EnergyREV

What are the most important decisions to enable smart local energy systems?

Dr Jeff Hardy & Dr Madeleine Morris
Grantham Institute, Imperial College London

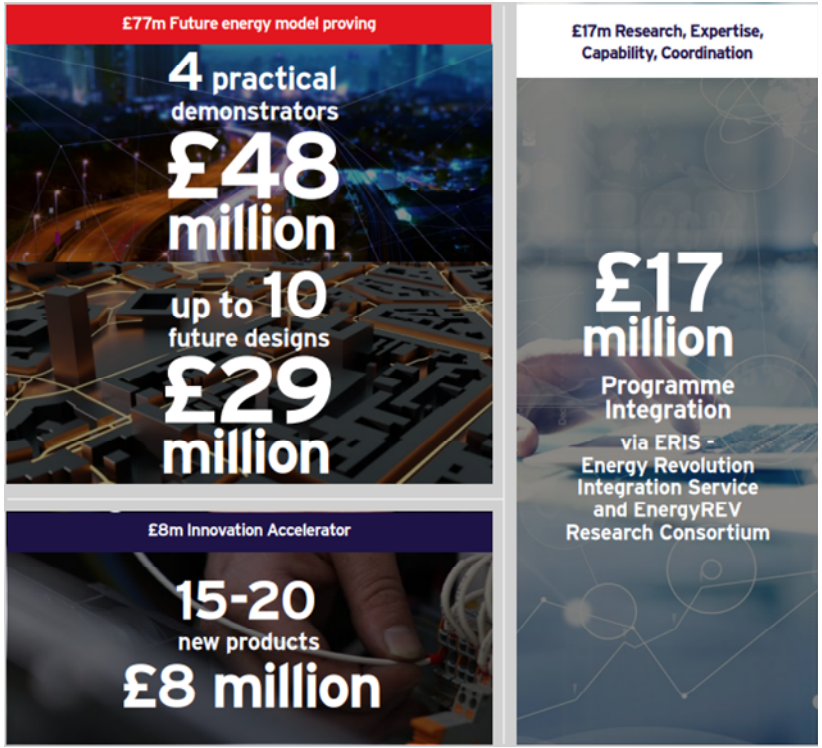
Oxford Energy Network's seminar series
8th November 2022

INDUSTRIAL STRATEGY

UK Research and Innovation

EnergyREV and PFER

EnergyREV within Prospering from the Energy Revolution (PFER)



Informing projects' future plans for delivery and scaling

Systematic research and analyses of longer-term requirements and innovations

Integrating knowledge from global activities

EnergyREV

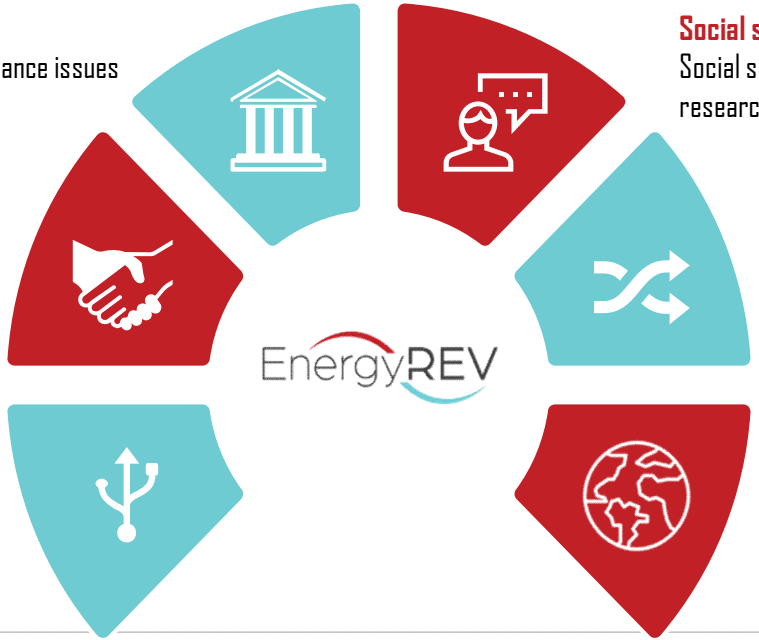
The EnergyREV Consortium

Consortium of 32 co-investigators from 22 Universities → *Exploring challenges around smart local energy systems from an interdisciplinary and whole-systems viewpoint.*

