Flexibility in the GB Power Market

Ofgem Winter Outlook Technical Seminar

Overseas House, Thursday October 15th 2015

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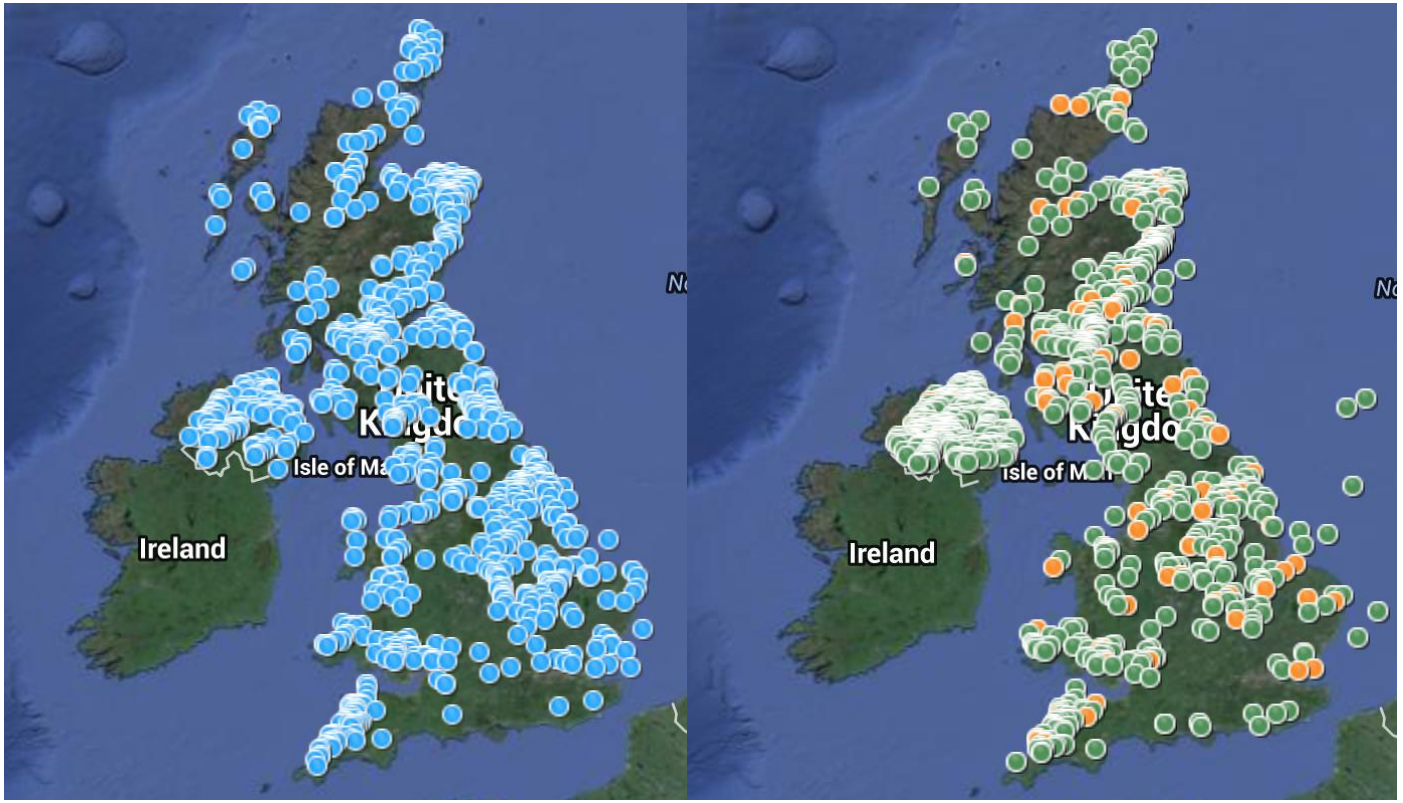
Founded in 2012, NRP works:

- With governments and utilities looking to transition to power systems with high renewables share.
- With investors in renewable energy assets, and flexible power assets.
- In European and developing economies.

