



Volatile wind and flexible demand: a balancing act?

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www.cir-strategy.com/events



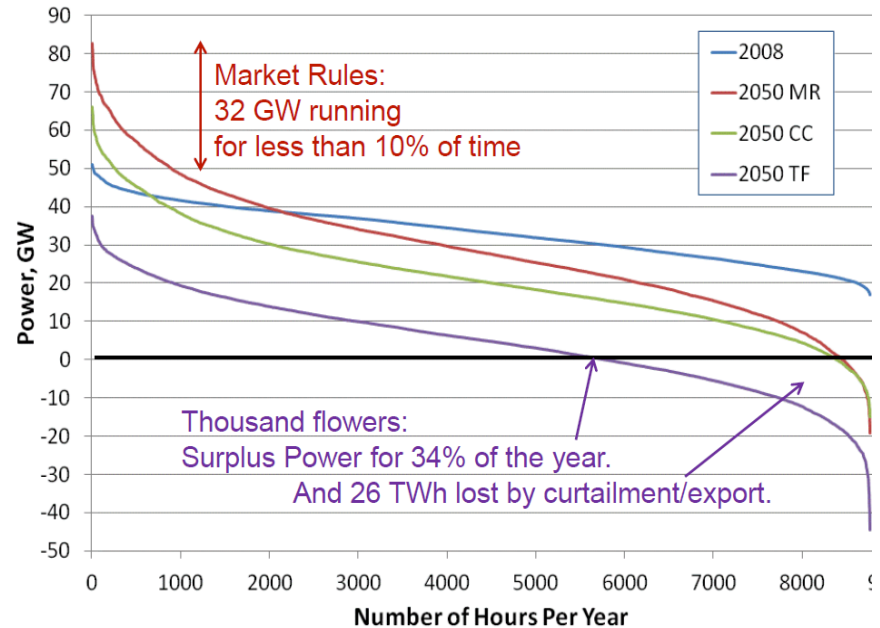
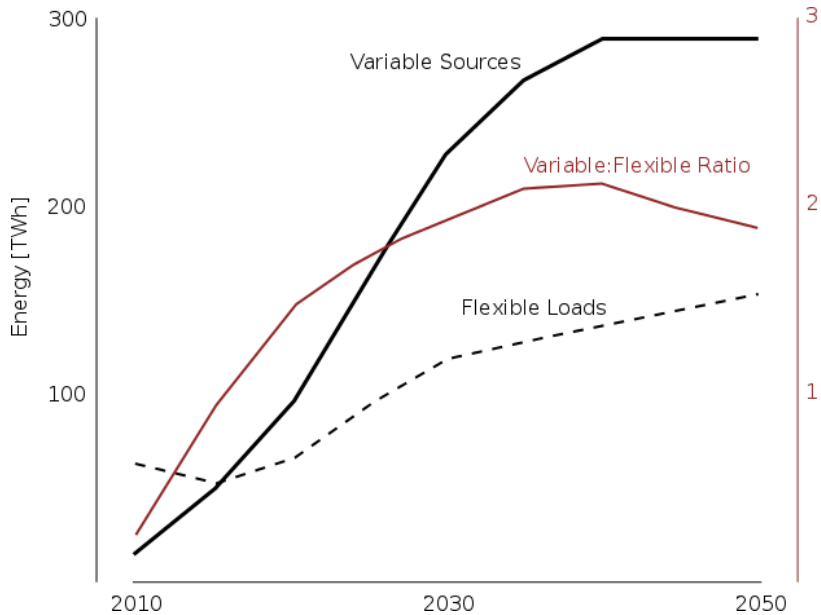
What to expect

- Something old, (Storage)
- something new, (DSR)
- something borrowed, (Flexibility)
- something blue, (Peak demand)
- and a silver sixpence in her shoe (Data)

