National Engineering Policy Centre

Royal Academy of Engineering

ROUNDTABLE SERIES ON DELIVERING A DECARBONISED ELECTRICITY SYSTEM

Governing transformation, transforming governance: Managing ambiguity, interconnection and digitalisation

Introduction

To achieve the government's target of a decarbonised electricity system by 2035, a whole systems approach is required. In order to inform the government's ongoing work on a delivery plan for a net zero electricity system, the National Engineering Policy Centre organised a series of roundtable discussions. The roundtables were convened with senior representatives from industry, academia, and government to discuss crucial systems-level challenges for an effective delivery plan. The intention of the roundtables was to build a greater shared understanding and recognition of the actions and barriers that need to be addressed to implement a net zero electricity system.

This briefing summarises the discussion at the fourth roundtable, held on Wednesday, 22 November 2023, with the title *Governing transformation, transforming governance: managing ambiguity, interconnection and digitalisation*. The roundtable was hosted by the Institution of Engineering and Technology. The document does not intend to give a complete view of the whole discussion, but rather to summarise key themes. The aim of these discussions was not to reach a consensus on all topics discussed but to contribute to a better shared understanding through gathering key perspectives on important systems-level questions which need to be addressed in the delivery of a fully decarbonised electricity system. Given this and the broad range of stakeholders involved in the discussion, there was no definite consensus on all the topics listed below.

Roundtable 4: **Governing transformation, transforming governance: managing ambiguity, interconnection and digitalisation**

The focus of the fourth roundtable was to explore the governance arrangements that will best enable the decarbonisation of Great Britain's electricity system in a secure and affordable way.

The following high-level questions formed the overall focus of the roundtable discussion:

- What are the governance issues that have not yet been addressed in order to achieve and maintain a decarbonised electricity system, including addressing cross-system interdependencies with systems such as telecoms, water and data systems?

- How do we ensure that governance is forward-looking and adapts to future needs?

Introducing the terminology

Governance is a broad term which has a range of interpretations. In contemporary usage, the meaning of governance can include the following: the act of controlling, directing or regulating influence; the act of governing a nation, person or activity, and; the manner in which something is governed, regulated or managed.[1] To provide the participants with a slightly narrower definition of governance and to structure the roundtable discussion, a matrix of what was to be included and excluded across the scope of governance arrangements relating to energy and electricity broadly was developed and circulated in advance. The matrix can be found in Appendix 1 to this summary (page 15).

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Key themes of discussion

The broad range of stakeholders at the roundtable[i] provided a diverse set of inputs, and several key themes emerged from the discussion.

A clear vision is needed for the future of the energy system

Addressing the challenge of governance for a decarbonised electricity system will benefit from a clear, holistic, and inclusive vision for the future energy system. A significant part of the roundtable discussion centred around the need for a vision. Without a vision of the end state and the system transformation being sought, it is difficult to identify improvement and corrections in the existing governance framework.

There is also a need for regulatory and market mechanisms to be aligned with a vision for the future energy system. Leadership, with the right governance processes and system architecture, is needed to achieve a successful energy transition. As part of this, practical solutions need to be communicated in simple language.

The Strategic Spatial Energy Plans (SSEP), recommended by the Electricity Networks Commissioner (ENC) review,[2] could form an important part of such a vision. Such a plan would describe the energy resources we need to deliver a net zero energy system: what energy resources are available, where these energy resources are to be found, what is needed to exploit these, including the generation technologies, energy storage, transmission and distribution infrastructure, to meet the forecast demand. A plan is especially important given that there is an expected 50% increase in electricity demand by 2035, compared to demand from before 2020, and a further doubling of demand by 2050 from the electrification of surface transport, heating and industry.[3]

Participants agreed that rapid establishment of the National Energy System Operator (NESO)[ii] and the production of the SSEP is crucial. The SSEP could describe the supply and demand characteristics

i All stakeholders are listed at the end of the document

ii The ENC recommendation refers to the Future System Operator (FSO), which has been rebranded as NESO by the Electricity System Operator.[4]

of future energy needs and their location, translate the spatial energy outlook to network plans and initiate the building of consistent strategic transmission over multiple timelines. These are crucial components of the vision needed for the future energy system.

Any vision should also include the needs of local energy systems and should form a shared basis for a much-needed delivery plan, with key milestones to ensure effective delivery.[iii] Long term planning, with a spatially and temporally explicit strategic plan would be a much-needed guide to delivery and decision-making. A regional system planner, like the Regional Energy Strategic Planners (RESPs) announced by Ofgem,[6] if set up and resourced effectively, should be well-placed to coordinate the necessary decision making. A delivery board, such as that proposed by the ENC,[2] can help drive the delivery of the vision and planning approvals needed.

