

WP2 – Governance and organisational structures

SIF PRIDE

Work package two of planning regional infrastructure in a digital environment (PRIDE) aims to outline how a digital tool can support users across different organisational structures, and demonstrate how the tool can integrate across local, regional, and national energy planning. Detailed in this report are the regional governance structure proposed that will capture sector specific input across local authorities and facilitate engagement with sub-national infrastructure providers and remain accountable to the regional democratic structures. This report will also outline proposals for the upwards integration of this governance structure with the regional system planner (RSP), drawing on the outputs of the regional energy system operator (RESO) project.

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1 Overview

The UK is currently at a stage where the energy system is undergoing a transition to net zero where accelerated decentralisation and decarbonisation of generation and demand are crucial to meet our legally binding targets. Accelerated decentralisation is needed to accommodate the transformation in the way we generate electricity, heat our homes and power our vehicles - requiring the system to be planned and operated at a sub-national level.

There has been a lot of work in this area reviewing and proposing various options that could exist to meet those needs. The West Midlands first looked at this during the Regional Energy System Operator (RESO) project of which the outputs have fed into much of Ofgem's current work consulting on the future of local energy institutions and governance. Alongside this there have also been several pieces of work advocating for the place-specific needs and comparative benefits gained through taking a more local approach to decarbonisation.

The WMCA's vision is for a just energy transition, where investment is appropriately channelled to meet the needs of our diverse communities, to enable timely decarbonisation and create a thriving market for clean-tech innovation and economic growth. As such, we need to ensure the governance arrangements are in place to inform investment and unlock or prevent barriers to decarbonisation and economic growth.

Through this work package we aim to take a holistic approach considering all the work to date, feeding in input from local authority engagement and proposing how the outputs of RESO tailored to Ofgem's current work area can arrive at a governance and organisational structure that can be trialled through the PRIDE project.

2 Regional Energy System Operator

The [Regional System Operator \(RESO\)](#) project was a two-year Prospering from the Energy Revolution project that ran through 2020 and 2021. The RESO project developed and explored the hypothesis that giving cities and localities a stronger role within the UK's established model for energy market regulation offered significant potential for releasing additional value. There is now wide spread acknowledgement that localised action is needed with the solution to many decarbonisation problems such as domestic heating, transport and manufacturing requiring [specialised solutions that would vary from place to place](#).

2.1 Functions of a RESO

The organisational and governance design work package of RESO aimed to understand what the optimal structure for a nationally replicable RESO would be. To do this the approach taken made a clear distinction between the functional and governance aspects of the proposed design. In practice this consisted of an assessment of the functions which are currently performed in the UK energy system and those that need to be performed to reach net zero.

These functions are detailed in full in Appendix I Table 7 with a brief description of their function, also included is a detailed breakdown of the functions determined to sit at a national (Table 8) and regional level (Table 9) following the RESO analysis. For simplicity these have been summarised below in Table 1 only by name, and further simplified by only considering the strategic and planning functions to align with the Ofgem local governance consultation.

National Level Function	Regional Level Function
System insight, planning and network development	Energy systems planning, integrated into whole place system planning
National system architect	Regional system architect
Advisory role on net zero transition	Investment in energy systems assets
Coordination with DNOs	Driving competition in energy networks
Data digitisation	Stimulating demand-side investment and optimisation, including delivery of energy efficiency programmes
	Data governance
	Consumer protection
	Consumer engagements and behavioural change
	Protection of vulnerable citizens

Table 1: summarised table of functions that were determined to be a national or regional level responsibility, these have been amended to reflect strategic and planning functions in order to align with the regional system operator proposal by Ofgem.

2.2 Cost-benefit analysis of a RESO

An extensive cost-benefit analysis was carried out for RESO which demonstrated having a RESO and appropriate governance in place could influence investment decisions and ensure the money spent is in the best interest of the areas in question. A crucial role of the governance is to ensure

infrastructure investment takes better account of spatial planning, building energy performance and transport plans. By taking this approach local authorities will be able to benefit from local system-driven benefits and network cost savings, ensuring alternatives to network investment are considered in the context of local priorities and in the best interests of communities.

The benefits of taking place-based action have been demonstrated with RESO, but also supported by additional work including the summarised findings from [PWC](#). The tables below highlight how the costs and benefits of a place-specific approach vary in comparison to a place-agnostic approach.

	Place-agnostic	Place-specific		RESO Cost Benefit Analysis
Investment	£195 billion of investment up to 2050 to meet 6 th CB, this releases £57 billion of energy savings	£58 billion of investment up to 2035 to meet 6 th CB, this releases £108 billion of energy savings	Cost (capital and revenue)	<ul style="list-style-type: none"> £35.4m p.a. implementation (£4.4m revenue, £31m capital) £295.03m 10-year PVC £524.58m 30-year PVC
Societal impact (by Carbon Budget 6 - 2037)	£444 billion of wider social benefits over the next 30 years	£825 billion of wider social benefits over the next 30 years	Benefits	<ul style="list-style-type: none"> £450.71m 10-year PVB £1245.39m 30-year PVB

Table 2: summarised findings from PWC and RESO of the benefits of taking a place-based approach.

2.3 Making RESO happen

To realise these benefits through delivery of a RESO, local area energy plans (LAEPs) were highlighted to be a crucial enabling asset. The plans would inform, shape and support key aspects of the transition to net zero and forge a link between local net zero plans and future network investment. Alongside LAEPs, to realise a RESO there is the need for a neutral entity that sits between stakeholder groups driving forward action.

RESO identified three least regrets local investments that would support an accelerated transition to net zero, these also do not require wholesale energy market or regulatory reform (statutory powers may be required to ensure necessary data is made available). These were:

- A local energy and climate data governance function.
- Local whole systems net zero planning capability.
- Integrated neighbourhood decarbonisation support capabilities.

These least regrets actions form a good fit with current national energy policy developments, particularly the future system operator (FSO) and regional system planner (RSP) proposal.

3 Ofgem – Future of local energy institutions and governance

Ofgem have been consulting on what the future of local energy institutions and governance should look like for an energy system transitioning to net zero. Ofgem have identified that to deliver this transition effectively there are three key energy system functions which Ofgem have associated a reform to.

- Energy system planning: introduce new Regional System Planners (RSPs) to ensure there is accountability for regional energy system planning.
- Market facilitation of flexible resources: assign a market facilitation function to a single entity with sufficient expertise and capability, to deliver more accessible, transparent, and coordinated flexibility markets.
- Real time operations: keep real time operations within the distribution network operators (DNOs), ensuring clear accountability for network reliability and safety.

