



# **DSO and energy retailers: coordinating our vision of the energy future**

**9 May 2019**



# Welcome and our DSO plan

**Anne-Claire Leydier**  
DSO Transition Manager

**9 May 2019**

# The team today

- **Alan Creighton**, Senior Smartgrid Development Engineer
- **Andrew Spencer**, System Planning Manager
- **Gavin Sangiovanni**, Stakeholder Advisor
- **Helen Priestley**, Stakeholder Manager
- **Issy Middleton**, Smart Metering Programme Manager
- **Victoria Dove**, Communications Officer
  
- **Dr Jeff Hardy**, Senior Research Fellow - Grantham Institute - Climate Change and the Environment

# Our business



**8 million**  
customers.



**Over 2,700**  
employees.



**£75/year**  
our average domestic  
customer bill.



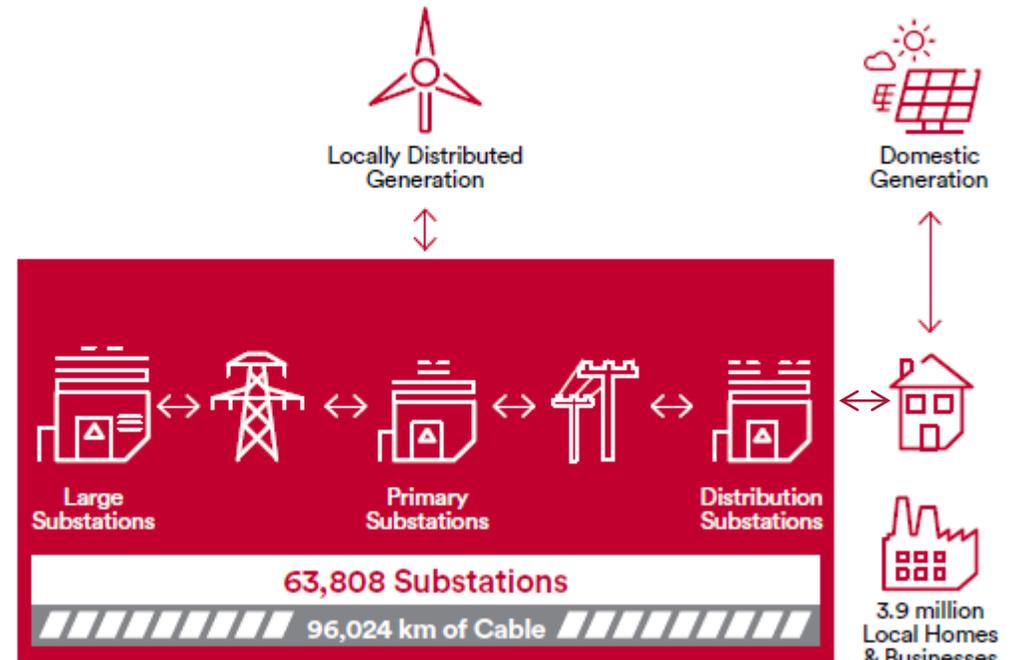
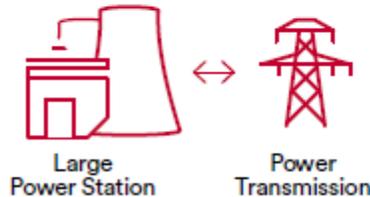
**Smart meter  
ready**  
systems connected to central  
DCC system in November 2017.



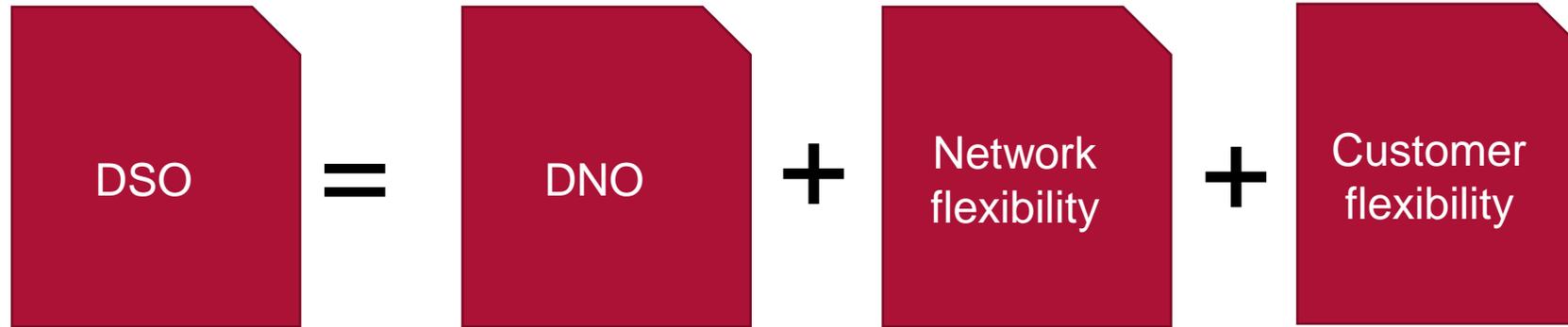
**26**  
innovation projects.



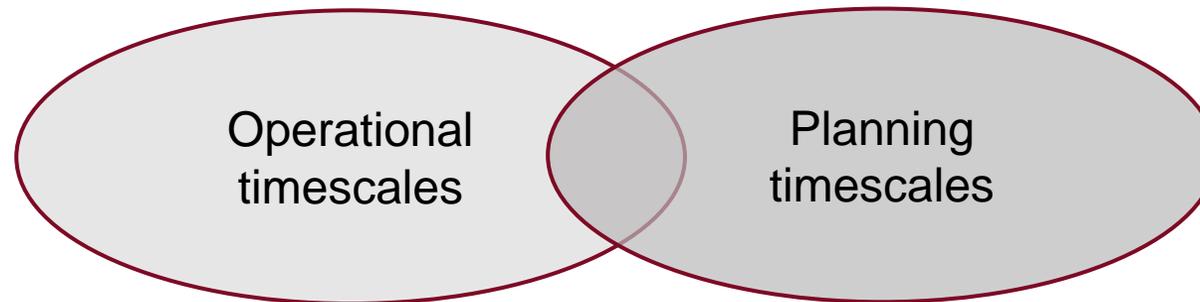
**16%**  
of our customers are  
living in fuel poverty.