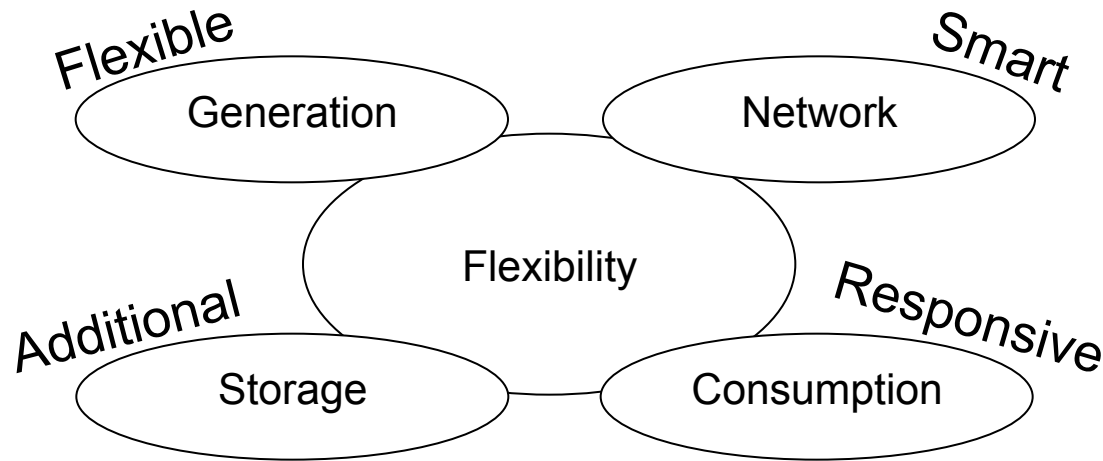


The displacement of conventional plant

1) decarbonise →
 2) electrify →



Sources of flexibility



- 1: Build **flexible generation** and curtail excess supply
- 2: Build expansive **networks** and enable spatial arbitrage
- 3: Build physical electricity **storage** capacity
- 4: Enable **demand side** flexibility to respond to supply

[Electricity storage] promises savings on UK energy spend of up to £10bn a year by 2050 as extra capacity for peak load is less necessary.

George Osborne, 9 November 2012



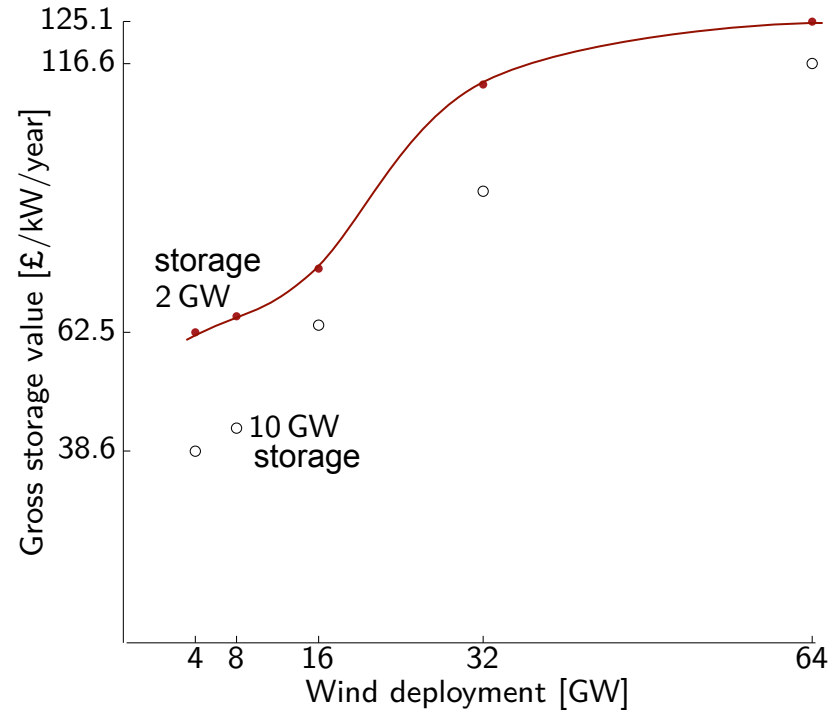
Up to 30 new gas power stations will be needed by 2030

