Half Hour Gate Closure

Issues & Possible Straw Man Solutions

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Half Hour Gate Closure

- National Grid is starting to look at what system operation and the wider market place looks like in 2015 to 2030
- High wind penetration, and changing generation sources, make it prudent to consider spectrum of ideas including, but not limited to, HHGC or even redefining concept of Gate Closure altogether
- However these changes need to be considered in the context of their impact on
  - system operation (The ability of the System Operator to manage the system efficiently and economically)
  - Change proposals being progressed in other code forum (Access Review)
  - Appropriate Incentives to balance
- Need to make sure the building blocks are in place before we consider a move to half hour gate closure

HHGC Building Blocks – What We Need to Get right

- **Resolve Limitations of Plant Dynamic Capability**
  - Plant Synchronisation
    - All BMU, even those warmed under a BMSU contract have NDZ > 60 minutes
    - PGBT not seen as transparent by market, Reduced flexibility means not seen as the most attractive option to the SO in most circumstances
  - Pant De-Synchronisations/ Cancelled synchronisations
    - How fast can plant be desynchronised. HHGC means FPN only go firm at 30 minutes notice. The greater penetration of Wind means that constraints are likely to materialise closer to real time.

- **Need comfort that we have the Ability to Optimise/Secure the System**
  - Current Plant Dynamics and SO transmission Optimisation have a time constraint.
  - Although Initial transmission assessments done prior to Gate Closure movement in PN closer to real time require revisions to be assessed. Current SO systems mean that this takes time. Risk that time to identify and resolve constraints coupled with time to deload, de-synchronise plant causes SO to run non firm.
  - System security and health and safety Implications

HHGC Building Blocks – What We Need to Get right

- **Do we get the right information from the market**
  - HHGC leads SO to act in much reduced timeframe. Information from market becomes critical, (both content and accuracy)
    - NDZ – currently BMU do not conform to NDZ for self dispatch – Do we need to look at this
    - SO gets no prior notice of intention to desynchronise – do we need to look at this

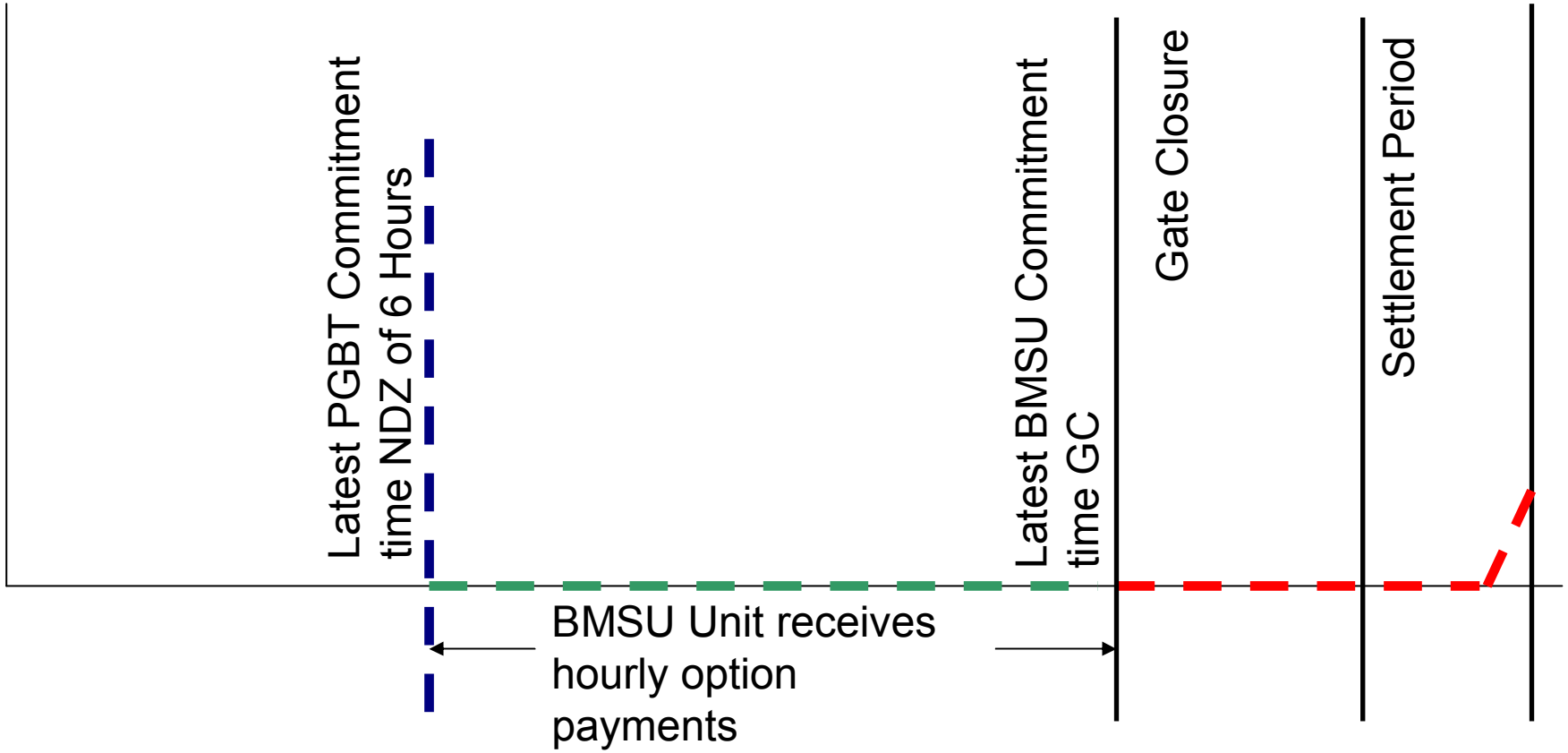
Resolve Limitations of Plant Dynamic Capability