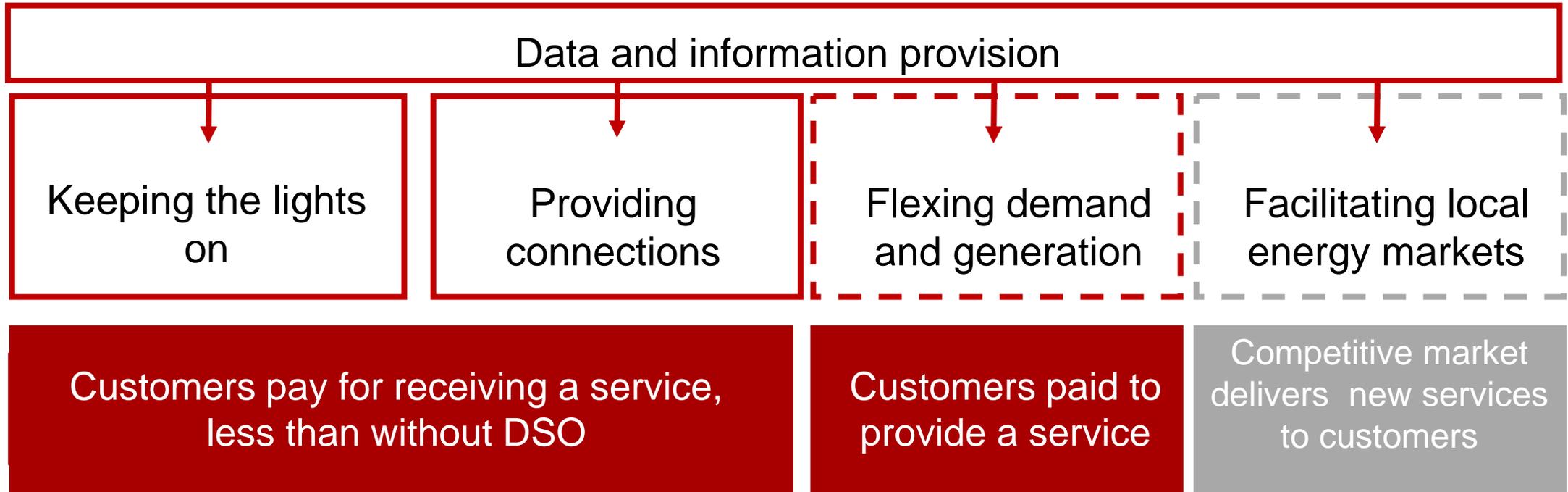
# Distribution System Operation



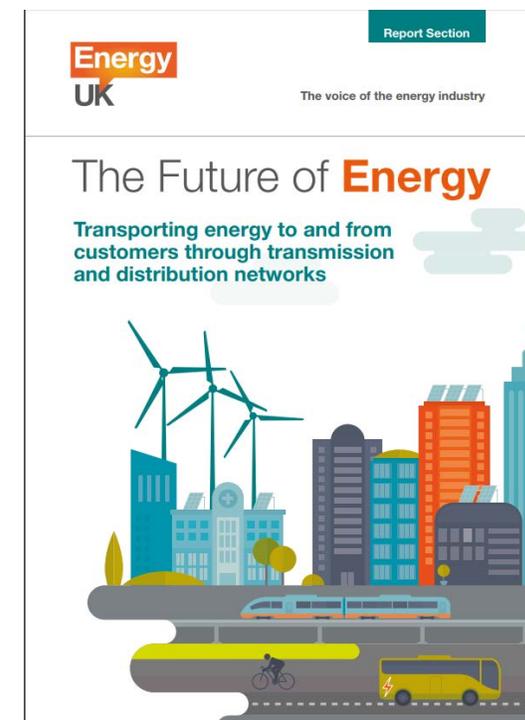
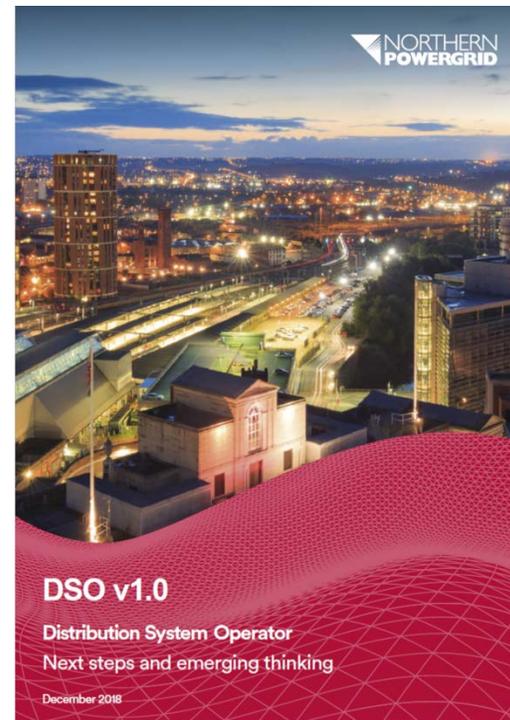
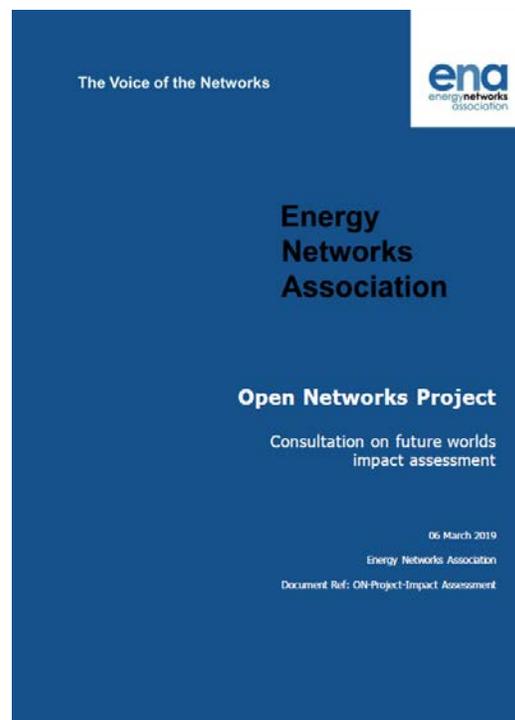
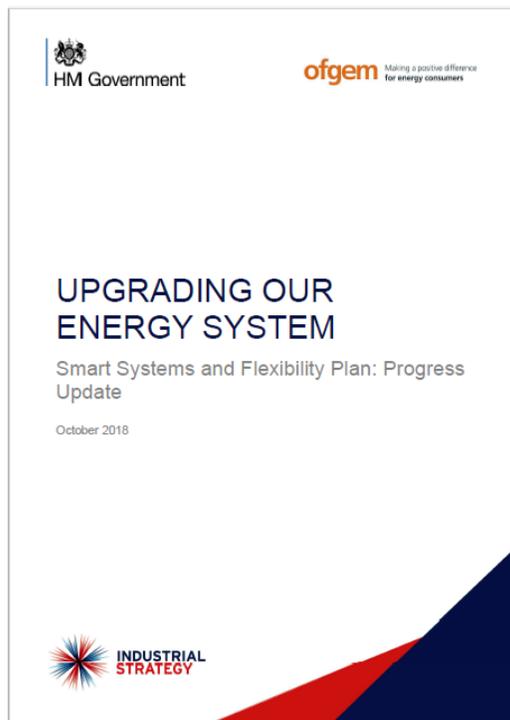
Right-sized,  
smart  
network



# DSO - What it means for our customers



# Looking beyond the question of the “who”



# About today

Agenda	Lead	Timings
Conference welcome Our DSO plan	Anne-Claire Leydier	12:30 – 12:45
New retail value propositions	Dr Jeff Hardy	12:45 – 13:00
Why collaboration matters: Forecasting	Andrew Spencer	13:00 – 13:15
<b>Roundtable discussion 1:</b> Explore and discuss the new ways in which energy will be sold in 2030	All	13:15 – 14:00
<b>BREAK</b>		<b>14:00 – 14:15</b>
Why collaboration matters: Markets co-ordination (CLDS)	Anne-Claire Leydier	14:15 – 14:25
<b>Roundtable discussion 2:</b> Explore and discuss the interaction between energy retail and network-led flexibility markets	All	14:25 – 15:05
Why collaboration matters: Smart enablement for business models	Issy Middleton	15:05 – 15:15
<b>Roundtable discussion 3:</b> Explore and discuss the role of DSO to enhance the new value propositions	All	15:15 – 15:55
Thank-you and next steps	Anne-Claire Leydier	15:55 – 16:00

## Objectives:

- Input your feedback into our business plan for 2020
- Start a dialogue

# New retail value propositions

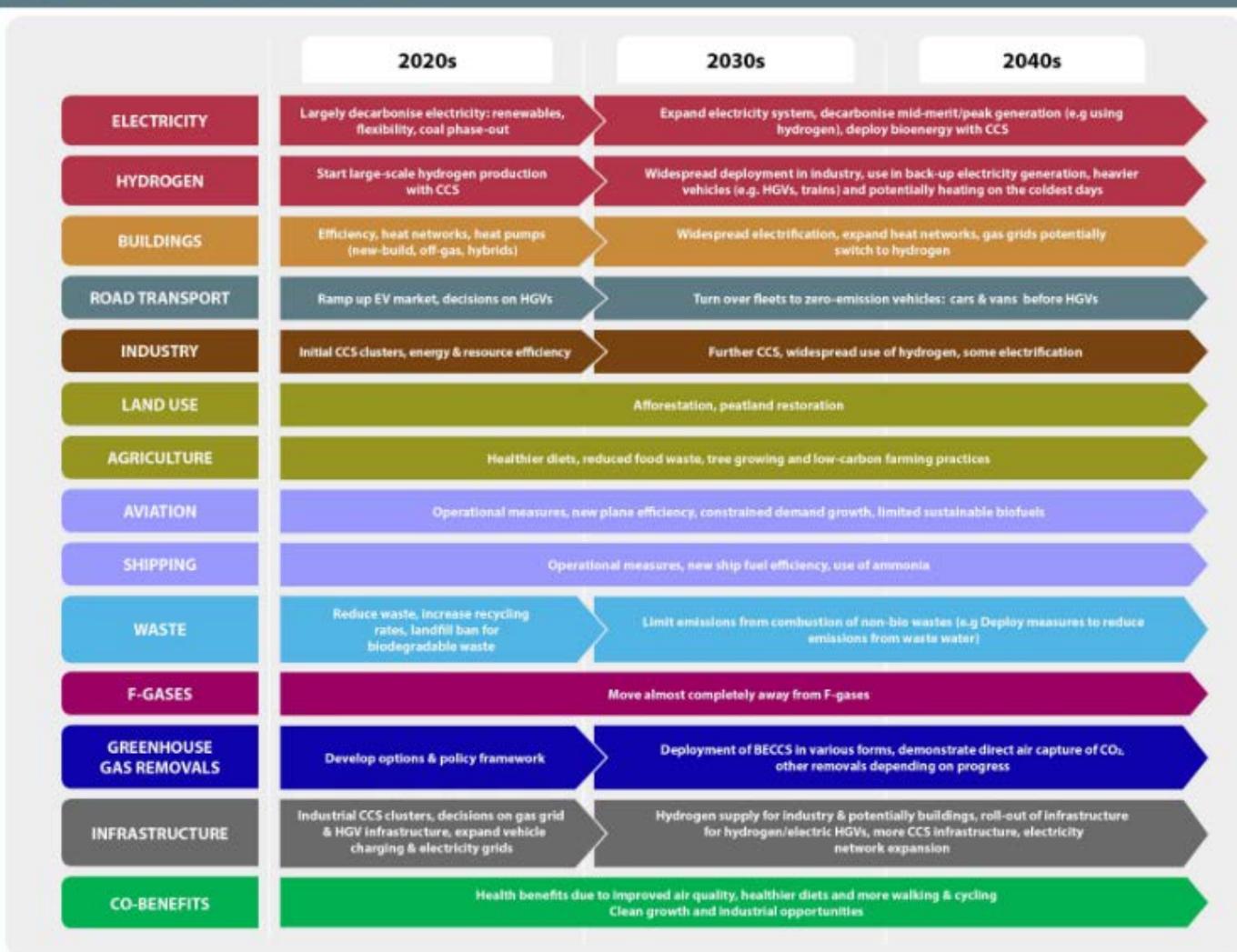
Dr Jeff Hardy

Senior Research Fellow - Grantham Institute - Climate Change and the Environment

jeff.hardy@imperial.ac.uk | @jjeh102 | @Grantham\_IC

# Net zero context

Figure 2. UK net-zero GHG scenario



*“I urge the governments of the UK, in London, Edinburgh, Cardiff to consider our advice carefully and legislate for these new targets as swiftly as possible. We must now increase our ambition to tackle climate change. The science demands it; the evidence is before you; we must start at once; there is no time to lose.”*

