Insight Session 1:

Tamar Bourne; Richard Hall; Rachel Stanley; Felicty Jones; Sam Weavers; Jeff Hardy; Janet Wood; Afsheen Rashid

IGov Advisory Group, 6th July 2017

IGov New Thinking For Energy

University of Exeter

EPSRC Engineering and Physical Sciences Research Council

Your homework question was:

From your perspective what do you think is the most important thing/s happening in energy systems within GB/Globally in terms of practice change or ideas?

Three questions to come back to in each session

- What are the key issues and challenges for governance ?
- What is most important for GB ?
- What does this mean for the IGOV 2 research focus ?

Tamar Bourne – (fed in)

- Decentralisation of how power is generated and supplied. We are doing a lot of work on local supply models and keep coming across barriers, such as: not being able to lease part of the public network from the DNO; and the charging structure not reflecting/incentivising local balancing.
- The expansion of flexibility markets and the move to DSOs. We are keen to see this done in a coordinated and transparent way that allows the small players (including households) to engage and benefit.

Rich Hall (fed in)

The increasing irrelevance of wholesale prices. They no longer provide the signal to invest in new generation or demand reduction, and are less frequently the driver of retail bill movements than previously. This creates real difficulties in measuring subsidies, which are often calculated through reference to the wholesale price - even though nothing could be built at that price. It creates communication and trust challenges around policy costs - which are often opaque and blamed by suppliers for price movements. It creates challenges for government in how it chooses to replace that missing money through capacity mechanisms and decarbonisation instruments - creating a single central buyer tasked with having perfect foresight. It can result in clumsy approaches to tackle scarcity - eg we have a capacity market, should it actually be a flexibility market? And as we increasingly enter a world where some renewables are at grid parity, it creates transition risks as governments consider how they move back to a market - that long term contracts struck now will overhang the market, suppressing the price etc. What's the exit strategy?

Rachel Stanley

Different types of practice change have different barriers and needs

Types of Practice Change	Customer / Citizen Focused	New Tech	Asset Focused
Focus	Focus on people / behaviour: - Engaged/Empowered - Sharing Value	Focus on experimentation	Focus on infrastructure: - Increasing control - Optimisation
Examples	• Smart meters • NILM/ Disaggregation • Peer to Peer • Domestic Storage • Domestic DSR • Flexible charging contracts	• EV flexible charging • Blockchain	• Commercial DSR • Grid-based storage • VPPs • Flexible charging infrastructure

Barriers	- Slow smart meter rollout and lack of HH domestic metering
	- Focus on consumer protection by "consumer choice" -> focus on compliance over innovation by suppliers
	- Complexity:
	  - Process – complex web of codes / industry flows
	  - Stakeholders – high number and roles and responsibilities / relationships intransparent
	  - Physical – domestic electrical wiring
		New tech requires new business models – difficult to predict and value potential requires significant regulation changes, but there's a bit of chicken and egg!!	- Uncertainty of regulation / revenue stream
			- Industry mindset / investment decision making methods focused around concrete and steel

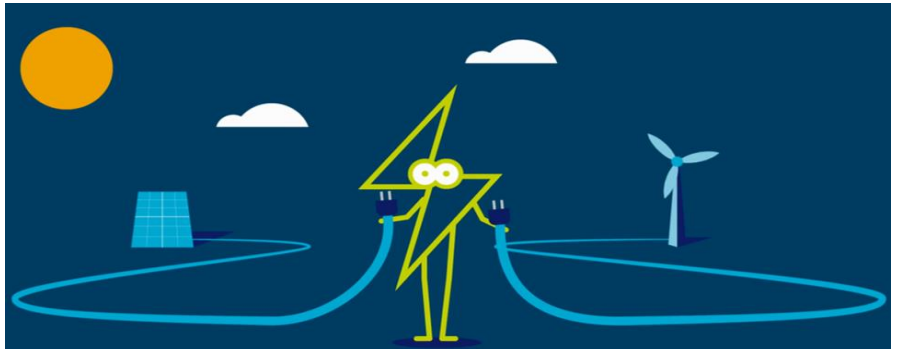
Practice-change Actors				
	Community Energy Groups e.g. Repowering London Carbon Coop Energy Local	**New Tech Entrants** e.g. Ubitricity Sonnen Powervault Greenrunning	**Aggregators** e.g. Upside Energy Smarter Grid Solutions Open Energi Origami Energy	**Suppliers** e.g. Ovo – vCharge Centrica Coop

Felicity Jones

- We are seeing a battery storage boom
- 500MW of batteries secured contracts in the last Capacity Market T-4 Auction (Dec 2017)
- 200MW of batteries are due to come online to deliver Enhanced Frequency Response by March 2018
- A further few hundred MWs of batteries are being developed right now to deliver Firm Frequency Response.
- Storage is no longer a hype-machine – it is a reality. Investors and even lenders are coming on board.
- This has big governance implications: how do investors transition from a renewables market (where you get a 15-yr guaranteed subsidy) to a merchant market (where you get short term contracts only)? How does National Grid make its procurement processes genuinely open to smaller projects? How do we clarify the regulatory uncertainty about how storage is treated? And how do we get ready for a future where the batteries within electric vehicles will be providing grid services in future?

centrica

Sam Wevers - Cornwall Local Energy Market



Points of interest:

