System Flexibility Workshop

24th June 2009

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Agenda

Definition

Potential drivers for change

Case studies

- LNG Importation
- Electricity generation

Potential impacts

Current constraint management tools

Break

Trends and possible indicators

Way forward

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Purpose of this workshop

In order to understand the potential requirements for system flexibility in the future we need to:

- Define and agree the service
- What data / information / indicators can be used to understand customers requirements going forward
- What timescales should be monitored for trends
- Agree what would constitute a signal for change

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Introduction

NTS has historically been built to meet Users flat requirements within a range of operating pressures.

System flexibility is inherently a "by-product" of operating the NTS within a range of pressure limits.

Current "limits" of flexibility entirely dependent on the daily NTS setup and the supply/demand pattern and therefore very difficult to define and model

Currently no incentive for National Grid to make increased quantities of system flexibility available

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System Flexibility – what do we mean?

The ability of the NTS to manage supply and demand mismatch without compromising safety

- A matter of supplies and demand on the NTS not being synchronised

Manifests in two forms:

- Flow pattern volatility
- Single entry/exit point volatility

Other views?

Such mismatches may become more prevalent in future

We need industry help to predict customers service requirements in sufficient time to allow the TO and SO to respond

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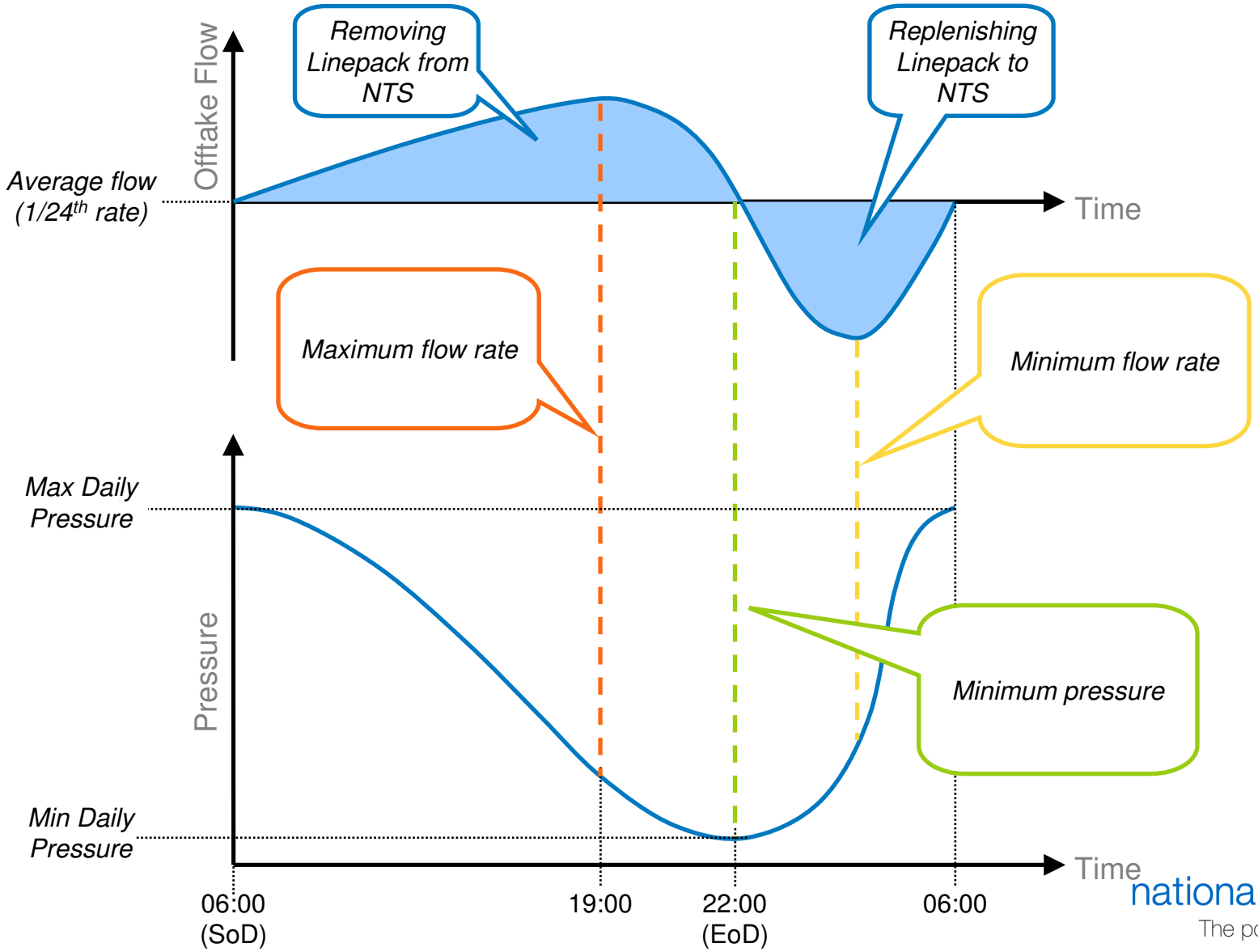
Definition:
Pressure, Flow & Linepack at an Offtake



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What might generate requirements for flexibility? (1)
Demand volatility – both within-day and across days

- Power station uncertainty driven by electricity market interaction
  - Growth in wind and nuclear generation
  - Electricity demand fluctuations
- Industrial / power station demand driven by price
- DN offtake profiles
- Accuracy of demand forecasts (gas and electricity)
- Effects of a growth in embedded DN entry
- Location of entry vs exit flows
- Any others?