It is crucial for these functions to be performed by institutions with the competence, appropriate skillset, and incentives to deliver net zero at least cost; but also combined with clear accountability and coordination. Ofgem state that the FSO would be the most appropriate option to take on the proposed RSP and market facilitation functions, with real time operations remaining with the DNOs.

Of pertinence to this work package is the role and function of the RSP and we will draw across from RESO and other complimentary pieces of work to propose the governance trial component of PRIDE.

3.1 Regional System Planner

The RSP will be responsible for undertaking regional energy system planning activities. They will coordinate input from other actors to establish a true cross-vector energy view that stretches across local and national infrastructure. To support delivery of the RSP Ofgem have proposed the following:

- Create and assign a new regional system planning role to a single accountable body for a region, Ofgem consider this should be a regulated entity.
- Ensure the RSP is central to a framework of interacting organisations within each region, which all feed into regional energy system planning.
- The RSP should be responsible for developing and owning a regional energy system plan, with other actors informing and being consulted in relation to their respective planning activities i.e., network planning and spatial planning.

The proposed scope of work for the RSP, as defined by Ofgem, contains a mixture of subject-specific engagement and technical planning activities:

- Develop and own the critical planning assumptions, using inputs from local actors (e.g., DNOs, GDNs, LAs etc) and exogenous sources to develop key assumptions that inform system need e.g., EV uptake numbers and the expected contribution to peak demand.
- Coordinate, facilitate and ensure effective participation between local actors (which ensures a place-based understanding is central to how the regional energy system is planned).
- Develop and own a regional whole system strategic plan that is coherent with national and local net zero ambitions and energy security priorities and that supports achieving the most cost-effective decarbonisation outcomes, derived from and informing the individual sub-plans made by local actors.
- Provide independent technical analysis and advice to support decision making, primarily within price control setting, for example if different vectors' plans conflict and/or by identifying improvements and opportunities for whole system optimisation.

It is important to note that Ofgem make it clear that the respective actors must remain responsible for their own planning activities, i.e., network companies remain responsible for network planning activities and so on, but these need to align to the regional energy system plan which the RSP will be responsible for ensuring.

3.2 RESO and the RSP

Reading across the outlined functions of a RESO (Table 1), and the RSP in Ofgem we are left with the following points of similarity and difference shown in Table 3.1 below.

Function	RESO		RSP		
	National	Regional	National	Regional	Relevant actor
System insight, planning and network development	✓		✓		
National system architect	✓		✓		
Advisory role on net zero transition	✓		✓		
Coordination with DNOs	✓			✓	
Data digitisation	✓				
Energy systems planning, integrated into whole place system planning		✓		✓	
Regional system architect		✓		✓	
Investment in energy systems assets		✓		✓	
Driving competition in energy networks		✓		✓	
Stimulating demand-side investment and optimisation, including delivery of energy efficiency programmes		✓		✓	
Data governance		✓			
Consumer protection		✓			✓
Consumer engagements and behavioural change		✓			✓
Protection of vulnerable citizens		✓			✓

Table 3.1: comparison of the who RESO determined to be responsible for different strategic and planning functions, and who has been proposed to be responsible for these functions in the Ofgem consultation. Where a row has been shaded grey it indicates that Ofgem are yet to determine where that responsibility lies, shaded orange is to highlight a point of difference, and where a “relevant actor” has been added indicates where Ofgem have determined the function to remain with the body it currently sits with. This is exclusively in relation to consumer protection and vulnerable citizens where DNOs and local authorities have a shared responsibility.

The RSP proposal is closely aligned with the RESO outputs, with only a handful of differences between the two. Some key differences are where the RSP proposal has stated consumer protection and protection of vulnerable citizens should remain the responsibility of the current actors. This feels to be very sensible since there are established relationships and each actor will have a different focus

e.g., fuel poverty, disability, age etc., where “vulnerable” will have a slightly different meaning to different actors. In relation to data digitisation and data governance, the tentative suggestions are that data governance would be the responsibility of the market facilitator (a national role, opposite to RESO), data digitisation is currently undecided. The last point of difference is “coordination with DNOs” which RESO had assigned to be a national function, and the RSP proposes as a regional function. We would support moving this function from a national to regional function and believe that it would be more effectively carried out with greater opportunity to have meaningful engagement and discussions with the RSP as part of the coordination process.

3.3 Mapping of the digital tool functionality onto RESO and RSP requirements

This section maps the RESO and RSP function against the current features of the digital tool prototype LAEP+ shown in table 4.2. None of the fourteen RESO and RSP functions are completely supported by the tool. Ten of the functions are partially supported. The partial coverage can be attributed to several factors such as the broad scope of the functions. It is also reasonable to expect that several tools will be required to deliver the decision-making functions of that span real time and strategic time frames. Such timeframes would require different system architectures and could not be serviced as a single platform.

Function	Coverage	Gap analysis
System insight, planning and network development	Partial	The tool enables the modelling of established low carbon technologies but currently does not model cross-system solutions or energy markets. The tool could provide direct input into the ESO's Network Options Assessment (NOA) through aggregating future load forecasts.
National system architect	Partial	The role of an architect and the scope of architectural decision making is unclear. However, the tool if operated at a regional scale would provide a valuable evidence base for future customer demand.
Advisory role on net zero transition	No	The impact of policy and regulatory decisions are currently not modelled by the tool.
Coordination with DNOs	Partial	The tool coordinate across organisational boundaries. However, additional development is required to ensure the interoperability of the tool between data models and systems used by different organisations.
Data digitisation	Partial	The tool provides data on national targets for low carbon technologies. Other organisational targets may be unknown.
Energy systems planning, integrated into whole place system planning	Partial	The tool provides energy network operators with an up-to-date view of new connections and projects under development within a region. The

		tool does not provide real-time information for flexibility markets.
Regional system architect	Partial	The role of an architect and the scope of architectural decision making is unclear. However, the tool if operated at a regional scale would provide a valuable evidence base for future customer demand.
Investment in energy systems assets	Partial	The tool supports the creation of project pipelines through zoning & optioneering and LCT siting. The tool also supports the formation of business plans through faster cost estimation. Further development of this feature is required in order to standardise modelling assumptions.
Driving competition in energy networks	No	Out of scope of the tool
Stimulating demand-side investment and optimisation, including delivery of energy efficiency programmes	Partial	The tool does not influence customer behaviour however it can facilitate private sector involvement in the development of project and to work more closely with the Energy Networks and the Public Sector.
Data governance	Partial	The tool data platform can provide many datasets with associated licences. Additional datasets can be added to provide full coverage.
Consumer protection	No	Out of scope of the tool
Consumer engagements and behavioural change	Partial	The tool digitalises stakeholder engagement to reach a wider audience. However, the tool does not support behavioural change.
Protection of vulnerable citizens	No	Out of scope of the tool

Table 5.2: Gap Analysis of functionality of the digital tool

4 Governance Trial Proposal

Bringing together the least-regrets outputs from RESO and proposed RSP responsibilities we can identify clear alignment (Table 6), and this is the space in which we have started to design our proposed governance trial. In Table 6 we demonstrate where PRIDE can support in trialling the regional system planner based on essential learnings from RESO on both the least-regrets implementation actions and investments.