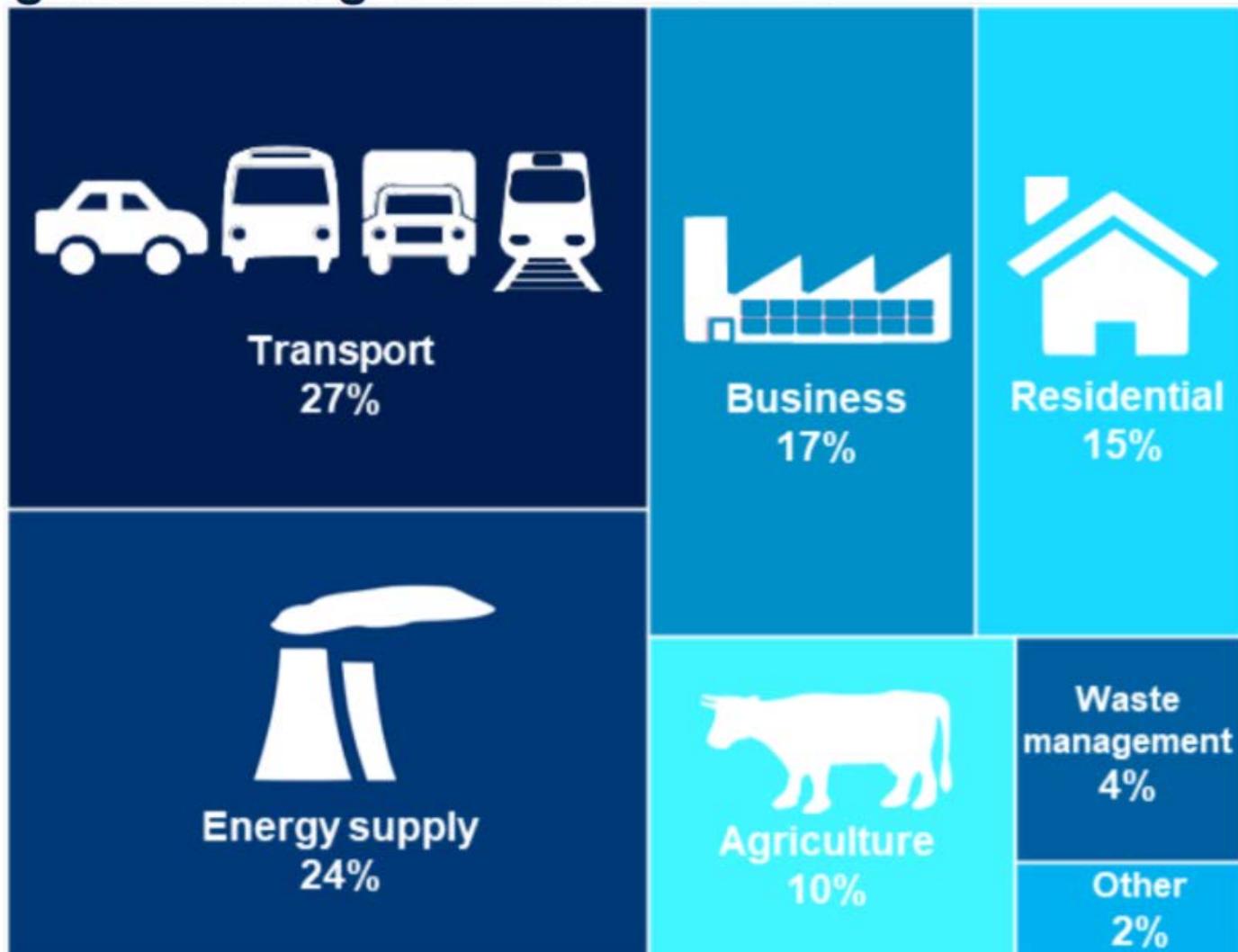
**Lord Deben, Chair Committee on Climate Change**

Source: CCC analysis.

Notes: CCS = carbon capture and storage. EV = electric vehicle. BECCS = bioenergy with CCS.

<https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf>

# Transport was the largest emitting sector of UK greenhouse gas emissions in 2017



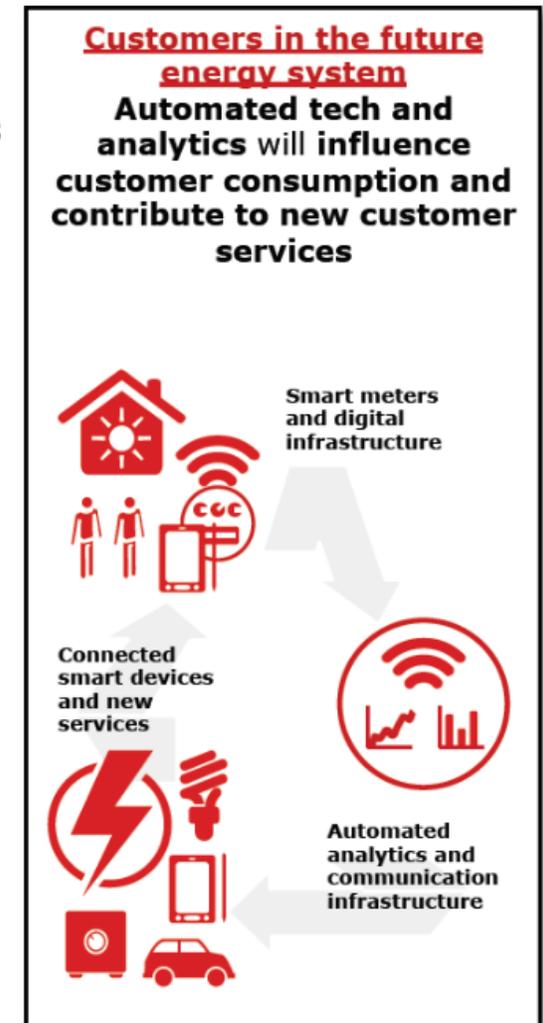
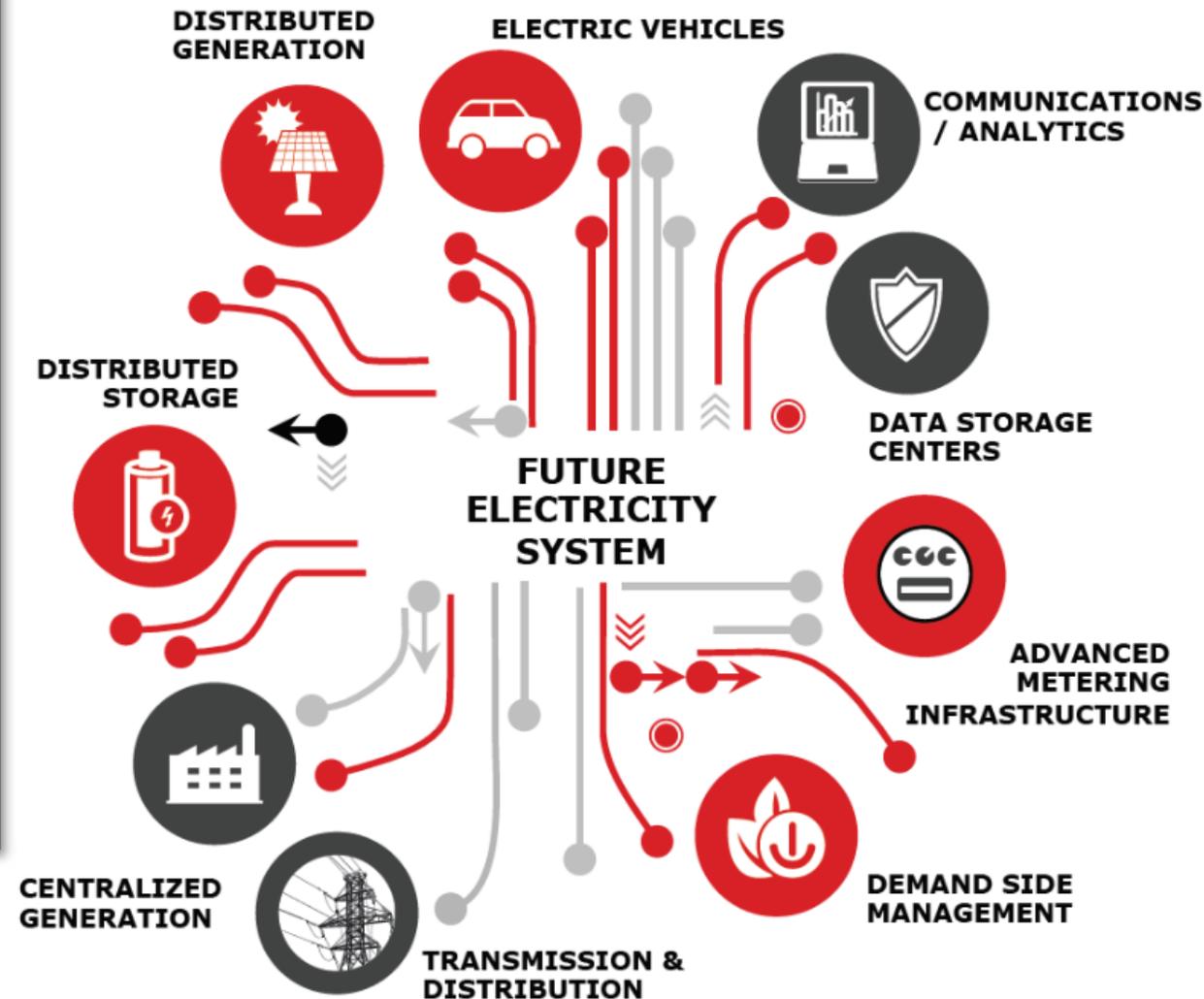
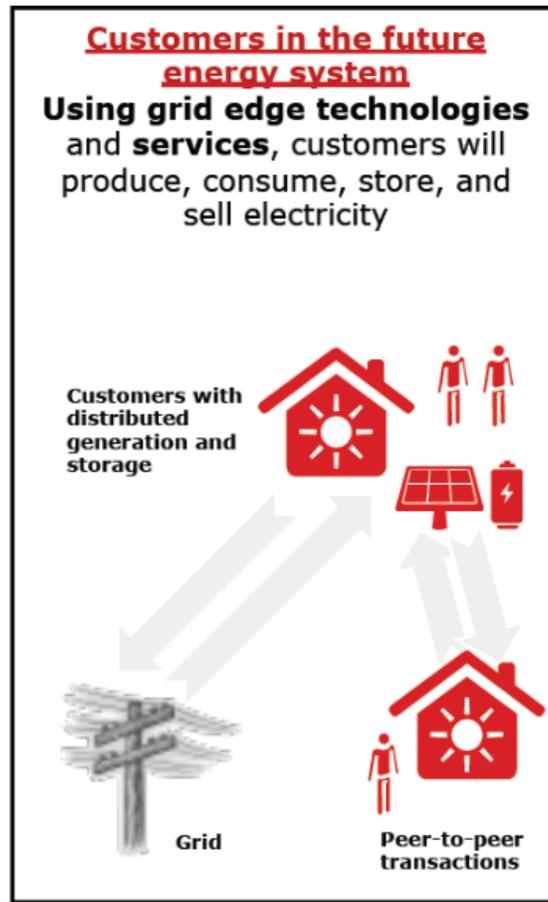
Other includes Public, Industrial Processes and the Land Use, Land Use Change and Forestry (LULUCF) sectors (note that LULUCF acts as a net sink of emissions). The percentages may not sum to 100% due to rounding.