01/04/07 to 01/04/08	BM Start Up Contracts (Capacity MWh)		
Catergory	Total Capacity Created	Avg Capacity Created MWh	Number of Events
Synchronised By SO	757,911	2,021	375
Cancelled By SO	407,995	5,804	198
Contract Aborted for Self Synchronisation	66,891	1,760	38
01/04/08 to 26/10/08			
Catergory	Total Capacity Created	Avg Capacity Created MWh	Number of Events
Synchronised By SO	1,985,143	2,068	960
Cancelled By SO	968,139	6,106	440
Contract Aborted for Self Synchronisation	431,280	1,782	242

- Vast majority of pre gate unit specific commitment decisions made through BM Stat Up Contracts
- Why Not PGBT ?
  - PGBT Unit commitment decisions made much earlier in the timeline
  - commitment made on less accurate information – less optimal decision
  - BMSU – able to utilise BM price submission system greater information and more competitive pricing

PGBT and BMSU Unit Commitment Flexibility

BMU has NDZ of 6 Hours → BMSU → NDZ of 89 mins



BMSU can only function if units can provide revised NDZ less than GC and SP time (< 60 minutes under HHGC)

Dynamic Capability - Straw Men Solutions

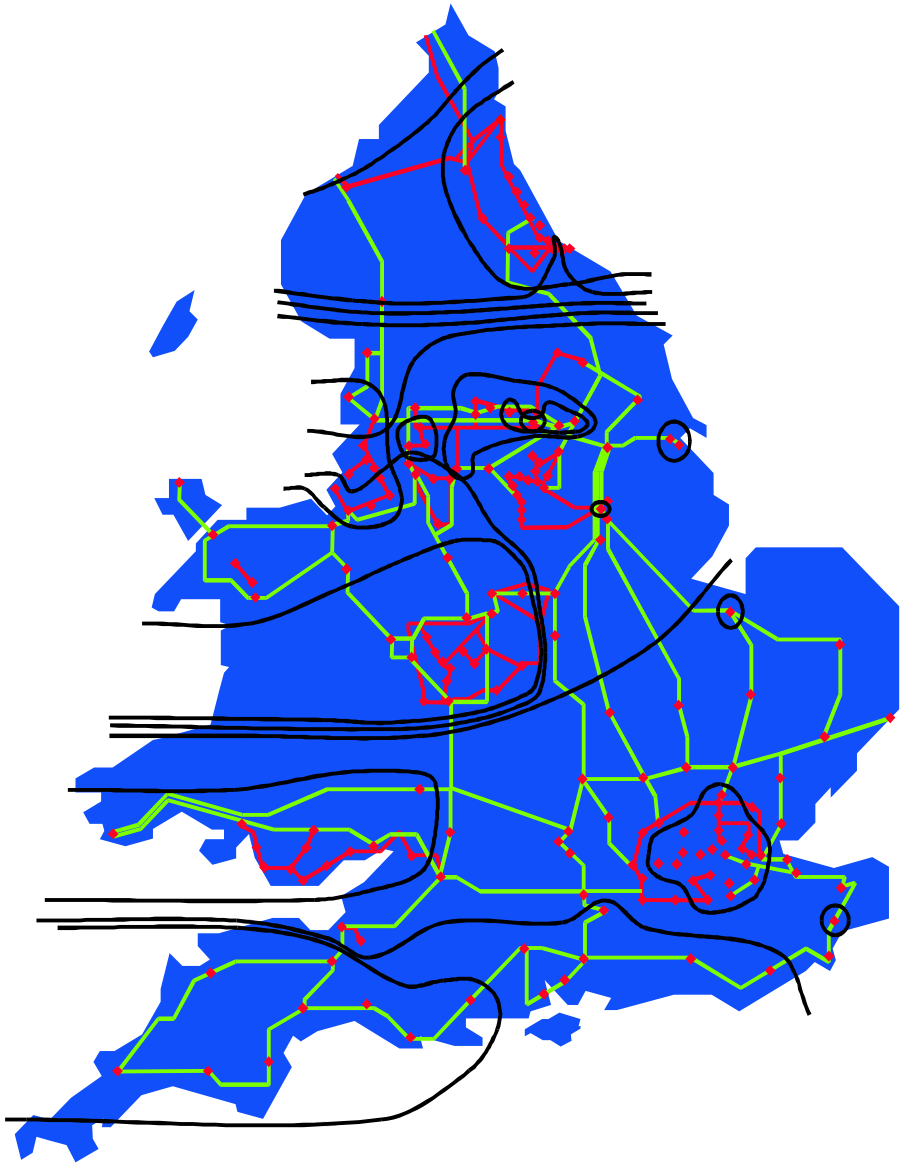
- Option 1 – Utilise PGBT for all issues
  - Potential to develop Market/Tender process (Effectively create a parallel Balancing Mechanism – Is this efficient)
  - Current Procurement framework not attractive to industry
  - Earlier Unit Commitment makes it less efficient than BMSU nad will increase SO costs.

- Option 2 – Revise the Concept of Gate Closure
  - SO can issue bids and Offers on units prior to gate closure
  - The PN, Dynamic parameters and price submissions become firm at the point of instruction for the duration of the instruction
  - In the example of Synchronisations the PN, Dynamic parameters and price submissions are firm for the minimum non zero time (MNZT)
  - PN on BMU not instructed are free to revise data up to Gate Closure in line with their Grid Code obligations
  - Able to utilise existing data submission system
  - Greater Transparency of Pricing Information