- National Grid:
  - Future role of the System Operator
  - System Needs and Product Strategy
  - Trial with UKPN
- DNO trials:
  - Flexible Power (WPD)
  - NINES (SSEN)
  - CMZs (SSEN)
  - Market-based approaches to curtailment (UKPN)
- InterFlex
- NY, California, Hawaii, Maryland, Oregon, Massachusetts
- Winter Package legislative agenda (e.g. Article 17)
- Cornwall Local Energy Market

European Union
European Regional
Development Fund

Jeff Hardy

This slide can be downloaded as [a PDF]

Imperial College London

Grantham Institute

June 2017

Society-led low carbon transformation

About the research

Our energy system – vital for keeping us warm, fed, entertained, mobile and productive – is changing. It is becoming cleaner and smarter, driven by environmental law, an explosion of data and rapid technological development. In the future, peoples' role as relatively passive consumers may end. This is because a future low-carbon energy system is more efficient and affordable if people consume energy when it is available, for instance, when the sun is shining and the wind blowing. There are also increasing opportunities for people and communities to take more control over energy, driven by the falling costs of technologies, like solar photovoltaic panels.

The cheapest future energy system is a smart and efficient one – the National Infrastructure Commission thinks a smart power system, where demand follows available supply, could save consumers up to £8 billion a year by 2030. This is a business opportunity for existing and new energy companies.

This study has centred on two potential future energy business models that put people or communities in control of energy. One model, 3rd Party Control, is where a company engages on your behalf in the energy system. The other model, Shared Economy, is where communities have come together to own and operate their local energy system.

During the research, energy stakeholders examined two futures, in which one or the other business models has dominated the market. They were asked "what would have to happen for this to be true?" Their answers give insight into: what is driving new business models; the issues they could face; and insight into the decisions that can be taken to enable new businesses to thrive. This graphic is a summary of the findings.

The study was funded by ESRC Impact Acceleration Account grant ES/M500562/1.

About the researcher

The study was undertaken by Dr Jeff Hardy, a Senior Research Fellow at the Grantham Institute – Climate Change and the Environment, Imperial College London. Jeff's research interests are around future low carbon energy systems, particularly how people will engage and what businesses will operate. Previously he was Head of Sustainable Energy Futures at the GB energy regulator, Ofgem, and Head of Science for Work Group III of the Intergovernmental Panel on Climate Change. He's also worked at the UK Energy Research Centre, the Royal Society of Chemistry, the Green Chemistry Group at the University of York and at Sellafield as research chemist in a nuclear laboratory.

About the Grantham Institute – Climate Change and the Environment

The Grantham Institute is committed to driving research on climate change and the environment, and translating it into real world impact. Established in February 2007 with a £12.8 million donation over ten years from the Grantham Foundation for the Protection of the Environment, the Institute's researchers are developing both the fundamental scientific understanding of climate and environmental change, and the mitigation and adaptation responses to it. The research, policy and outreach work that the Institute carries out is based on, and backed up by, the worldleading research by academic staff at Imperial.

www.imperial.ac.uk/grantham

Grantham Institute
Climate Change and the Environment
An Institute of Imperial College London

You and your energy company in the low-carbon future

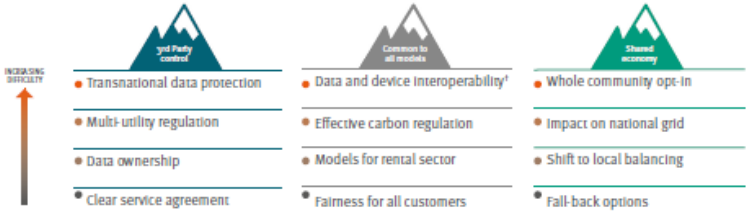
The UK's energy system is changing

From a few large generators to many small ones + Energy supply is becoming more intermittent + Consumer satisfaction with energy suppliers is low = £8bn+ saving*

This study examined two new future energy businesses that could address these issues

It uncovered common and specific drivers for these new energy businesses

Requirements for these businesses to succeed



Take-home messages

- **Markets must enable business model innovation**
- **Smart devices and data must be interoperable and secure**
- **Service standards must be better**
- **Solutions required for all consumer situations**
- **Greenhouse gas emissions must be regulated**

*For smart power alone, the National Infrastructure Commission estimate it could be worth up to £8bn a year by 2030
†Interoperability is the ability of computer systems or software to exchange and make use of information

Research by Dr Jeff Hardy, Senior Research Fellow | Grantham Institute – Climate Change and the Environment, Imperial College London | grantham@imperial.ac.uk