Existing and planned wind power



Source: RenewableUK, October 2015

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Challenges old and new

- In the struggle to attract new investment in capacity and meet a known challenge (winter peak)
  - …We must also plan for what is coming.
  - 30 GW (at least) of wind and solar PV in the UK in 2020.

- And perhaps even turn it into an opportunity?
  - More renewable capacity was added globally than conventional in 2013 and subsequently.
  - This is everybody's problem.

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Commanding the Invisible Hand?

- A measure of command and control, once in a while, can be a good choice for the common good.

- It becomes necessary when there is an urgent need to correct for fundamental change.
  - CO_2… and a decision to support wind and PV

- In a market where intermittent output rises above minimum demand “once in a while” may be understatement.

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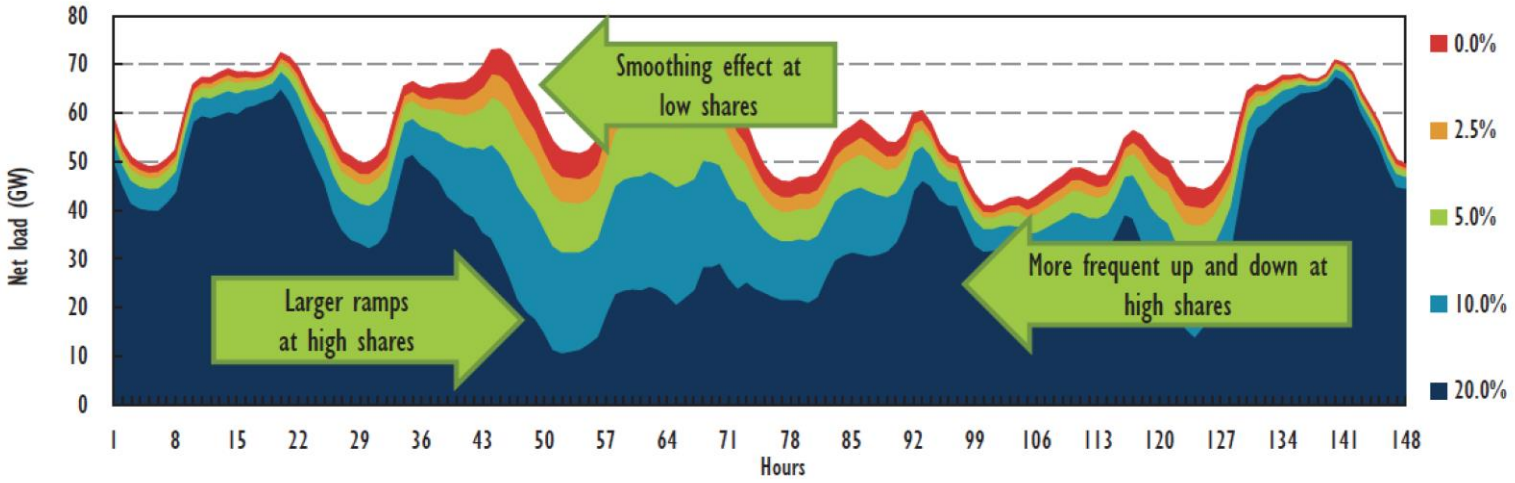
Wind and solar characteristics…

- Variability & uncertainty
  - More frequent, steeper, longer (net) load ramps up & down



- Near-zero variable cost
- Production-based support

Figure source: IEA: *The Power of Transformation: Wind, Sun and the Economics of Flexible Power Systems*