RESO	RSP	PRIDE
A local energy and climate data governance function.	Data governance is proposed to be the role of a market facilitator which Ofgem have suggested is the FSO, ENO or a neutral third party.	PRIDE propose a framework that engages local authorities through to the FSO and will capture this least-regrets action, by integrating digital tool into the framework it will provide a data digitisation space in which data governance can directly interact.
Local whole systems net zero planning capability.	Responsible for system insight, planning and network development including regional system architecture and energy system planning, integrated into whole place system planning.	PRIDE will take early action to bring the relevant energy system stakeholders onto the digital tool to trial this governance approach ahead of Ofgem's proposed delivery. This will enable clear sight of energy system planning such as heat networks versus heat pumps, versus hydrogen.
Integrated neighbourhood decarbonisation support capabilities.	Responsible for energy system planning, integrated into whole place system planning.	PRIDE will be working with local authorities to bring neighbourhood level data into the digital tool platform. In the context of the RSP this would enable them to see decarbonisation opportunities and areas of support at a neighbourhood level.

Table 6: identification of the RESO least regret actions, the aligned responsibilities of the regional system planner and how the ambitions of PRIDE will inform, support, and enable the RSP.

4.1 Regional governance

Through its work in pioneering projects such as the Regional Energy Systems Operator (RESO) demonstrator in Coventry, Energy Capital is recognised as a pathfinder for developing a place-based approach that maximises the effectiveness and cost value of the energy system. Through this work

Energy Capital has established a close working relationship with the Department for Energy Security and Net Zero and more recently Ofgem, as they look to establish a more decentralised approach to energy investment through the revision of energy system operations.

Through the strategic innovation fund Energy Capital plan to trial their revised governance structures (simplified Figure 1), establishing a Net Zero Infrastructure Delivery Panel (NZIDP) and Local Area Energy Planning Co-ordination Group (LAEP-CG) with enhanced responsibilities to explore opportunities to inform Ofgem's future energy system developments. These new collaborative, impartial and expert groups, will help to shape the regional energy investment landscape within the current regulatory environment and, with the opportunity of involvement from Ofgem, potentially inform the national approach to decentralised and digitalised energy through exploring and testing elements of the RSP model.

The purpose of the NZIDP is to enable a whole systems perspective to energy planning and delivery, bringing together those responsible for investment into infrastructure that will support the delivery of net zero objectives in a region, to develop Local Area Energy Plans, invest in their delivery and monitor progress. The specific make up of this group should be bodies who invest in regulated infrastructure that can enable delivery of the net zero transition (e.g., gas and electric distribution network operators, independent distribution network operators, water suppliers, transport providers, heat network operators etc.), with the aim to establish:

- Whole systems collaboration, committing to:
 - Collaborating on local area energy planning development and delivery, using the same data and modelling to align processes as much as possible within current regulatory framework.
 - Trialling a new approach to informing robust investment adjustments with Ofgem and exploring with D/GNOs and Ofgem how re-openers could be applied effectively to adjust levels of energy infrastructure investment in an area.
 - Establish a mechanism for inputting place-based considerations into energy policy and regulation to support net zero goals.
- Mutual accountability, committing to:
 - Developing and agreeing a shared, whole system decarbonisation pathway for the West Midlands (geography to be determined).
 - Detailed reporting on delivery progress of net-zero-enabling investment in the West Midlands.
- Transparency, committing to:
 - On-going analysis of the value and deliverability of enhanced collaboration between D/GNOs and local stakeholders.
 - Sharing our learning with government and Ofgem.

We recognise that each body with a budget for infrastructure investment has multiple objectives to consider, and that net zero may not be the top priority of some of these providers. The aim of this group is to form a partnership that is specifically responsible for evaluating whether decisions are supporting the delivery of net zero objectives or not, and establish whether the existing market regulations are supporting this goal.

The LAEP-CG will bring together local authority partners who are responsible for coordinating the planning and delivery of key infrastructural services and their respective energy requirements alongside those with specialist knowledge areas either at a national/governmental level and local research institutions. The primary purpose of the group is to provide the overarching perspective on Energy Capital's regional LAEP programme, particularly providing:

- Shared awareness among all local authorities
- Agreed prioritisation of the LAEP delivery programme

- Advice, direction, and technical insights
- Advocacy to regional and national partners

The group will work collaboratively to identify gaps in data and intelligence and potential solutions to fill those gaps. They will work closely with Energy Capital and the NZIDP to directly engage with and feed in energy infrastructure needs opportunities and issues for the respective local authorities.

The role of the West Midlands Combined Authority, through Energy Capital will be to act as the secretariat function for the NZIDP and the LAEP-CG, with the overall responsibility for feeding into the political structures of local government as well as influencing and advocating for regulatory changes to accommodate the specific needs of the region.