New Power

Janet Wood

The shift from a government/business to a consumer-led industry

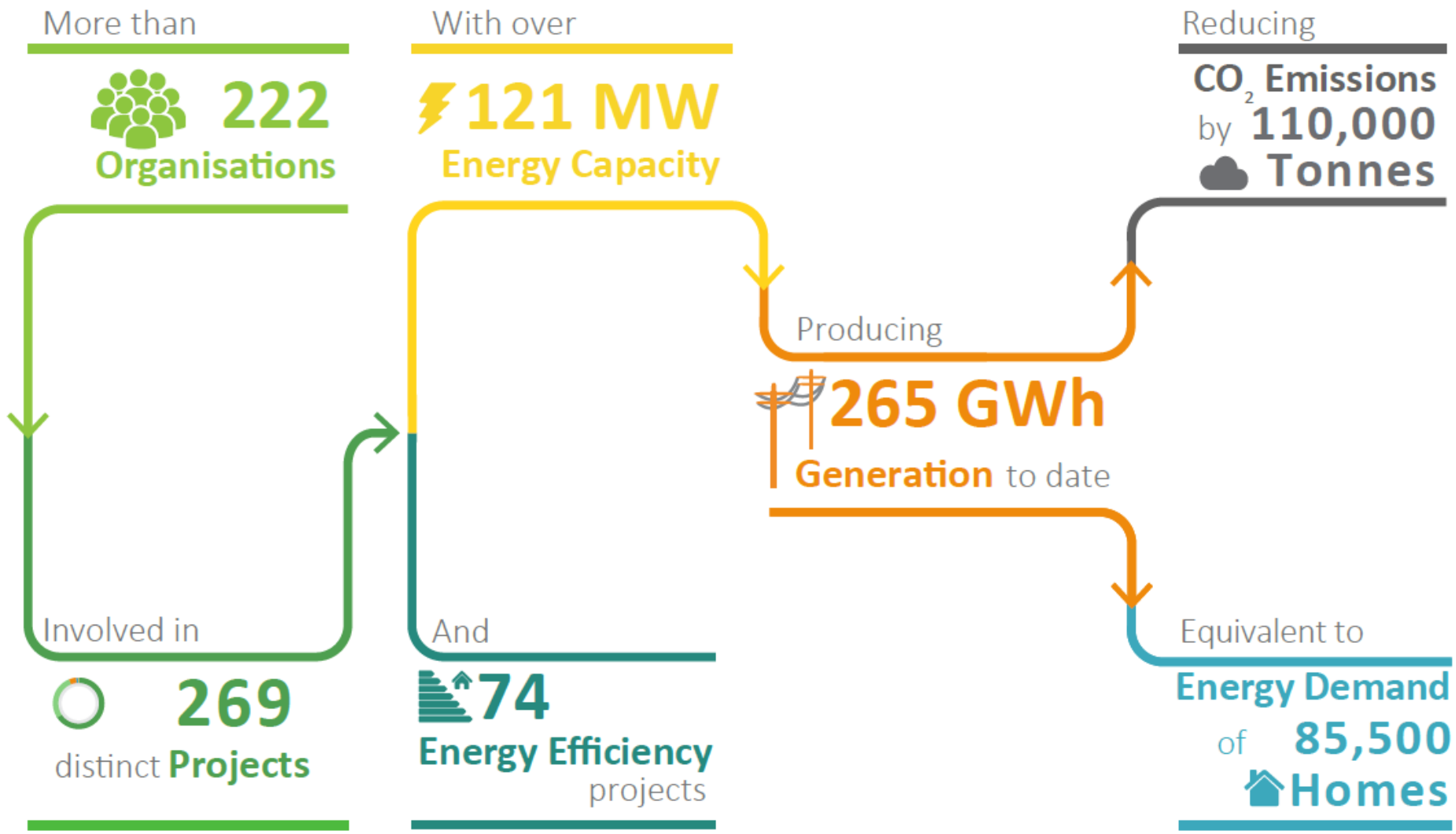
- The history of the energy industry has been central provision, often government-led
- That has determined development routes, industry pace and culture: eight-year price controls; 25-year contracts; large scale networks
- That mindset remains underpins most industry thinking, even when it aims to be future-proof
- Consumer technologies evolve much faster than large engineering, and can ‘boom’
- The UK can easily forget that it is not a global driver any more, can be ‘blindsided’
- Raises big issues about fairness as fragmentation replaces socialised charges
- This is not a single industry any more, nor one where progress is predictable, forseeable, or even necessarily logical
- Governance has to be flexible in response

