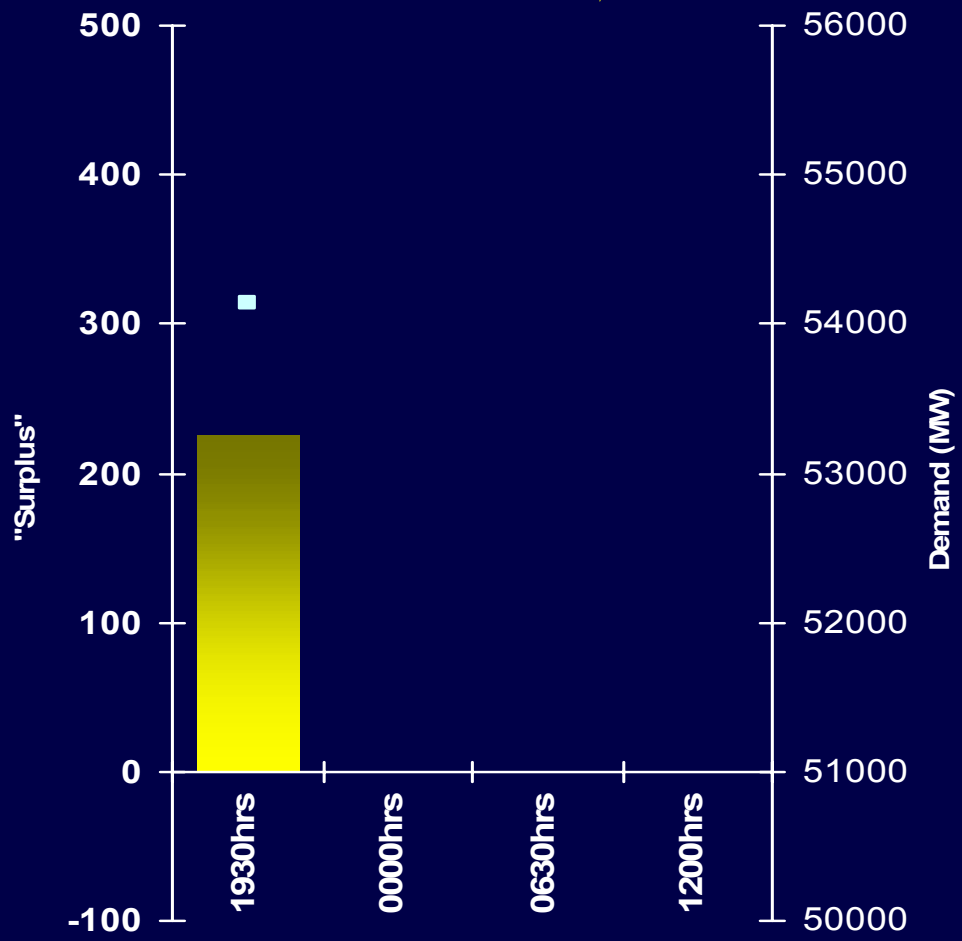


By 1930hrs.....

- ◆ Peak demand forecast : **54100MW**
- ◆ “Surplus”: **+200MW**

Notes.....

- ◆ *LITTD1/2, GRAI-1 & FAWL-3 warmed*
- ◆ *Notified Demand reduction (+225MW)*
- ◆ *Looking tight but manageable...*



