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Investment Drivers and Market Reform for Electricity Storage

SMi Grid-Scale Storage Conference

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Insight in Economics™

Outline of presentation



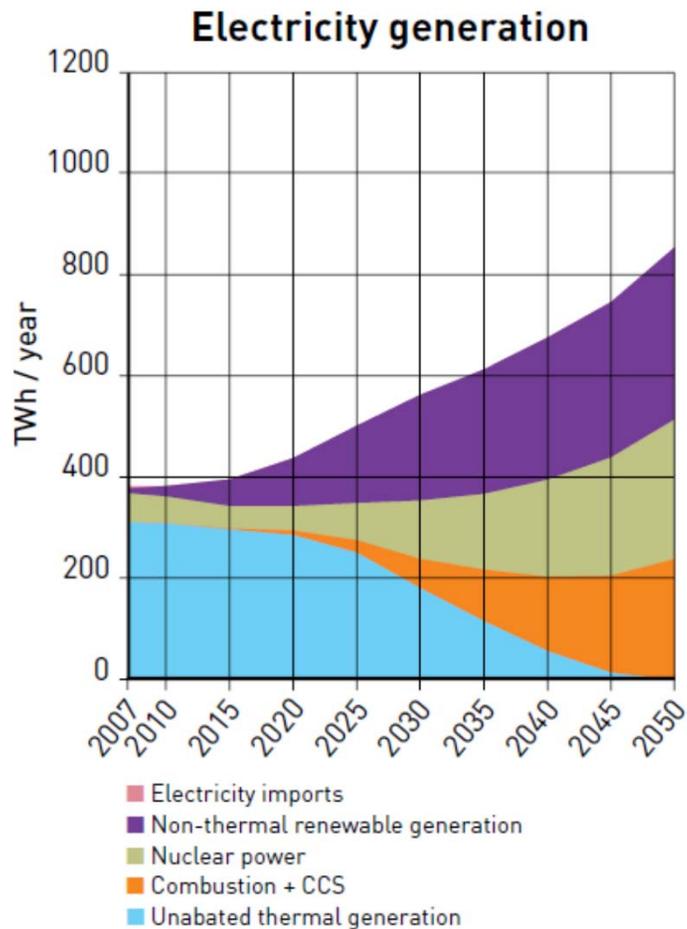
- Market fundamentals and sources of value for storage
- Key market reforms for storage
 - EMR: cash-out review
 - EMR: capacity markets
 - EU Target Model
- Conclusion



Market fundamentals and sources of value for storage

EU/UK decarbonisation targets are creating a new market context

DECC 2050 Pathways, 2010



- There will be a lot more renewables in future
 - Intermittent => more peaking plant
 - Resources located in isolated areas => major grid investment
- Creates two major policy challenges:
 - Ensuring efficient investment in peaking plant
 - Ensuring efficient investment in grids

Electric storage can help meet these challenges



- Storage provides **peaking capacity**, as an alternative to gas-fired plant or DSR
- Storage can **offset network investment**
 - Locate close to demand and reduce need for network capacity to manage peak demand
 - Long established as the model in the gas industry
 - Locate close to intermittent resources and reduce congestion costs in high wind/low demand conditions
 - Also helps increase the utilisation of intermittent resources