Policy perspectives
Policy, regulation, markets and governance issues around local energy systems

Social science insights
Social science understanding of end user research and engagement

Business, innovation, finance
Local energy businesses practices and industry engagement



Multi-vector "whole" systems
Electricity, heat and transport, and system integration

Data, AI, engineering
Expertise across wide ranging cyber-physical issues

Energy and environment
Interactions between energy and environmental systems

WP3.1 SLES governance

EnergyREV policy, regulation, markets & governance team

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Overarching research question:

Do we have the appropriate policy, institutional and regulatory framework to realise the technical, economic and societal potential of Smart, Local Energy Systems?

WP3.1 Workstream

“What are the barriers to SLES?”

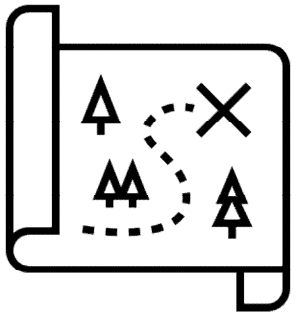
Policy & reg landscape reviews
2019-2021

“What change decisions would enable SLES & why?”

Decisions theatres

2022

“How/when should the changes be implemented? By whom?



Policy route-map

2023

The policy & regulatory landscape review

"Do we have the appropriate policy, institutional and regulatory framework to realise the technical, economic and societal potential of Smart, Local Energy Systems?"

1. Search methods

- Crowdsourcing
- Systematic online search
- Background documents
- Citation search

2. Screen + Sift

- Inclusion/exclusion criteria applied to all
- **Include relevant**
- Exclude irrelevant

3. Analysis

- Inductive coding
- Thematic analysis
- Cross-cutting themes
- Value chain
- Tech/ activity

Outputs to date – rigorous systematic reviews

- Definitions matter
- Ownership and visibility
- Market access and stacking value
- User-centric smart design
- Create smart local energy systems today

- PfER opportunity to learn, demonstrate & inform on market/platform design
- DER unleashed by platforms – but trust essential
- ESO and DSO roles

- SLES approach could result in net-zero transition that is faster, has more benefits, and is fairer.

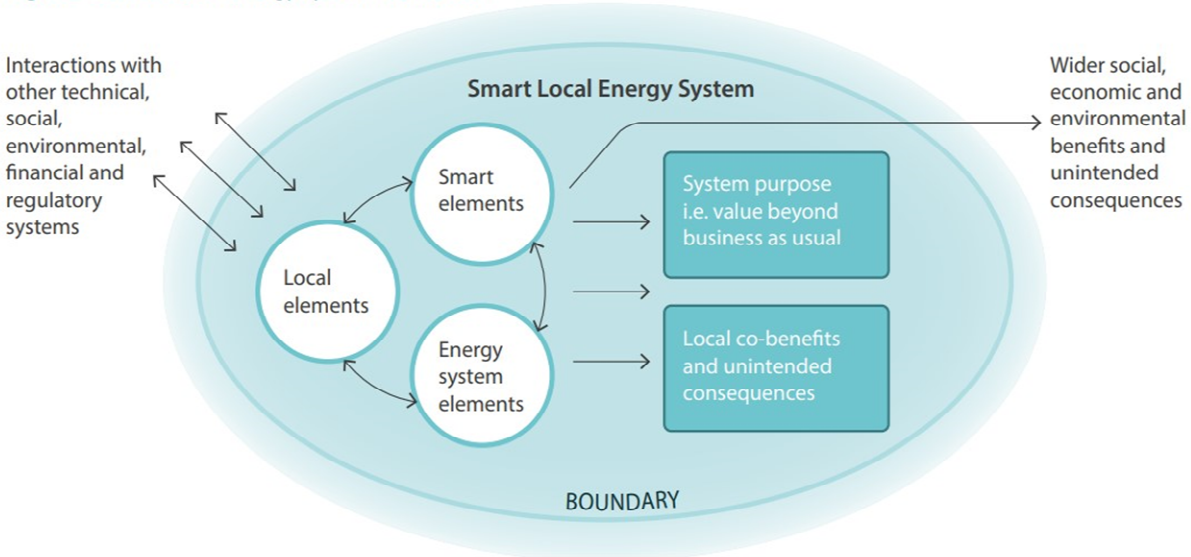
- National strategy needed
- Devolve powers locally (including EE, engagement, coordination of skills and training)
- Enable place-based energy innovation