George Osborne, 5 December 2012



The cost of meeting peak demand

increases the value of storage



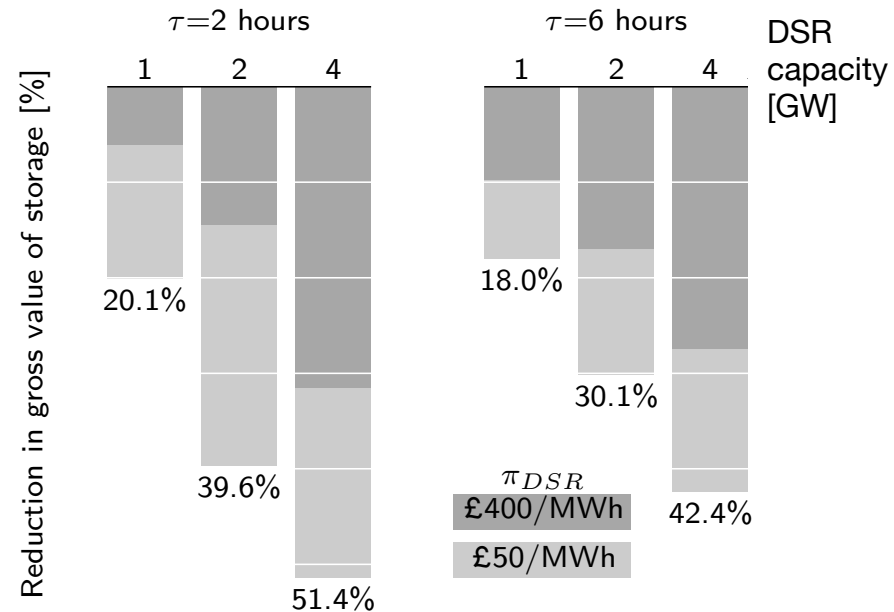
Price duration curve (1 year)

SOURCES OF FLEXIBILITY

- (Flexible) generation
 - (Smart) networks
 - (Responsive) demand
- in generation, and the flex all scenarios with compet baseline Grassroots case.

The effect on the marginal much storage would be in The marginal values differ exception of flexible dema

Storage value reduction from DSR



Demand aggregation in the UK

- Collaboration with Kiwi Power
- Access to data for over 500 sites
 - Half-hourly profile data (68 sites)
 - Recorded response events (266 sites)
- Analysis of load profiles and load characteristics
 - Distinct profiles demand a sector by sector approach
 - Some sectors can not be generalised based on their profiles (e.g. manufacturing)



'Demand response' from stand-by generation

(Telecoms sector)

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Figure 4: Stand-by generation responses to demand re
Sample of 97 sites.

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Considering the level of response, **Sites ranked by** response, shows that the former co reductions. Stand-by generation effectiveness and reliability. In the response resource from demand tu

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'Demand response' from

Load turn down
(Hotels)

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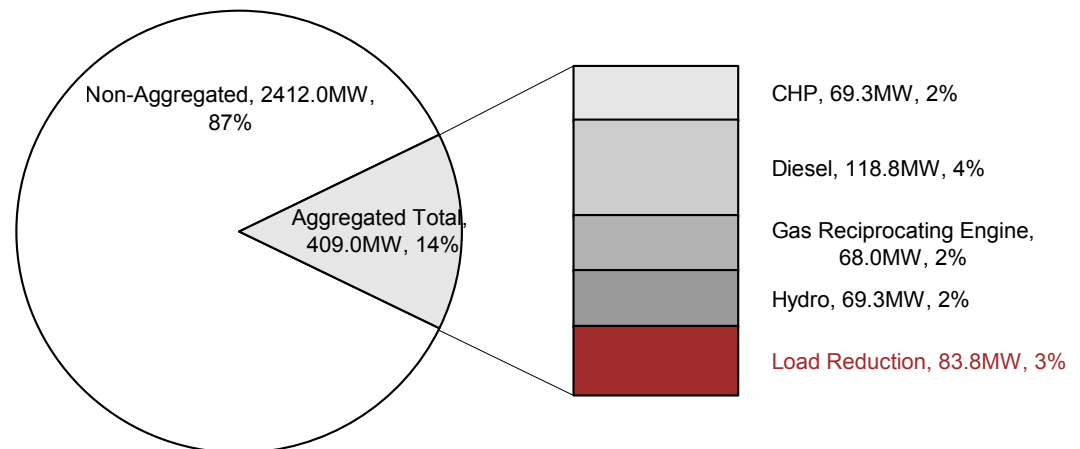
stand-by generation
(Telecoms)