There may also be a benefit to having multiple plans for the different scenarios and assumptions involved in order to build in the flexibility needed for adapting to uncertainty. Any plan will be time specific so processes for and mechanisms for monitoring, feedback and updates will be needed to coordinate the actions needed, especially across local and national levels.

Policies need to drive demand response, as well as supply

It is crucial that the long-term vision and underlying plan drive action on electricity supply and electricity demand equally, whereas there is currently a relative lack of attention and policies for achieving demand response and flexibility.[iv] The cheapest way to increase the electricity available is often by reducing or shifting peak demand, freeing up capacity in the network. In some cases, new sources of demand may have a direct impact on network planning, for example if electrolysers are co-located by wind farms, or if energy storage is located near areas of demand, and these will reduce the need for network capacity. A systems approach is needed to effectively mobilise and optimise the benefits of generation and storage technologies for local, regional or national distribution and demand.

> A regional system planner, like the Regional Energy Strategic Planners (RESPs) announced by Ofgem, if set up and resourced effectively, should be well-placed to coordinate the necessary decision making

iii To learn more about the need to coordinate and collaborate across local, regional and national efforts, see the summary of roundtable 2 – Local, regional and national: what interests, opportunities and challenges exist at these levels? How does each contribute to net zero?[5]

iv To learn more about demand response and flexibility, see the summary of roundtable 3 – Consumers, flexibility, and efficiency: How can consumption contribute to the decarbonisation of the electricity system?[7]

Decarbonised electricity systems are diverse and more complex

A large growth in electricity demand is expected, driven by the electrification of heating, transport and industry throughout the country. At the same time, much of the renewable electricity production added to the system (such as pumped hydroelectricity), will continue to be highly distributed and located far away from the current production hubs and areas of high demand. Even relatively concentrated areas of renewable energy generation such as offshore wind, will be located far from areas of high demand, and will require a large amount of transmission connections for use or storage across all levels of the network hierarchy. While a decarbonised electricity system will have increasingly diverse sources of energy, with many of its assets highly distributed, governance today tends to be highly centralised.

The increasing diversity, distribution and complexity of the electricity system will also open up public access and interaction with the range of assets across the electricity system. Public engagement is therefore crucial to the decarbonisation of the electricity system.[v] The increasing complexity of the electricity system and the rise of distributed assets creates a need for further clarity on the roles of local authorities, local stakeholders and Distribution Network Operators (DNOs) in the decision-making processes for the production, supply, networks and infrastructure of a highly diversified electricity system.

One way to consider energy locally is through Smart Local Energy Systems (SLES), which bring together different energy assets and infrastructure in a local area and enable these assets to be operated in an intelligent way. Though there is a lack of a working definition, SLES generally involve multi-vector, multi-asset systems at the local level, as well as decision-makers from local government and communities. SLES are designed to satisfy local needs and national goals, use a range of different technologies and engage a myriad of stakeholders and end-users.[8] This could increase value for communities and local authorities and allow them to meet their carbon targets more quickly and more cost-effectively.[9] Some of these benefits arise from demand response and local storage, as part of the SLES, reducing the peak load and thereby reducing the need for more generation and network capacity.[10]

These local energy systems need to be considered early in the planning process. New demand will also be highly distributed as the decarbonisation of heating and transport are local issues. The business cases for SLES currently differ across use cases and many of the potential benefits, such as job creation, cannot be immediately monetised or are external to the energy system. There needs to be a clear business case for SLES, in order to be able to improve the flow of value for the small assets that exist in local areas. This will also help address the current inequitable distribution of skills and benefits in the net zero transition where wealthier areas would otherwise benefit more than deprived areas. Research has found that low-carbon technology adoption will cluster in more affluent households unless there is sufficient government support for people vulnerable to fuel and transport poverty to adopt low-carbon technologies. This pattern can have cascading effects on the development of network infrastructure and further entrench the inequitable distribution of skills and benefits. The business case for SLES can improve the flow of value for small assets that exist in local areas and address the gaps in access to net zero benefits.[11]

Managing a diversified network at the local level will require an urgent rethink of how decisions are made. As the energy system diversifies,

v To learn more about public engagement, see the summary of roundtable 3 – Consumers, flexibility and efficiency.[7]

decarbonises, and digitalises, there needs to be parallel developments on how the system is governed and managed. This can be facilitated by digitalisation to support the alignment of local planning with system-wide planning via better data availability and sharing. There is also a need to account for and incorporate the fact that different local authority areas will be of different sizes and densities and have different energy needs. They will therefore interact with networks differently. Guidance on these interactions can support the coordination needed from different stakeholders.