Smart local energy systems

What is a smart, local energy system (SLES)?

- Contains energy, local and smart elements.
- Highly place-based – local needs, goals, resources, actors and conditions.
- SLES are becoming more complex (e.g. combining electricity, heat and transport) and smarter over time.
- SLES are currently mostly projects – specific to a place and local needs.

Figure 1: Smart local energy system framework



[SLES = smart local energy systems]

The benefits of SLES

- SLES have a range of process and outcome benefits and influence over how benefits are distributed.
- How a SLES scheme is configured (leadership, technology, location and objectives) will determine which benefits are desirable and achievable.
- Co-benefits are also interlinked (e.g. pollution → health → reduced NHS cost) and timescales matter.
- SLES interact with wider energy systems – local benefits could be at the expense of wider stakeholders.

	Potential benefits of SLES				
Process related benefits	Inclusion / participation	Addressing inequalities	Public engagement	Transparent / participative decision making	Governance and accountability
Financial / economic benefits	Reduced system costs	Reduced generation costs	Reduced household bills / fuel poverty	Reduced technology costs / payback time	Reduced NHS cost
Financial / economic benefits (continued)	Employment opportunities	New business models	Innovation	Increased (local) revenue	
Educational benefits	Skills development	Energy / sustainability education	Knowledge exchange		
Societal benefits	Improved health and wellbeing	Warmer homes	Social cohesion / acceptance	Community empowerment	Trust
Energy system benefits	Reduced energy demand	Energy security	Grid stabilization	Voltage and frequency control	Better data / grid optimisation
Environmental benefits	Carbon reduction / air quality	Conservation / biodiversity improvement	Increased sustainability	Regeneration / smarter planning	Siting of infrastructure
Distribution of benefits	Distribution of costs & benefits	Distribution of power from monopolies	Local ownership models	Increased social equity	Achieving joint goals

SLES stakeholders have significant influence

5 years of smart local energy systems projects: 2018-2023

£104m government investment

£500m approximate industry investment expected

60 business-led projects around the UK, involving:

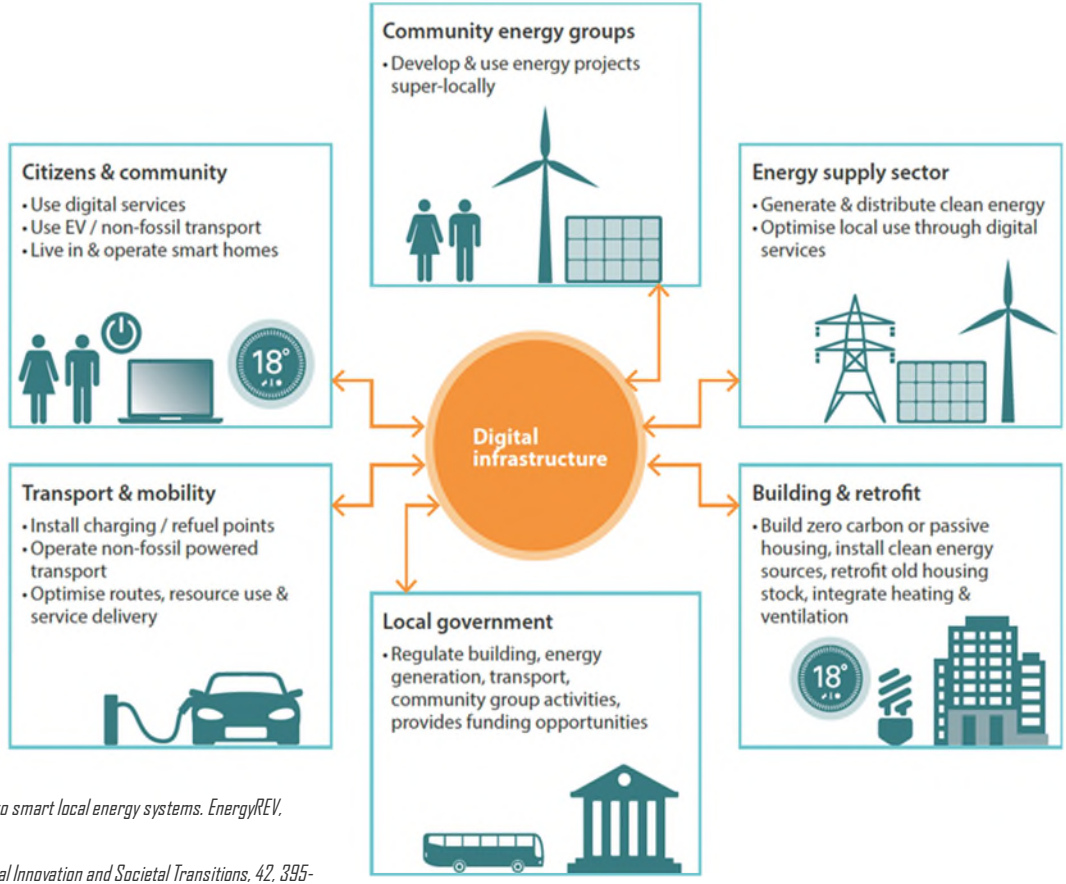
180 businesses, universities, local authorities and other bodies working together

Locally embedded stakeholders (councillors, community energy groups, academics)

Non local stakeholders including industry partners from outside area

The need for new skills

- New skills (tech and soft) are needed across the sector and to support interdependence of different parts of the energy system.
- Increased focus on local means we need to pay more attention to distribution of skills and upskilling.
- New skills are not just for the workforce, but for end users of the SLES.
- Lack of skills or skills development opportunities could lead to injustice.



Chitchyan, R. & Bird, C. 2021. Bristol's ICT subsystem: Case study on skills and training needs for transitioning to smart local energy systems. EnergyREV, University of Strathclyde Publishing: Glasgow, UK.

Bray, R., Montero, A. M., & Ford, R. (2022). Skills deployment for a 'just' net zero energy transition. Environmental Innovation and Societal Transitions, 42, 395-410.

Upscaling SLES beyond the niche

Growth	Replication	Accumulation	…Transformation
			*Transformation doesn't refer to geographical or physical scaling, but to the contribution of project(s) in shaping best practice, policy and industry focus.* *This sees the associated innovation become the norm.*
Where an existing project or initiative is expanded to include more participants.	Where a project concept is replicated in another location.	Multiple projects are linked, physically or organisationally (often via intermediaries).	