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What might generate requirements for flexibility? (2)

Within-day supply volatility

- Driven by demand volatility
- DN demand forecasting

} Speed of supply chain response to changing demand

- Late portfolio balancing

} Speed of supply chain response to changing price / demand

- Plant issues

} Speed of response to recover end of day positions

- Entry variation

- What else?

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What might generate requirements for flexibility? (3)
Supply volatility across days

- LNG delivery uncertainty
  - May affect flow patterns on the NTS
- Increased interaction between European events and UK supplies
- Storage increasingly price-driven rather than season-driven
  - Expected to help the system regarding security of supply
  - May provide flexibility or consume it?
- What else?

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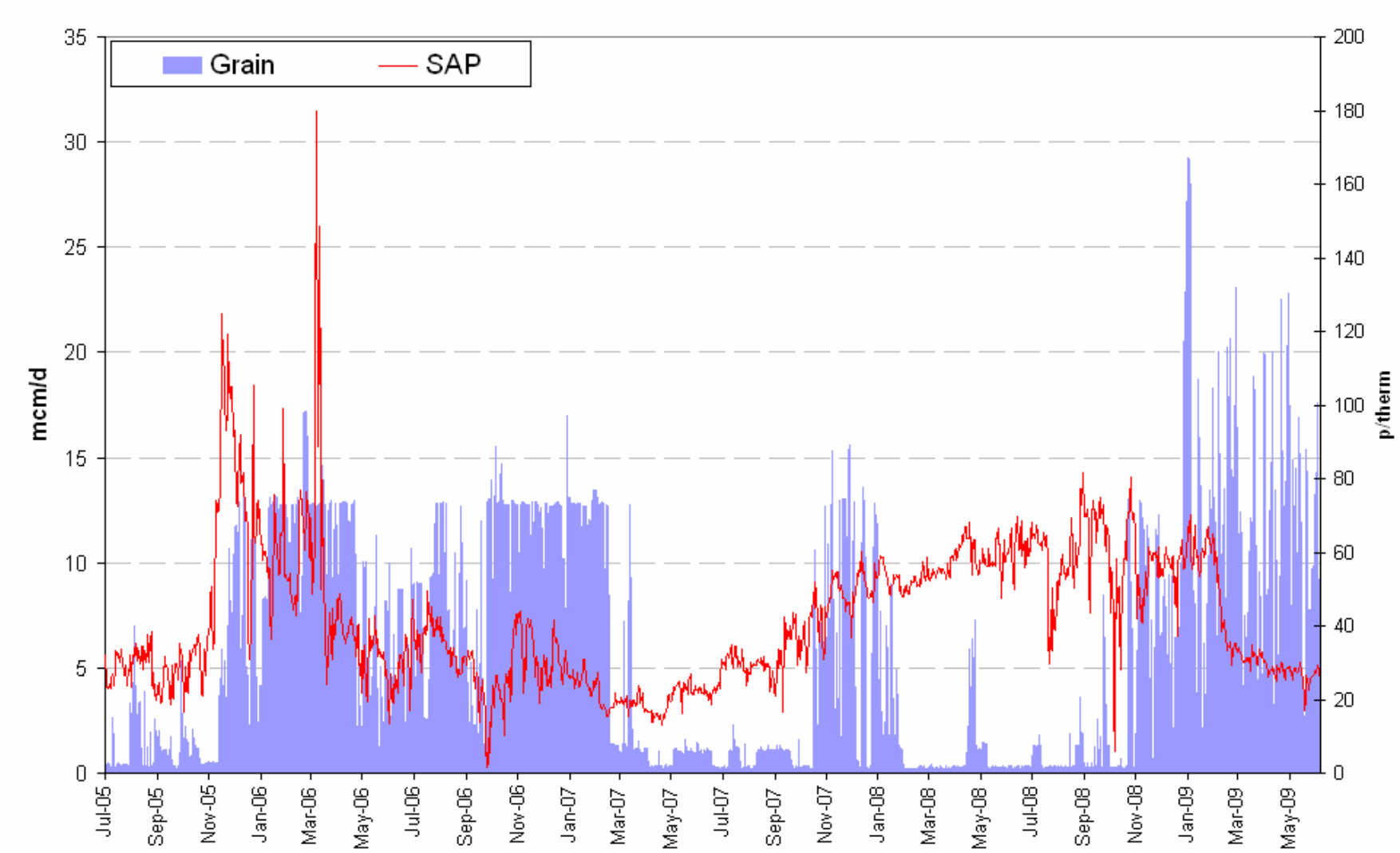
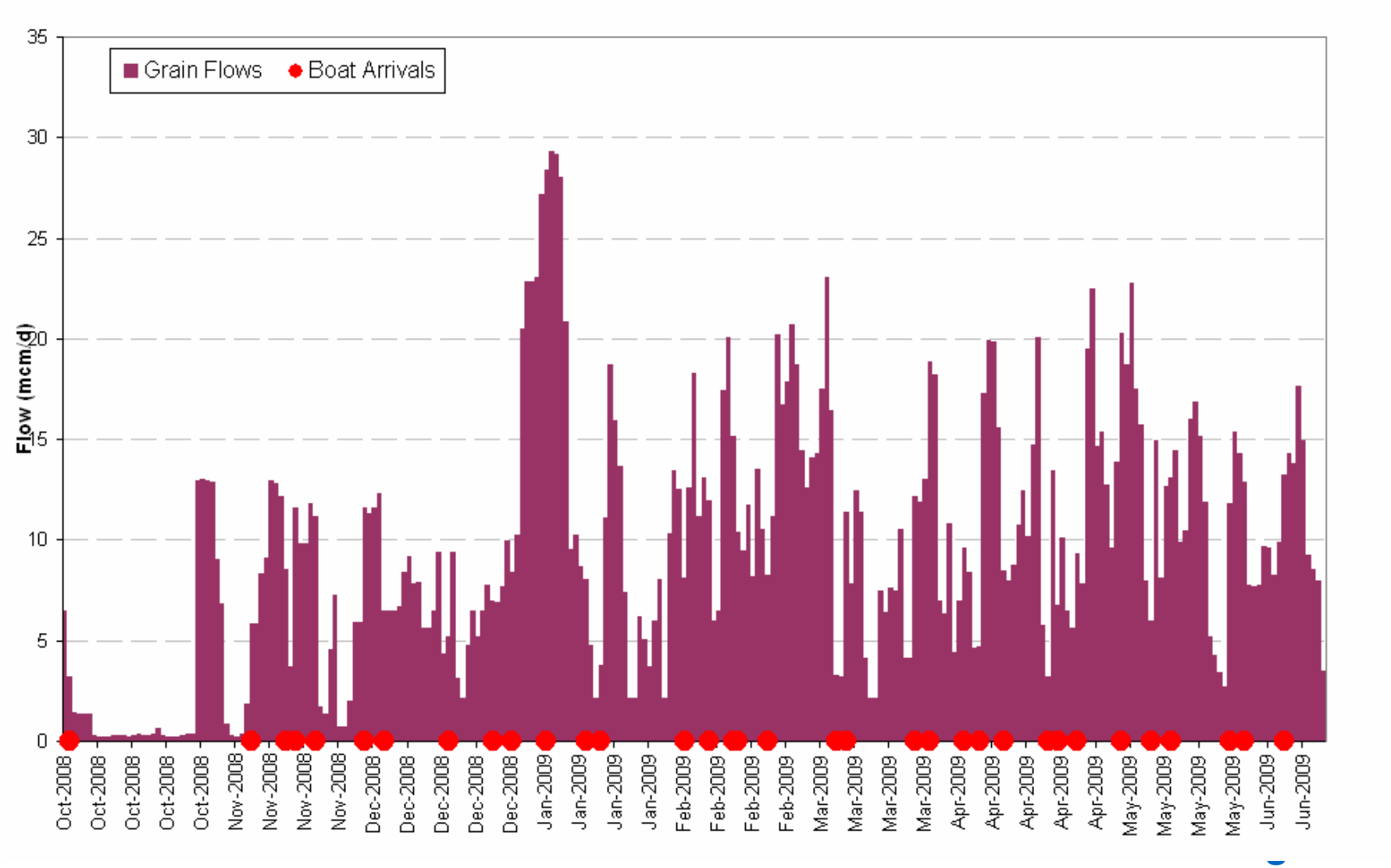
Case Study 1 – LNG:
Grain flows since conversion to import terminal