Afsheen Rashid
Important things happening in energy systems in GB

REPOWERING LONDON

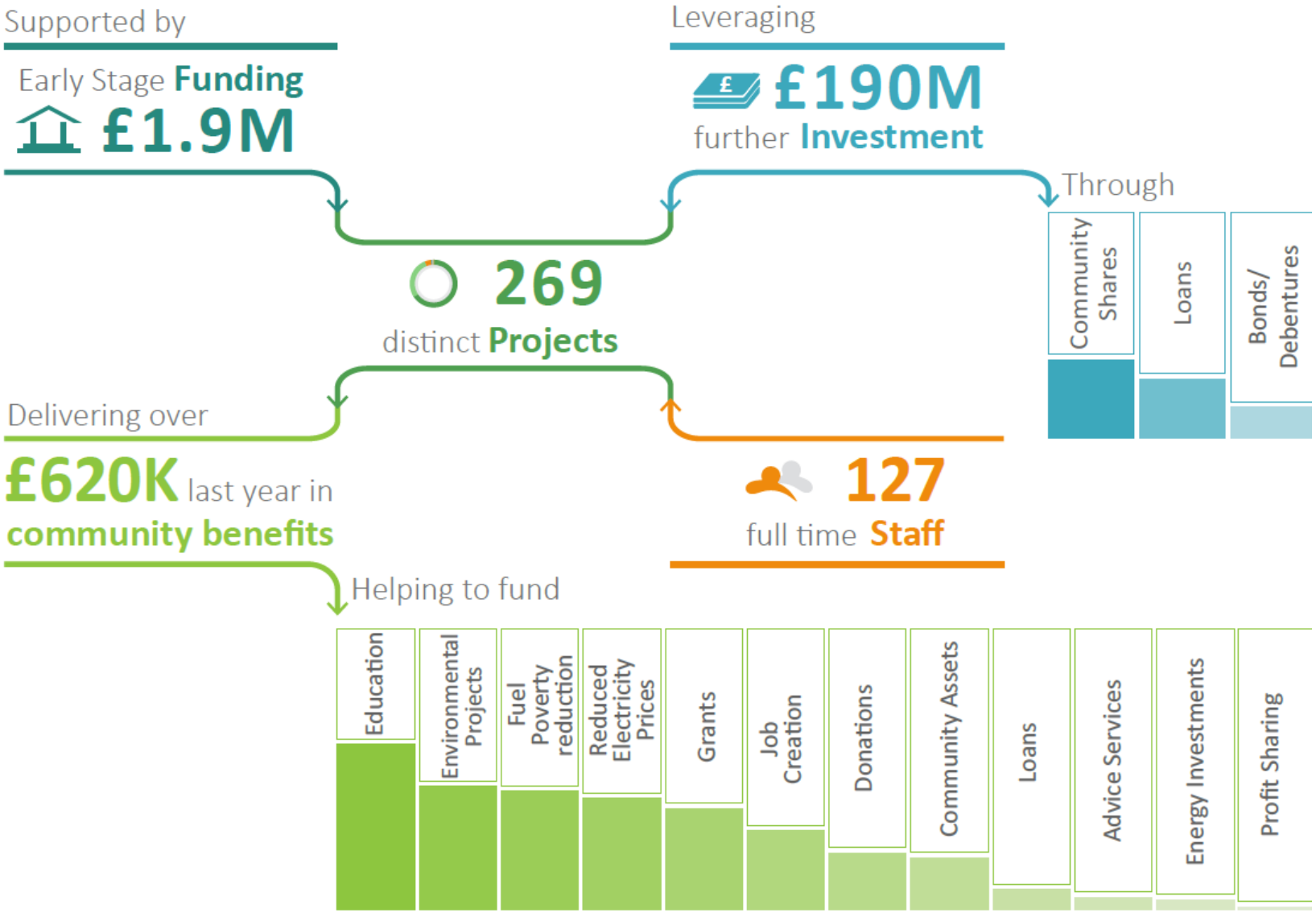
- Community Energy - Local ownership, control and benefit
- Innovation – technology, emerging business models, regulatory sandbox
- Establishment of partnerships and collaborations
- Lack of policy support and strategic thinking

Community Energy
State of the Sector Report



Community Energy
State of the Sector Report

Community Energy England



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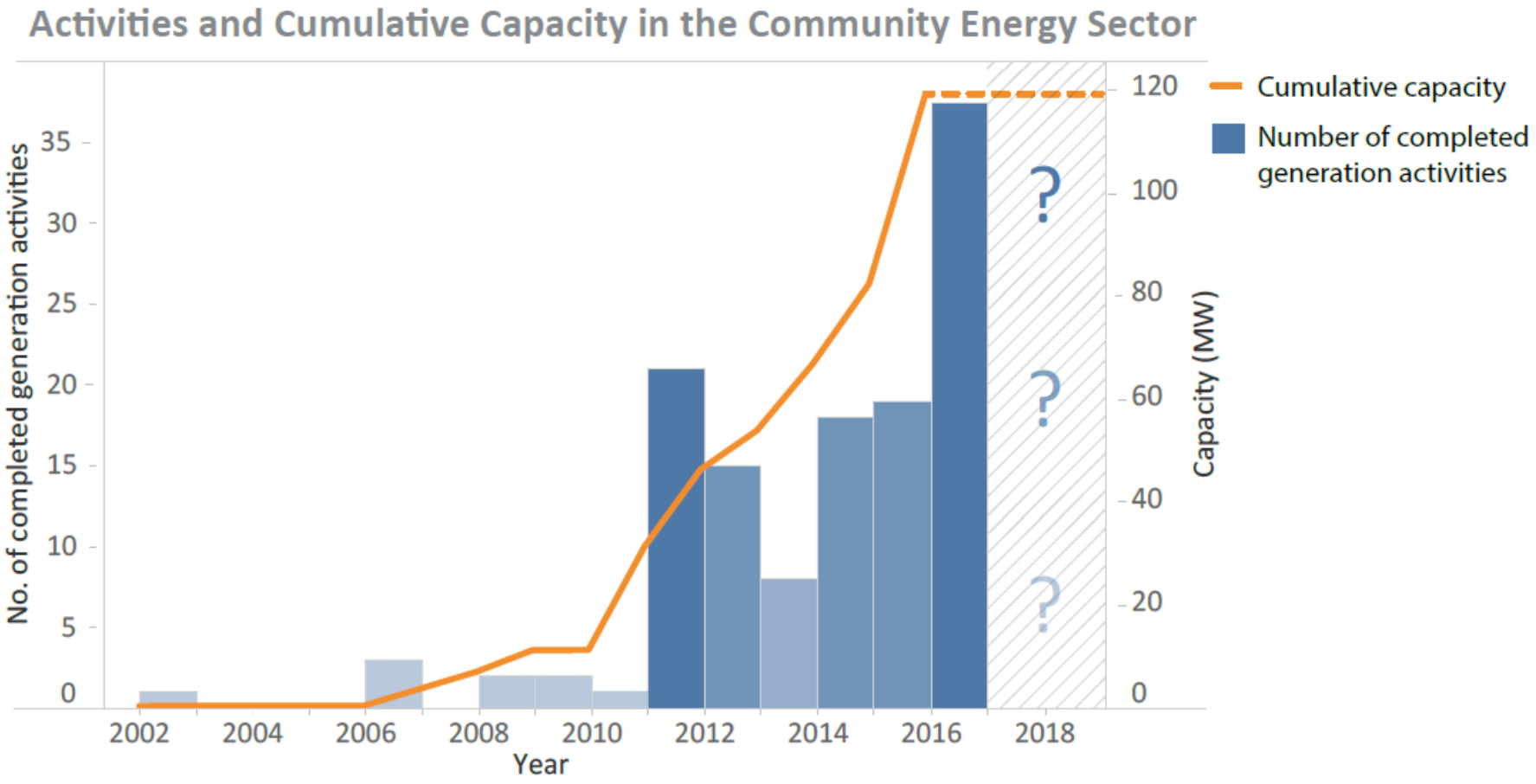