(Some) Barriers to SLES

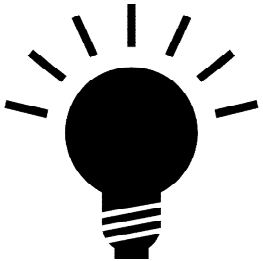
Strategy, policy and regulation

- Centralised decisions
- Lack of vision
- Prescriptive regulation
- Lack of powers, resources and capabilities at local government

Scalability and skills

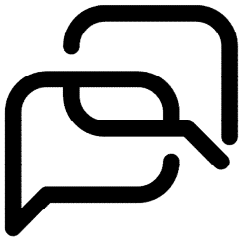
- Unique SLES projects
- Lack of learning from mistakes
- Skills vary regionally
- Time lag of skills development

Markets and business



- SLES can't access (local) value
- Wider benefits blur traditional boundaries
- SLES business models don't fit licences
- Boom and bust has hampered businesses

Engagement



- Lack of culture that supports learning about engagement
- Some households could be excluded from SLES
- Data protection

Enabling SLES

EnergyREV Decision Theatre's

In March 2022:

- Six decision theatres
- 46 participants
- 40 prioritised decisions

The question:

Given absolute power…

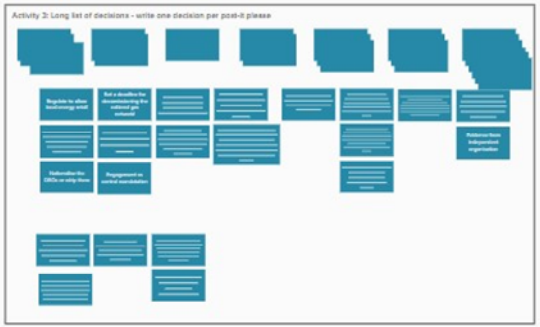
…what are the <u>most important</u> changes that could enable the implementation of smart, local energy systems?

Report and input materials here

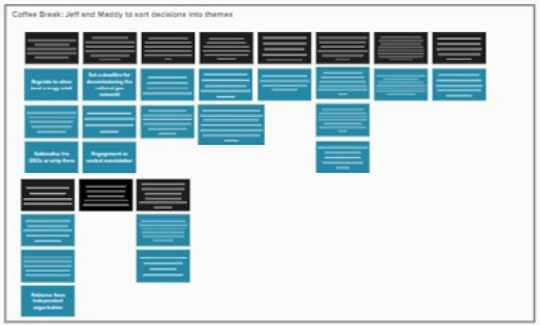
Decision Theatre approach

What did you have for breakfast?

Provocative statements about local energy



Long list of change proposals



Decision prioritisation

Problem themes identified by participants

UNCLEAR ROLES & RESPONSIBILITIES

- LAs have a critical role in SLES, but lack powers, resources and capabilities
- GB lacks a function that plans and coordinates SLES in net-zero
- The duties of DNOs hinder the emergence of SLES

SLES BUSINESS CASE

- Lack of long-term, targeted SLES funding
- Propensity of boom and bust approach to funding
- Value of SLES to energy system and users isn't clear and in many cases, realisable