Case Study 1 – LNG
Grain flows in winter 2008/9



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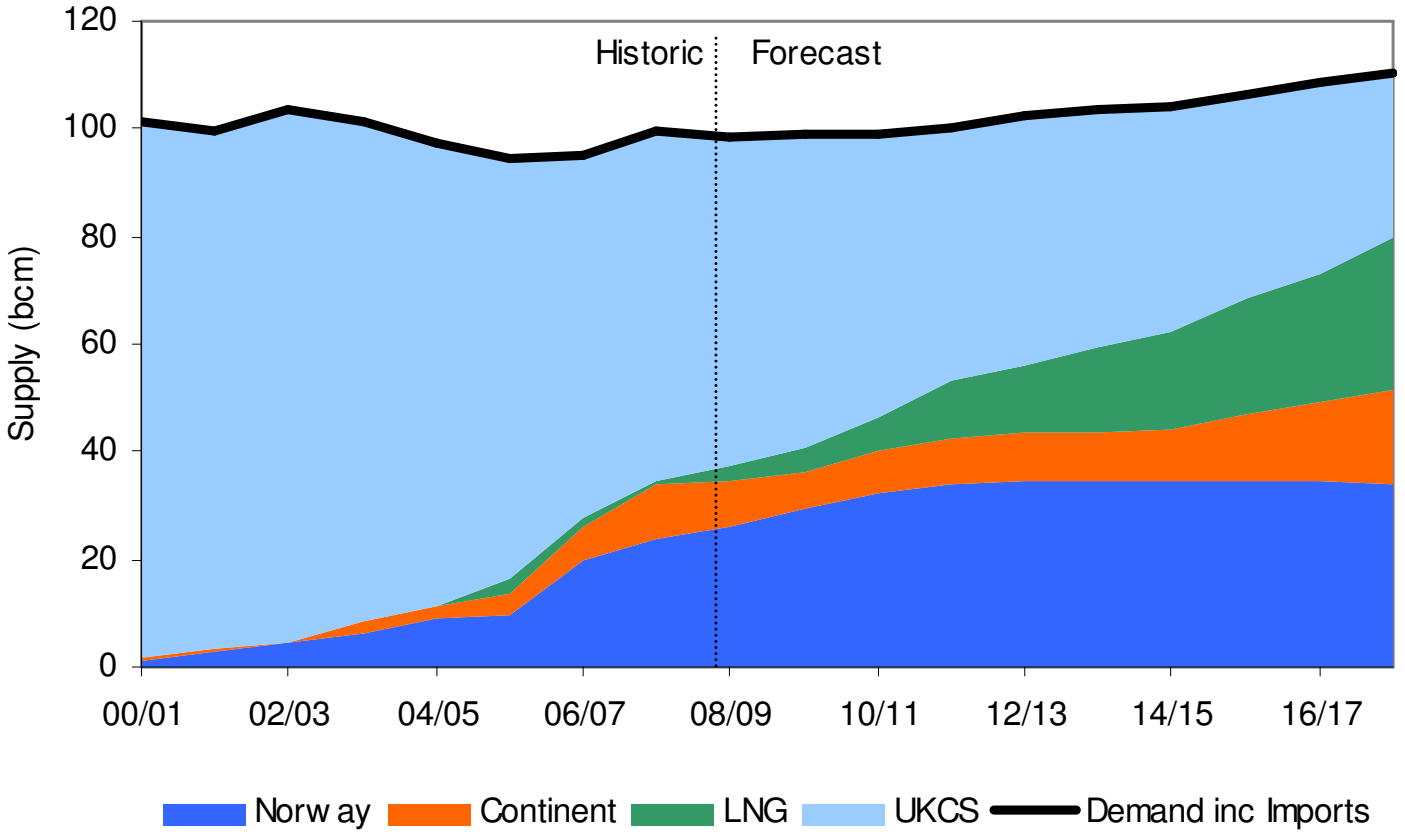
Case Study 1: LNG
2008 TYS Base Case Annual Supply Forecast



Will the current volatility in LNG supplies continue?

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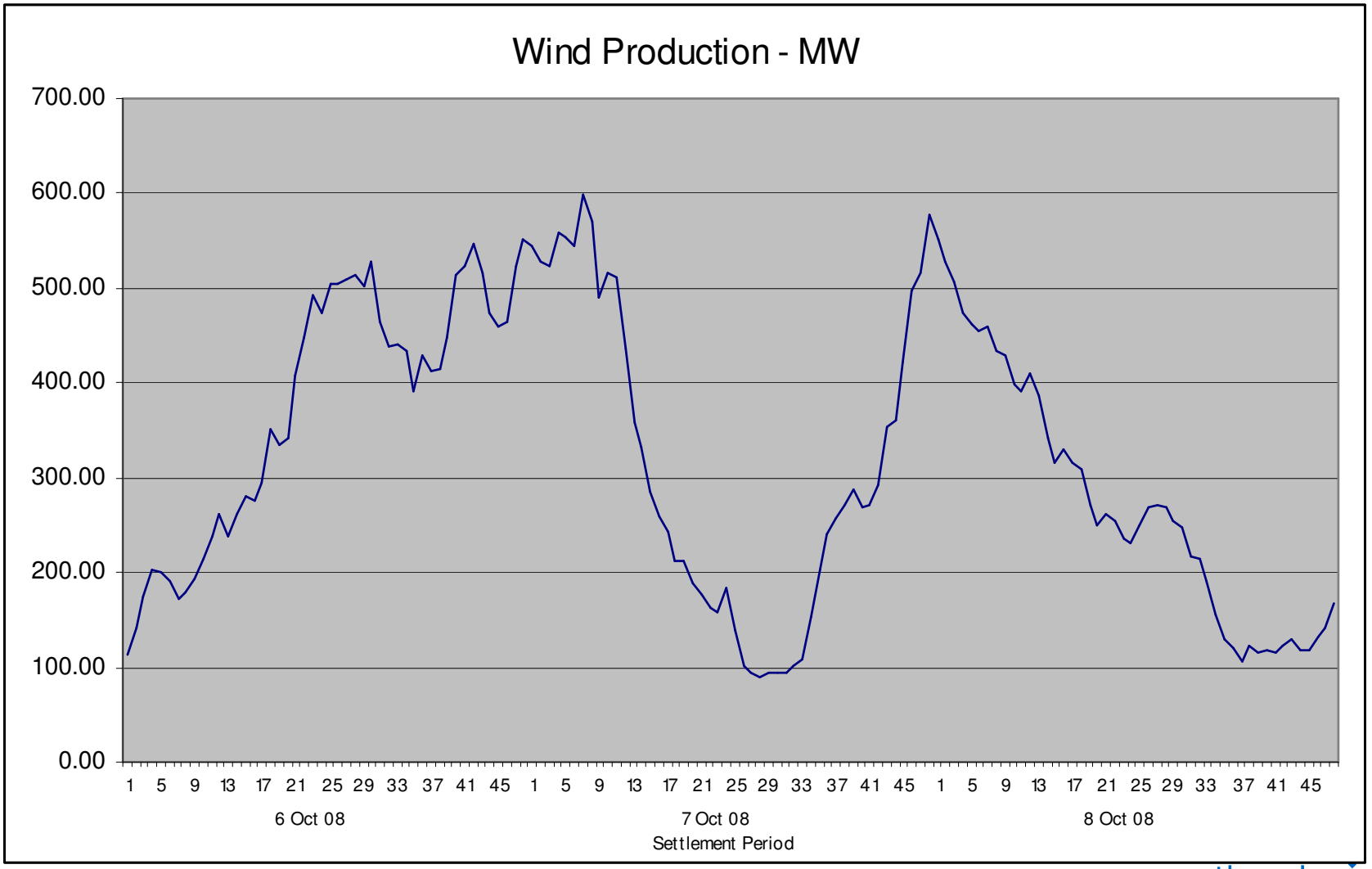
Case Study 2: Electricity Market Interaction

