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Capacity Market procurement under future uncertainty



19 January 2017

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Capacity Market Uncertainty – Overview

- Why was a Capacity Market needed?
- What has happened since that decision?
- International Reliability Standards
- Reliability Standard Comparison
- How is uncertainty covered in modelling?
- Capacity Procurement - Decision Tools
- Current outcomes?

Not a view on Capacity Market design or operation!

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Why was a Capacity Market needed?

- Wholesale revenue streams weren't providing enough i.e. "missing money"
- Ancillary services prices were competitive
- CCGTs were "out of the money" and starting to close
- Coal was "in the money" but stations are old and with increasing CPS payments would result in closure by early to mid 2020s
- Nuclear plants are ageing with closure dates by mid 2020s
- Changing generation mix with more intermittent plant and thus a requirement for more backup plant but with lower load factors
- Growth in supported renewables putting downward pressure on wholesale prices
- Growth in ancillary service revenue slow due to greater competition
- No new CCGTs coming forward due to lack of market signals

Conclusion – real uncertainty and hence Security of Supply concerns

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What has happened since?

- Electricity Market Reform (EMR) introduced
  - Supporting renewables (CfD) & thermal plant (CM)
  - Reliability Standard set by Govt.
  - 1 Round of CfD (plus RO and FiTs) and CM auctions covering 17/18, 18/19, 19/20 & 20/21
  - Auctions brought forward small scale generators & DSR but limited new CCGT
- Oil prices plummeted followed by gas
- CCGTs (more efficient) became “in the money” and coal “out of the money”
- Interconnector developments move forward supported by Cap & Floor regime
- Thermal plant (old CCGT & coal) closed earlier then expected requiring Contingence Balancing Reserve (CBR) to fill the gap from 14/15 to 16/17
- Increasing requirement for ancillary services
- Nature of system operation changing with increasing emphasis on off peak periods e.g. low demands high renewable output

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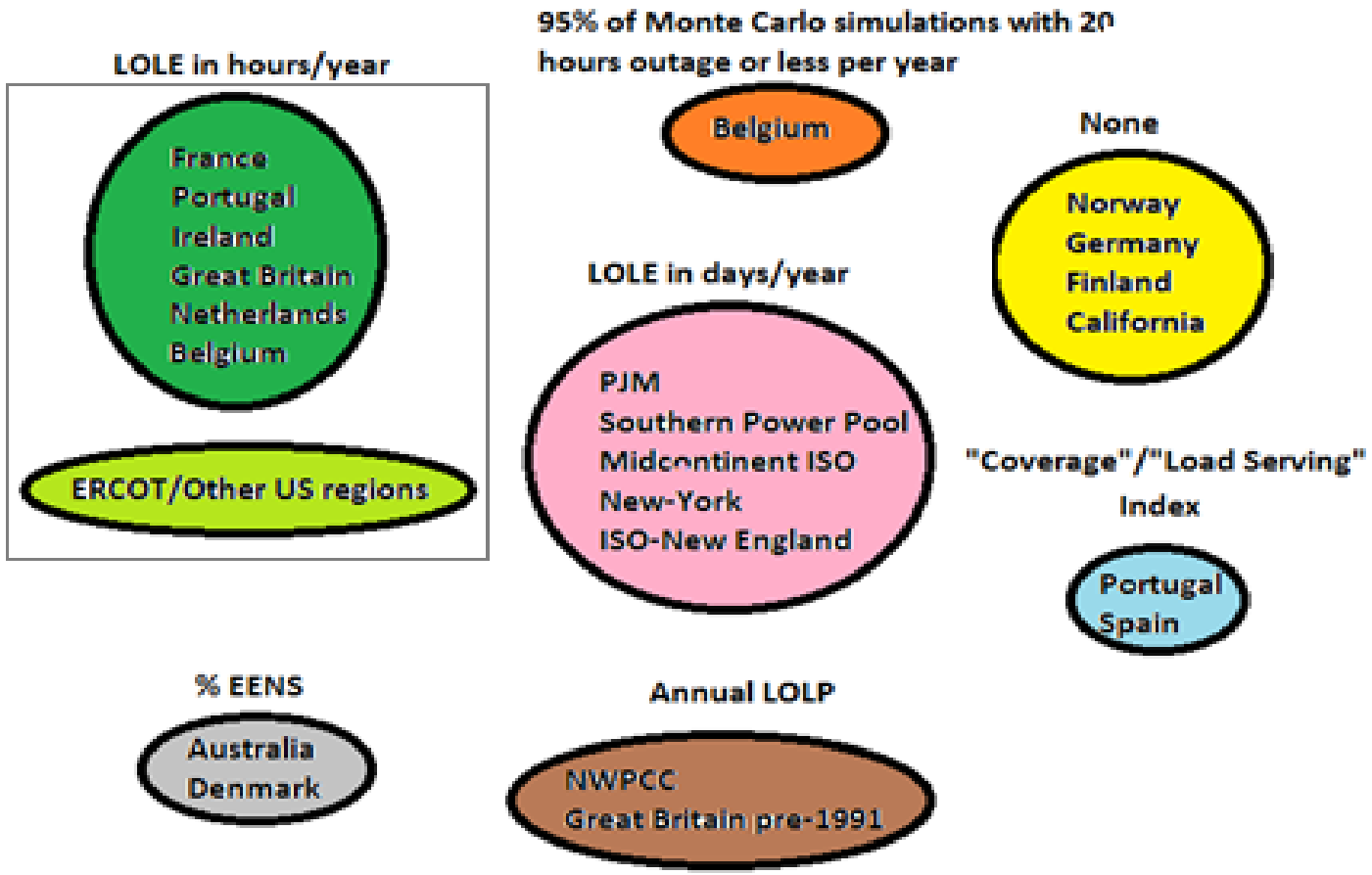
International Reliability Standards