Ability to Optimise/Secure the System

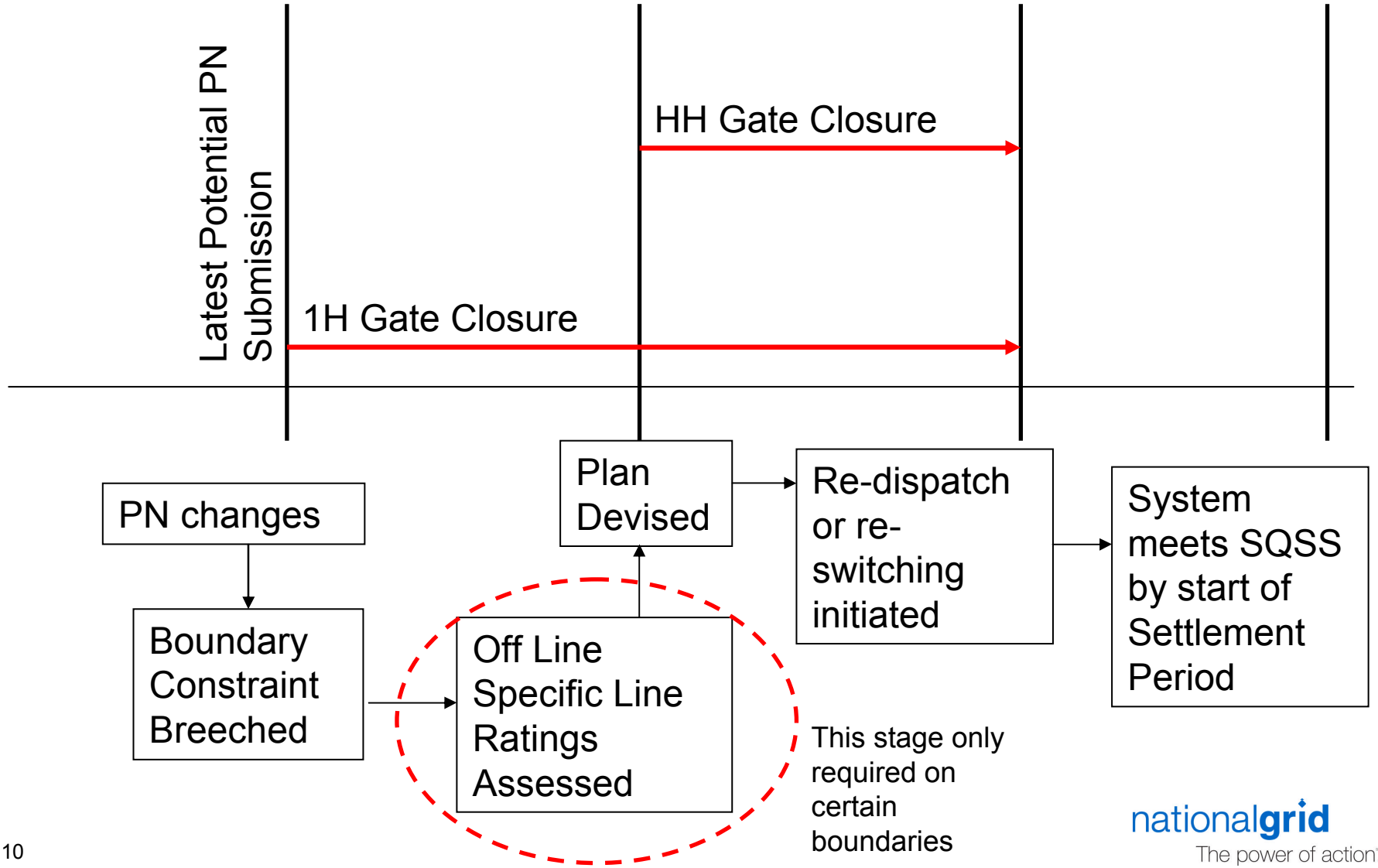
- SQSS states
- For the Loss of…
  - A single circuit cable or Overhead Line
  - A double circuit overhead line
  - A section busbar or mesh corner
  - A super grid transformer
  - A reactive compensator
  - The most onerous single system infeed
- There shall not be…
  - A loss of supply
  - A permanent change in frequency below 49.5Hz
  - Unacceptable high or low voltage conditions
  - System instability
  - Unacceptable overloading of the transmission system

Typical System Constraints



- 20-25 limits typically active on any day
- Constraints will vary with generation patterns and transmission circuit outages
- Potential access reform and increase in wind penetration likely to significantly increase this number