Wind Variability Now



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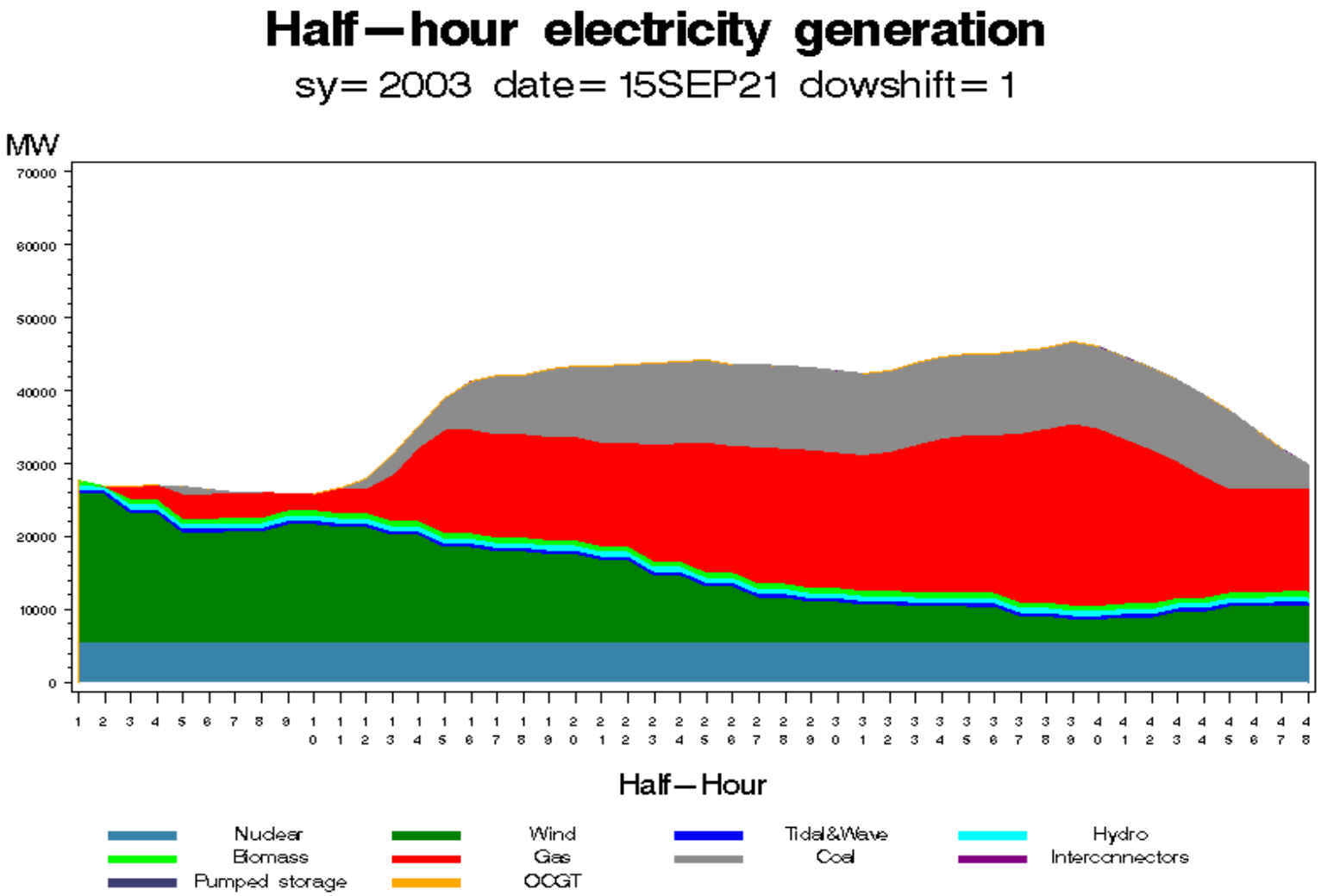
Case Study 2: Electricity Market Interaction