- In Q3 2016 National Grid undertook a survey of standards and how they are implemented around the world
- We found that even the same standard can be implemented in different ways



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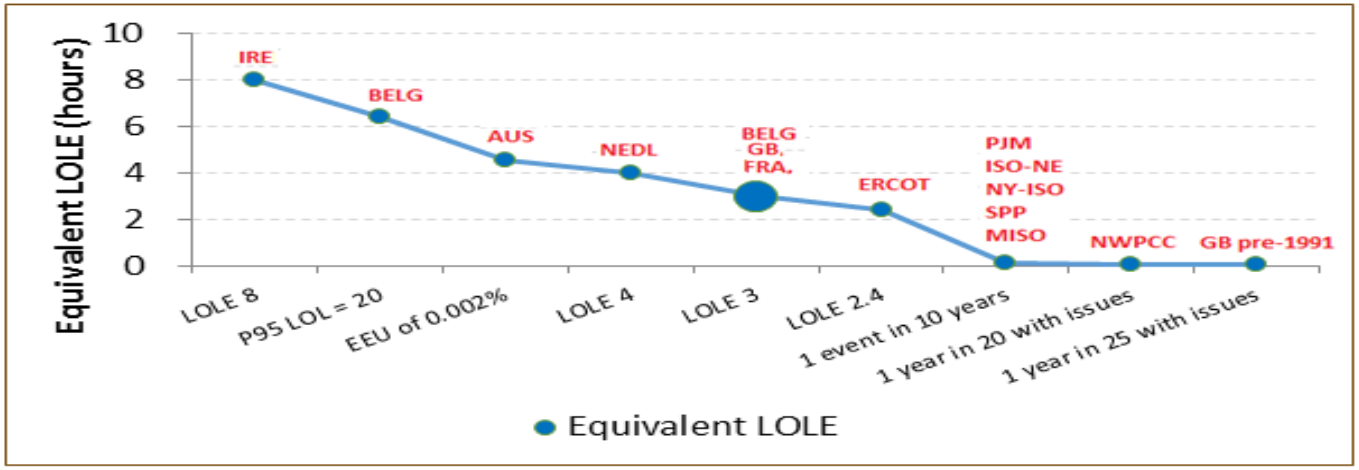
Reliability Standard Comparison

- Standard set at 3 hours LoLE based on “value for money” relationship between CONE & VoLL
- Surprisingly GB is the only country with a standard explicitly derived from a direct capacity/unreliability economic trade-off
- GB standard is roughly in the middle of an international comparison



- However, “actual” or present state capacity margins for most countries are well in excess of their standard as that is seen as a lower bound as opposed to a target when compared to GB