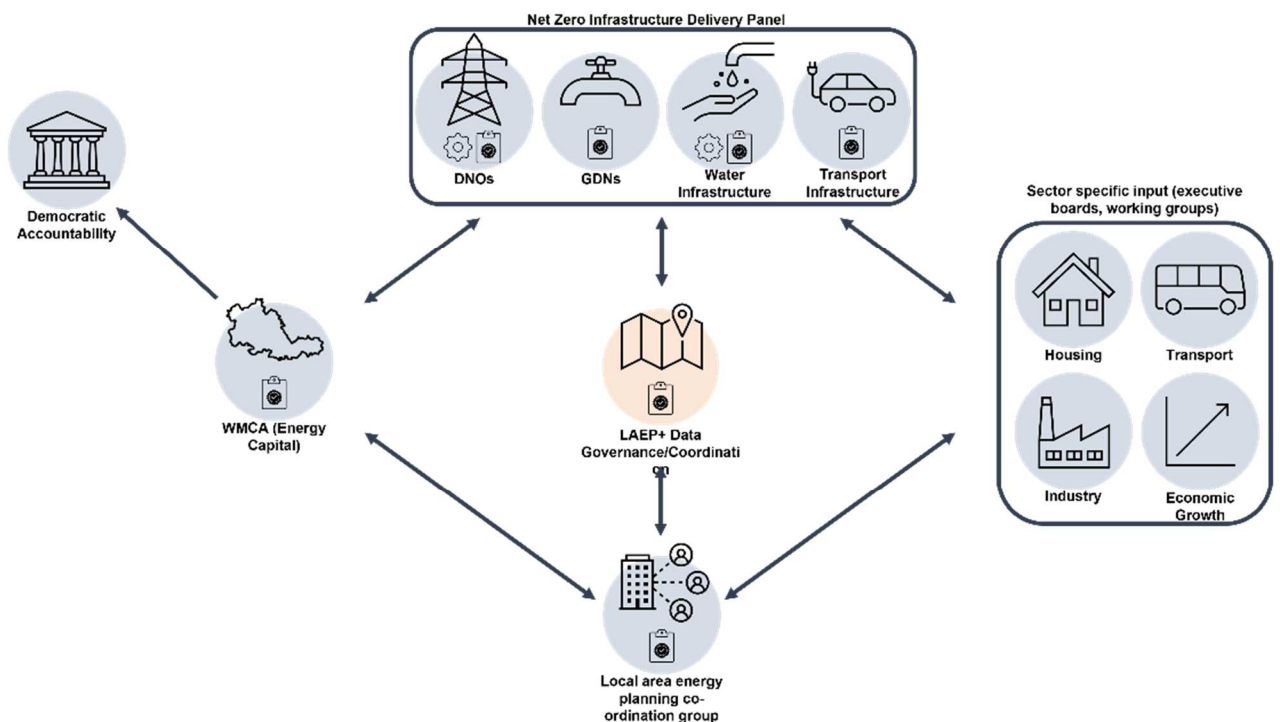


Figure 1: demonstrates the proposed Energy Capital governance structure where sector specific executive boards and working groups feed directly into the NZIDP and LAEP-CG, who are able to directly engage with each other. Acting as the secretariat, Energy Capital will take responsibility for feeding into the regional democratic accountability structures.

Within this structure the digital tool will provide each individual local authority with a platform to breakdown silos between their colleagues working in other sectors e.g., housing, transport, economy etc. This issue of working in silos was reiterated several times across multiple engagement forums and by the majority of the WMCA constituent local authorities. In providing a platform that aligns cross-sector local planning it will enable local authorities to create a streamlined, whole-system, local area energy plan with their decarbonisation goals well defined.

More broadly, taking the digital tool at a regional level will give the WMCA oversight of local authority plans and decarbonisation goals, highlighting any strategic opportunities or priorities that local authorities may need additional support with. Further to this, the platform will enable engagement with sub-national infrastructure providers creating a single point from which meaningful engagement and co-working can take place, allowing for infrastructure providers to be cognisant to local authority plans ahead of time and able to work collaboratively to meet their infrastructure needs.

4.2 Integration with the RSP

In Ofgem's [Call for Input: Future of local energy institutions and governance](#) (2022), they illustrate in figure 4 the framework model for what a Regional System Planner and Operator would look like. Following the 2023 consultation and a re-focus to planning with operation taken out of the RSP remit we believe the following framework model (Figure 2) demonstrates the RSP and is the basis for which our governance and organisational models are formed.

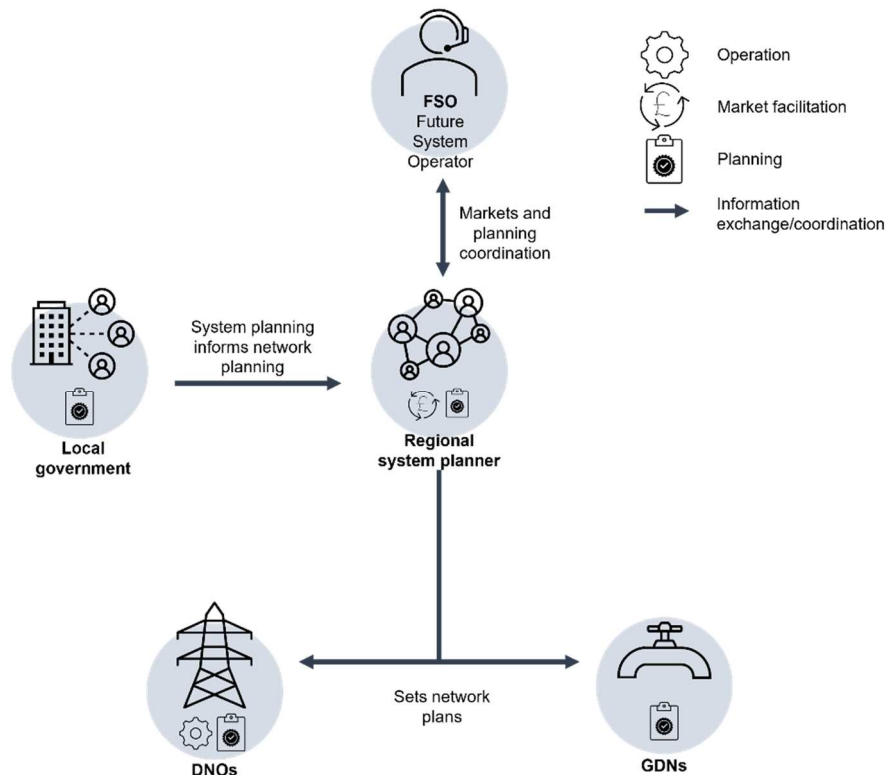


Figure 2: original regional system planner and operator framework model proposed by Ofgem in their 2022 "Call for Input: Future of local energy institutions and governance".

In the original framework from Ofgem there was one directional information exchange depicted between local government and the RSP, and the RSP and the DNOs and GDNs, with no information exchange between local government and the DNOs and GDNs. Where operation was previously included in the RSP role there was two-way information exchange between the DNOs and RSP.

Through the PRIDE project we are proposing to start a trial of the governance structure (Figure 1) where there is two-way information exchange between all stakeholders including local government and sub-national infrastructure. Implementation of the regional governance trial will be an incremental process with the trial initially taking place before the digital tool is available across the region. The platform will create a more effective and efficient space to have meaningful engagement, and for local authorities and infrastructure providers to understand each other's current and future plans. However, the intention is to start the trial before it is ready to start creating working relationships between local authorities and infrastructure providers. It is intended that by creating these relationships and structures in advance of the platform availability, the benefits of the platform will be multiplied.