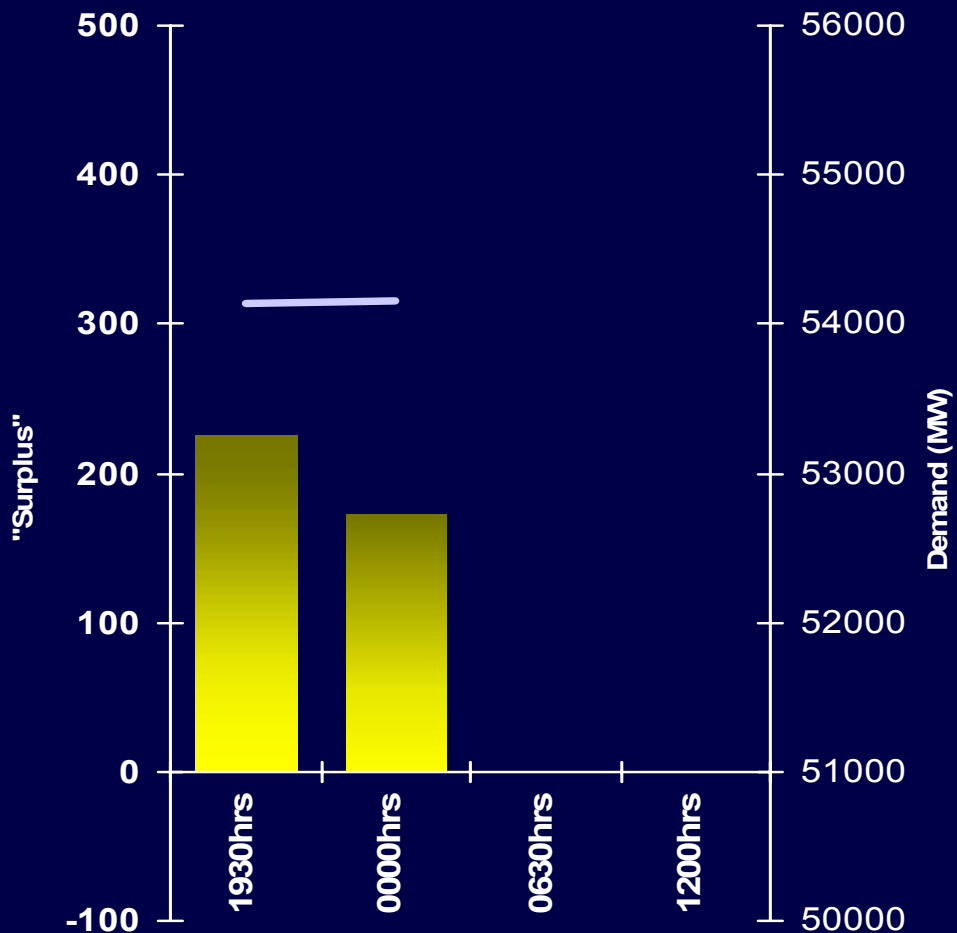


By Midnight.....

- ◆ Peak demand forecast : **54160MW**
- ◆ “Surplus” : **+170MW**

Notes.....

- ◆ *Minor plant/demand changes...*



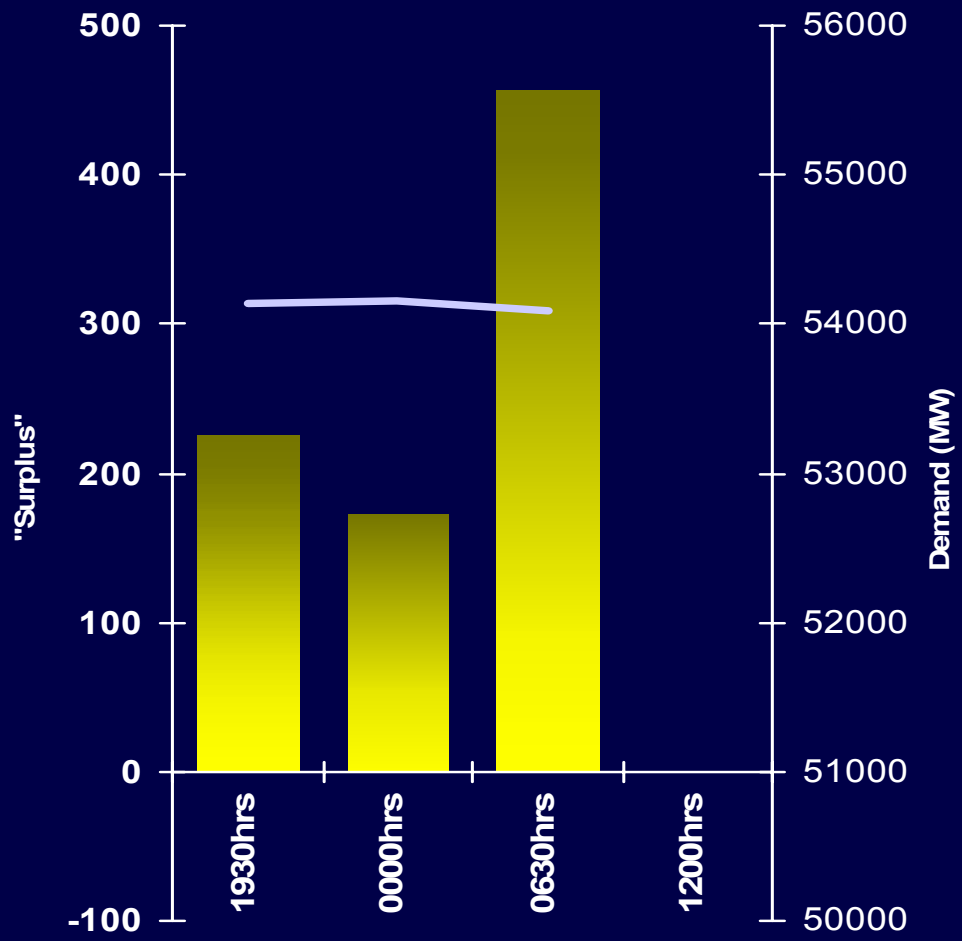


By 0630hrs.....

- ◆ Peak demand forecast : **54087MW**
- ◆ Surplus : **+450MW**

Notes.....