Electricity ✓

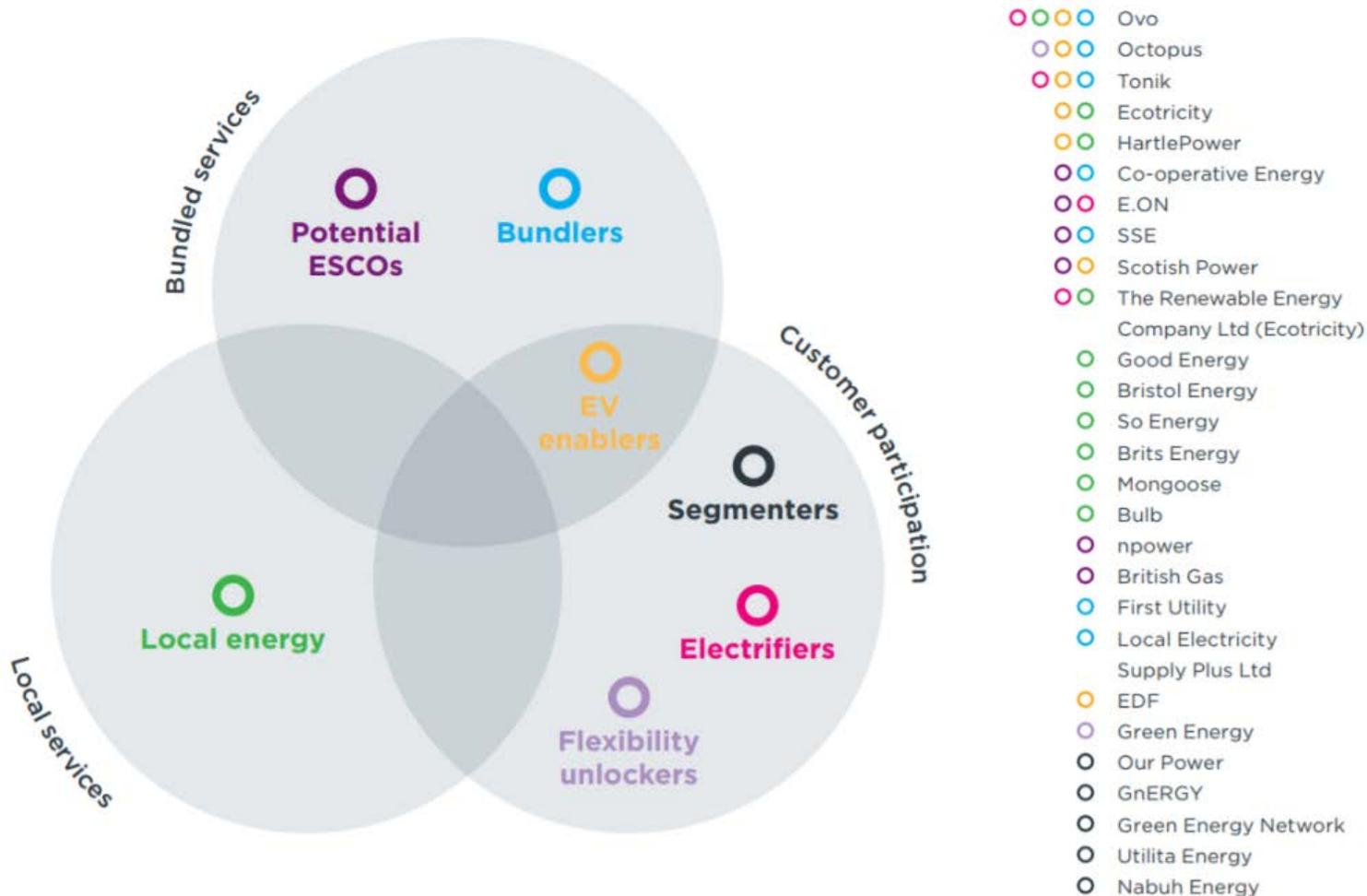
Transport 😐

Heat ✗

# (Useful) Data = options and opportunities



# Innovation in energy suppliers



- Lot's going on, particularly on local energy, electric vehicles, 'smart' electric homes and bundling products
- However, little innovation in the core traditional utility business model (selling as much commodity as possible)

Credit: IGov - <http://projects.exeter.ac.uk/igov/wp-content/uploads/2019/01/IGov-BM-Analysis-report.pdf>

Figure 8: Emerging domestic electricity supplier value propositions compared to broad NTBM themes

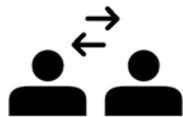
# Business model innovation needed

## New electrifier



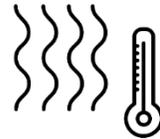
Traditional utility that is helping consumers switch to electric heat and mobility, including installing equipment and automating DSR

## Peer-to-peer



P2P customers directly buy, sell or swap electricity with each other.

## Energy as a Service



An ESCo delivers energy services to customers, such as comfort and illumination, rather than units of energy like a traditional supplier.

## Lifestyle as a service



A third party, such as a price comparison website, takes decisions on consumers' behalf, like automatically switching energy supplier.

## Everyone has an opinion on the energy business model of the future...



Smarter Britain

**Imperial College  
London**

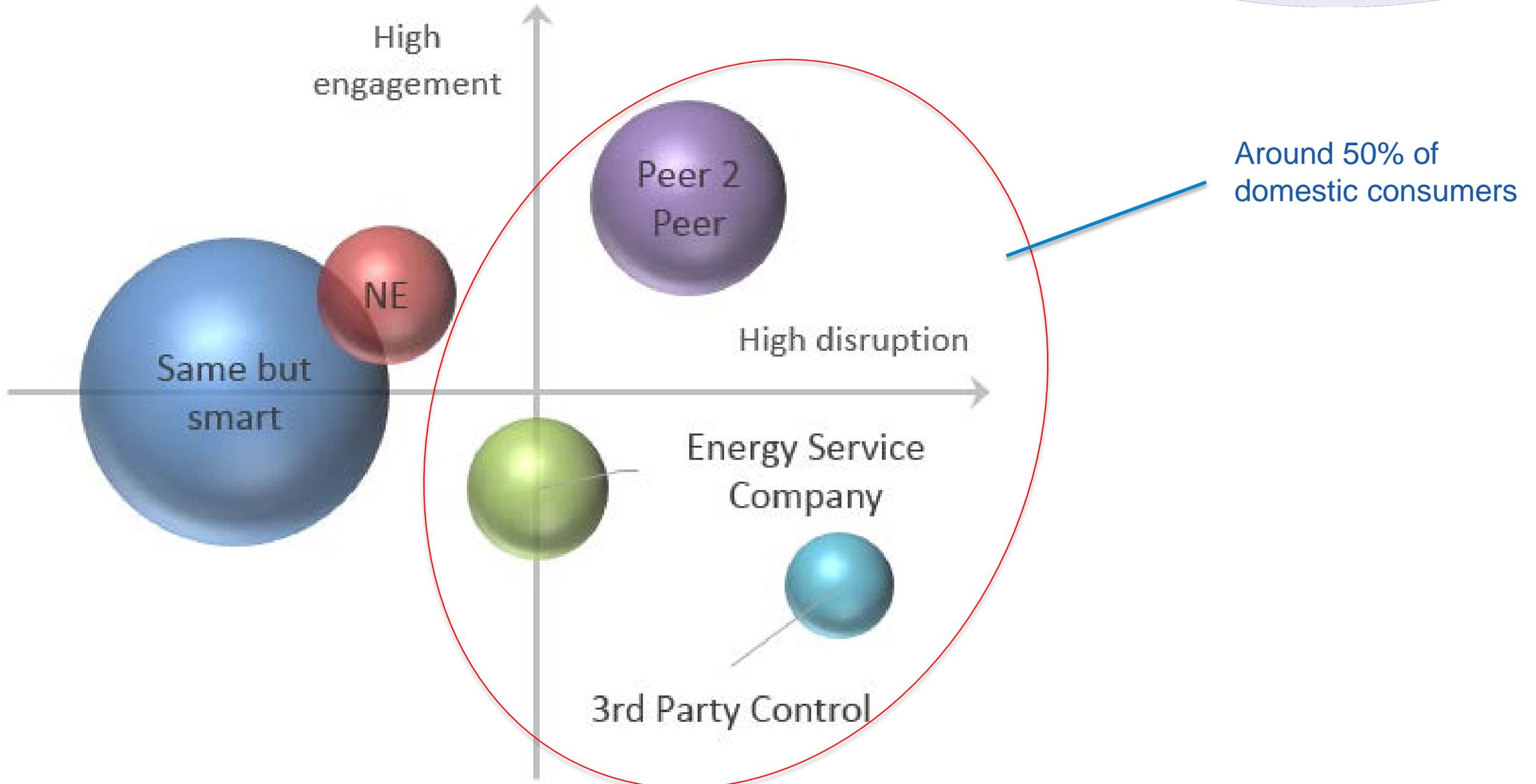
## How could we buy energy in the smart future?