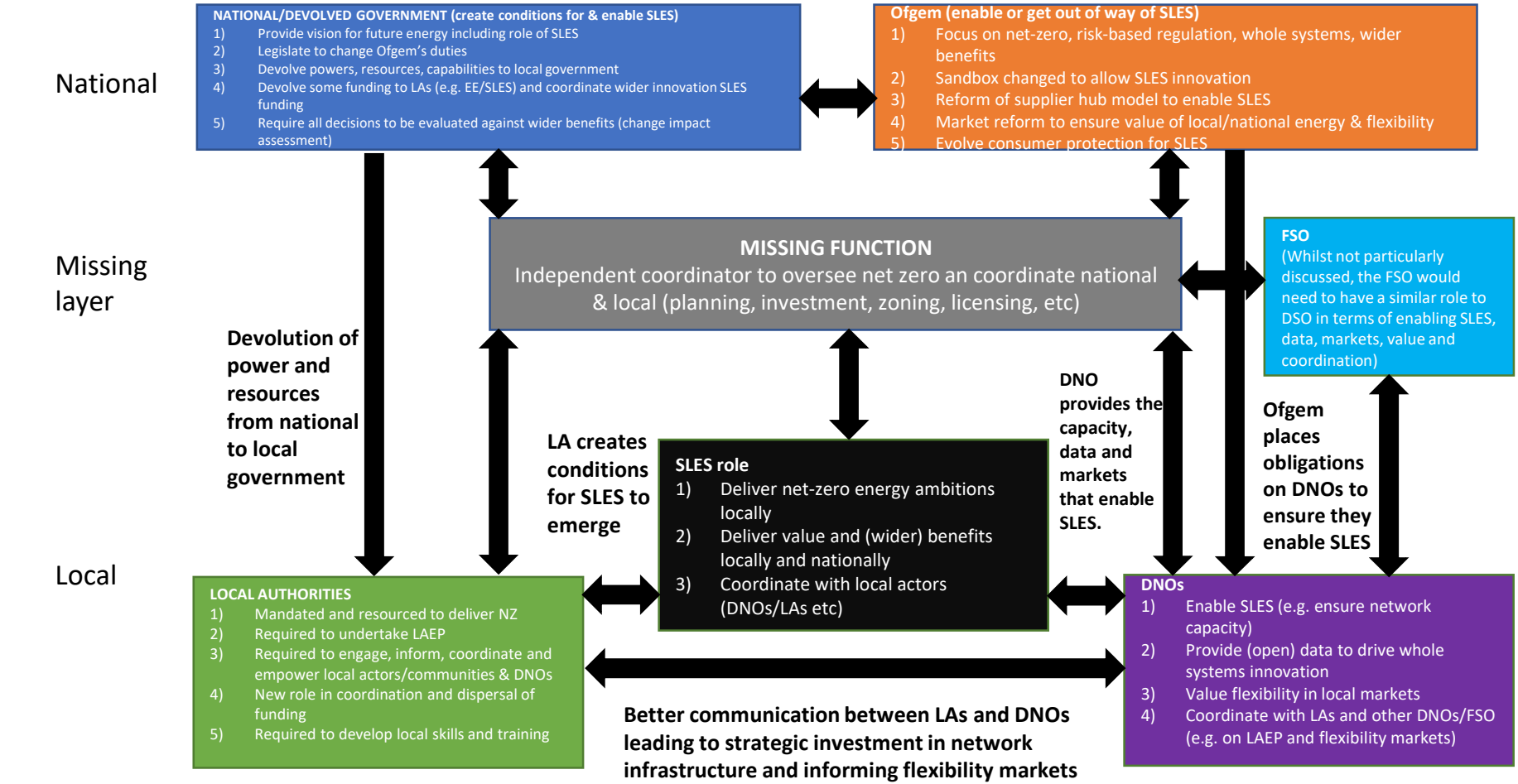
CENTRALISED DECISION MAKING

- Central planning + budgets of energy
- Ofgem's current (including interpretation of) duties constrain ability to enable SLES

JUST TRANSITION

- Skills to deliver SLES aren't available in UK and are unequally distributed
- Success of SLES requires behavioural changes in households/businesses but awareness is low
- SLES could broaden inequalities (and/or introduce new ones)

Enabling SLES



Government and Ofgem

NATIONAL/DEVOLVED GOVERNMENT (create conditions for & enable SLES)

1) Provide vision for future energy including role of SLES
2) Legislate to change Ofgem's duties
3) Devolve powers, resources, capabilities to local government
4) Devolve some funding to LAs (e.g. EE/SLES) and coordinate wider innovation SLES funding
5) Require all decisions to be evaluated against wider benefits (change impact assessment)

Ofgem (enable or get out of way of SLES)

1) Focus on net-zero, risk-based regulation, whole systems, wider benefits
2) Sandbox changed to allow SLES innovation
3) Reform of supplier hub model to enable SLES
4) Market reform to ensure value of local/national energy & flexibility
5) Evolve consumer protection for SLES

Local actors

Devolution of power and resources from national to local government

LA creates conditions for SLES to emerge

SLES role
1) Deliver net-zero energy ambitions locally
2) Deliver value and (wider) benefits locally and nationally
3) Coordinate with local actors (DNOs/LAs etc)

DNO provides the capacity, data and markets that enable SLES.