- ◆ *Looking better!!*
- ◆ *Minor plant/demand changes...*



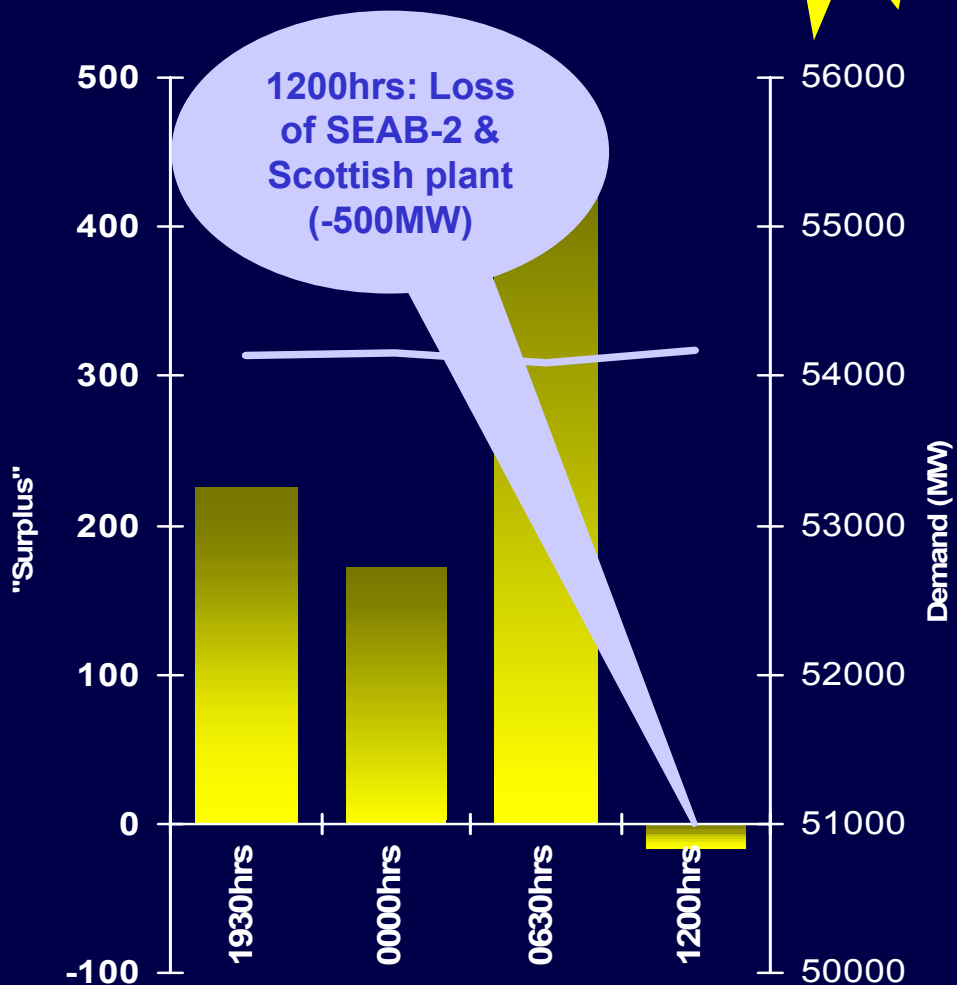


By 1200hrs.....

- ◆ Peak demand forecast : **54164MW**
- ◆ Surplus : **-20MW**

Notes.....

- ◆ 1138 : *PGBT southern machine for constraint (+480MW)*
- ◆ 1200 : *Loss of SEAB-2 (-380MW) and Scottish plant*



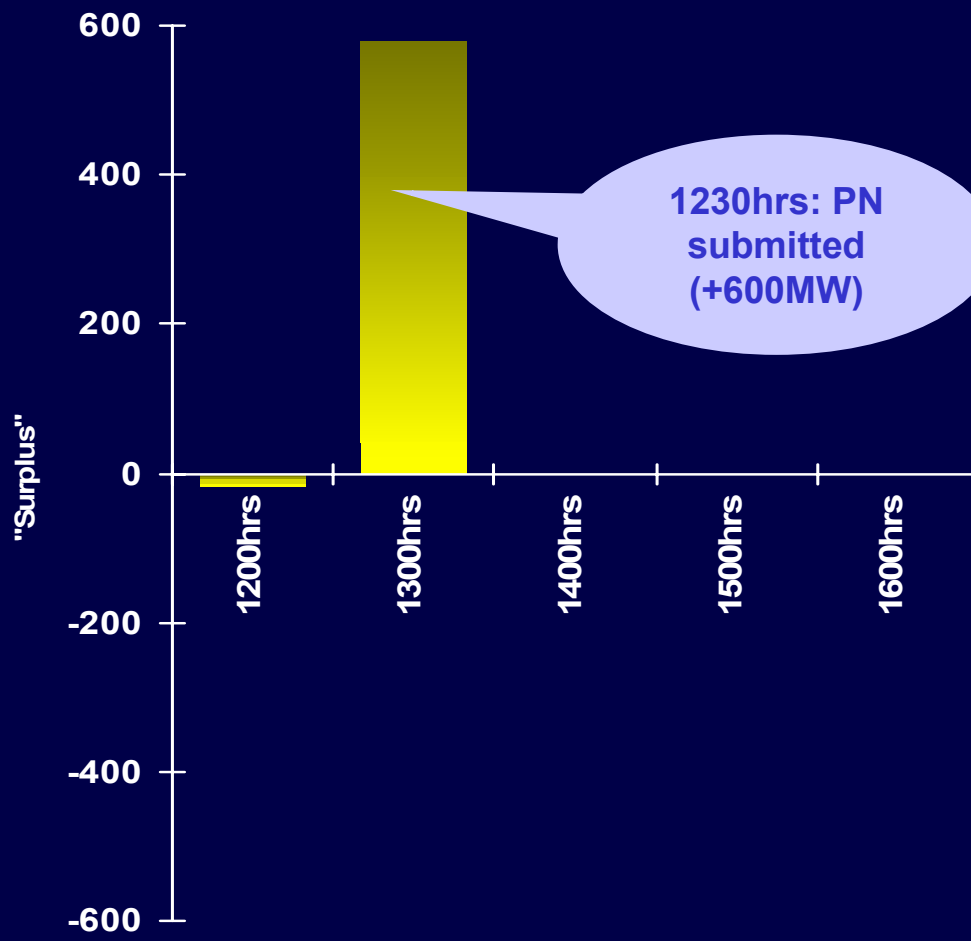


1300hrs.....