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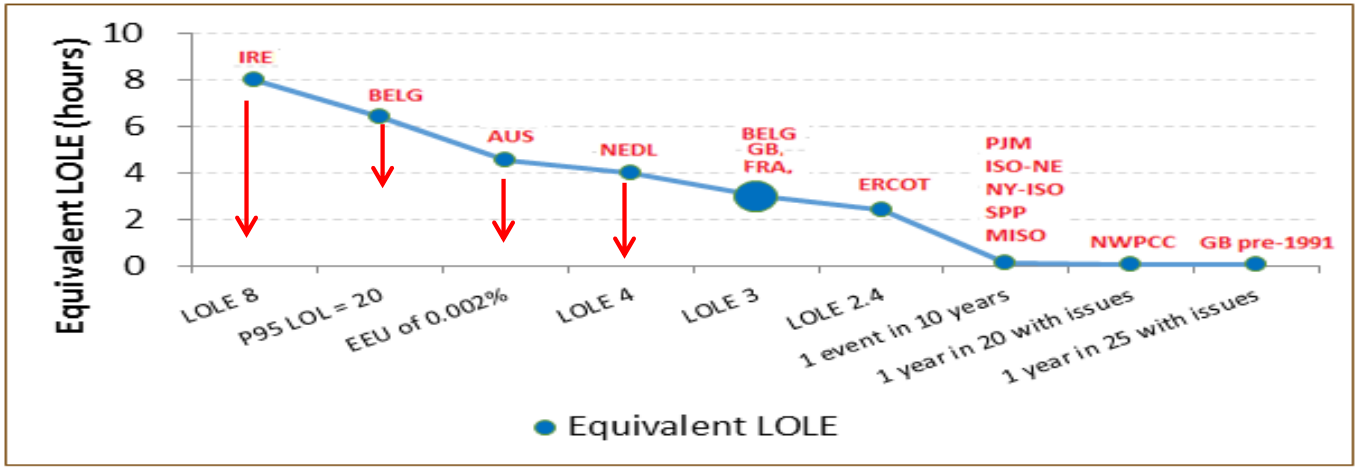

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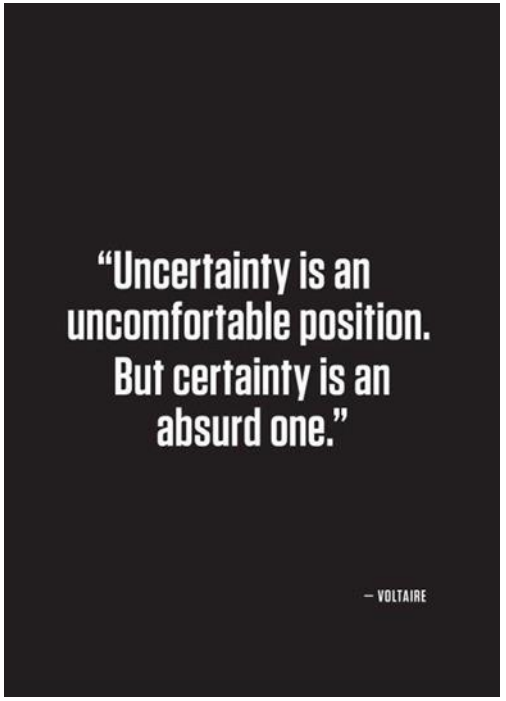
How is uncertainty covered in modelling?



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How is uncertainty covered in modelling?

- Probabilistic modelling based on a demand and generation scenario doesn't address uncertainty around that scenario
- The future levels of demand and the generation mix are hugely uncertain and consequently need to be addressed
- Virtually all countries do this by running a range of alternative scenarios or sensitivities
  - Such sensitivities incorporate demand, wind, non-delivery & outage rates, weather or combinations thereof
  - Although a number of countries use a deterministic approach to incorporating wind and interconnectors
- How do countries decide what capacity to procure?
- Most countries present the range of required capacities from the scenarios & sensitivities modelled to a panel or Govt. or Regulator who then decide subjectively what to procure
- GB is the only country to use a formal decision tool/algorithm

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Capacity Procurement - Decision Tools

- GB's decision tool utilises an approach known as "Least Worst Regret" and aims to remove subjectivity from the decision (but does it?)
  - Currently all scenarios and sensitivities included in the LWR are assumed to have equal probability of occurring
  - This assumption has been challenged and we are currently investigating (with the help of our academic consultants) if there is a way of applying weightings without introducing additional subjectivity
  - Although the calculation of LWR is non-subjective the decision to include which scenarios and sensitivities is
  - In addition the result is really dependent on the sensitivities at the end of the range with all the other scenarios and sensitivities simply providing granularity for the answer
- The LWR tool calculates National Grid's recommendation which is then subject to Government review and potential adjustment. These adjustments relate to capacity to be held back for future auctions (T-1), any market developments since the modelling was undertaken and uncertainty around assumed Non-CM capacity growth