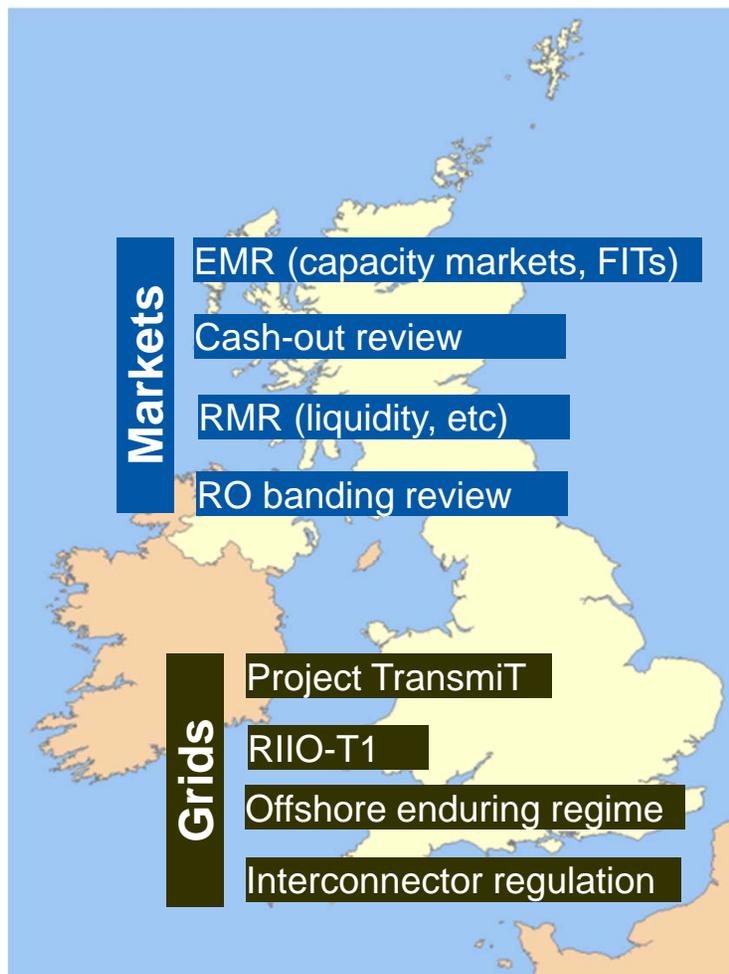
Getting the market arrangements right is key to unlocking this potential



Key market reforms for storage

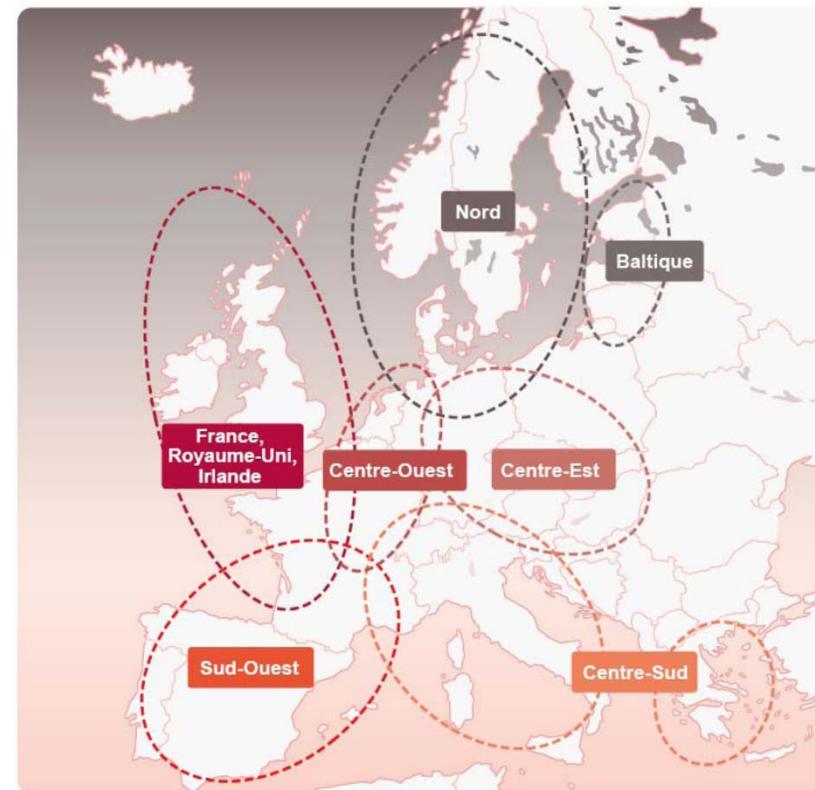
The policy and regulatory landscape is evolving fast