Three questions to come back to in each session

- What are the key issues and challenges for governance ?
- What is most important for GB ?
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Insight Session 2

Simon Roberts; Judith Ward; Adam Cooper; Nigel Cornwall; Chris Harris; Graham White; Becky Willis; Syed Ahmed

IGov Advisory Group, 6th July 2017

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Judith Ward

Revolutions take time to play out ….

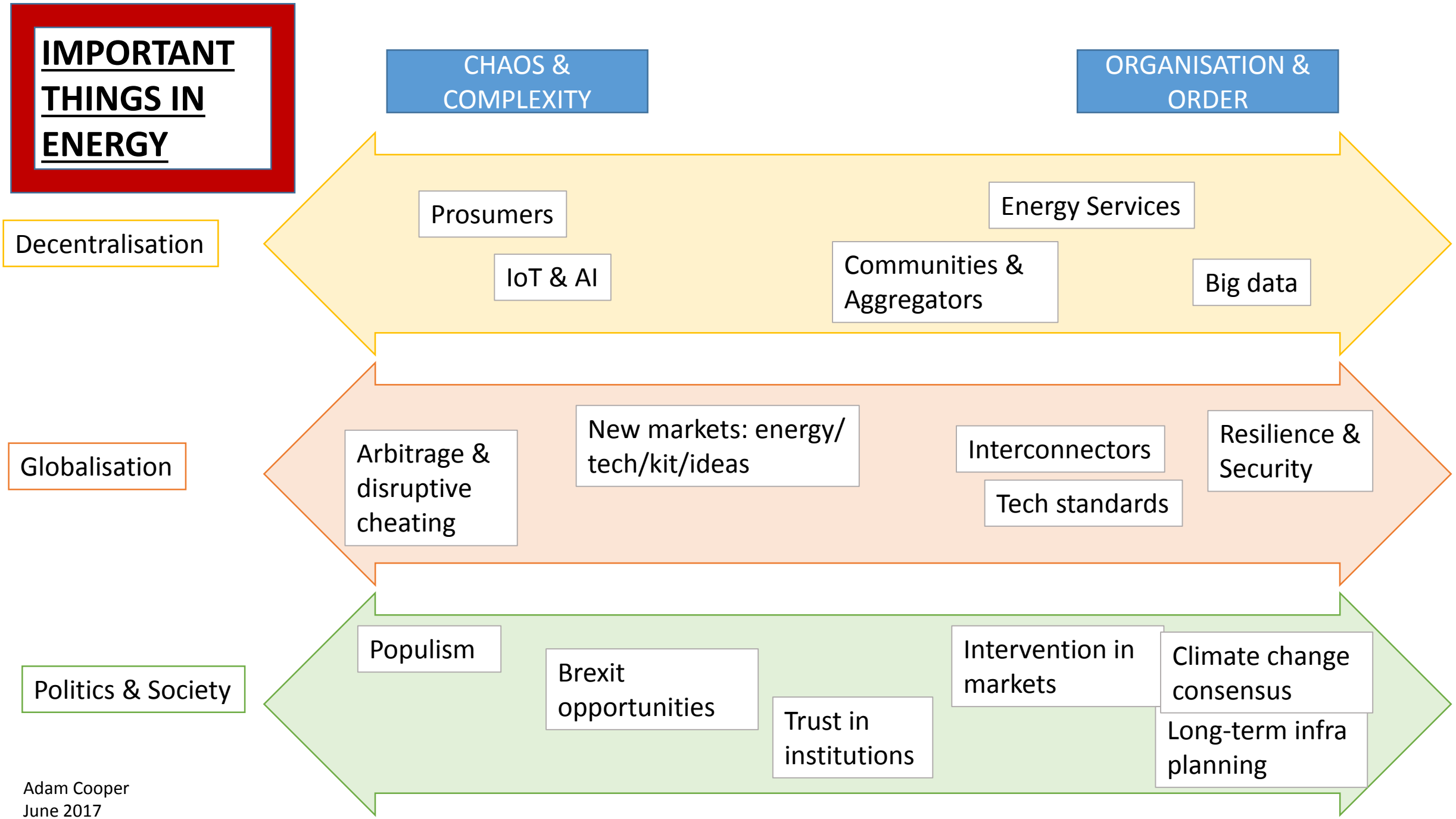
1. **A user-led energy transition**
   - for real ?
   - ‘public interest’ outcomes - ‘fair’, green ?