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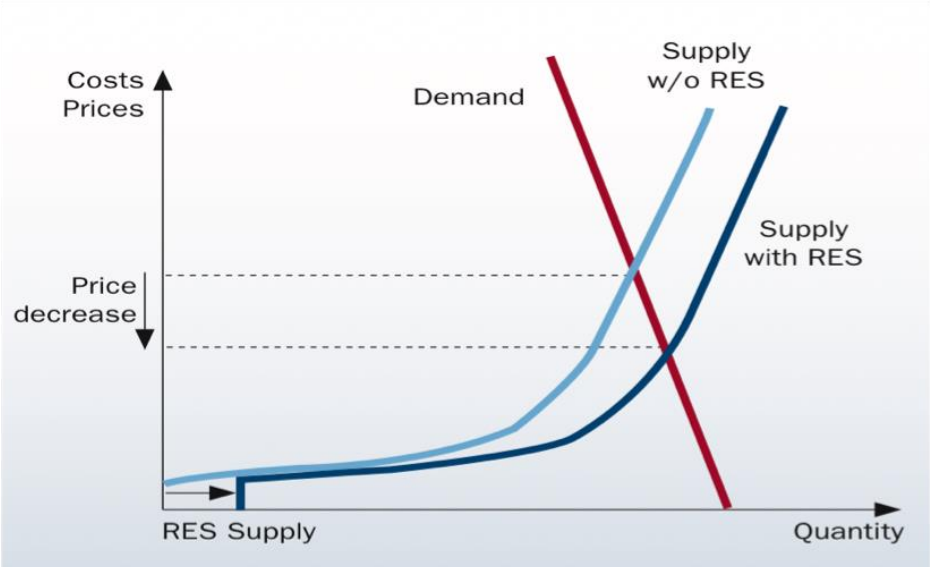
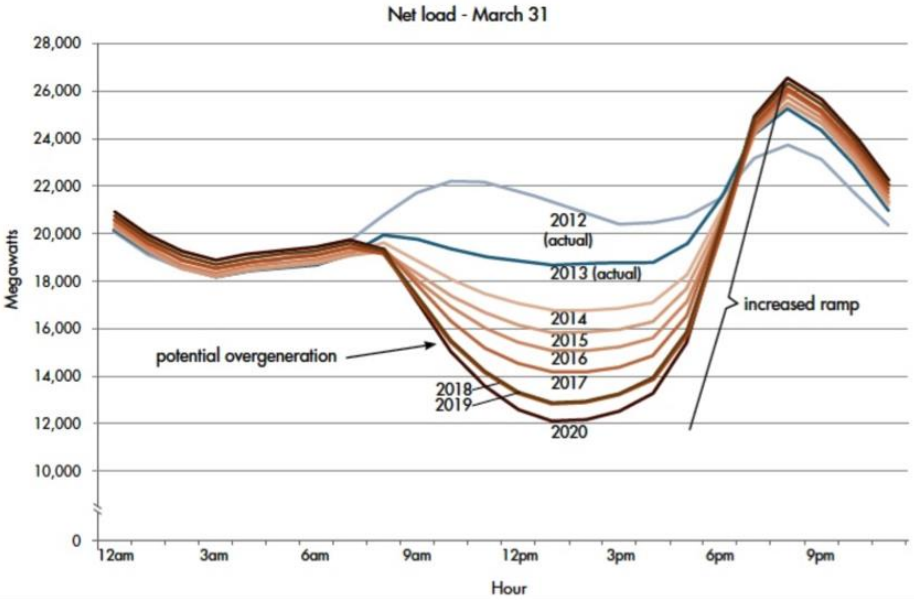
…and the consequences



The merit order effect (generic).

Source: ISPI



Changed load curve (California).

Source: CAISO

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…and the consequences

- Undermined revenue of mid-merit, flexible power plants.
  - Compounded by fuel prices
- Negative prices
  - Wind / PV offer price = SRMC - strike price
  - (…without price support, would cannibalise their own revenue)
  - If output > min demand, they become the price-setter
- A permanent feature?
  - Support will come to an end – eventually
  - Nature abhors a vacuum: new flexible resources will arise
  - In the meantime, manage (6+hours rule)