Gate Closure Constraint Management Assessment



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Ability to Optimise/Secure the System

- Potential Issues
  - Large change in PN behind a constraint boundary close to gate closure.
  - Plant with insufficient dynamic parameters to respond in shortened required GC timeframe
  - Number of constraints to manage due to increased wind penetration and potential access reform likely to increase significantly.
  - Reduced lead time to assess and revise transmission system arrangements
- This will lead to Increasing and compounded complexity of System Operation
- Need to develop new business and operational processes to manage against breeching SQSS

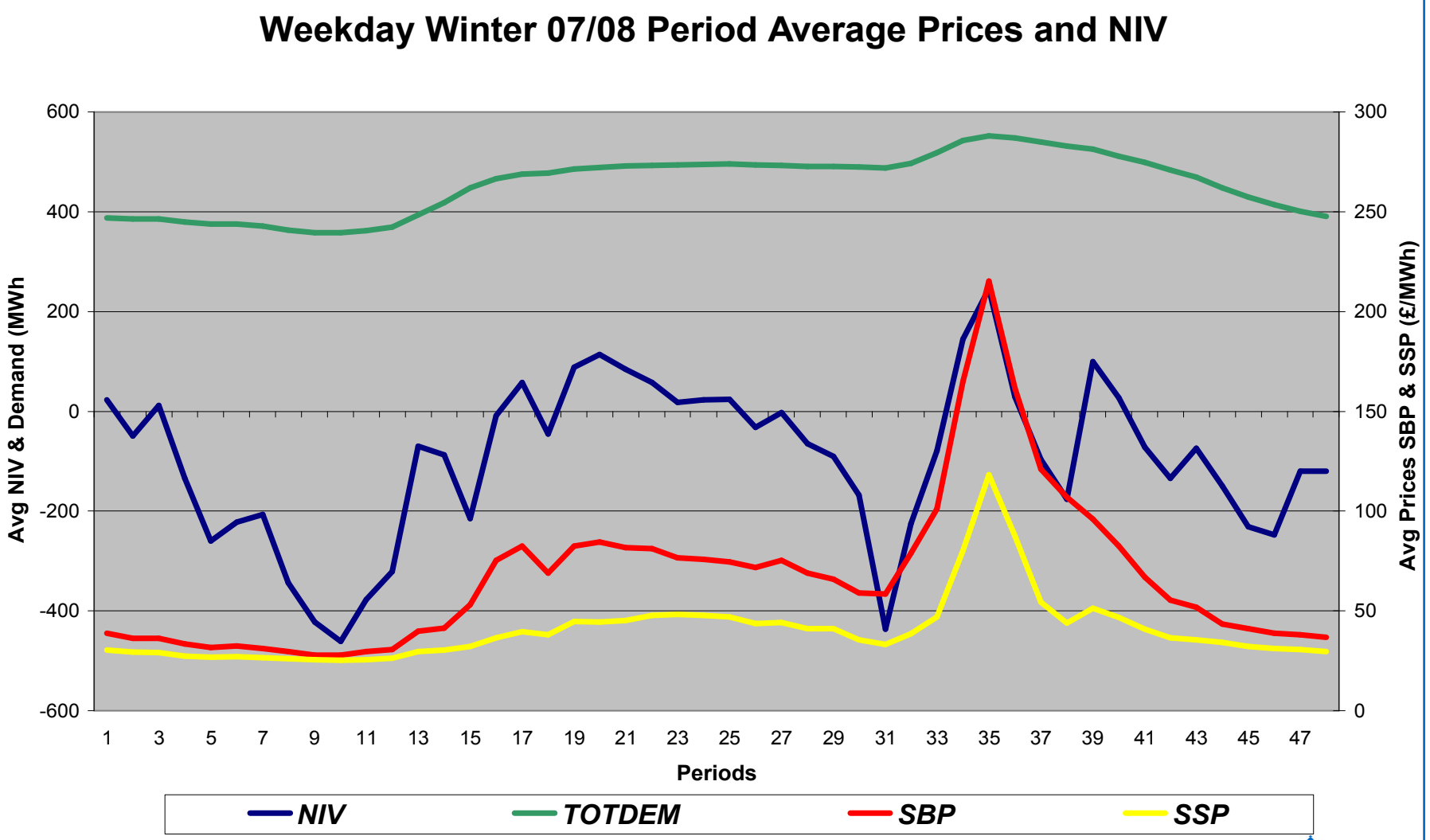
Ability to Optimise/Secure the System - Straw Men Solutions