Dr Jeffrey Hardy, Imperial College London

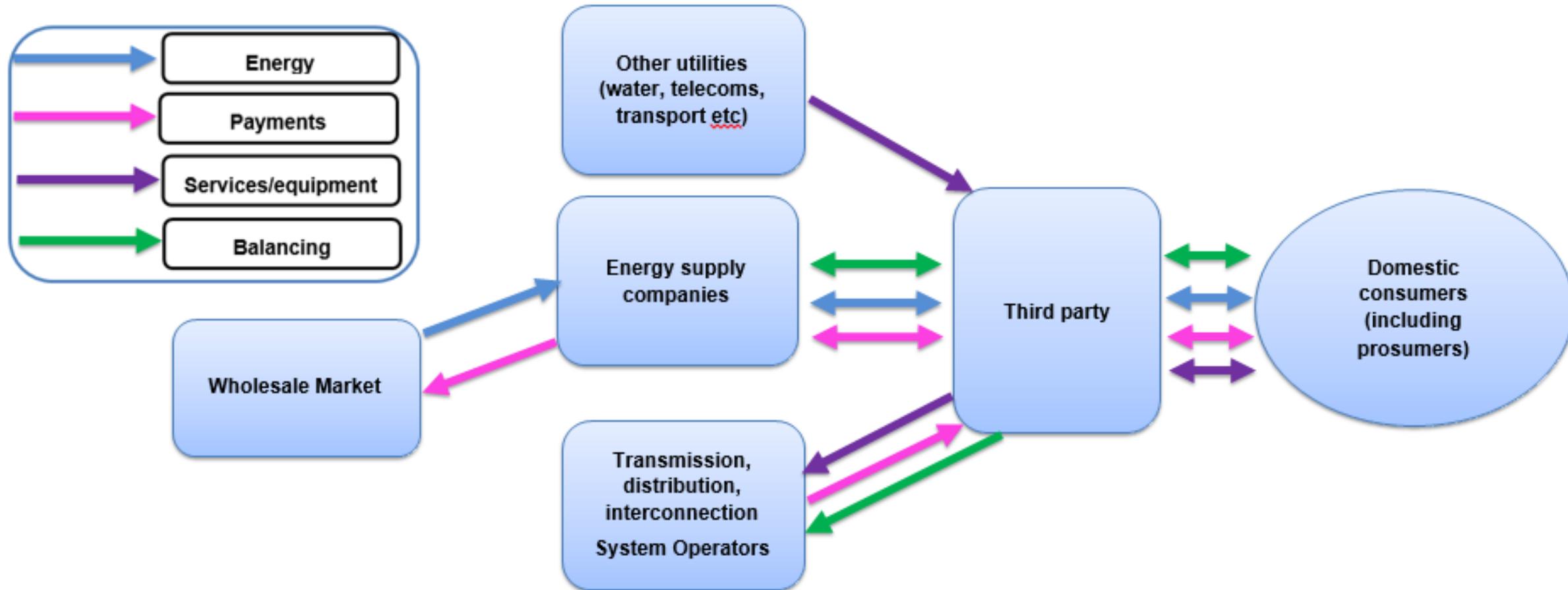
March 2017

# Disruption and engagement

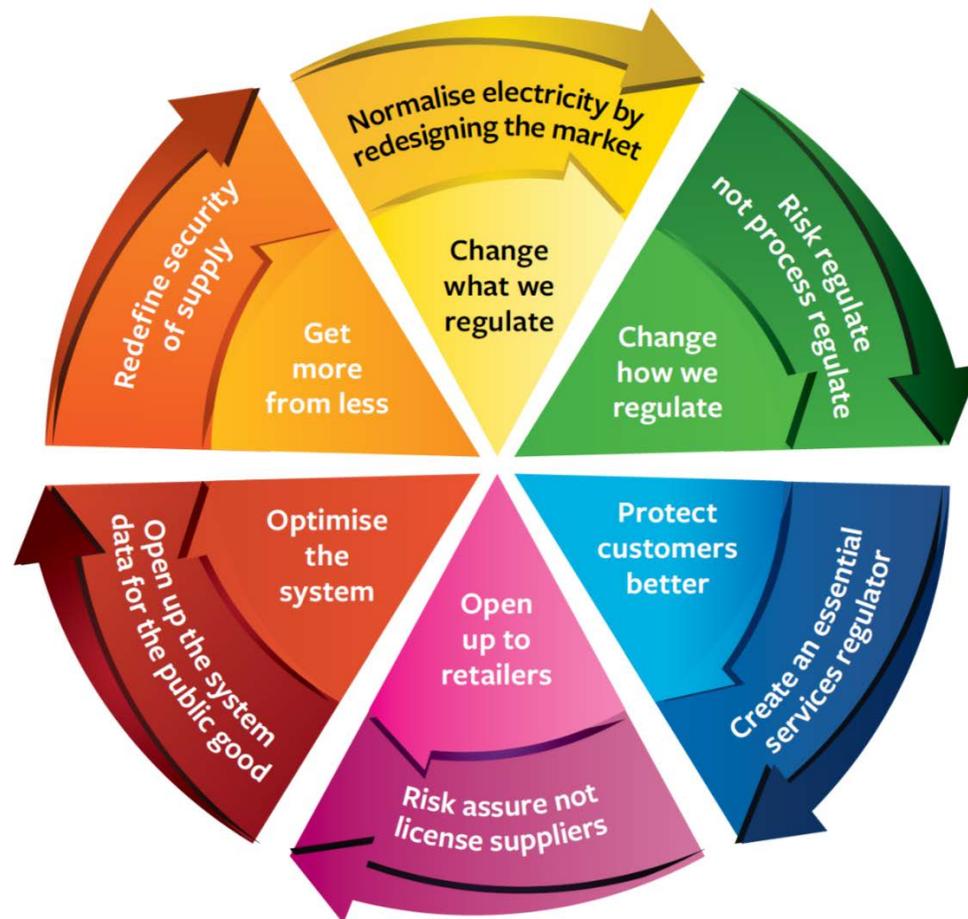
*Size represents people who preferred that option*



# New relationships?

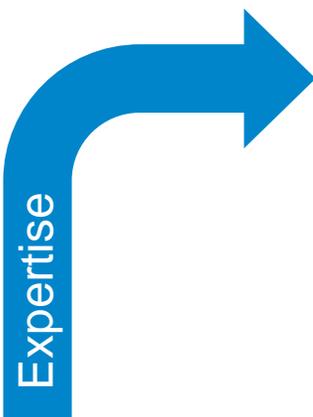


# Redesigning regulation



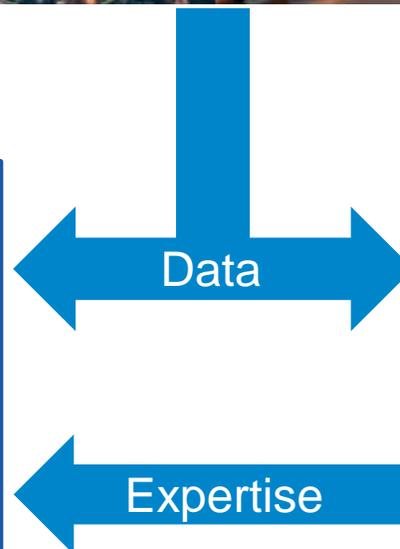
- **Change what we regulate:** normalise electricity through redesigning the market
- **Change how we regulate:** change from regulating process to regulating for risk
- **Protect and serve consumers better:** create one essential service consumer regulator
- **Open up to retailers:** risk assure retailers rather than license suppliers
- **Optimise the system:** opening up system data for the public good
- **Get more from less:** redefine and recalibrate security of supply

# PROSPERING FROM THE ENERGY REVOLUTION



**CATAPULT**  
Energy Systems

Co-ordination, integration, and alignment  
Supporting value maximisation  
Learning library and project network



**EnergyREV**

Whole systems research and innovation  
Academic evaluation of projects  
Academic liaison and domain expertise



# Load forecasting

**Andrew Spencer**  
System Planning Manager

**9 May 2019**

# Context and Objectives

- Peak demand has fallen over the last 15 years.
- This will continue for a while then reverse significantly when the take up of low carbon technologies (LCTs) begins to accelerate.
- The impact on the networks depends on how customers use these technologies and this will be heavily influenced by retail incentives.

## **The purpose for this roundtable is to:**

- Present an overview of how we are forecasting demand in this uncertain future
- Understand the customer flexibility plans and aspirations of Suppliers
- Check that the National Grid FES assumptions are in alignment.

# Our scenario-based forecasting model...

- ... models **domestic** and **industrial & commercial** consumption bottom-up;
- ... estimates the impact of the uptake of various low-carbon technologies (LCTs); and
- ... takes a judgement on the uptake of customer flexibility options.

Demand Technologies
Electric vehicles
Heat pumps (domestic and I&C)