2. **Gas – what *is* the future ?**

3. **Our networks – what are these for ? Who should pay for what ?**

4. **Winners / losers** (revolutions stall) . **Where’s the tipping point?**

IMPORTANT THINGS IN ENERGY

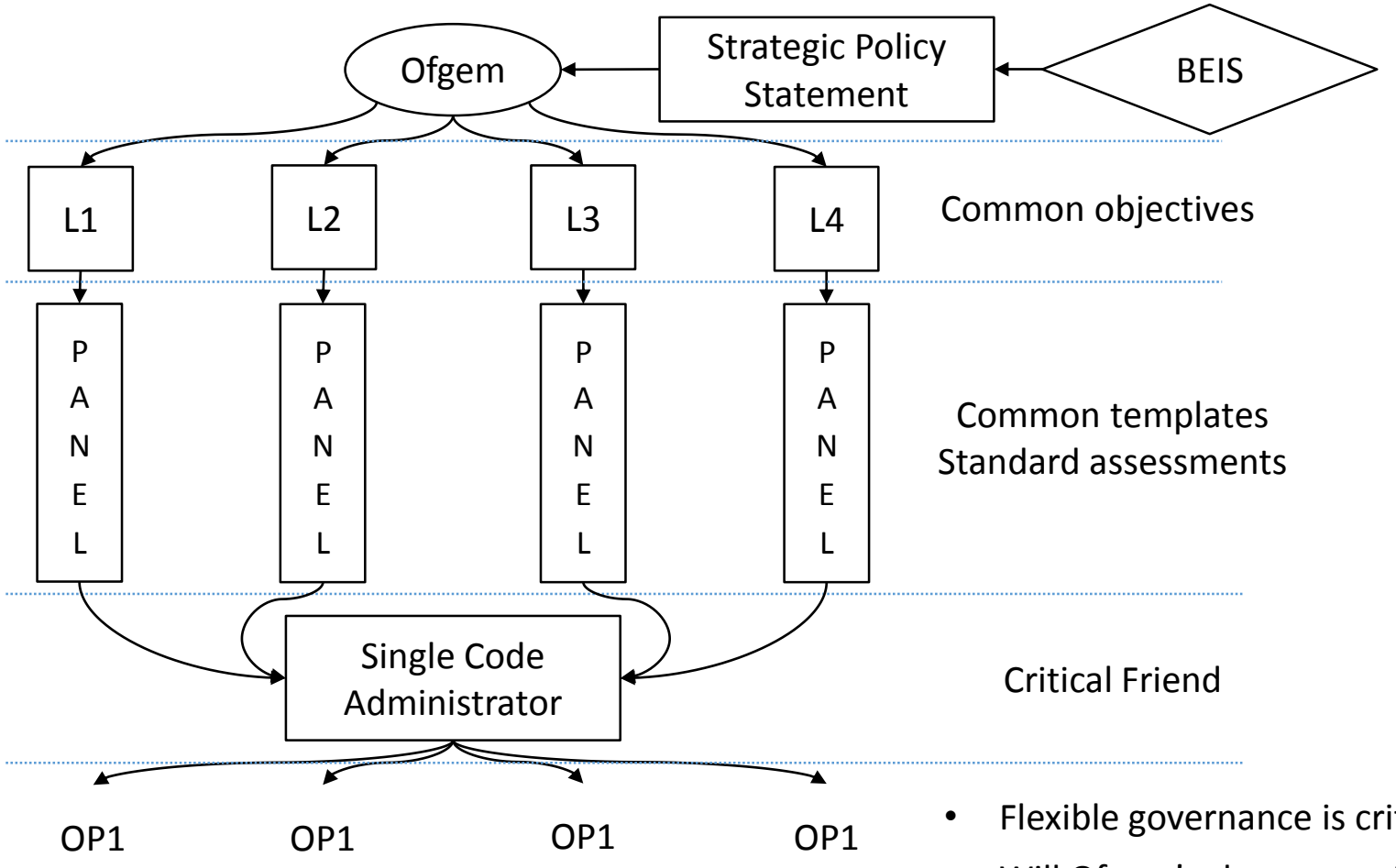


Adam Cooper
June 2017

