Market Outlook to 2030

Session 5
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Agenda

• The prospects for energy efficiency out to 2030
• The potential benefits that could be achieved by working with responsive domestic and industrial customers
• The interaction between the players and likely size of the Demand Side Response market out to 2030
• Methods for the DNOs and wider industry of increasingly making investment decisions on the balance of probabilities
What enabled this work

• Survey of 2,830 people who told us about their household appliances
• Measurements of EV charging profiles
• Measurements of responsiveness to domestic ToU tariffs
• Prices and volumes of I&C Demand Side Response achieved by Low Carbon London
• Models of the GB balancing market (Imperial College London and Poyry), of the LPN Distribution network (Imperial College London and UK Power Networks), and models of the peak demand (Element Energy and UK Power Networks)
• Flextricity’s proof of concept of wind-twinning
• Investment decision tools developed by Imperial College London
Example of household survey

We can say with 95% confidence that three-quarters of affluent singles own a microwave.
Lighting and cold appliances offered the greatest efficiency savings potentials

Source: LCL Report C3
The corresponding energy savings amount to 10TWh by 2020, equivalent to approximately 9% of consumption.

Source: LCL Report C3
Aggregate demand profile per household

Source: LCL Report D3*

Peak demand reduction

Source: LCL Report D3*

Benefits of combined mitigation measures

Source: LCL Report D3*

DSR value chain interactions

**Local Network**
- Used by local network to avoid or defer network reinforcement

**National Grid / TSOs**
- Provision of ancillary services
- Avoidance of Transmission Constraint

**Wholesale Market**
- Suppliers may use DSR for energy management
- Generators / Wind Portfolio players may use DSR to manage imbalances

**Customer**
- Reduces cost for the end user

Source: LCL Report A5
GB electricity capacity mix in the four main scenarios

Source: LCL Report A5
Use of DSR nationally
Intermittent World, 2020 and 2030


2030 – Intermittent (2010)

Scenario (DSR use)
- Intermittent (STOR)
- Intermittent (Supplier)

Source: LCL Report A5

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I&C ‘Wind-Twinning’ Trial

Source: Flexitricity, ‘Wind-Twinning’ Trial Data
Network benefits of mitigation measures

Source: LCL Report D3*

Potential conflicts between local network and national objectives

Demand Response to low energy prices

Source: LCL Report D5*

Future network investment decisions
Importance of Whole-System approach

Allocation of DSR resource?

National Balancing Services

Local Network Control

Source: LCL Report D5*

Can you trust smart when it comes to security?

Source: LCL Report D4*
Investment under uncertainty
Flexibility to deal with uncertainty

Source: LCL Report D3*

Investment Decisions
Here & now or wait & see?

Source: LCL Report D3*

Flexibility to deal with uncertainty

Option value of DSR

Source: LCL Report D3*

Making it happen
Improving regulatory & commercial regimes

1. Strengthening incentives for investment in cost effective smart grid measures – more positive incentive to adopt
2. Whole systems approach to network planning – from silo to whole-system thinking
3. Emerging new role of DNOs – from energy delivery to facilitating market integration
4. Facilitate investment under uncertainty – from scenario only to option value driven
5. Enable anticipatory investment framework – from incremental to strategic
6. Evolution of the regulatory regime – Ensure cost assessment appropriately deals with smart grid enablers

Source: LCL Report D5*
Ioannis Konstantelos, Dimitrios Papadaskalopoulos, Danny Pudjianto, Matt Woolf, Goran Strbac, “Novel commercial arrangements and the smart distribution network, LCL Imperial College London, 2014
The findings from Low Carbon London represent a step change in understanding the electricity network required for a low carbon future.

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