◆ Surplus : ~570MW

Notes.....

◆ 1230 : PN submitted (+600MW)



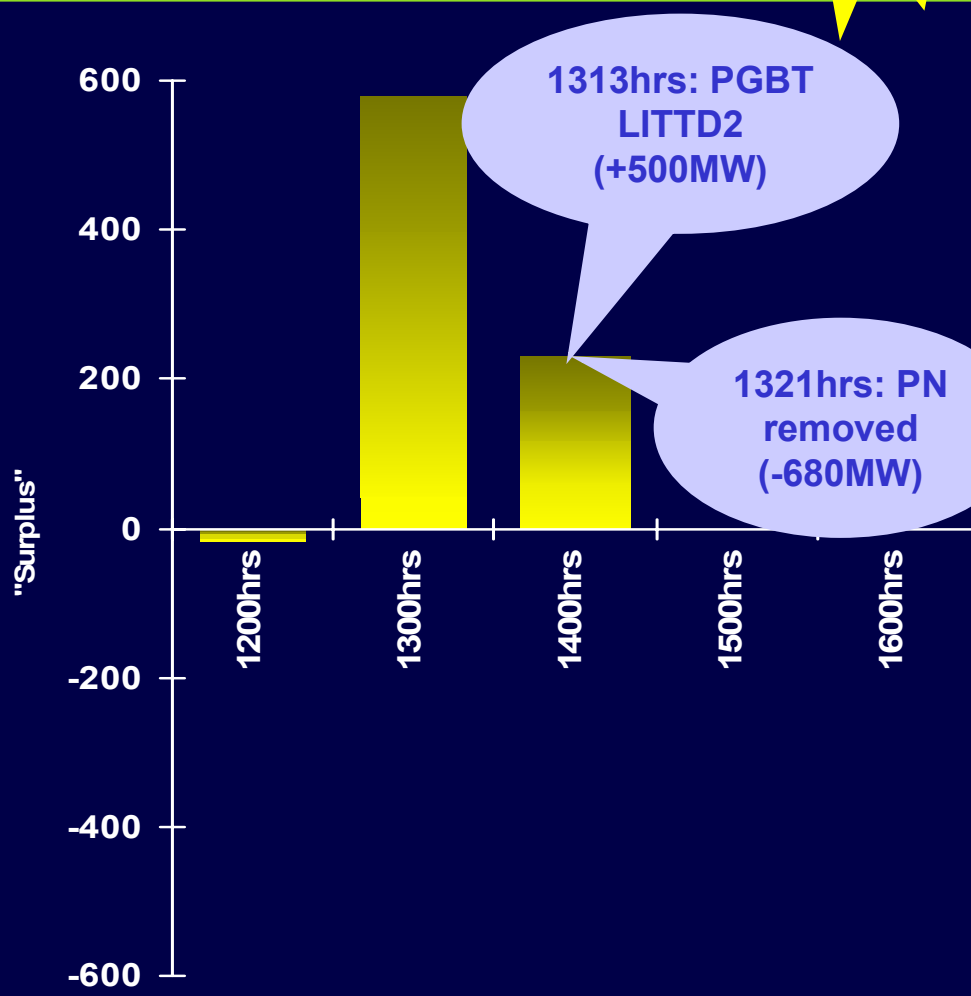


1400hrs.....

◆ Surplus : ~230MW

Notes.....

- ◆ 1313 : PGBT LITTD2 (+500MW)
- ◆ 1315 : GRAI-1 stood down from warming
- ◆ 1321 : PN removed (-680MW)