Wind Variability in 2020?



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Case Study 2: Electricity Market Interaction

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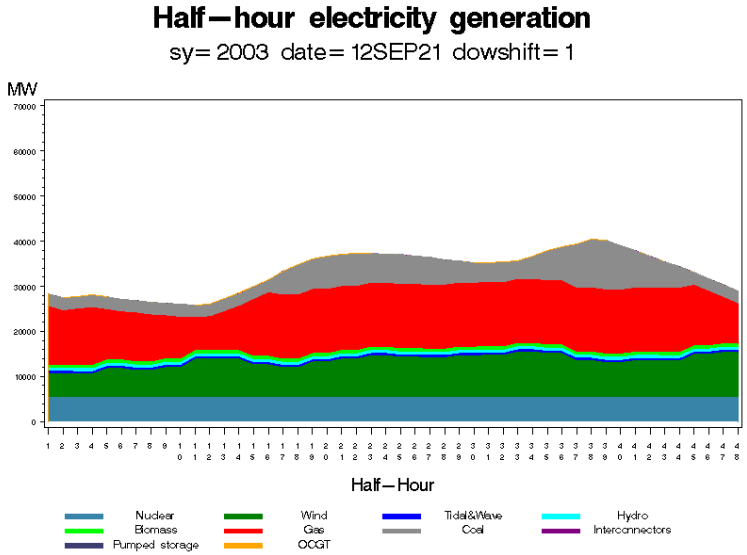