Multiple reforms are ongoing in the UK



... and at EU level, with the “Target Model” being the main one

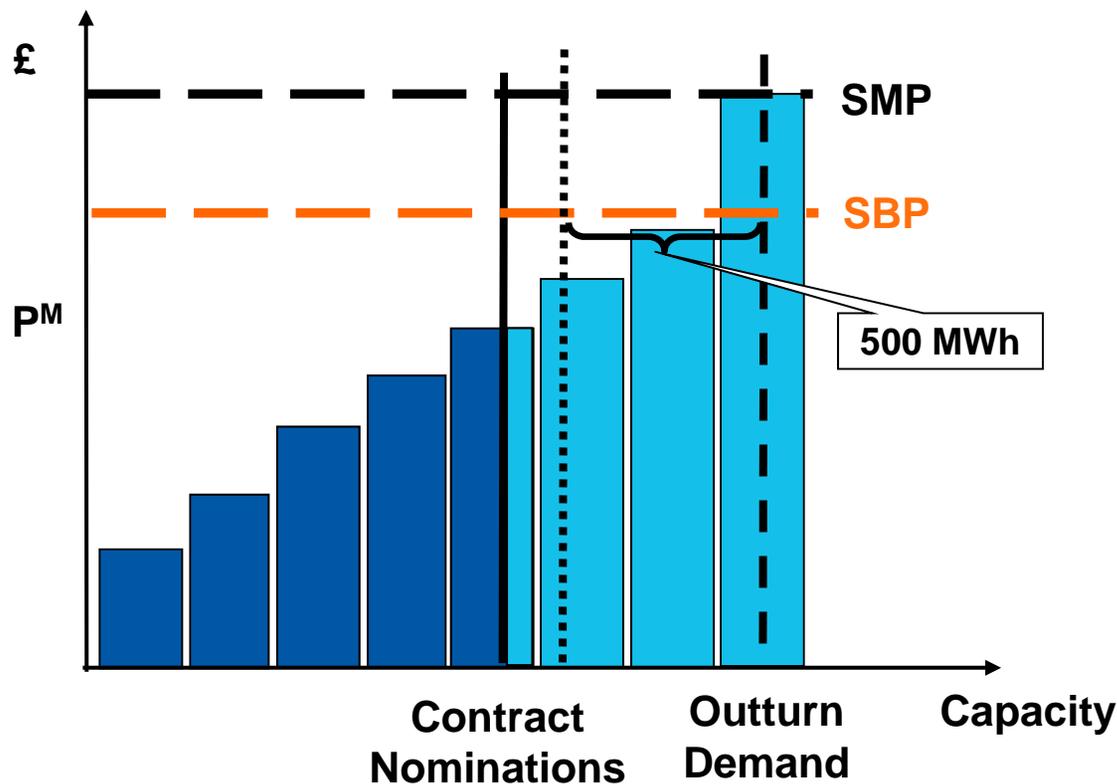
EU Regional Initiatives & CACM



Source: EDF R&D, 2010

The System Buy Price lags behind the marginal price under BETTA

Offers and Bids into BM

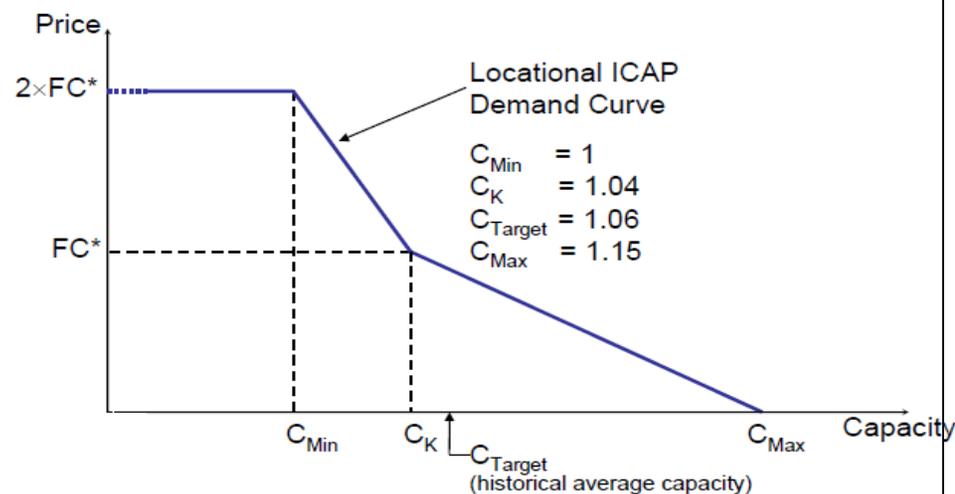


- The 500 MWh rule results in an $SBP < SMP$ (or VOLL)
- Smoothing prices at peak dilutes incentives to invest in peaking plant
- Ofgem is now aware of this problem and is consulting on change

Capacity markets substitute for peak prices but may be just as volatile

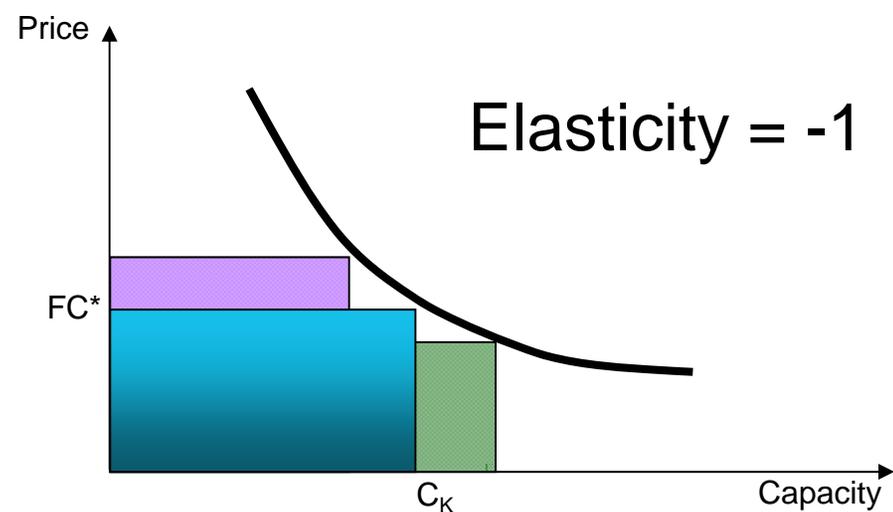
- In lieu of peak energy prices (scarcity rents), efficient CPMs must offer all generators FC^* (the fixed annual cost of peaking plant) for C_K (the optimal level of capacity)

New England, New York, PJM



Source: Crampton and Stoft, 2005

Ireland (SEM), Spain (formerly)



Fixed payment divided by actual capacity

- In both schemes, payments vary inversely with capacity
- The Irish price based CPM may offer more revenue stability than the US quantity based schemes

Capacity markets may conflict with cash-out reform

Capacity markets are attracting new interest across Europe

BE: CREG (2011) warns of shortages in generation capacity

NL: Reliability concerns since 2004; Talks between Tennet and NMA (2006) for Tennet to procure capacity, not implemented so far

SE: Strategic Reserve of peaking capacity (criticized by other members of NordPool)

IRL: Price-based CPM implemented in 2007 (currently under review)