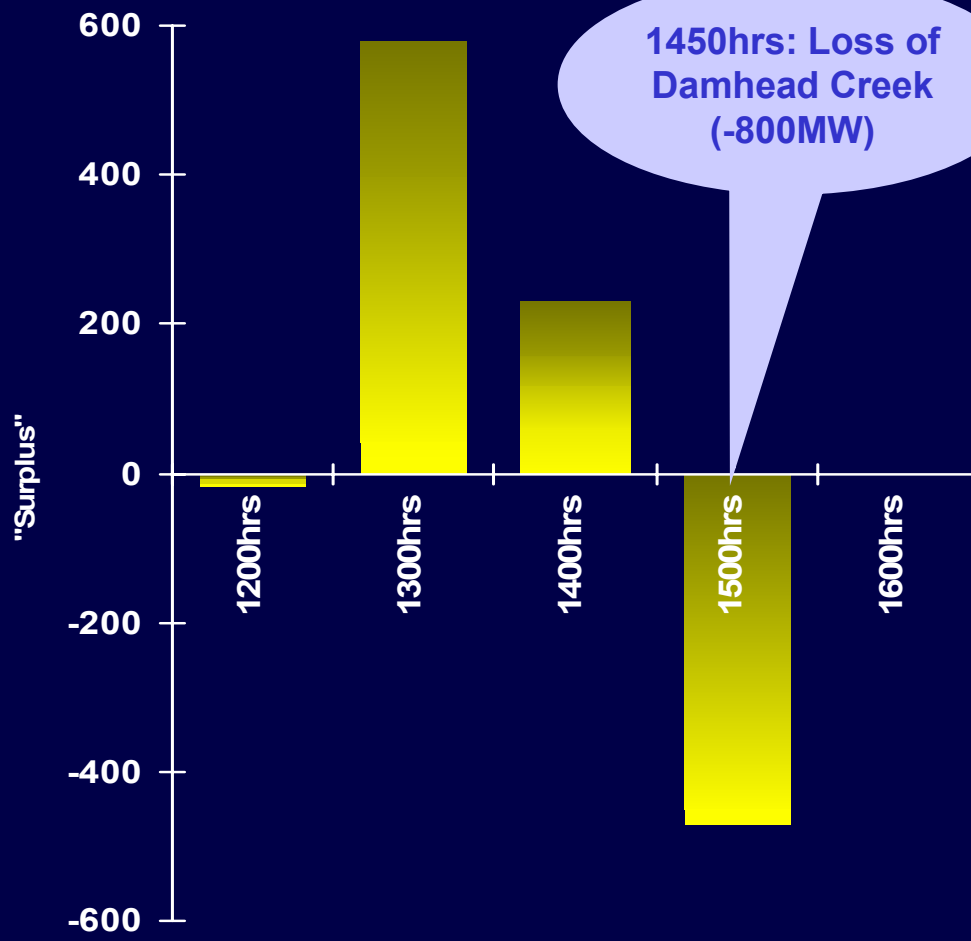


1500hrs.....

◆ Surplus : ~ -500MW

Notes.....

◆ 1450 : Loss of Damhead Creek (-800MW)



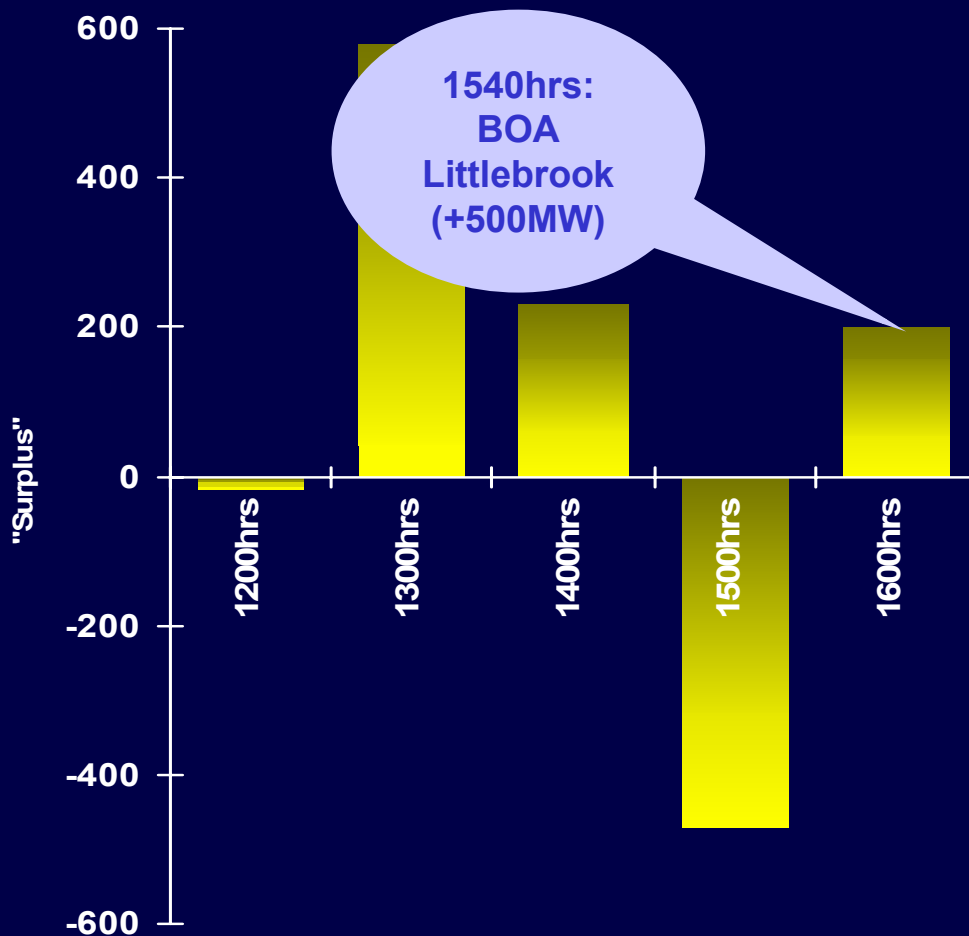


1600hrs.....

◆ Surplus : ~ 200MW

Notes.....