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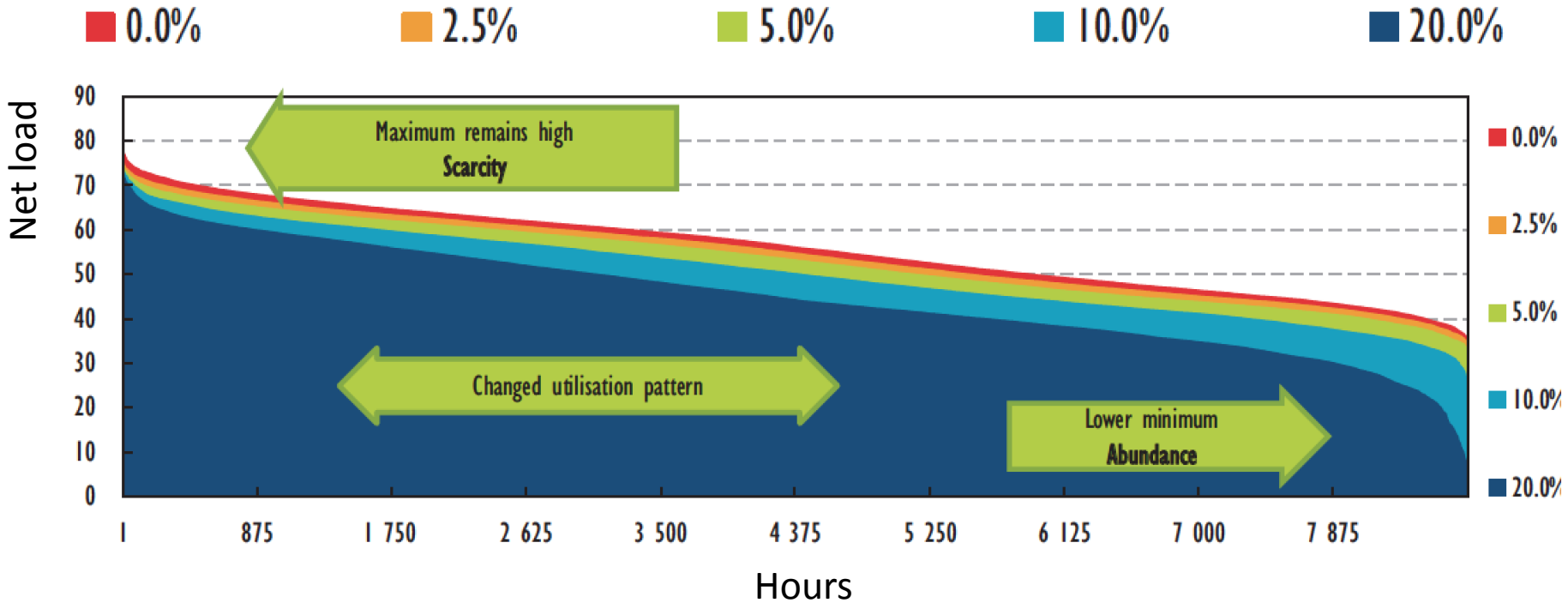
…and the consequences



Persistent challenge: dispatchable plant mix needs to evolve towards more mid-merit, peakers; fewer baseload.

Figure source: IEA: *The Power of Transformation: Wind, Sun and the Economics of Flexible Power Systems*

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So… more change is likely

- The market may need to reward flexible capacity explicitly.
  - Generation and consumption that respond quickly, ramp up and down quickly, and within a wide range.
  - Sufficiently to manage what is to come.
- Flexibility is not new.
  - Manage demand uncertainty (balancing timeframe).
  - But now we need it day-ahead against (predicted) variation in wind.
  - PX volume growing fast, but insufficient certainty for new investment.
- Enough FR may exist already or be in the pipeline.
  - Gas, DSR, interconnections, storage.
  - Interconnections: North West European Market Coupling.
  - Accessing it when it is needed is the issue.

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Change will probably carry a cost

- How much?
  - Inefficient plant mix until new equilibrium reached.
  - Compensated by a lower average wholesale price?
  - So many variables that it is difficult to model: not least the the market impact of business models which do not yet exist.

- Might the CM auction process be most expedient?
  - E.g. additional constraint in a Round 2.

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Conclusions

- Flexibility is the corollary to variability and uncertainty.
  - Flexible resources support reliability.
  - And avoid curtailment of the very plant we have chosen to foster.
- A bit more C&C may be needed to achieve it.
  - Winter stress is predictable: traditional dispatchables should manage.
  - 30+ GW VRE means we need more flexibility, faster.
  - Greater share of mid-merit and peakers, more trade, DSR, and eventually storage.
  - Value signal must reach existing flexible resources.
- Present CM auction design may not do the job.
  - But it might be “tweaked”.
- And one other thing… R&D

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