Generation Technologies
Solar PV
Wind
Micro and larger CHP
Other

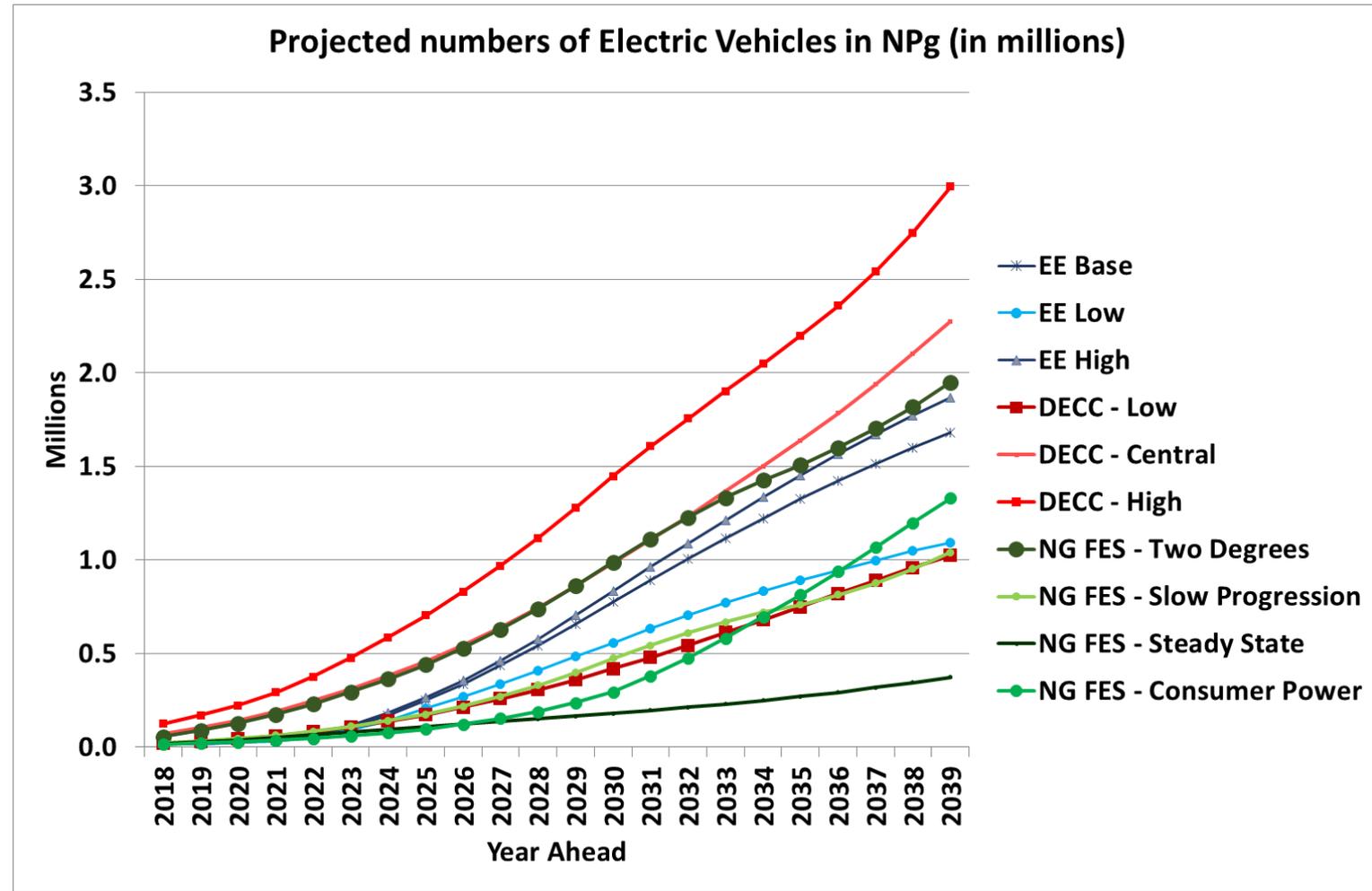
Customer flexibility
Domestic time-of-use tariff
I & C DSR
Smart EV charging
Battery storage

**The output** = an estimate of the load impacts at a substation level for a range of uptake scenarios.

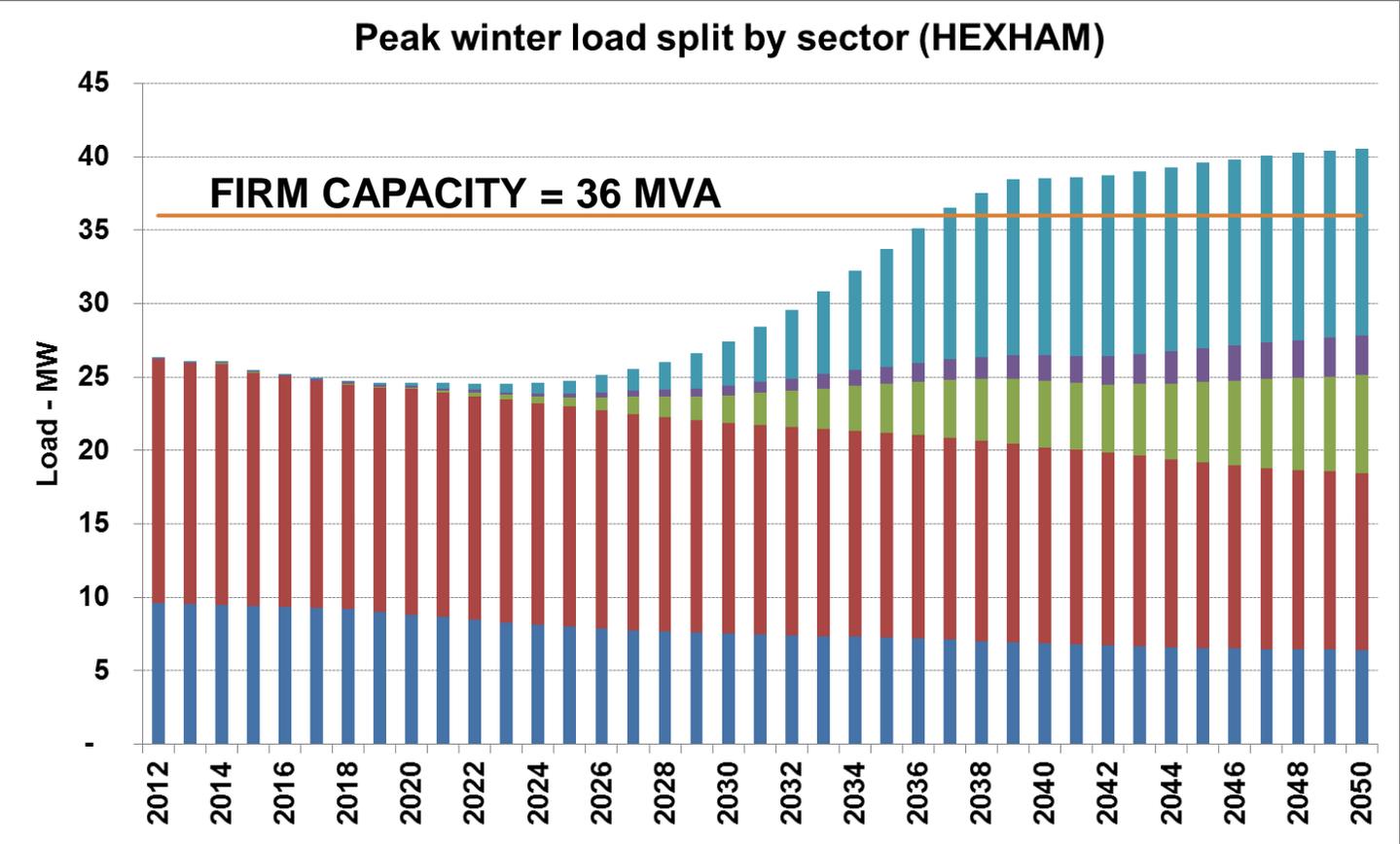
# The take up of EVs is a big driver of uncertainty

- The range of scenarios for the growth of EVs leads to uncertainty on the timing of their impact.
- There is also uncertainty on where these technologies will connect.

EV take-up scenarios (millions)	Total NPg	Northeast	Yorkshire
DECC – High	1.6	0.6	1
NG FES - Two Degrees	1.1	0.5	0.7
DECC – Central	1.1	0.4	0.7
EE High	1	0.4	0.6
EE Base	0.9	0.4	0.5
EE Low	0.6	0.3	0.4
NG FES - Slow Progression	0.5	0.2	0.3
DECC – Low	0.5	0.2	0.3
NG FES - Consumer Power	0.4	0.2	0.2
NG FES - Steady State	0.2	0.1	0.1

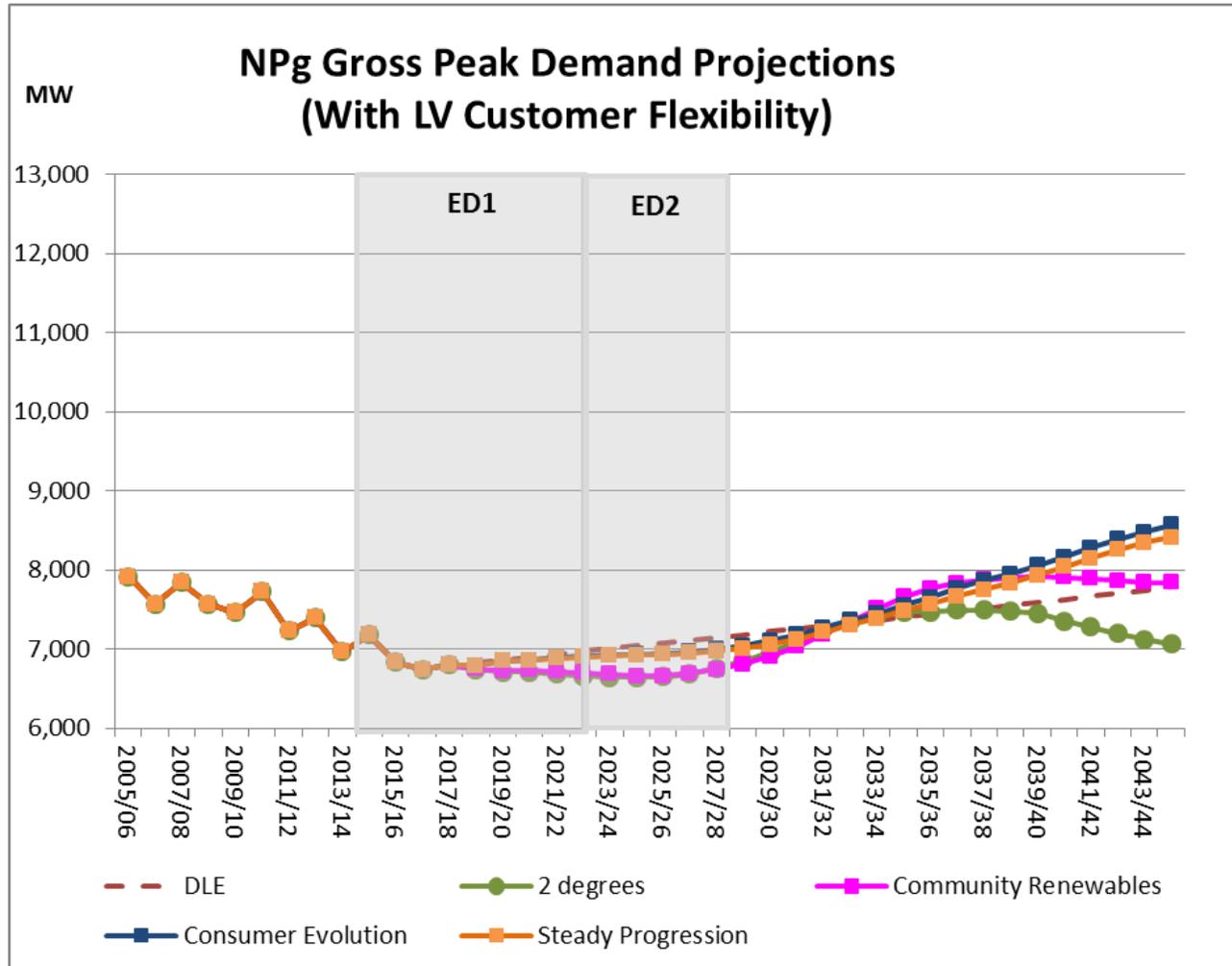


# Domestic demand will increase but this brings with it the potential for flexibility



- Electric Vehicles
- I&C Heat Pumps
- Domestic Heat Pumps
- I & C
- Domestic (Exc EV)