- The System Operator will look to manage the increase risk associated with HHGC.
  - Move to a position of pre-emption rather than substitution
  - In scenarios where concern over replacing plant - may look to purchase capacity pre event
  - Look to secure system more fully pre gate closure
  - Carry less uncertainty into the BM
  - Secure again less accurate information – sub optimal decisions
  - Introduction of a new SO control system to improve constraint management assessment times (Likely to be addressed as part of BM replacement)
- These actions likely to have considerable cost implications
- PN synchronisations can occur at very short notice
  - Notice to synchronise (NDZ) – Obligation could be extended to self dispatch plant
  - Would provide greater predictability of plant self dispatch

Incentive and Opportunity to Balance

- Need to make sure that HHGC will deliver improvement
- HHGC may afford some BSC parties the opportunity to balance closer to real time
  - Dependant on availability of plant with dynamic capability to accommodate trades
- However is incentive there under the current arrangements
  - The proposed benefits of GC suggest that BSC parties will improve the level of balance within their energy contractual positions
  - In a world where the System Operator needs to take on a greater share of balancing the system important that incentive to balance is correct.
- Experience of current market would suggest that the incentive may not be encouraging parties to balance appropriately

Examples of NIV Behaviour



Initial Thoughts

- Half Hour Gate Closure (HHGC) – Starts to impinge on System Operators ability to manage the System
  - Introduces greater level of risk and complexity with dispatch of BOA and ancillary service utilisation
  - Coincidental to a time when SO is starting to experience a number of issues with Intermittent and embedded generation and conscious of potential access reform
- Moving to HHGC requires a substantial review of how the system is balanced.- Need to sort out the building blocks first
- Need to consider whether Grid Code Generator obligations are still sufficient under such a scenario
- Need to understand whether the current Cash Out arrangements are appropriate for HHGC
- Need to make sure that this is the best way forward
  - Cost is worth the perceived gain ?

