



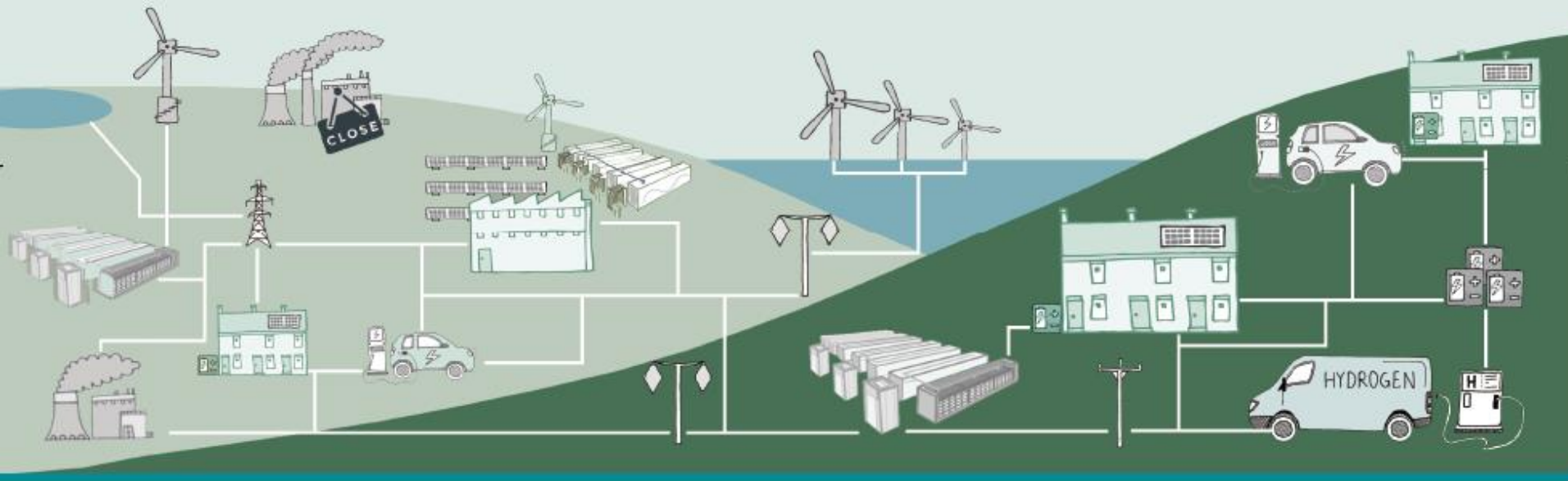
Business models for utility scale energy storage