# Our forecasting model helps us to predict the range of impacts at a substation and network level

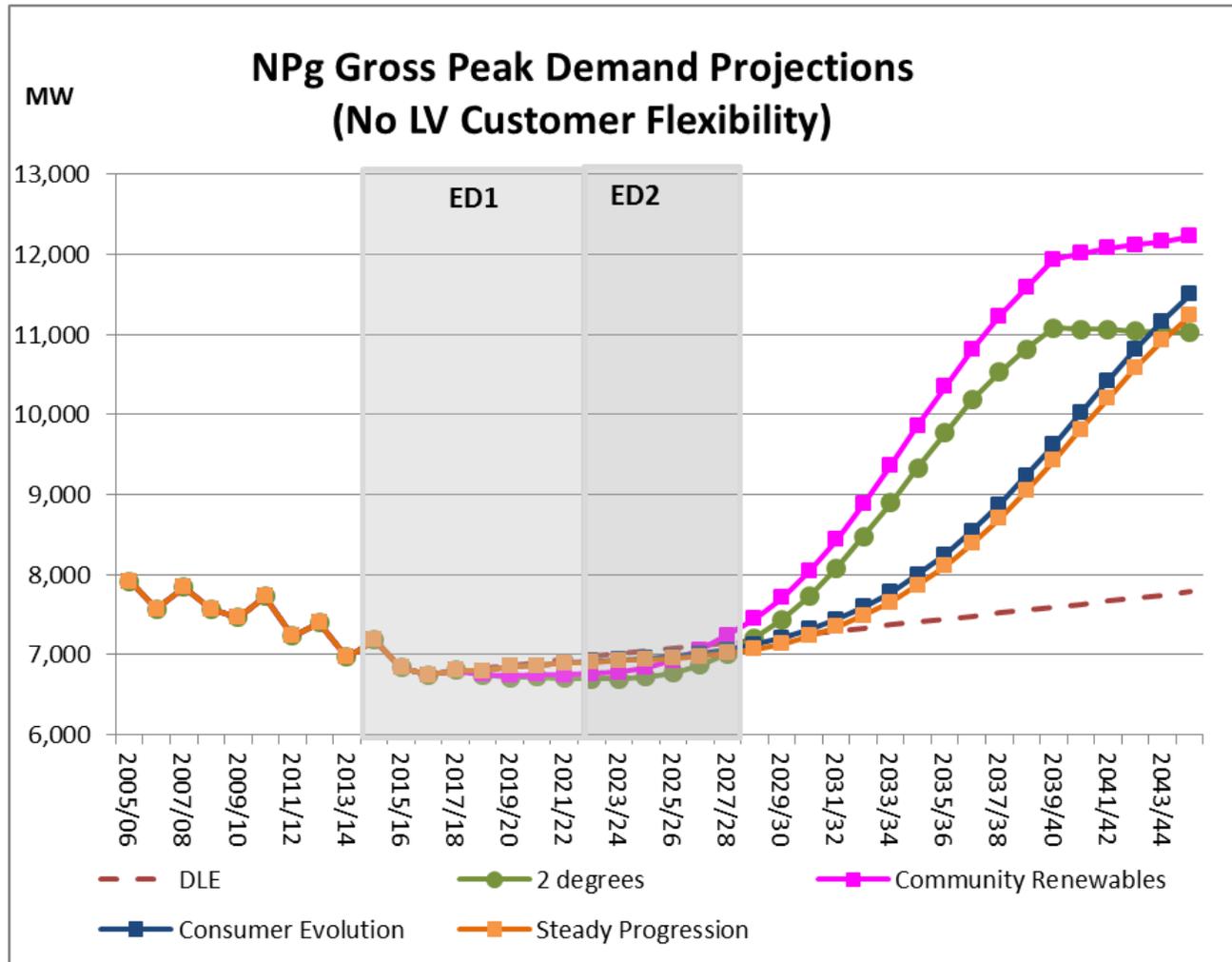


The National Grid FES assume a level of customer flexibility provided by customers connected to the lower voltage networks (i.e. Time of Use Tariffs and EV smart charging, etc).

These incentives are not fully within the control of the DNO, so we need to understand the impact if:

- suppliers do not provide the incentives; or
- if customers take-up is not as expected.

# The impact of customer flexibility on peak demand is significant ...



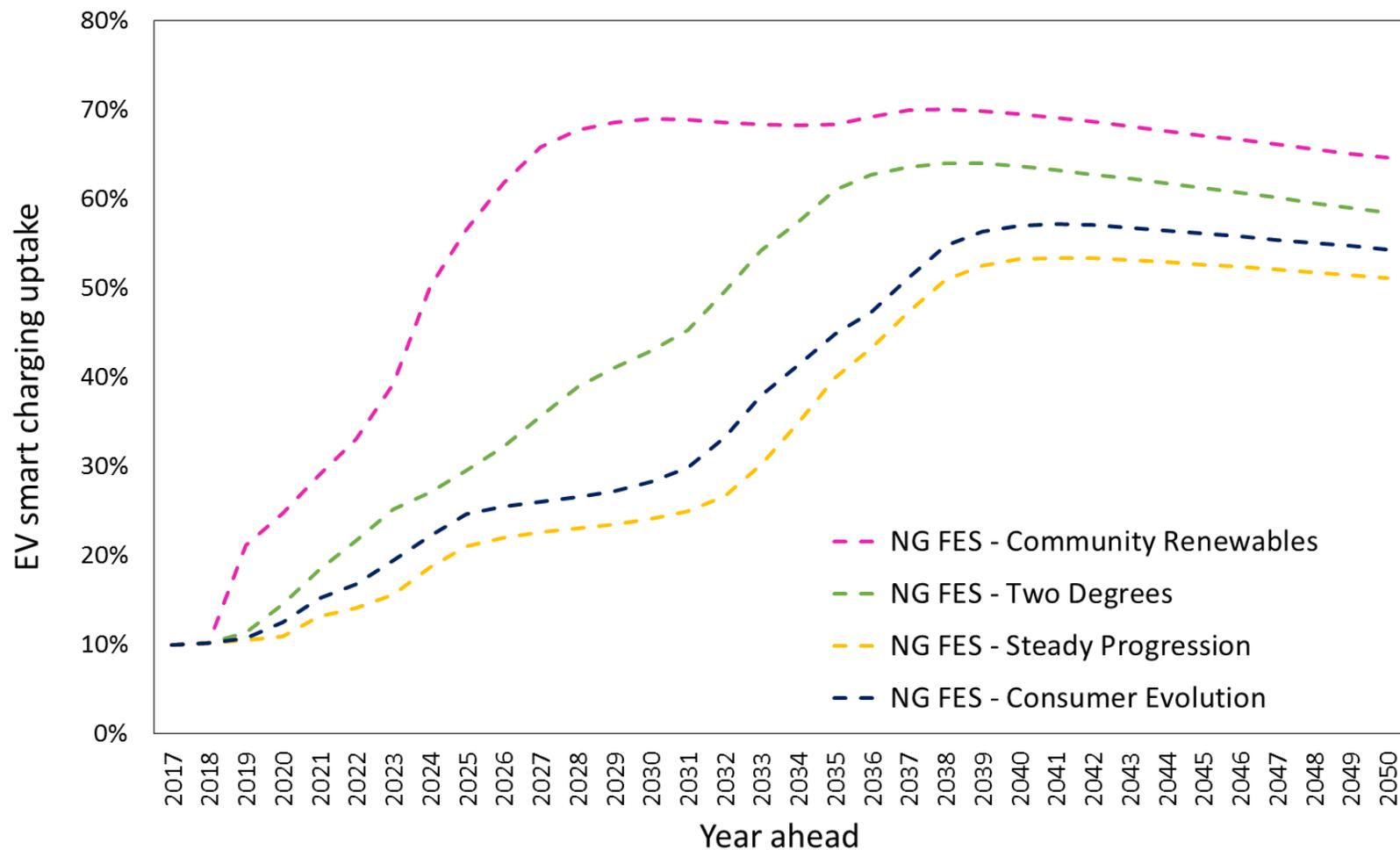
This is a worst case scenario that shows what could happen if:

- suppliers don't offer peak avoidance incentives; and / or
- customers don't take up the flexibility incentives

that become possible with the roll out of smart meters.

# Underlying FES assumptions on customer flexibility

## EV smart charging uptake



# Summary & opening up the roundtable

## The problem

- The Distribution Network Operators need confidence that the rate of take-up of LV customer flexibility embedded in the National Grid FES aligns with the energy retailers plans and aspirations.
- The consequence of this not being the case would be a need to increase network capacity with subsequent increases in network charges



# Roundtable 1

# Explore and discuss the new ways in which energy will be sold in 2030

- What are your views on the vision for new customer offerings presented by Dr Jeff Hardy?
- To what extent can the roll out of flexibility incentives to domestic and commercial customers (particularly those with Electric Vehicles) be large scale rather than niche?
- What are your views on the assumptions used by National Grid in their Future Energy Scenarios about the uptake of Time of Use tariffs?
- Is the wholesale market of energy also likely to undergo change?