- ◆ Tight - only feasible machine to get on to system LITTD1.....
- ◆ Grain now infeasible due to NDZ.
- ◆ 1540 : LITTD1 BOA'd @ £446/MWh (+500MW)

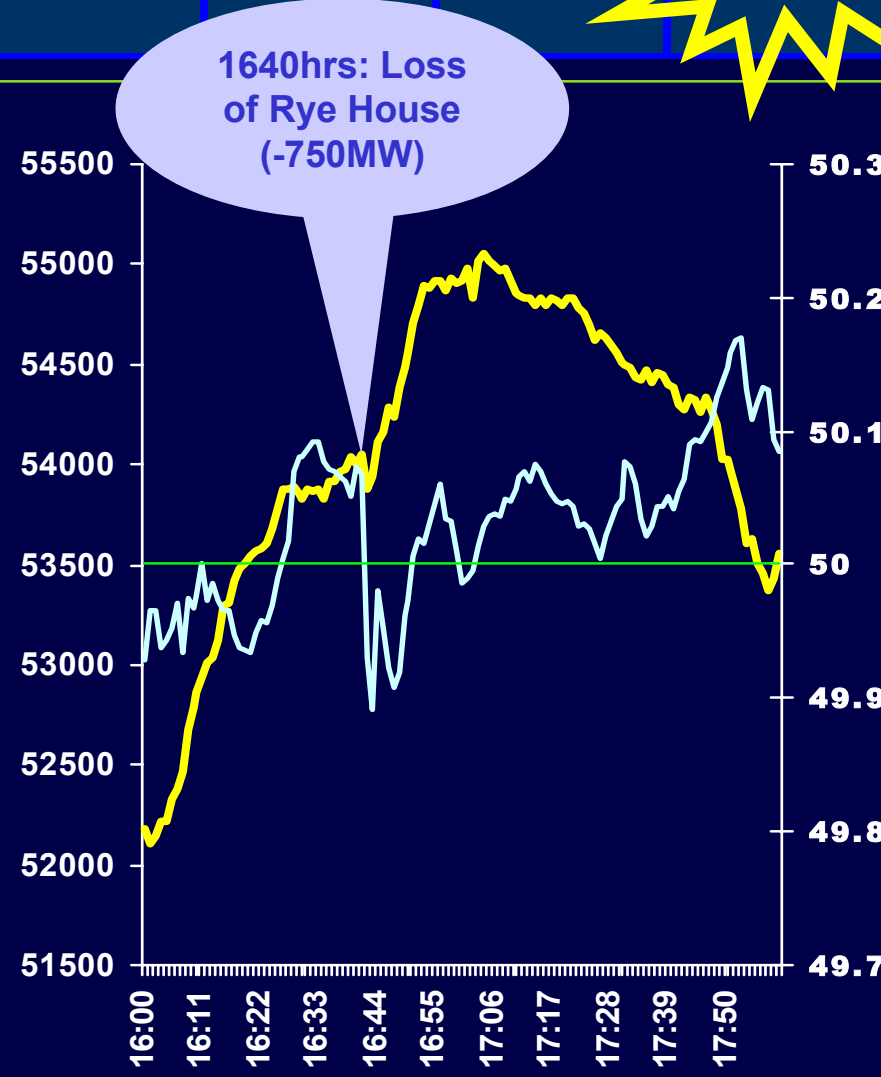




1600hrs on.....

Notes.....

- ◆ Demand rising sharply....
- ◆ 1610 : Some Gas turbines instructed on
- ◆ All response on to Pumped Storage plant
- ◆ 1640 : Loss of Rye House (-750MW)
- ◆ All remaining GTs instructed on (total 1100MW)
- ◆ 1708 - last feasible offers taken @ £9999/MWh