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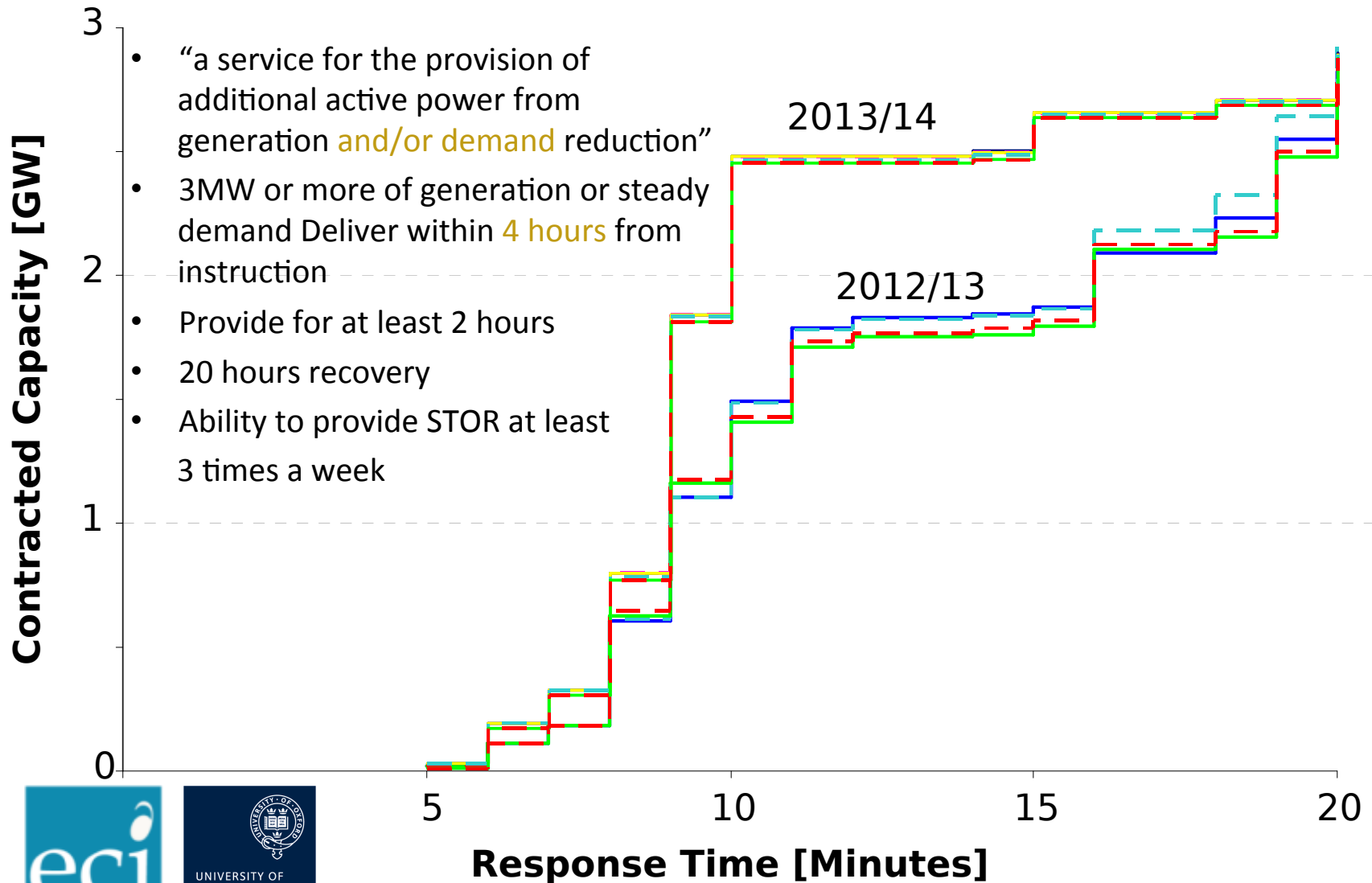
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Untapped potential?