In **Figure 3** digital tool is positioned between the LAEP-CG, NZIDP, and the RSP, in this framework we intend for the digital tool to support and enable the role of the RSP in bringing all the sub-national

infrastructure planning and local planning into one place. As a result of this the DNO will get a clear map of how to engage with the WMCA local authorities which will also identify any potential problems that will require a network solution. At the same time the DNOs will be supported in achieving many of their core commitments from RIIO-ED2: supporting local authorities develop local area energy plans, enable low carbon technology connections, whole system collaboration, enhanced use of the distribution future energy scenarios and the opportunities to identify alternative options to conventional reinforcement.

Combined with the local authorities being able to more effectively breakdown internal silos and have better cross-sector working within their authority e.g., housing, transport, economy etc. The local authority will be able to create their local area energy plans with decarbonisation pathways that will remain agile to the changing policy and technical landscape. Altogether this will create a collective whole-system regional and local plan that when in operation the RSP will be able to interrogate to identify any conflicts in future plans between infrastructure providers and local authorities.

For the FSO through the PRIDE project, we will work directly with them (currently ESO) as a partner of the project to understand the requirements for integration of the digital tool with the virtual energy system (VirtualES). The VirtualES is aiming to create a decentralised network where each actor can develop their own digital twin and connect them through the VirtualES. This common framework will create a common language, recommended infrastructure, and processes to connect and federate individual digital twins from across the energy sector. The framework will consider both social and technical factors, including, but not limited to governance, policy, legal, data rights and consent management, ontologies, metadata standards, interoperability approaches, skills, data standards, security protocols, dispute resolution, performance and codes of practice. This integration workstream with the VirtualES further aligns with actions described in RESO.

The digital tool will also be crucial in providing a technical solution to integrating this regional planner with the future RSP and the FSO. Until the point that the platform is available, the FSO established and the final form of the RSP determined. To stay connected and agile to the evolving nature of the RSP and FSO we intend for Ofgem to act as an observer within the regional governance. This will allow them to take learnings from the trial, and also directly input on any alterations that should be made to better align with the changing picture of the RSP.

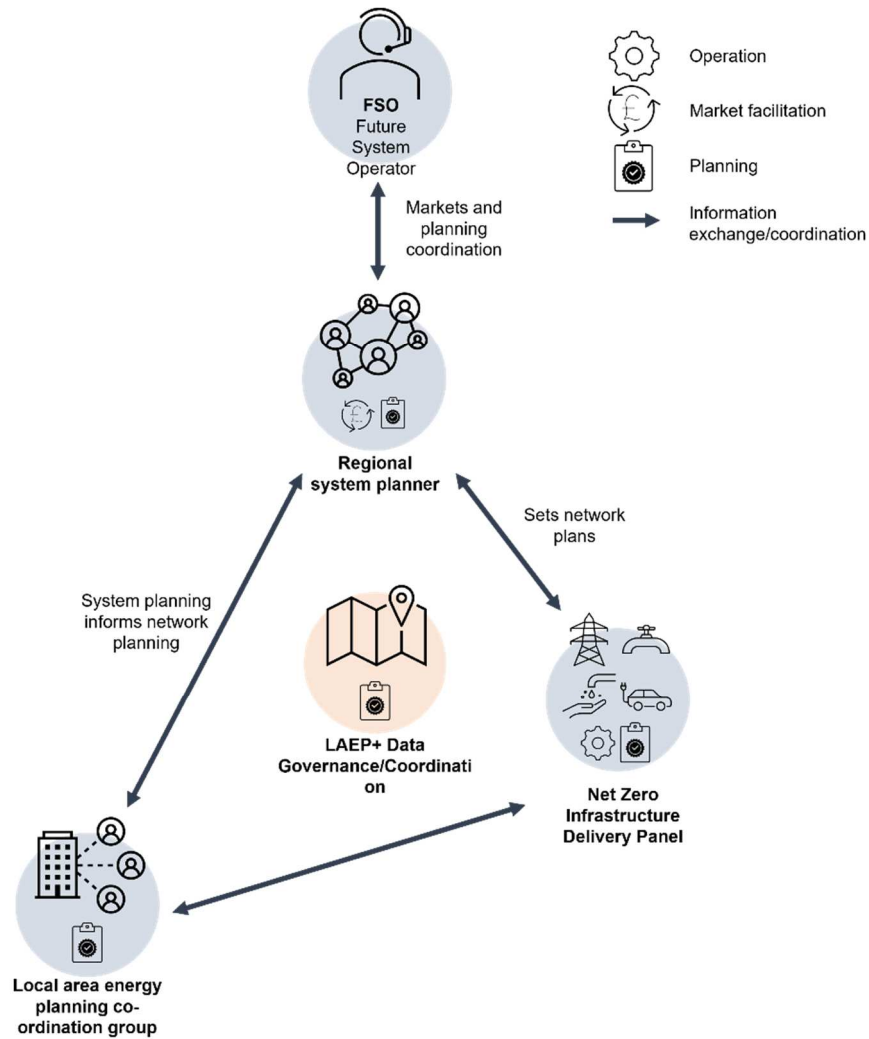


Figure 3: a revised framework model for the regional system planner which takes into account the regional governance structures and demonstrates the digital tool LAEP+ as the enabling platform for the regional system planner role.

The regional governance (Figure 1) is directly linked to the framework illustrated in Figure 3 where the LAEP-CG and NZIDP are both engaging with regional sector specific groups, whilst also feeding into Energy Capital who will interface with the regional democratically elected leaders. In this aligned model it demonstrates that the regional governance model will take responsibility for the bottom-up energy infrastructure and decarbonisation targets, facilitated by the digital tool to feed these into wider energy system planning. These additional engagement pathways are illustrated with dashed lines and the additional groups shaded grey in Figure 4, highlighting that they exist but making it clear that they would lie outside of the proposed framework model for the regional system operator.