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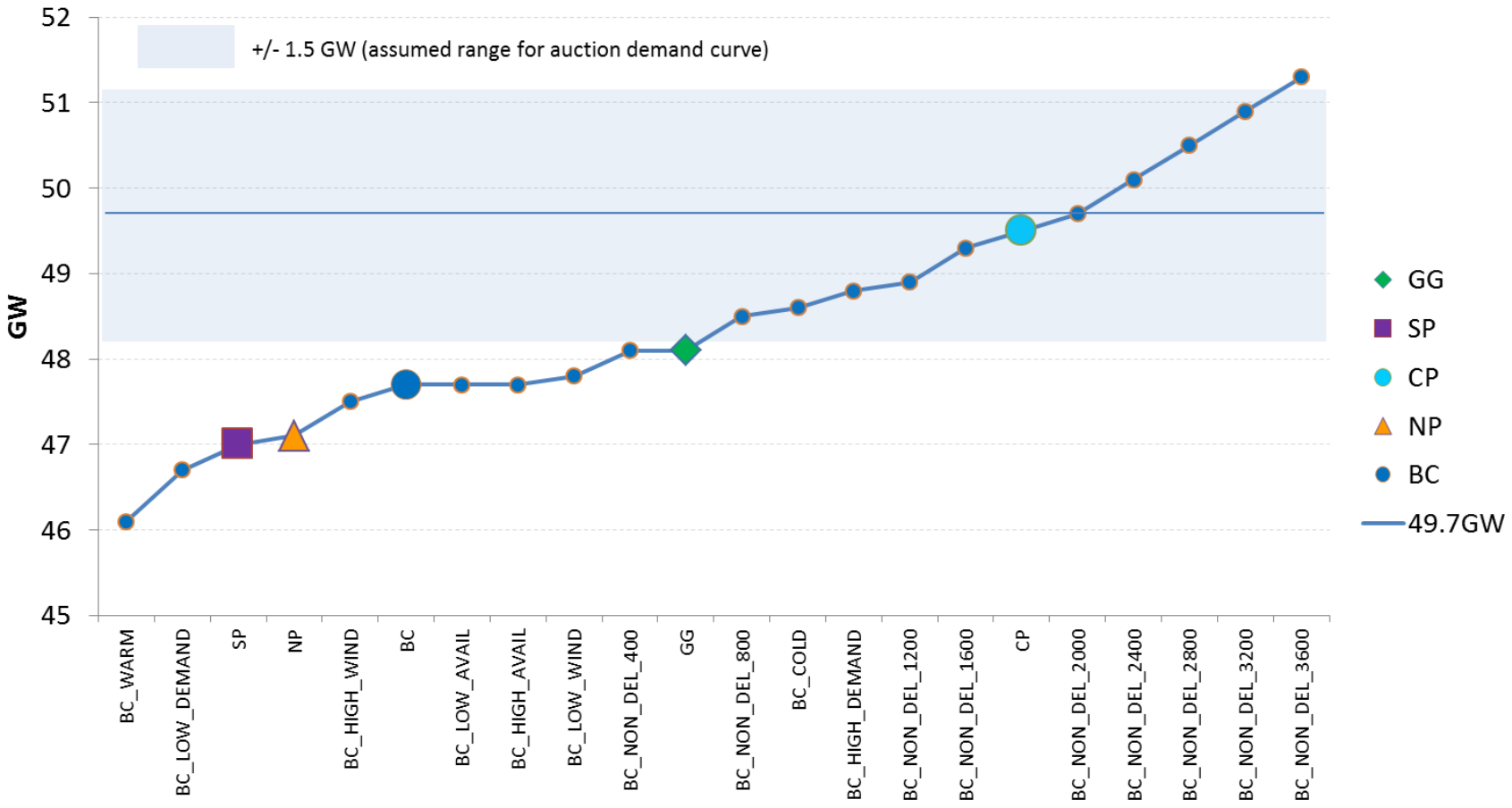
2020/21 – LWR Decision from Range



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Current outcomes

- Capacity Market auctions have cleared at lower than expected prices (£19.4, £18.0 & £22.5/kW)
- New build generation has been dominated by small scale generators with now some storage but limited new CCGTs
- With low CM prices plants will need to look for more revenue from other markets e.g. wholesale & ancillary services
- Growing penetration of renewable generation will put downward pressure on wholesale prices thus putting upward pressure on CM and ancillary service prices if revenue is to be maintained for thermal plant
- Growth in interconnection will result in GB prices becoming increasingly influenced by European prices
- If the growth in small scale distributed generation continues it will become essential (if it isn't already) that the SO has visibility of their output to ensure efficient system balancing as system operability issues increase

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