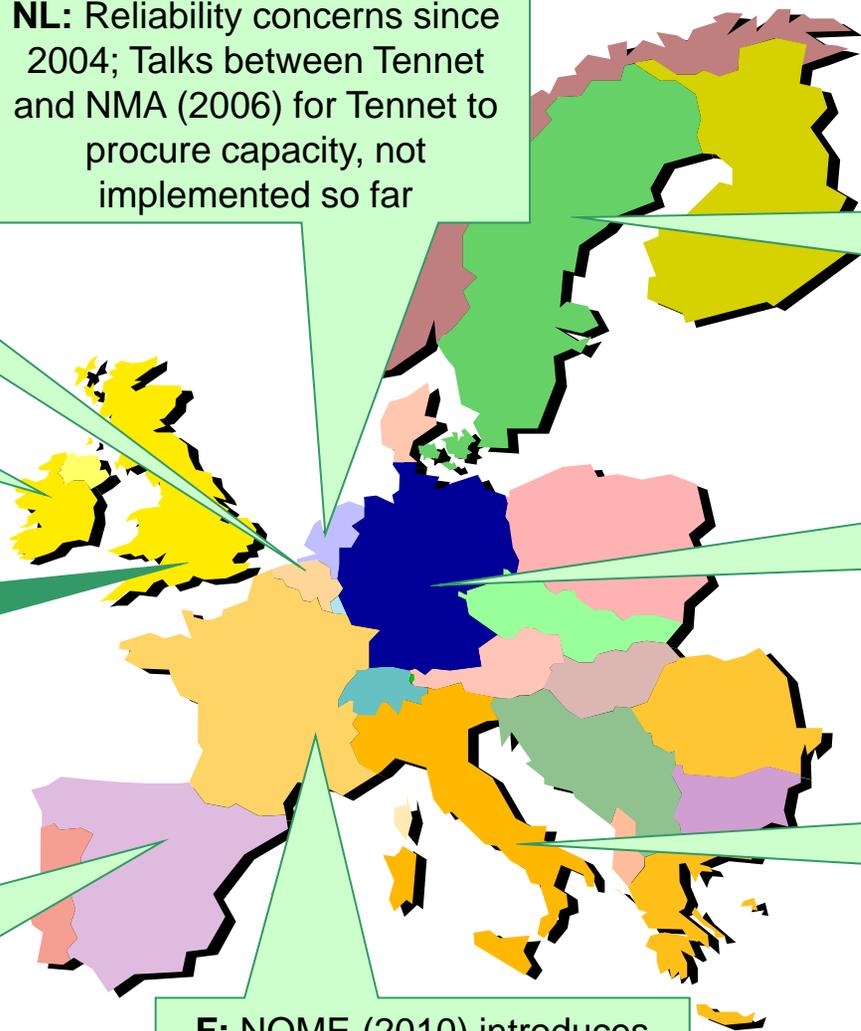
D: Nuclear phase-out has triggered a debate, but no conclusions have been reached to date

GB: EMR (2010) – Choice between Targeted and Market-wide Mechanisms

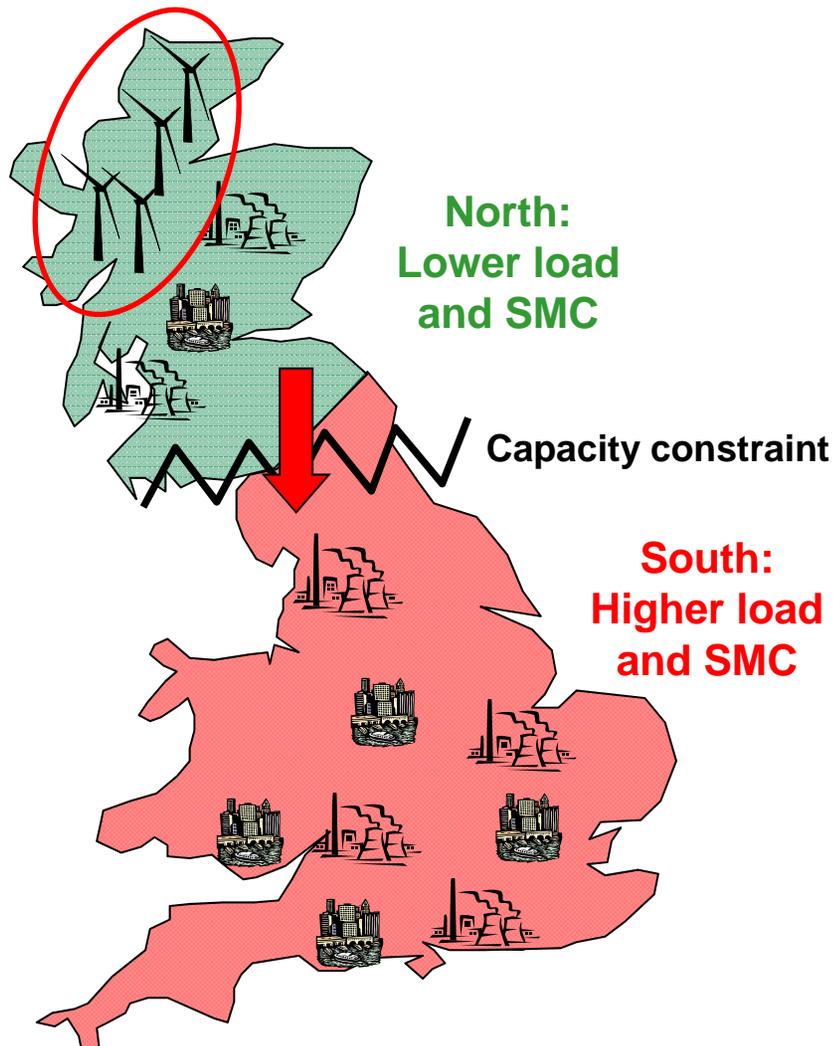
IT: AEEG published proposal for a new Capacity Obligation scheme