Balancing better governance and market transformation

IGov, 6 July 2017

Nigel Cornwall, Pixie Energy

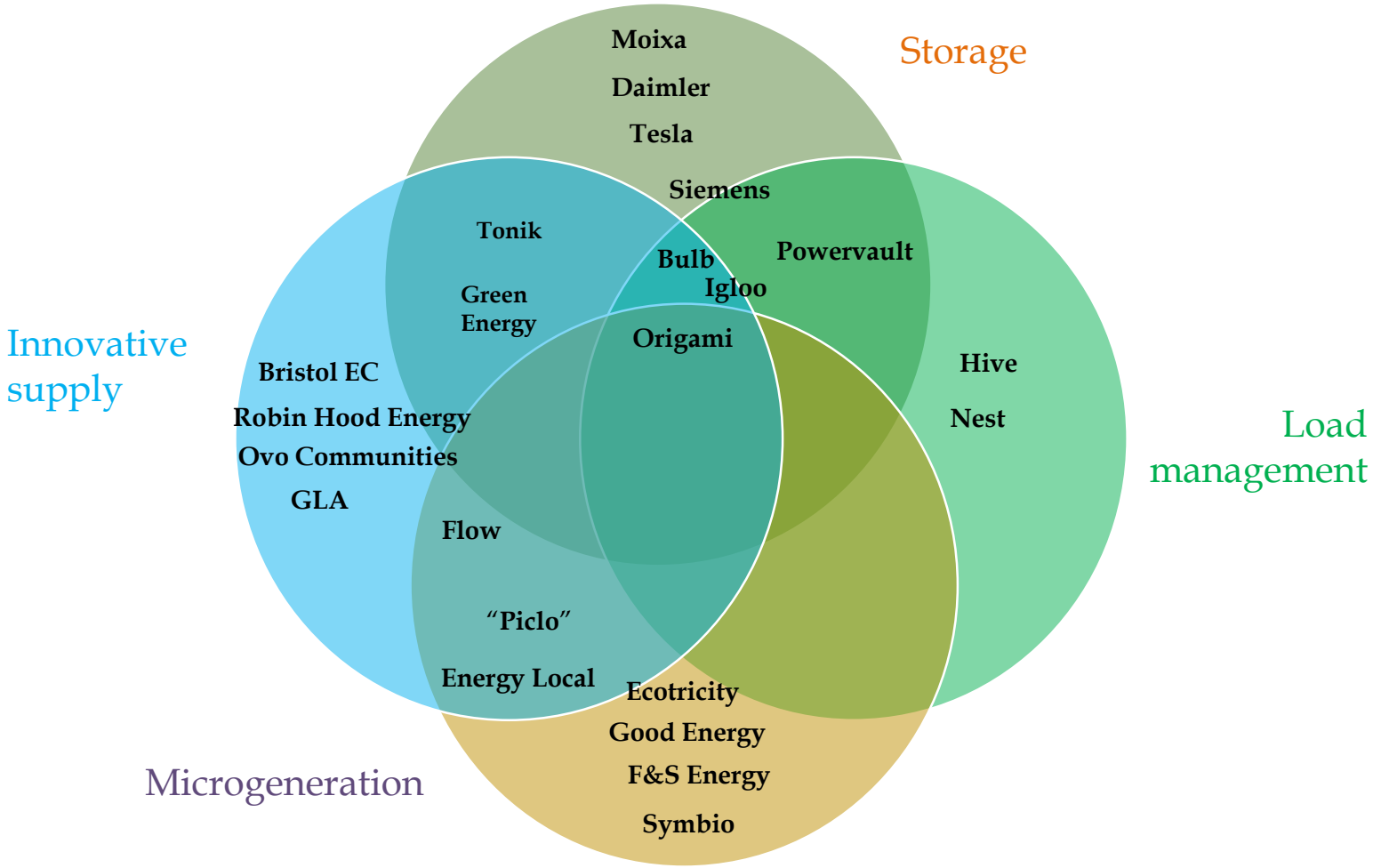


L = Licence

OP = Code Operator

- Flexible governance is critical
- Will Ofgem's changes go far enough?
- NTBMs and how to engage with them
- Too early to learn from regulatory sandbox