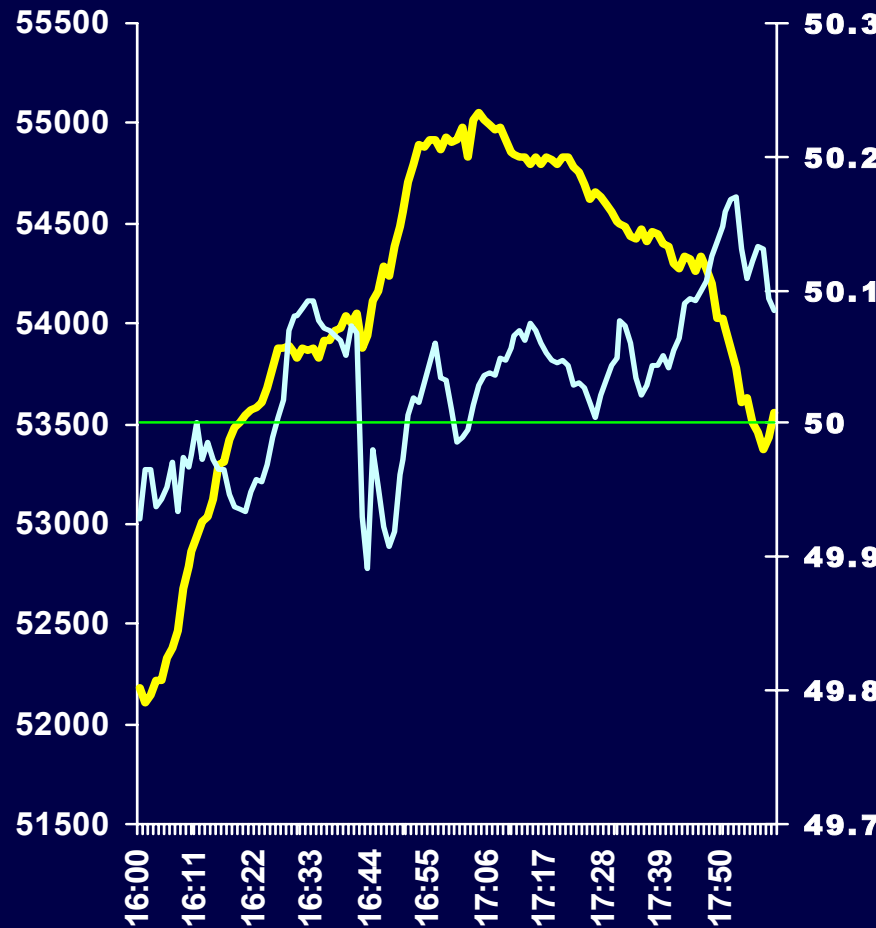




The peak.....

Notes.....

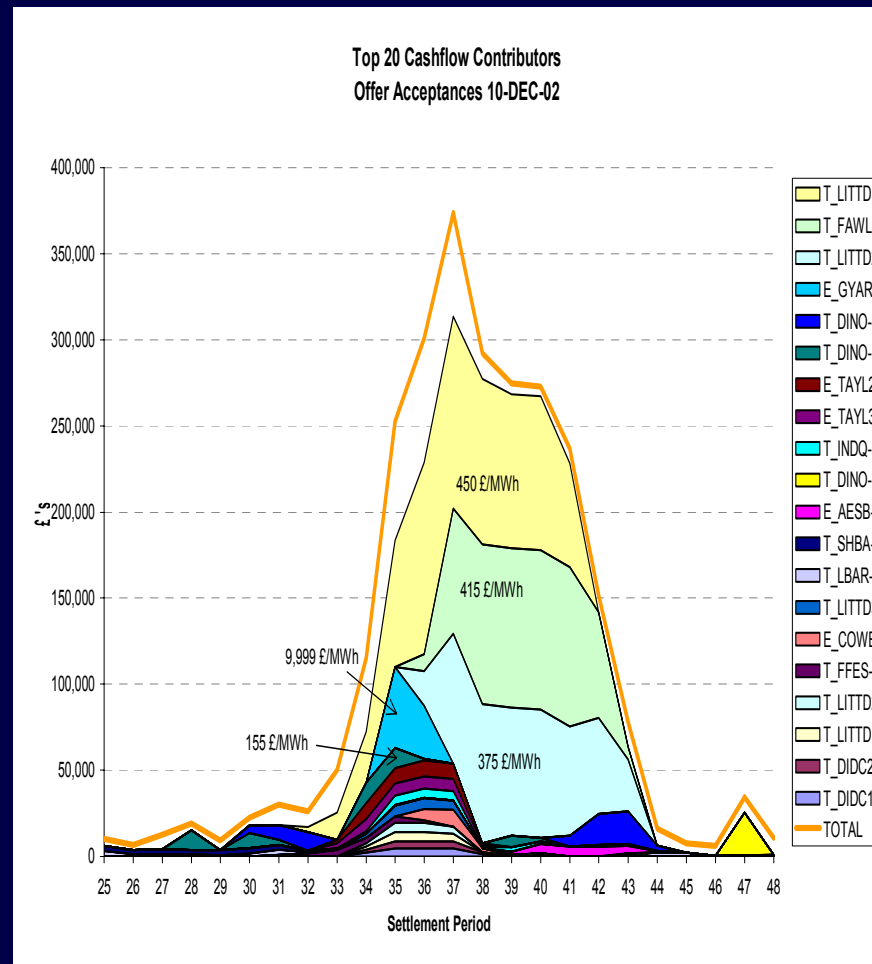
- ◆ Next step - potentially reduce demand
- ◆ Demand Control Imminent warning effective 16:55 -18:00 : Stage 1 - ~5% (demand reduction)





The peak.....

- ◆ Average 984 MW offers accepted
- ◆ Average offer price £320/MWh
- ◆ Maximum accepted offer price £9999/MWh
- ◆ Further loss of 500MW generator at 17:34
- ◆ High Risk Demand Reduction in force from 1800hrs to 1905hrs



03-Dec

04-Dec

05-Dec

06-Dec

07-Dec

08-Dec

09-Dec

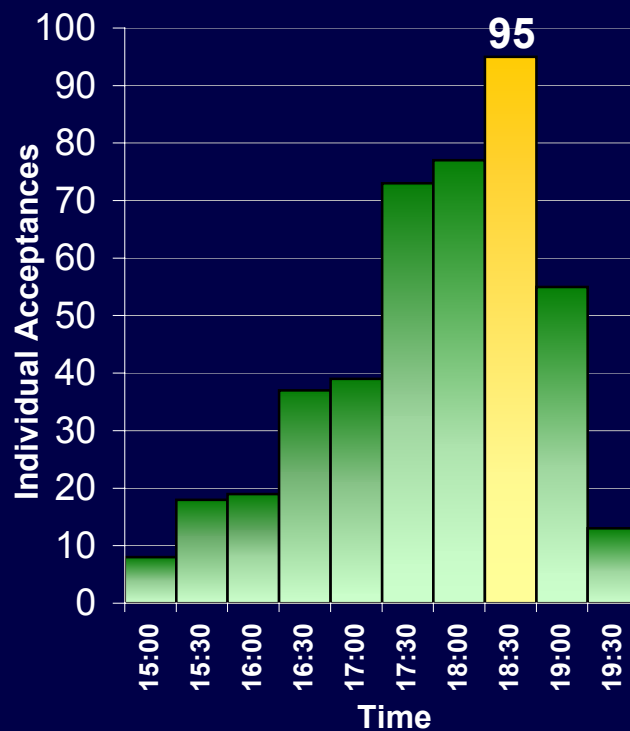
10-Dec



The peak.....