Smart Energy Marketplace – 28 March 2017

Johnny Gowdy

Pathways to Parity - Market insight series

Energy Storage - Towards a commercial model

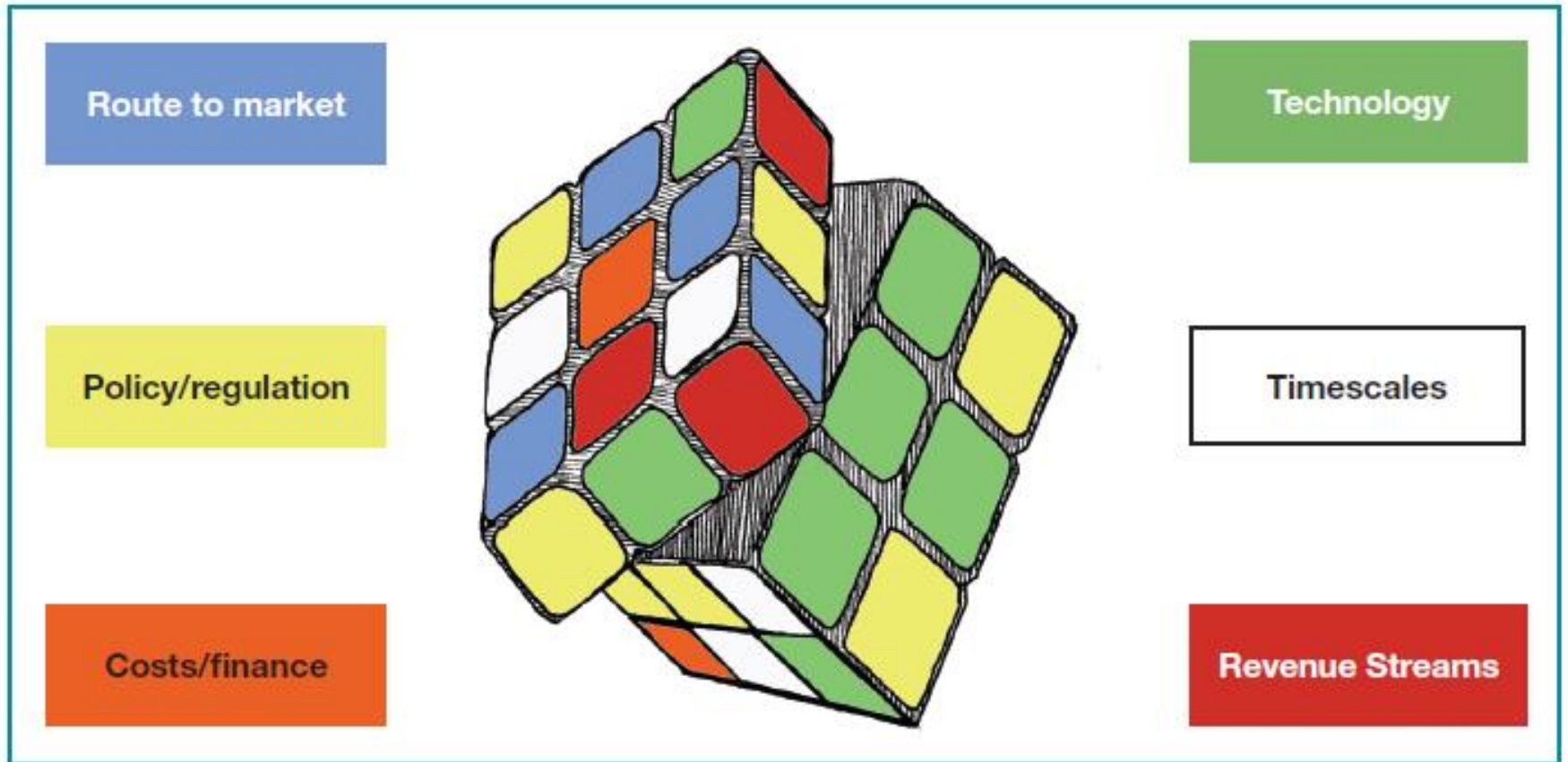


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Solving the Rubik's Cube



A big year for storage

EFR Auction

- 200 MW – 8 projects @£7.50-11.90 per MW/h
- 1.2 GW of bids across 60 sites

2016 T4 Capacity Market

- 500 MW of new storage @£22.50 per KW

Pipeline over ½ GW capacity across 31 sites

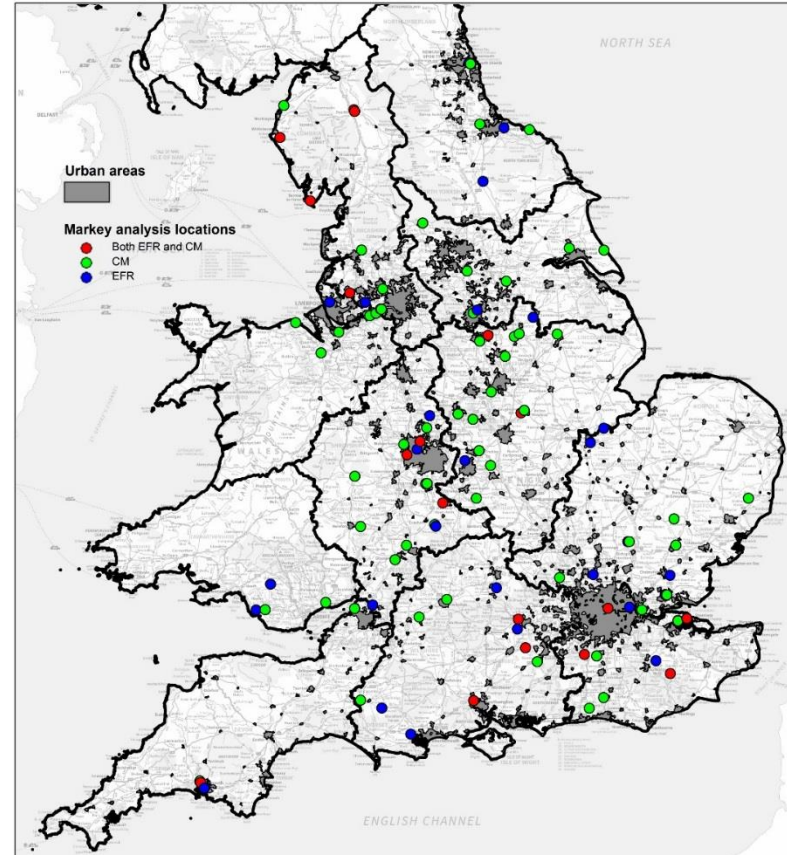
Embedded benefits

- Ofgem open letters
- Consultation but minded to accept code modifications 264/265 to reduce transmission demand residual (credits)

Consultation : Smart and Flexible Energy System

- proposals to remove ‘double charging’

National Grid : “System needs and product strategy” paper



Power system transformation

New capacity
needed

Coal



X

Close all remaining coal plant by 2025 or earlier

New
Gas



3-7 GW

Some new capacity will be needed to replace aging gas plant. Ideally this should include CCS. But CCS is unlikely to be ready at scale by 2030

New
Nuclear



6-8 GW?

It will be a challenge for new nuclear to replace the 7 GW of old nuclear that is expected to close. Hinkley C plus other plants may come on stream by 2030. This could maintain nuclear's current share.

Renewables

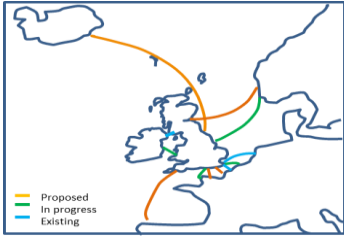


50 GW

Onshore and Offshore wind 30-40 GW
Solar – 10 GW
Hydro and Bioenergy – 5 GW
Marine – Wave and Tidal - ??

Plus – sources of flexibility

Interconnection

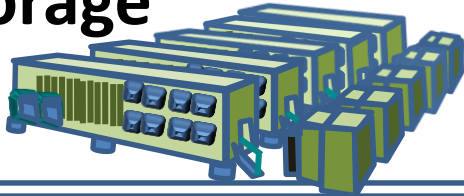


10-15 GW

New links planned to France, Norway, Ireland, Denmark and Belgium.

European Energy Market

Storage



10-12 GW

Large and small scale storage from pumped hydro, commercial and small scale battery storage

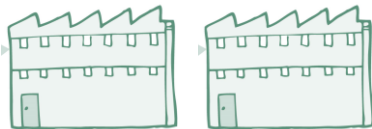
Peak demand shift



1-2 GW?

Smart meters and Time of Use Tariffs. Heat pump and EV charging off-peak. Smart appliances

Demand side Response (DSR)



2-4 GW

Contracted DSR – energy user peak demand reduction and demand turn up as needed



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transforming energy