ES: New 'investment incentives' and 'availability incentives' (2012) for plant that contribute to 'ramping'

F: NOME (2010) introduces Capacity Obligations on suppliers (implementation talks ongoing)



The EU Target Model could bring locational energy price signals to GB



- “The CACM Network Code(s) shall provide that TSOs propose the delimitation of zones for subsequent approval by the relevant NRAs. In cases where it can be shown that there is no significant internal congestion within or between control areas, one or several control areas may constitute one zone.” Framework Guidelines on CACM, ACER, 29 July 2011
- Power flows from Scotland to E&W are becoming more constrained :
 - Oct 2009: 3.0 GWh costing £0.15m
 - Oct 2011: 52.1 GWh costing £10.21m

Source: *National Grid Monthly Balancing Reports*

Splitting markets creates new reference prices and would redistribute value (absent compensation)



Conclusion

The market is moving in the right direction for storage investors



- Market fundamentals are increasingly supportive of storage
- Market reforms are also positive
 - Cash-out review and the EU Target Model herald sharper marginal cost signals and locational pricing
 - Capacity markets offer the opportunity for more stable returns, but may conflict with other reforms
- The missing piece is the creation of transparent markets for operating reserves

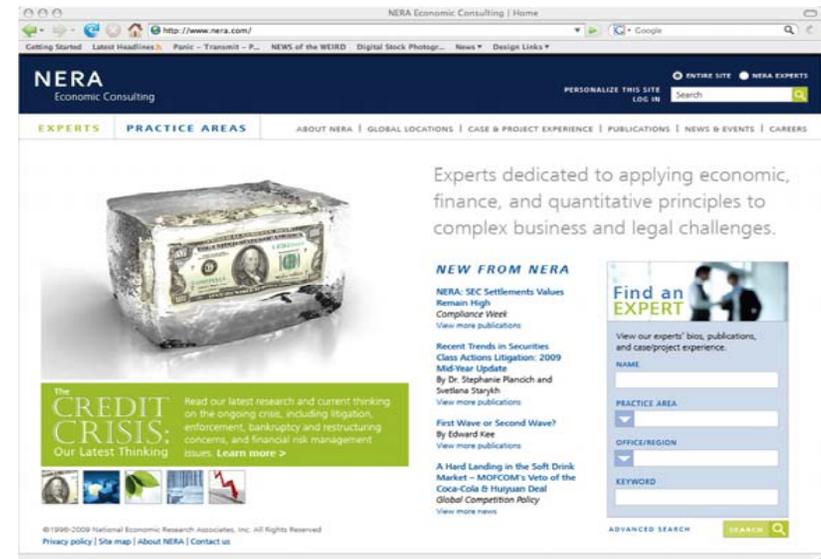
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