# **Markets coordination**

## **Customer-led Distribution System (CLDS) project**

**Anne-Claire Leydier**  
DSO Transition Manager

**9 May 2019**

# About the innovation project

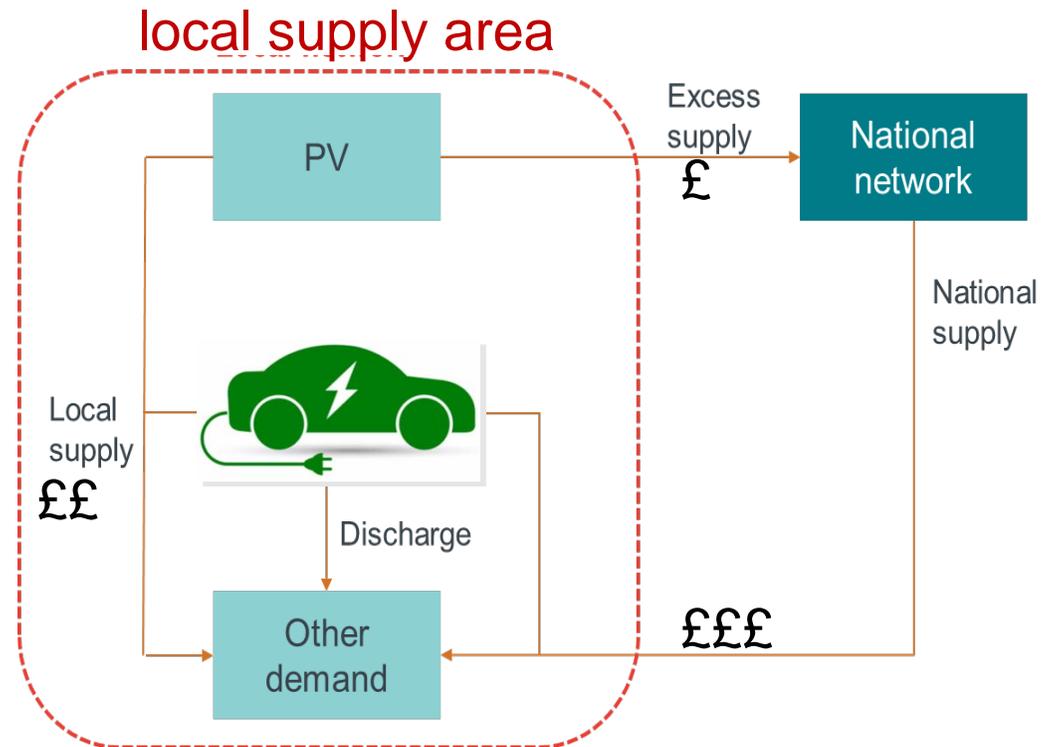
- November 2017 to April 2021
- Desktop-based research
- Studies the interplays between
  - the operation of markets for energy and for network services;
  - network operation, and infrastructure development; and
  - the growth of distributed energy resources (DERs).



# Introducing local energy markets

- “Local markets can drive smart local energy systems optimisation and bring customers into the low carbon transition”
- **Local energy market:** incentivising flexible load to connect and to follow locally produced clean energy
- **Local network market:** payment for flexible response to support the local network

# Energy system modelled



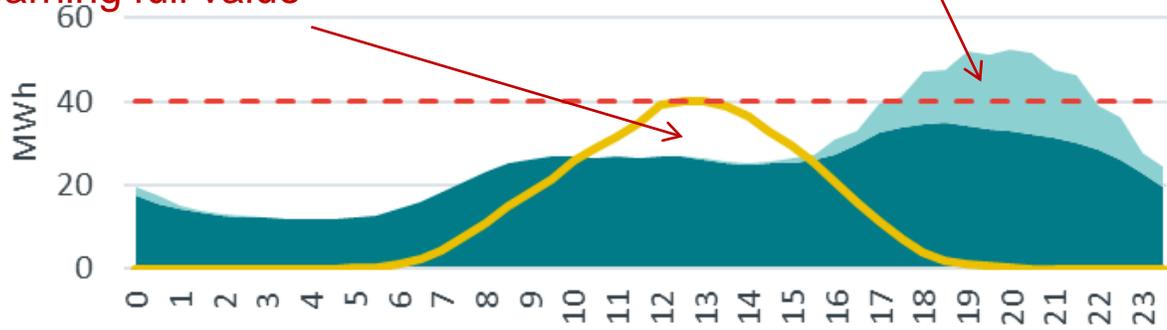
# Markets solving problems



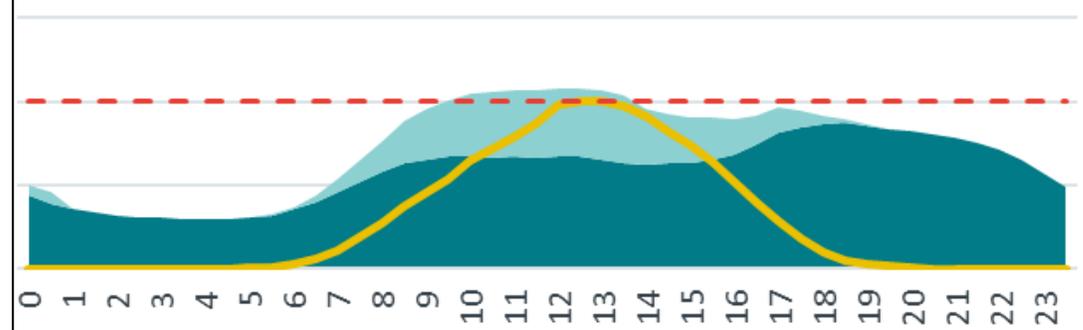
Energy problem:  
energy not  
earning full value

Domestic: Base Case

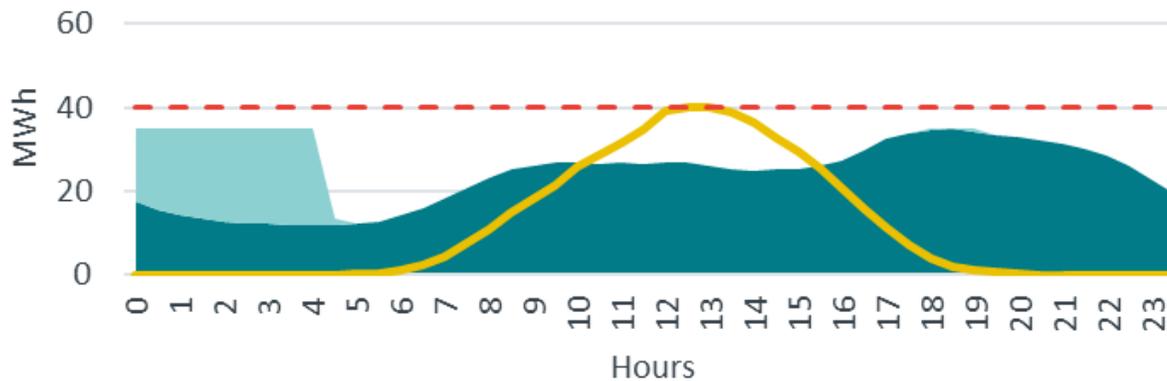
Network problem:  
capacity breach



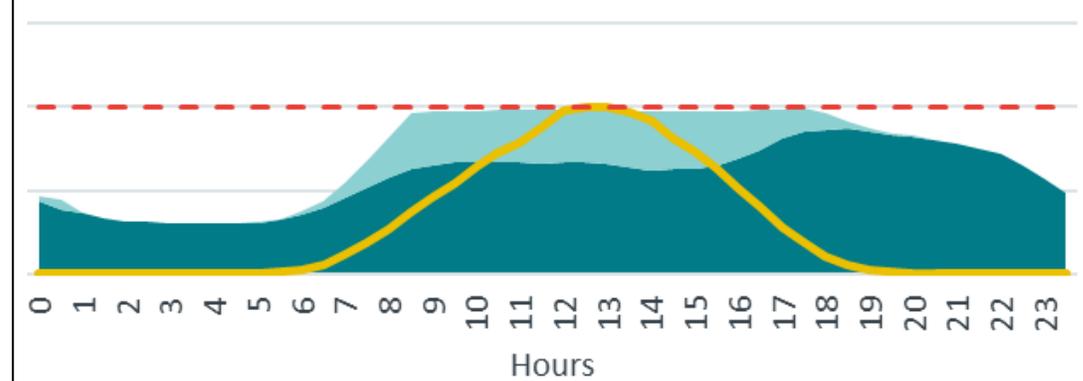
Domestic: Energy market



Domestic: Network market



Domestic: Energy and network market



# Key learning points

- 1. The value of DERs varies** for their owners, users and for the energy system - with their mix, their penetration level, and their time of operation.
- 2. The appropriate market arrangements can increase the value of DERs** for their owners, users and for the energy system.
- 3. But the reverse is also true:** market arrangements that fail to correctly value both network and energy costs may worsen system performance.
- 4. There are cases where increasing network capacity creates more value than flexibility:** if the value of potentially curtailed PV generation was high it makes economic sense to utilise it

# Implications for DSO transition

1. In a world where networks operate a flexibility market on top of a local energy balancing market, **it is important to identify the pieces of the energy supply chain that we are seeking to maximise value from** (i.e. what asset and for who?)
2. **Establishing market principles to coordinate different local markets is a necessity**, particularly if there are competing objectives (for instance between network and balancing needs) – especially because price signals alone may not reflect the preferred prioritisation.



# Roundtable 2

# Explore and discuss the interaction between energy retail and network-led flexibility markets

- What impact, if any, can network-led flexibility markets have on energy wholesale and retail markets?
- To what extent will the new customer offerings help DNOs reduce the risk of increased network peak constraints?
- Is there a need to bring together various actors' price signals? How should this be co-ordinated?
- How could a DSO help to enhance the new retail value propositions?



# Smart enablement for business models

**Issy Middleton**  
Programme Manager

**9 May 2019**







# Roundtable 3

# Explore and discuss the role of DSO to enhance these new value propositions

- What technologies are key to enabling the new retail value proposition?
- Are there any specific functionalities within these technologies that are key?
- Will you have any specific requirements of a DSO to enable or enhance your customer offering?

**Thank you**