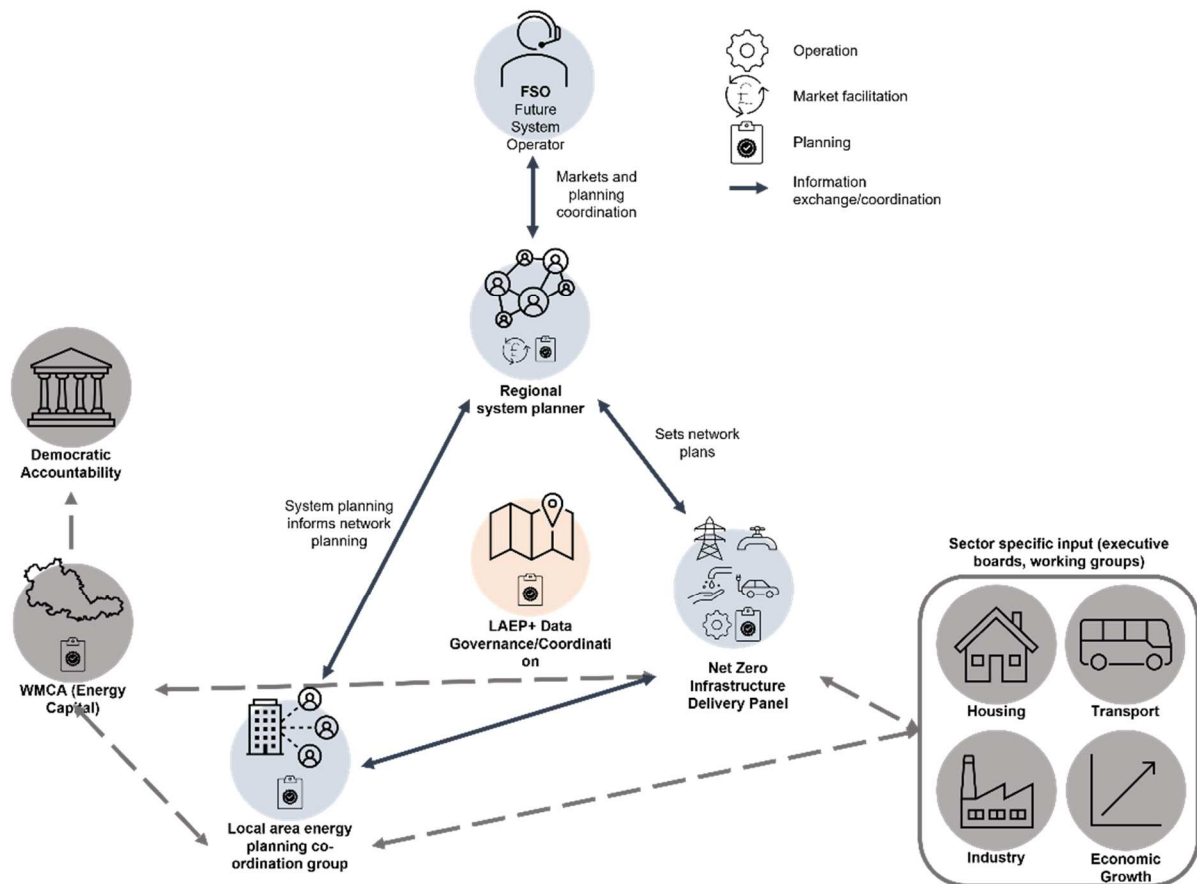


Figure 4: detailed framework model to demonstrate the interaction between figure 1 and figure 3, demonstrating how the sector specific and regional democratic accountability will be considered within the wider regional system planner framework model.

In this model digital tool provides a platform to bring all data into one place, where local government and infrastructure providers can co-work in a live environment to have meaningful and timely engagement ahead of time, ensuring plans can be realised and will be supported by the necessary infrastructure. This will provide day-to-day business as usual planning support and enhanced identification of business opportunities further detailed in work package 1. Digital tool will create an engagement space where most problem areas can be brought to the attention of the LAEP-CG and the NZIDP. Through this the RSP will be able to oversee engagement between local government and sub-national infrastructure, with unresolved problems escalated to the RSP via these engagement routes. This regional governance structure and the digital tool will best enable the RSP role and support them in their responsibility to integrate with national infrastructure.

5 Next Steps

If successful as part of the alpha phase we will start to implement the regional governance as a trial that will be an incremental process with the trial initially taking place before the digital tool is available across the region. The platform will create a more effective and efficient space to have meaningful engagement, and for local authorities and infrastructure providers to understand each other's current and future plans. Although the trial will start before that platform is available across the WMCA region we have identified this as an opportunity to start creating working relationships between local authorities and infrastructure providers. It is intended that by creating these relationships and structures in advance of the platform availability, the benefits of the platform will be multiplied.

The digital tool will also be crucial in providing a technical solution to integrating the regional planner with the future RSP and the FSO. Until the point that the platform is available, the FSO established and the final form of the RSP determined, we will continue to engage with Ofgem and the Department for Energy Security and Net Zero to stay connected and agile to the evolving nature of the RSP and FSO. To do this Ofgem will be an observer within the regional governance structure, this will allow them to take learnings from the trial, and also directly input on any alterations that should be made to better align with the changing picture of the RSP.

Appendix I

The tables included below are direct outputs from the regional energy system operator (RESO) project where more information can be found [here](#). The publicly available reports and documents can be found on this page, and any further information can be made available by request. The tables included below are not publicly available, and so further information will need to be requested.

Scale	Function	What is it
Electricity Systems		
Macro	Control Centre Operations ⁽¹⁾	Balancing the National Electricity Transmission System (NETS) in a safe, reliable and efficient way is a core function for the ESO. The Electricity National Control Centre (ENCC) performs the day-to-day, short-term (within day and day-ahead) operational activities for the NETS. The ENCC carries out real-time system balancing by contracting and trading with energy market participants (e.g. generators, storage providers and third-party providers of aggregated flexibility).
	Market development and transactions ⁽¹⁾	The ESO operates the balancing mechanism and develops and procures a number of additional balancing services to balance and operate the system in a safe, reliable and efficient way. The ESO's regulatory framework for procuring balancing services provides the ESO with significant scope and flexibility in the design of these services.
	System insight, planning and network development ⁽¹⁾	The ESO performs a variety of insight, planning and network development activities. It publishes key insight documents that include credible long-term pathways for the energy sector through its Future Energy Scenarios (FES), it identifies long-term electricity system needs in the Electricity Ten Year Statement (ETYS) and also provides GB input, based on the FES, into the development of the pan-European Ten Year Network Development Plan (TYNDP). The ESO's annual Network Options Assessment (NOA) is a central part of its network development activities. The NOA assesses and recommends solutions to electricity onshore and offshore transmission system needs and provides an analysis of optimal interconnector capacity growth.
	National System architect ⁽²⁾	Currently, the system lacks an architect. Combining system operability and enhanced planning and coordination functions in the FSO would create a body able to anticipate the operability impacts of new technologies and cross-system solutions and proactively consider opportunities and challenges across a range of energy markets and networks. This would position the FSO well to provide technical advice across a range of decarbonisation issues and take on any new and enhanced roles and functions
	Advisory role on net zero transition ⁽²⁾	The Government and Ofgem will have to make important policy and regulatory decisions, which would benefit from drawing on specific areas of expertise of the FSO, such as the impacts of potential government or Ofgem decisions on future system operability or network investment.
	Dispute Resolution ⁽²⁾	Between Ofgem and the current ESO there are a variety of functions relating to the determination of disputes. For example, they both have roles in determining disputes in relation to prequalifying industry applicants to bid in capacity auctions.