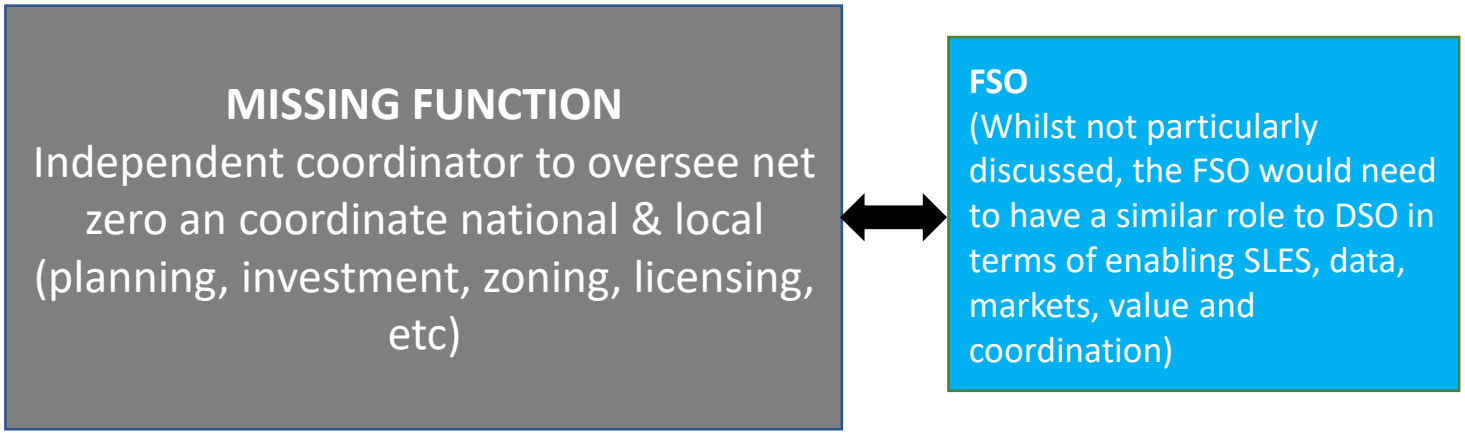
Ofgem places obligations on DNOs to ensure they enable SLES

LOCAL AUTHORITIES
1) Mandated and resourced to deliver NZ
2) Required to undertake LAEP
3) Required to engage, inform, coordinate and empower local actors/communities & DNOs
4) New role in coordination and dispersal of funding
5) Required to develop local skills and training

DNOs
1) Enable SLES (e.g. ensure network capacity)
2) Provide (open) data to drive whole systems innovation
3) Value flexibility in local markets
4) Coordinate with LAs and other DNOs/FSO (e.g. on LAEP and flexibility markets)

Better communication between LAs and DNOs leading to strategic investment in network infrastructure and informing flexibility markets

Missing function?



Key conclusions:

- **National government:** Devolve power, resource and capabilities to local authorities.
- **New regional coordinator required:** To coordinate between actors and local and national energy systems.
- **Mandate open energy data and transparency:** Particularly from Distribution Network Operators and the Energy System Operator.
- **Widen the benefits evaluated:** Require all energy decisions to be evaluated against wider benefits to ensure that the energy transition is fair and that the benefits of SLES are realised.

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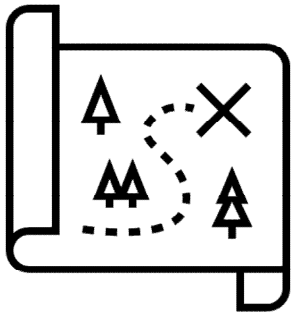

Policy route-map

2023