- Presently demand response plays a minor role in response provision.
- Although policy makers desire a “level playing field” for all options, generation based solutions have shaped the existing framework.
- Could the demand response contribution be improved through regulatory changes?

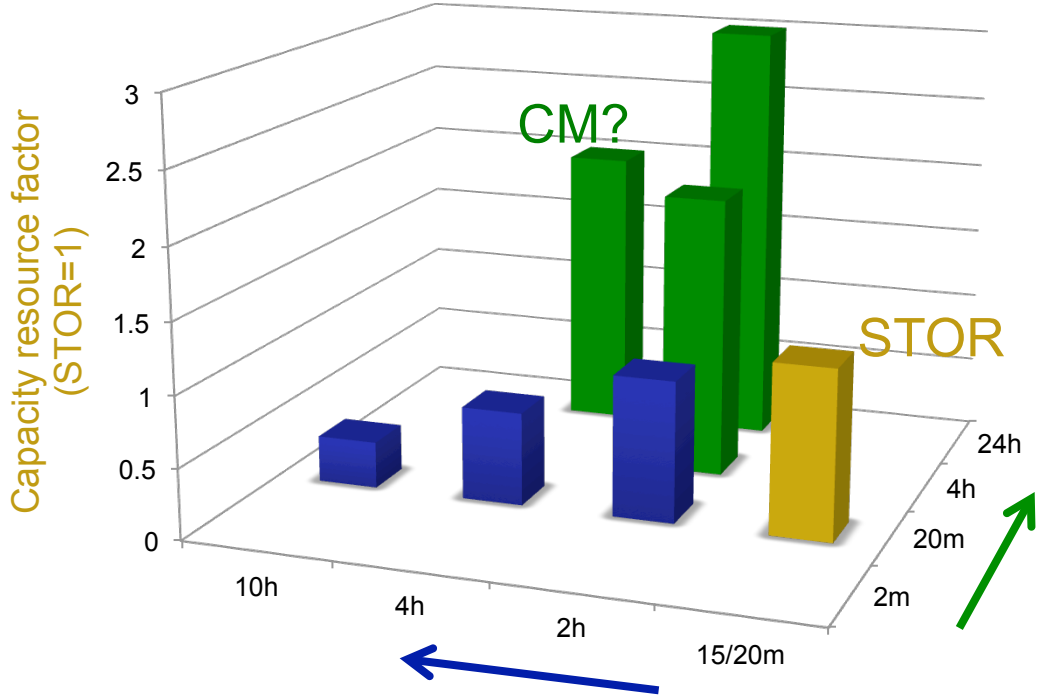


Short Term Operating Reserve (STOR)



What if conditions were relaxed?

Response capacity availability from UK warehouses
(illustrative example)



Possibly worth between 0.4 and 1 GW

Longer response time
→ Time to “preload”
→ Greater capacity

Longer response duration
→ Rising/falling warehouse temperature
→ Reduced capacity



The fire

shadows cast
on wall

Prisoners

Roadway where
puppeteers perform

The fire



Researchers

Roadway where
Consumers perform





Conclusions

- Significant technical and commercial potential for various flexibility options
- Current regulatory structures favour generation based solutions
- A better understanding of demand response potential could be gained through a combination of empirical studies and detailed analysis



Thank you.