	Coordination with DNOs ⁽²⁾	Distribution systems will be an important part of the transition to net zero, and we consider that the FSO should co-ordinate with the distribution networks for electricity (DNOs) and gas (GDNs). The FSO is well placed to do this given its system-wide perspective and its wider roles supporting network planning and future system operability.
	Data digitisation ⁽²⁾	Minimise the barriers in markets, by providing data on national targets. Some of the data need to be registered on a national database.
Micro	Energy systems planning, integrated into whole place system planning ⁽³⁾	<p>Ensure investment in electricity, gas and hydrogen networks is aligned with investment in other economic infrastructure such as transport and built environment assets, factories, waste streams etc. This minimises risk of stranded assets but also allows the city to take informed risks, for example putting in infrastructure ahead of demand to attract industrial investment; or cutting the costs of energy networks by specifying lower capacity connections to developments where buildings are required to be designed to higher standards of energy efficiency. The function could be delivered by planners, or by local powers to regulate and direct network companies, or both. It entails taking responsibility for delivery of local carbon targets (and is necessary to do so). (3)</p> <p>At a local level you have the same challenge of trying to anticipate new technologies. However, it is an operational (less strategic challenge). Combining system operability and enhanced planning and coordination functions in the FSO would create a body able to anticipate the operability impacts of new technologies and cross-system solutions and proactively consider opportunities and challenges across a range of energy markets and networks. This would position the FSO well to provide technical advice across a range of decarbonisation issues and take on any new and enhanced roles and functions (2)</p>
	Regional System architect ⁽²⁾	This function is very important on a local level. It has to be more embedded in the local level. This requires system architecture capable of guiding the markets, and ensuring long-term system optimisation. On a local level, there is a need for an organisation that can identify local needs and opportunities to promote a transition to a low carbon system.
	Investment in energy system assets ⁽³⁾	<p>Selective investment in assets to ensure optimal plans are delivered (e.g., local energy storage or generation assets). This could be done directly (RESO ownership) or more likely via local licenses and tenders (coupled with powers to regulate monopolies – i.e., allocate licences).</p> <p>It includes stimulating local investments in key privately-owned assets such as heat pumps and EVs, working within national policy frameworks but also using (enhanced?) local planning powers etc. This needs to be distinguished from energy systems planning.</p>

	Driving competition in energy networks ⁽⁴⁾	<p>Enable onshore electricity network competition, by allowing parties other than the established network companies to compete for network solution build, ownership, and operation. The FSO could be a strong candidate for this role as it is closely linked to network planning and NGENSO has already begun to link the NOA into early competition work⁵⁵, alongside the NOA pathfinder process. In our model, the RESO is an even better candidate to carry it out, because it includes all the functions listed here and additionally distribution/procurement takes place at a local level.</p>
	Local energy system balancing in real time (optimisation) ⁽³⁾	<p>Find out more about it: This means minimising the real-time requirement to call on the national energy system and is linked to responsibility for security of supply.</p> <p>It includes licensing flexibility market operators (for example) and supervising such platform operators (see Electron's notes). In order to do that you need the software to carry it out as well as the ability. You need an organisational structure that can manage this type of transactions.</p> <p>Grant Wilson: Creating local markets was an original consideration for a RESO. What happens if the different levels are not balancing out? We don't know yet, what might happen then. Real-time balancing market is not the same as next day balancing. WPD need to know what is happening real-time what is happening on their network. There is a lot of interest in creating a localised flexibility market. Whoever causes the imbalance pays for the imbalance. If you keep getting it wrong, you will pay more than your competitors.</p> <p>Dave Philips: There are four levels of balancing</p> <p>Third Level: Transmission networks are making sure that the electricity going through the wire and transmitters is below safety threshold.</p> <p>Fourth Level: Smart meter markets.</p>
	Security of supply ⁽³⁾	<p>Separating system balancing and system planning functions could also lead to security of supply risks over time. This reflects the reality that efficient local delivery of security of supply requires effective whole system planning and operation, so this function affects the way functions above are defined. In practice, this would mean taking responsibility for keeping the energy requirements of Coventry on the national system within (periodically agreed) parameters negotiated with the national system operator.</p> <p>These parameters include system/network resilience, managed maintenance etc.</p> <p>Responsibility for security of supply impacts the quality of RESOURCES required to carry out planning and investment functions; it may encourage more balanced engagement in (the right) markets.</p> <p>On the national level, the FSO needs robust controls to safeguard against national security and energy security of supply risks.</p>

Stimulating demand-side investment and optimisation, including delivery of energy efficiency programmes ⁽³⁾	Arguably part of investment in energy system assets, but making a distinction because the key distinguishing feature is that this is about 'encouraging' third parties to act via policy and incentives (e.g., market-making). Energy efficiency in houses and businesses in particular, requiring private individuals and organisations to invest in assets (e.g., insulation, energy efficient equipment etc should be highlighted as the potential economic gains are so high (but public) and the individual benefits relatively low. Hence a major public policy challenge.
Data governance ⁽¹⁾	A neutral party acting in the public interest to ensure relevant data is available in a timely fashion to enable efficient market outcomes. On a regional level, as opposed to a national, the local entity will be responsible for policing that the data is accurate.
Consumer protection ⁽³⁾	Related to data – essentially like trading standards making sure that organisations providing energy-related products and services in the locality do not exploit their market position or misinform and lie to customers. May need to include some 'buyer of last Resort competence' – e.g., if suppliers fail? You need a local policing system to ensure that the regional monopolies do not abuse their power at the cost of consumers (by increasing prices).
Consumer engagements and behavioural change ⁽¹⁾	Seeking and integrating the views of end users to ensure that the energy transition meets their needs and facilitate required consumer behavioural changes.
Protection of vulnerable citizens ⁽³⁾	<p>Actively intervening in markets on behalf of and to support those members of society who are unable to engage effectively with service providers on their own and hence are at risk of exploitation or abuse, even when reasonable standards of consumer protection exist.</p> <p>The more complex and remote energy markets are, the greater the need for protection of vulnerable customers.</p> <p>Example activities include identifying elderly people who are paying far too much for energy because they have obsolete boilers and poorly insulated houses, and proactively managing access to support schemes which typically exist but which the vulnerable individuals lack confidence or competence to engage with.</p> <p>A key competence is ability to identify vulnerable individuals efficiently. Localities are often best placed to do this as the same individuals will also be in receipt of other social services and support programmes. Local authorities are close to knowing the people who are vulnerable to increase in prices, in a way that Ofgem or national organisations do not. For this reasons, Ofgem precludes a set of potential market outcomes to safeguard vulnerable consumers because they cannot identify who they are. You create a least common denominator market.</p>
Coordinate DNO Tariff Setting and Local Market Implementation ⁽⁵⁾ /Allocation of costs and benefits ⁽³⁾	<p>Enables incentives to be aligned to local priorities. However, it entails power to set energy tariffs, which may be difficult to secure.</p> <p>Commonly used internationally to make localities attractive for energy intense manufacturing for example, by allocating network and connection costs across domestic customers rather than industrial customers.</p>