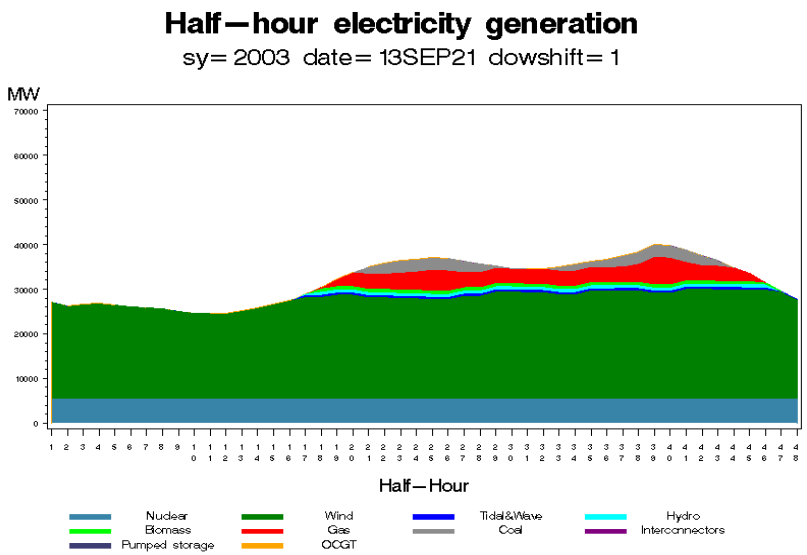

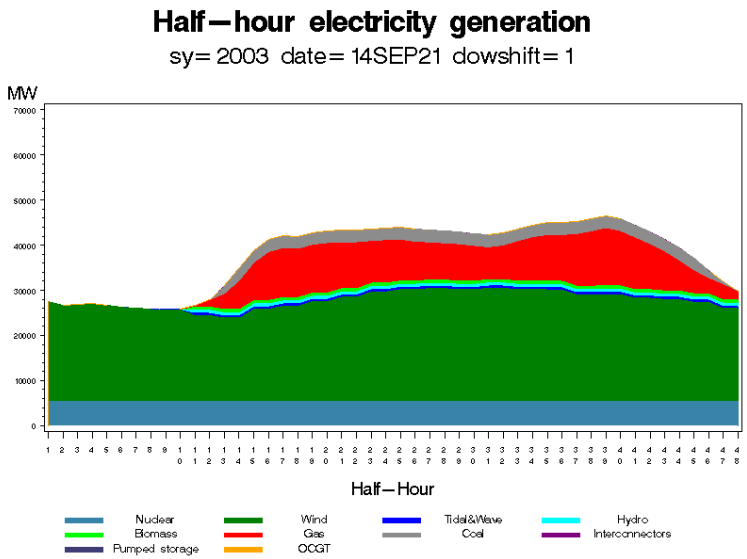

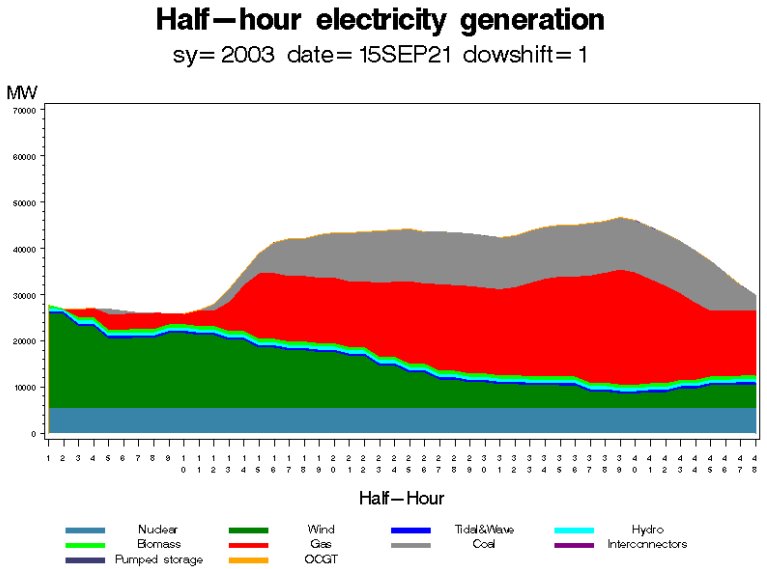

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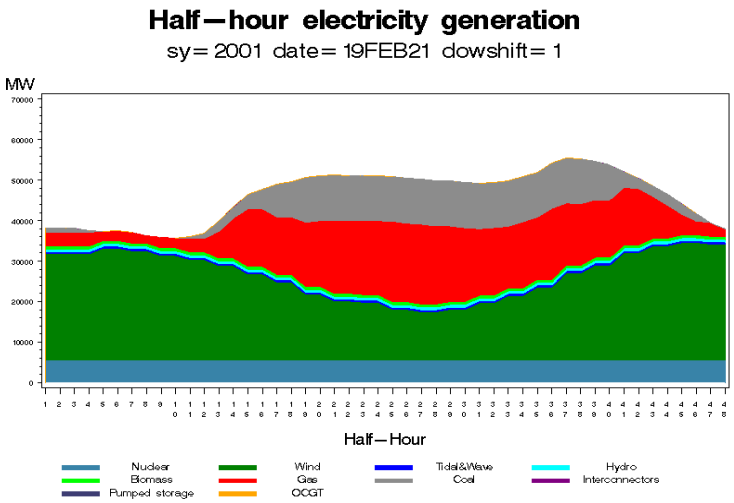