Appendix – Requested Information

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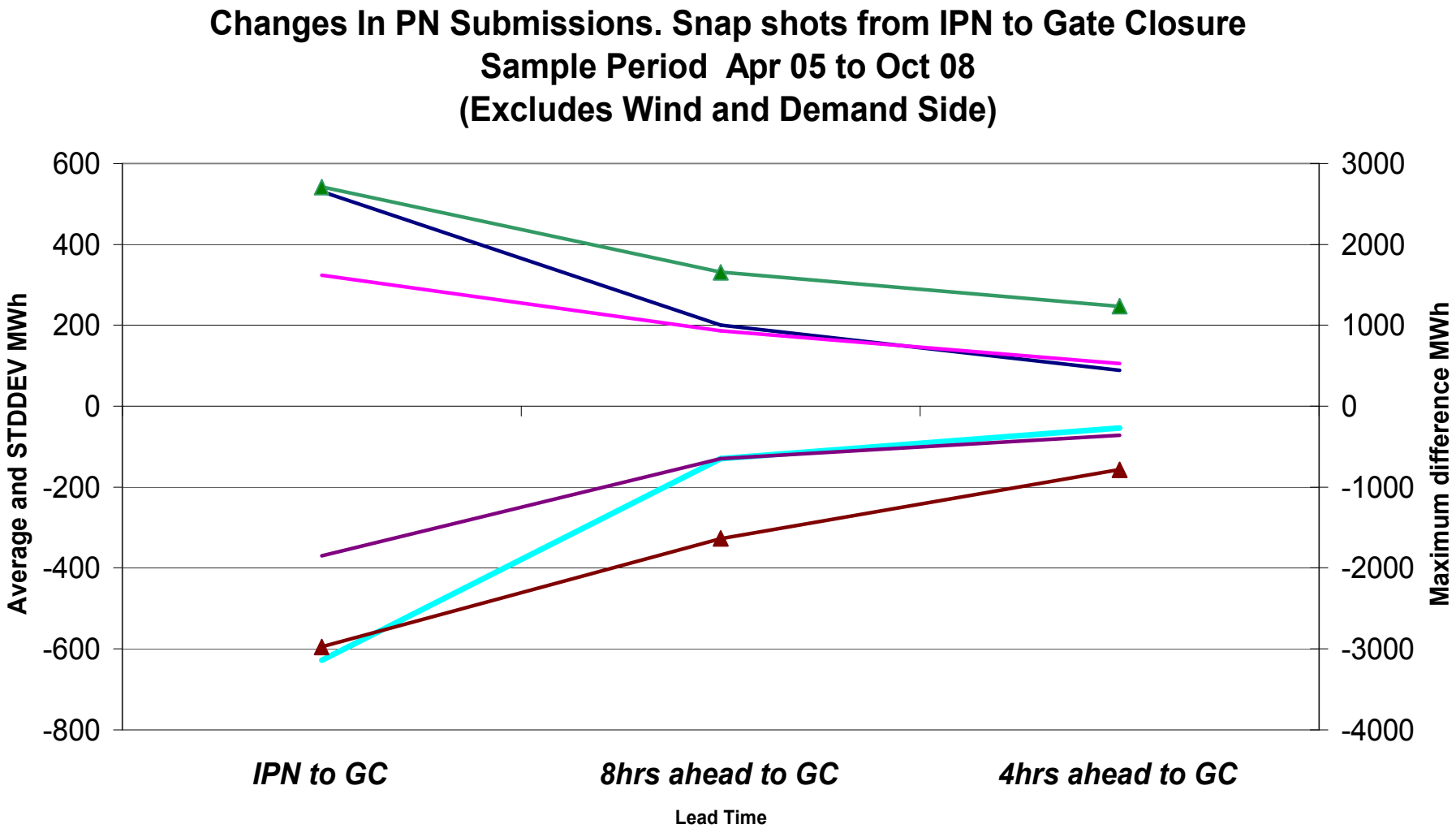
Current PN Submission Behaviour



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How Important is Accurate PN information to the SO

- PN Information Is Utilised by the System Operator for a number of issues
- Used in Aggregate to determine the likely level of Demand Supply imbalance
  - This in turn drives SO strategies, such as unit commitment decisions and forward contracting. Uncertainty leads to sub optimal decision making and costs for the end consumer
- The aggregated PN position is utilised by participants to assess market characteristics – Long or Short – length of market
- BOA dispatched from FPN positions. If PN do not represent intended physical output of units dispatch of Bids and Offers start to become meaningless

How Important is Accurate PN information to the SO

- Used on a BMU specific basis to determine potential congestion management issues that need to be resolved.
  - Without accurate FPN it is not possible to generate accurate system assessments and identify whether constraints are active.
    - PN required to identify circuit specific load flows
  - Without accurate PN data may not be able to identify active constraints until the MW are actually flowing
  - May be too late to take pre fault actions. Effectively the system runs “Non Firm”
    - System Security Implications
    - Health and Safety Implications

Plant Loss & BOA Lead Time statistics

- Between 1st April 05 and 20th Oct 08 there were 631 Incidence of Plant loss
- The average size of loss was approximately 390 MW of Load
- The Standard Deviation of this loss was approximately 180 MW
- Plant loss does not account for all the difference between Gate Closure position and real time. Other factors include
  - Demand Forecast Error
  - Supply side shortfall
- These losses can occur in the same half hour as was demonstrated by the Incident on the 27th of May 2008
- Average lead time for a BOA instruction is 17 minutes (Standard Deviation = 19 minutes)