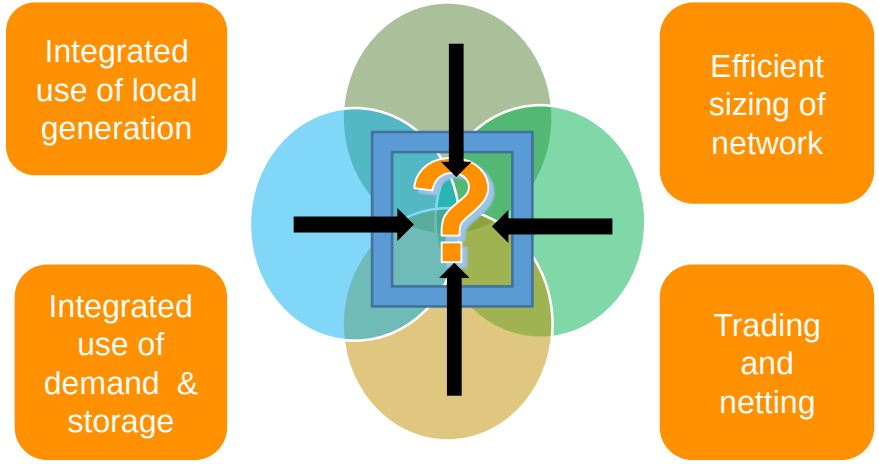
New players and business models



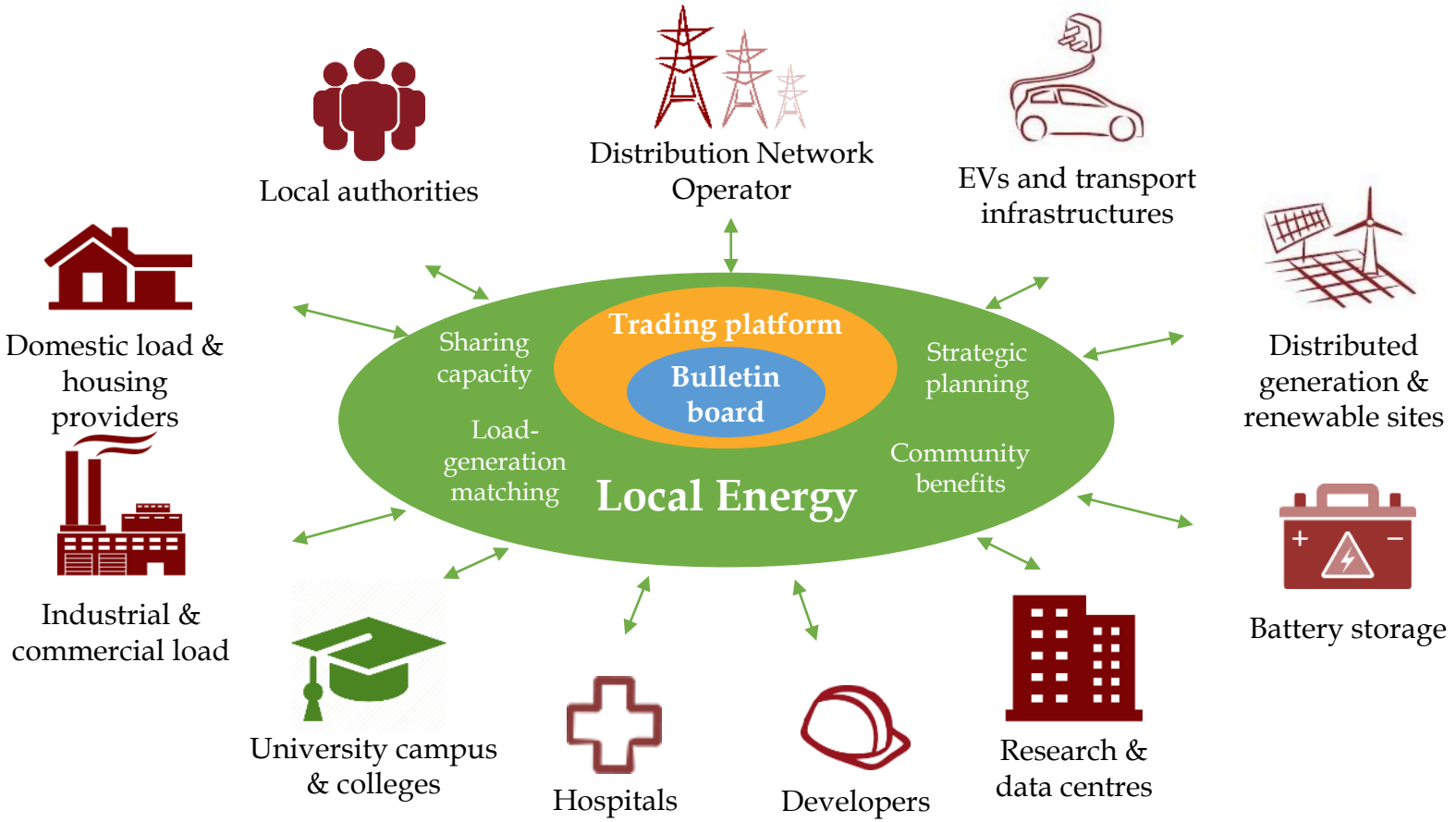
Drivers of change

- Transformation is happening but in a piecemeal and uncoordinated way
- All solar PV and nearly half of wind generation “embedded”
  - consumers are becoming “prosumers”
  - pressure on networks is increasing
- 20% of generation now intermittent making prices more volatile
- But costs falling
  - solar costs continue to fall (~10% by 2025)
  - lithium ion storage too (~60% fall by 2030)
- Systems also becoming smarter
- Interest in “peer to peer” trading increasing
- Decarbonisation will continue to act as catalyst

Moving to a smarter world will lead to a more efficient use of local energy resources and greater energy resilience



Smart communities and smart cities



THANK YOU

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Chris Harris: Energy Systems Change – Practice & Ideas

What is happening ?

Electricity – Massive installation (EV, PV, HP, batteries etc) coming on at the grid edge. Massive commercial innovation at the market edge. Regulatory market design getting left behind.

Gas – still building out infrastructure for tomorrow's today.

What are the key issues and challenges for governance?

Electricity – When should government/regulator enable, prevent or get out of the way

Gas – Decisions on big gas infrastructure need to be taken, but how?

What is most important for GB?

Decision on gas for heat and (to a lesser extent) transport, thence infrastructure, carbon capture and storage, hydrogen, domestic biogas, low or high C gas import

When to cast the consumer protection net, who to cast it and how

What does this mean for the IGov2 research focus?

How to get attention and cross party consensus on key issues so that energy policy is not destabilised by elections. What bodies can enable this (CCC, Ofgem, NIC, catapult, other)

How much should the private sector be responsible for redistribution of wealth and to what extent should consumers by protected from their own decisions.

Graham White

Challenge: One of the major governance challenges is to create a long term, stable market framework that tackles climate change, whilst maintaining security of supply, through competition in energy (electricity) markets.

Problem: Increased intervention by Government (and the lack of a long term strategy) is creating uncertainties, reducing competition, discouraging investment and innovation, and leading to a complex "state-driven" energy system with many unintended consequences.

Solution:

(a) Capacity market (through auctioning) can deal with security of supply.

(b) Additional interventions (multiple) to deliver lower carbon emissions have led to Government's determining capacity and price and a significant reduction in competition.

(c) (c) A carbon price (capable of ultimately delivering climate change targets) seems to be the best route for re-introducing competition.

Issues:

- (1) Public acceptability of carbon prices seems, at best, lukewarm. Why?
- (2) Current proposals (e.g. EU-ETS) have not been a great success. Why?
- (3) Carbon taxes, or trading regimes, are means of pricing carbon. Are there others and which is likely to be most successful?
- (4) Distributed generation, and the creation of regional/local markets, have some advantages over a national approach. How is the carbon price best reflected in such an approach?
- (5) Can a carbon price be made more acceptable by phasing it in over time – using receipts to support social and industrial policies and reduce opposition?
- (6) Any solution needs to be at global level – to tackle competitiveness concerns -and have an appropriate international governance regime (such as the G20). How do you achieve global support that will have an impact?

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