- ◆ All steam plant instructed to full load
- ◆ Consistent with Balancing Principles need to commit all feasible plant in BM (including standing reserve)
- ◆ Demand 400 MW underforecast
- ◆ Market Energy short, capacity issues driven by plant loss

No. of Bid Offer Acceptances per Half Hour



03-Dec

04-Dec

05-Dec

06-Dec

07-Dec

08-Dec

09-Dec

10-Dec

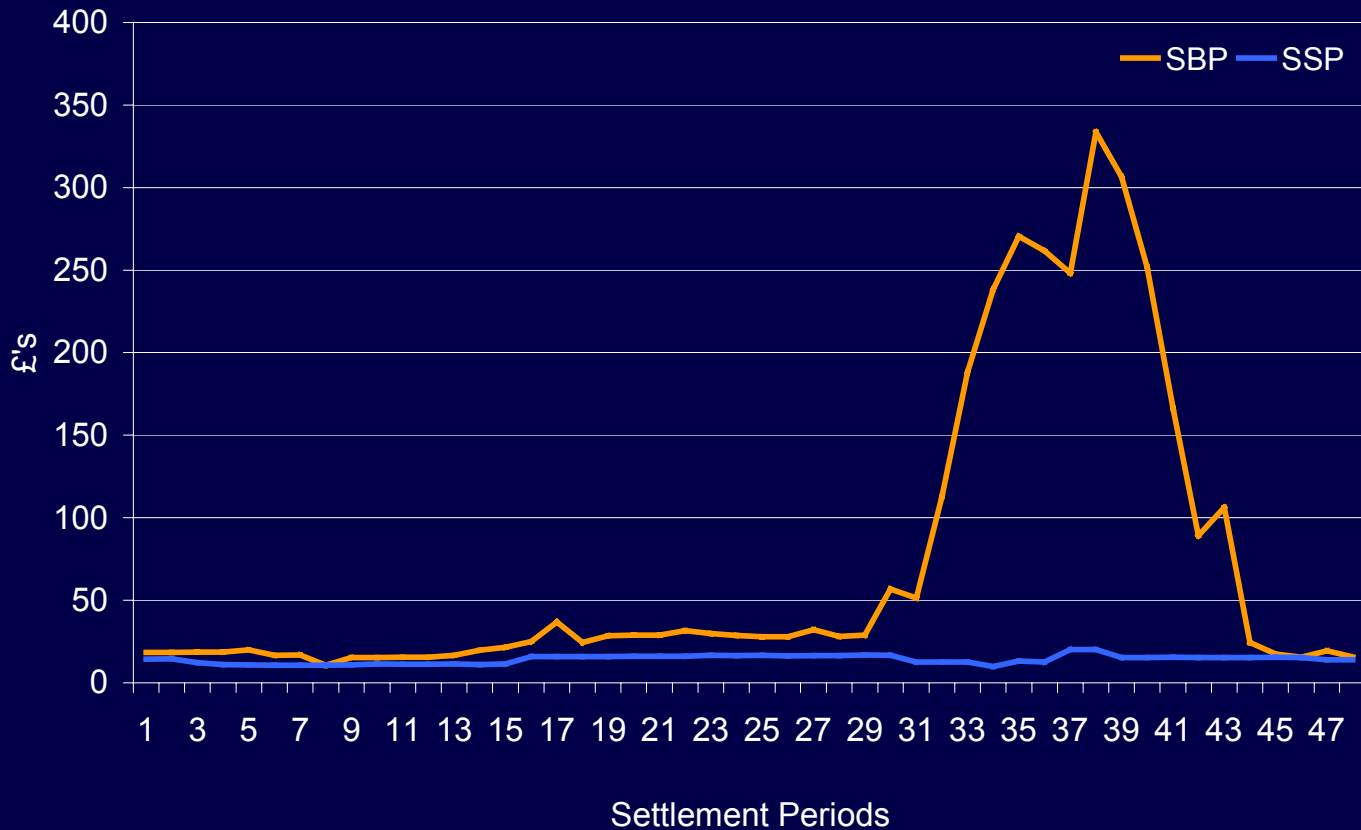


Summary

- ◆ **Record Demand**
 - Into ACS conditions
 - 400 MW above final operational forecast
- ◆ **Exceptional Generation failure**
 - 2,400 MW in 3 hrs up to 17:40 (typical ~200MW)
 - <4hr losses only >2000MW once before in 2002.
- ◆ **Generation with technical problems continued to operate**
- ◆ **Warnings issued and responded to**
- ◆ **Security Standards maintained using normal operational and commercial processes**



Outturn Imbalance Prices



A day in the Life....