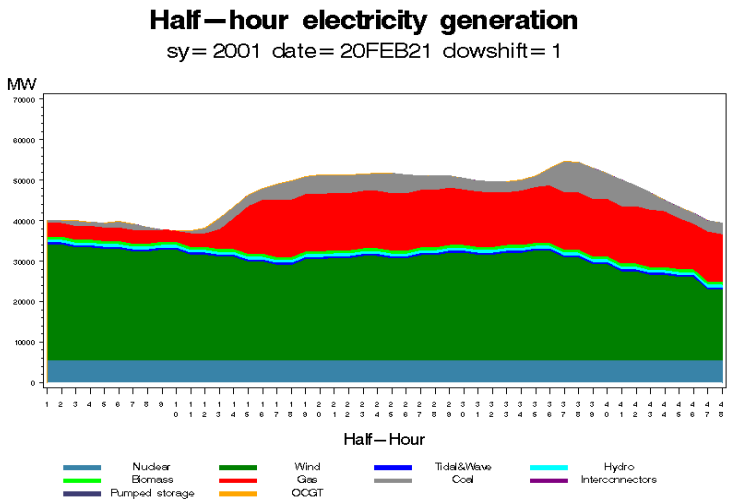

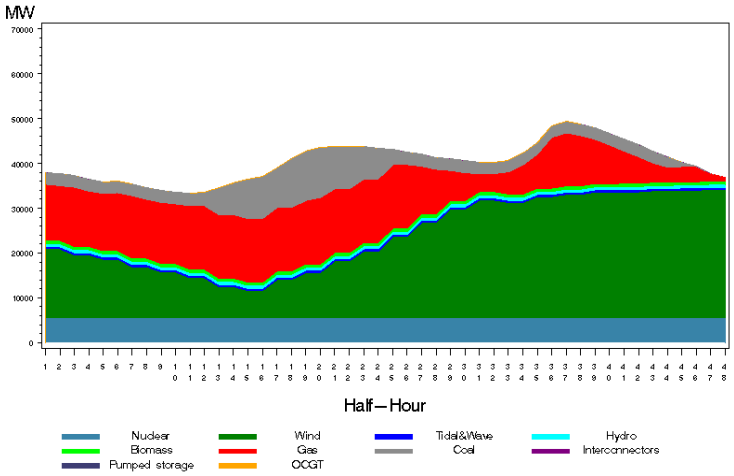

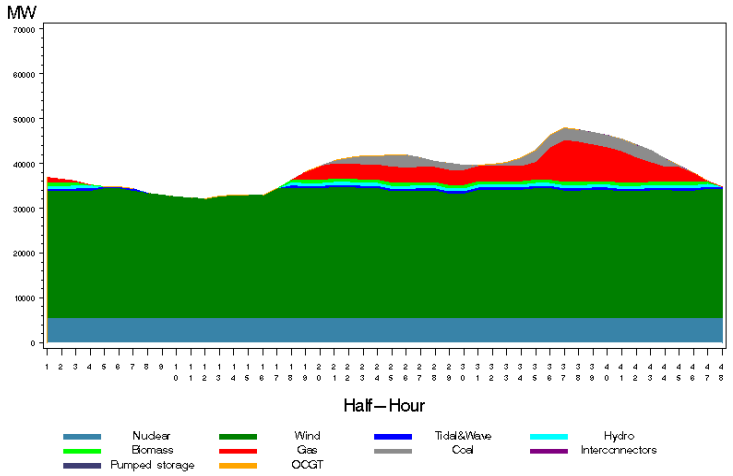

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Potential Impacts

Linepack / pressure management

Capacity constraints / buyback risk at exit and entry

- Increased capacity neutrality costs (08/09: no buybacks)

Increased need for residual balancing actions

- Increased balancing neutrality costs (08/09 residual balancing costs ~ -£40M)

Compressor usage changes (impacting reliability, shrinkage costs etc)

- Increased shrinkage costs (08/09 shrinkage costs ~ £150M)

National Grid NTS may be unable to deliver the level of service that the industry is accustomed to

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Flexibility Management

If flexibility issues arise how might we manage them?

- Changes to the commercial arrangements
- Operational strategies & tools
- New asset build

Several years leadtime for construction and / or new IT systems

'Wait and see' approach risks degradation to current level of service to customers

Prudent to start investigatory work now with a view to predicting future service requirement

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Current Constraint Management Tools

Operational event	System Management Tools Available
Entry capacity constraint	Scale back interruptible capacity Buyback firm capacity Forwards/options contracts OCM locational balancing action Terminal Flow Advice (TFA)
Gas gas quality excursion	Terminal Flow Advice (TFA)
Exit capacity constraint (Pre 2012)	Interruption OCM locational balancing action Exercise bilateral contracts Constrained LNG Reject OPNs (if NExA limits / OCS bookings exceeded)
Exit capacity constraint (post 2012)	Scaleback off peak flat capacity Forward/options contracts for flat buyback Daily NTS Exit flat buyback Daily purchase of within-day flow reductions OCM locational balancing action Constrained LNG Reject OPNs (if NExA limits / OCS bookings exceeded)

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Timescales

Short term - develop understanding

- Establish indicators
- Develop monitoring tools
- Establish service level definition
- Information provision to industry
- Analysis of potential impacts

Then, if warranted:

Medium term - put in place management tools / funding for operational risks

- Operational / Commercial tools
- UNC / licence changes

Long term – develop network to deliver required service level

- Revised network build assumptions
- Funding for flexibility

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What trends may signal a need for change?

- Increasing frequency / costs of using system management tools
  - Residual balancing actions
    - opposing actions within day
    - more physical / locational actions to deal with supply/demand mismatch constraints
  - Capacity tools
- Increase in magnitude and frequency of within day linepack changes
  - Correlations to residual balancing actions
  - Nationally & zonally
- Increased volatility in NTS entry and exit flows
- Any others?

At what points do these trends reveal issues that require industry change?

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Potential Entry & Exit Indicators: NG NTS' thoughts

NTS Entry

- Hourly flows by supply type: LNG, other beach, storage, interconnectors
- Entry renominations: frequency, magnitude, timing
- Capacity buybacks: volume, frequency, cost, timing
- Forwards / options capacity contracts: number, frequency of exercise

NTS Exit

- Aggregated hourly flows by offtake group: CCGTs, industrials, DNs, storage, interconnectors
- Accuracy of OPNs / frequency of rejection

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Potential ‘Within System’ Indicators: NG NTS’ views

Hourly zonal linepack data

Variability of predicted closing linepack

Residual balancing actions: volume, frequency, cost, timing

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What timescales should be monitored?

How far back?

How far forward?

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Summary

Uncertainty exists regarding the ability of the NTS to respond appropriately to potential future flow patterns

Potential for increased costs to balance and manage the system

If customer requirements for flexibility exceed NTS capability, a significant leadtime is likely to be needed for NTS to provide

Proactive monitoring now should help to:

- Quantify concerns about the future
- Enable timely solutions to be implemented, if necessary

Industry views being sought

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Way forward

From today until 8th July: open to feedback and ideas from this meeting

From today until 31st July: open to bilateral or group meetings

August: Formulate our short / medium / long term plans

September: Present our proposals to industry (either at Transmission Workstream or separate workshop)

Separate Ofgem consultation expected

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