How to transform energy governance

Governance has a crucial role to play in the transition of local and national energy systems. While there are major ongoing governance changes that could have a significant impact on governance, including the development of NESO, and the Review of Electricity Market Arrangements (REMA), there is still a need to further transform governance arrangements. Governance will need to take into account the 2035 decarbonisation target for the electricity system while simultaneously planning for the net zero target of 2050, and the growth in overall electricity demand this will entail, in order to deliver a resilient, efficient and functioning system.

The current model of centralised decision-making in energy governance is a significant challenge to the decarbonisation of the electricity system. The current model does not fully support capturing the potential benefits of local energy, such as increased community ownership and engagement, and local energy resilience.

The energy transition and the governance challenges this poses are complex and would benefit from an examination of the underlying framework that drives decision-making to identify what needs to change foundationally to fully support the energy transition, the future system and its co-benefits.

The governance framework will also need to have the flexibility to change in line with and to account for long-term transformation of the energy system. Governance will ultimately need to factor in and plan for adaptation under conditions of uncertainty and complexity, and how to maintain collective understanding and confidence during the period of energy system transition.

There needs to be further clarity on the roles and responsibilities of the various stakeholders in the system, including local authorities and DNOs to improve coordination among them. Central government should empower local authorities with more resources and powers to drive decarbonisation, and there is a need for guidance to facilitate coordination between local authorities and for a framework to accommodate local variations. The Department for Energy Security and Net Zero (DESNZ) has a key role to play in providing guidance for local and regional governance. The NESO also has a role to play in the transformation of governance by providing a vision for the future system which can help build trust and confidence in new governance arrangements.

Coordination and better accountability across the various government departments is required. With the rise of electrification for decarbonisation, transmission is an urgent issue that needs to be immediately addressed. While doing so, transmission networks can function as a use case for testing new governance frameworks and structures.

There is urgency and time constraints to the energy system transformation

The target for decarbonisation by 2035 leaves limited time to develop the perfect future governance system. There is urgency in the need for agile decision-making and pragmatic approaches to governance and leadership, in achieving a functional and effective energy system. Key to the effectiveness of any framework will be how the parties involved interact and act together to achieve an end vision. Leadership will therefore be key and will need to be underpinned by a range of capabilities such as improved planning skills, highly-skilled organisations, effective modelling and engineering capabilities. Despite the scale of the challenge, there is an opportunity for building the legitimacy that can help drive the transformation needed.

To some extent, the pace of delivery will need to be prioritised over developing a perfect system. Leadership will be needed to develop contingency options and enable delivery at pace in the face of risks and uncertainties. Leadership will also be needed to make and implement the short- and long-term strategic decisions that are needed now. Strong leadership will be needed to build the legitimacy of the institutions with the public and to thereby support faster decision making.

There is a need for innovation by industry to help speed up developments for decarbonisation, and for the governance frameworks to support the implementation of innovative solutions that have long term implications. As called for by the Climate Change Committee (CCC), it is time for the government to prioritise pace over perfection.[12] Decarbonising earlier and more rapidly will contribute more to reducing emissions.

Digitalisation and Data

Digitalisation has a major role to play in the transformation of the energy system. Digital technologies and data flows can improve the governance of a distributed and diverse decarbonised electricity system. To enable this, governance too is required for standardising and incentivising digitalisation and data sharing across the energy sector.

Open data, a digital spine and data infrastructure will help coordinate the information needed to plan and deliver the system and can support more agile governance. These are recommended by the Energy Digitalisation Taskforce.[13] The availability of data will also help refine the planning needed.

> There is urgency in the need for agile decision-making and pragmatic approaches to governance and leadership, in achieving a functional and effective energy system

Key messages from the NEPC Working Group on decarbonising the electricity system

The roundtable highlighted some of the key challenges that need to be addressed in decarbonising the GB electricity system by 2035 in a secure and affordable way.

Based on this discussion, the NEPC Working Group on decarbonising the electricity system has identified a number of key messages. While these were informed by the discussion in the roundtable, the conclusions are made independently by the Working Group and do not reflect the opinions of the participants at the roundtable.

- **The need for governance reforms**
  Current governance frameworks are inadequate for governing a more complex, distributed and diversified electricity system. Governance needs to be reformed to meet the needs and requirements of a transitioning electricity system and to start to account for possible future end-states. The challenge to governance is: to support and enable the transition to a decarbonised future; to structure governance in a way that is both responsive and adaptive to the oncoming changes; and to be able to embrace uncertainty as inherent to a transforming system. There is an opportunity to distinguish and clarify the functions that are performed by governance, the institutional arrangements where those functions are implemented, and the artefacts and effects that are to be produced from these arrangements. With this there is the opportunity to clarify roles, responsibilities, and accountability, which in turn can support effective decision-making.

- **A clear vision is needed with an achievable plan**
  There is a need for a clear vision of the future decarbonised energy system, and how the electricity system fits into this, which accounts for the transition at all levels, from national to local, including the different types of end-users. The vision is needed to develop the plan, which is crucial for reaching UK's decarbonisation targets. The Strategic Spatial Energy Plan recommended by the Electricity Networks Commissioner[2] can form a core part of this. The plan needs to be defined and certain for the first few years ahead, but going forward, needs to progressively incorporate more optionality and uncertainty going further into the future.

- **Recognise the importance of local energy systems**
  While Smart Local Energy Systems (SLES) are not relevant everywhere, they have an important role to serve in certain areas and for specific functions. There is a need to recognise the co-benefits that they can provide in managing and maintaining the overall energy system which also includes securing economic and social benefits to local communities. This will contribute to the development of Local Area Energy Plans (LAEPs) by Local Authorities.[14] However, Local Authorities are under resourced and would benefit from greater resources, people and skills to gain competence to undertake their key roles in this area.

- **Agile governance is needed**
  With the rise of distributed assets and a diversified electricity system, there is a need for flexibility and adaptability of governance for new systems. A source of flexibility and adaptability can be the bringing together of different functionalities for new purposes or objectives, as and when needed, similar to the model of object-oriented programming. There also needs to be further improvement to how institutions across the governance framework interact together to discharge their duties as a system. How these institutions work together needs to be made more agile to speed up delivery.

- **Continued assessment of the governance model will be necessary**
  While 2035 is very close from a planning perspective, there is a need to continuously assess the governance arrangements in place both to deliver the 2035 decarbonisation target and to ensure a functioning long-term electricity system. One way to ensure that market and regulatory arrangements are suitable is annual assessments of whether they are still compatible with the long-term vision and the delivery plan.

There also needs to be further improvement to how institutions across the governance framework interact together to discharge their duties as a system. How these institutions work together needs to be made more agile to speed up delivery

Roundtables and briefings in the series

This is roundtable 4 of a series. The full series of roundtables and reports is listed below:

Roundtable 1	**Decisions now for a future system: Making design and construction decisions for the electricity system of 2035 and 2050**
Roundtable 2	**Local, regional and national: What interests, opportunities and challenges exist at these levels? How does each contribute to net zero?**
Roundtable 3	**Consumers, flexibility and efficiency: How can consumption contribute to the decarbonisation of the electricity system?**
Roundtable 4	**Governing transformation, transforming governance: Managing ambiguity, interconnection and digitalisation**
Roundtable 5	**Delivering electricity decarbonisation by 2035: What do we need across industry capacity, procurement and skills?**

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This roundtable series is being convened by the National Engineering Policy Centre (NEPC).

The working group includes representatives from the Institution of Engineering and Technology (IET), the Energy Institute (EI), the Institution of Mechanical Engineers (IMechE), the Institution of Civil Engineers (ICE), the Permanent Way Institution (PWI), the Royal Academy of Engineering, and the Energy Systems Catapult.

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Appendix 1: **Guide to roundtable participants on the scope of governance arrangements**

Included	Excluded
Determination of legal structure of energy system (e.g. privatisation, energy and capacity markets, safety regulations, economic regulation, grant-giving bodies etc.)	Detailed management and operation of financial control systems such as CfDs, constraint payments and capacity markets.
Decision to set up System Architect function for energy system, definition/approval of the method for preparing the systems architecture and a strategic roadmap and the mechanisms for approval or endorsement of output system architecture and strategic roadmap.	Detailed conclusions made within that function on, for example, the balance of generation technologies, local or national, energy storage etc.
Design of planning system and the weights placed on considerations such as land value, local communities, pressure groups, local councils (etc.) and the processes for appeals therein.	Output decisions of planning committees and planning inspectors.
Overall commercial models and structures for industry: ESO, TSO, DNOs, energy retailers etc.	Management of these bodies or decisions to accept specific private sector proposals on any one project.
Legal and financial constraints on actors within the energy system and associated accountabilities and liabilities.	Apportionment of budget to competing projects or activities within any one organisation's remit.
Processes of oversight and appointment of directors to public sector bodies.	Management and individual decisions of public sector bodies.
Subsidies of incentivisation of certain technologies or programmes (eg home retrofit and boiler upgrade schemes) and the mechanisms by which they are delivered.	Implementation of policies to decarbonise local heating.
Setting and iterating the engineering principles, rules and standards governing how the component parts of the system work together.	Detailed specifications of equipment.
Defining and selecting the protocols that allow interoperability of digital systems.	Individual actions and decisions on data sharing etc.
The means, mechanisms and institutional arrangements for explicit monitoring and measurement of progress against outcomes and the maturity of the processes that are delivering it (ie learning feedback loops).	Individual examples of feedback or implementation of reinforcement or course correction.

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