Gas System		
Macro	Strategic network planning ⁽¹⁾	Undertaking long-term network capability assessments, needs case production, optioneering, economic options assessment, and publication of the Annual Network Capability Assessment Report (ANCAR), the Gas Ten Year Statement (GTYS) and Gas Future Operability Planning (GFOP).
	Long-term forecasting ⁽¹⁾	Undertaking medium to long-term gas supply and demand forecasting, as an output of the Future Energy Scenarios (FES), which provides an input to the Gas Winter/Summer Outlook publications.
	Market strategy functions ⁽¹⁾	Leading market participants in developing gas market strategy, publication of the Gas Market Plan (GMaP), and leading Future of Gas (FoG) forums.
	Network Emergency Coordinator (NEC) ⁽¹⁾	The NEC is responsible for coordinating actions to prevent a supply emergency developing or, where it cannot be prevented, to take timely decisions in order to minimise safety consequences. The NEC is responsible for coordinating actions across the affected parts of the gas network to take action to prevent, as far as possible, a supply emergency developing, and where it cannot be prevented, to take timely decisions in order to minimise the safety consequences. A 'supply emergency' is defined as an emergency endangering persons and arising from a loss of pressure in a network or any part thereof.

Table 7: a complete list of energy system functions as defined in the regional energy system operator project. The sources used to determine these functions are as follows (1) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/654902/Cost_of_Energy_Review.pdf, (2) BEIS and Ofgem, Energy Future System Operator Consultation (London: UK government, 2021). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004044/energy-future-system-operator-condoc.pdf, (3) <https://www.energynetworks.org/creating-tomorrows-networks/open-networks/>, and (4) ESO regulation team, ESO Roles Guidance (London: Ofgem, 2021), https://www.ofgem.gov.uk/sites/default/files/docs/2021/03/eso_roles_guidance_2021-23_1.pdf.

Function	Description of Function
Control Centre Operations	Balancing the National Electricity Transmission System (NETS) in a safe, reliable, and efficient way is a core function for the ESO. The Electricity National Control Centre (ENCC) performs the day-to-day, short-term (within day and day-ahead) operational activities for the NETS. The ENCC carries out real-time system balancing by contracting and trading with energy market participants (e.g. generators, storage providers and third-party providers of aggregated flexibility).
Market development and transaction	The ESO operates the balancing mechanism and develops and procures a number of additional balancing services to balance and operate the system in a safe and reliable way. The ESO's regulatory framework for procuring balancing services provides the ESO with significant scope and flexibility in the design of these services and it has objectives to operate the system efficiently. However, the national level mechanisms are blunt instruments and this efficiency is difficult to deliver, particularly in a more carbon-sensitive world.
System insight, planning and network development	The ESO performs a variety of insight, planning and network development activities. It publishes key insight documents that include credible long-term pathways for the energy sector through its Future Energy Scenarios (FES), it identifies long-term electricity system needs in the Electricity Ten Year Statement (ETYS) and also provides GB input, based on the FES, into the development of the pan-European ten year network development plan (TYNDP). The ESO's annual Network Options Assessment (NOA) is a central part of its network development activities. The NOA assesses and recommends solutions to electricity onshore and offshore transmission system needs and provides an analysis of optimal interconnector capacity growth.
National System architect	Currently, the system lacks an architect. Combining system operability and enhanced planning and coordination functions in the FSO would create a body able to anticipate the operability impacts of new technologies and cross-system solutions and proactively consider opportunities and challenges across a range of energy markets and networks. This would position the FSO well to provide technical advice across a range of decarbonisation issues and take on any new and enhanced roles and functions
Advisory role on net zero transition	The Government and Ofgem will have to make important policy and regulatory decisions, which would benefit from drawing on specific areas of expertise of the FSO, such as the impacts of potential government or Ofgem decisions on future system operability or network investment.

Dispute Resolution	Between Ofgem and the current ESO there are a variety of functions relating to the determination of disputes. For example, they both have roles in determining disputes in relation to prequalifying industry applicants to bid in capacity auctions.
Coordination with DNOs	Distribution systems will be an important part of the transition to net zero, and the FSO is intended to co-ordinate with the distribution networks for electricity (DNOs) and gas (GDNs). The FSO is well placed to do this given its system-wide perspective and its wider roles supporting network planning and future system operability.
Data digitisation	Minimise the barriers in markets, by providing data on national targets. Some of the data need to be registered on a national database.

Table 8: national level functions as determined by the outputs of the RESO analysis.

Function	Description of function
Energy systems planning, integrated into whole place system planning	<p>Ensure investment in electricity, gas and hydrogen networks is co-ordinated with investment in other economic infrastructure such as transport and built environment assets, factories, waste streams etc. This minimises risk of stranded assets but also allows the city to take informed risks, for example putting in infrastructure ahead of demand to attract industrial investment; or cutting the costs of energy networks by specifying lower capacity connections to developments where buildings are required to be designed to higher standards of energy efficiency. The function could be delivered by planners, or by local powers to regulate and direct network companies, or both. It entails taking responsibility for delivery of local carbon targets (and is necessary to do so). At a local level you have the same challenge of trying to anticipate new technologies. However, it is an operational (less strategic) challenge. Combining system operability and enhanced planning and coordination functions in the RESO would create a body able to anticipate the operability impacts of new technologies and cross-system solutions and proactively consider opportunities and challenges across a range of energy markets and networks. This would position the RESO well to provide technical advice across a range of decarbonisation issues and take on any new and enhanced roles and functions.</p>
Regional system architect	<p>At a local level, there is a need for an organisation that can identify local needs and opportunities to promote a transition to a low carbon system. For example, in Coventry the approach to phasing out 6.6kV.</p>
Investment in energy system assets	<p>Selective investment, largely in enabling local assets such as metering and occasionally local energy storage of generation to ensure optimal plans are delivered. This could be done directly (RESO ownership) or more likely via local licenses and tenders (coupled with powers to regulate monopolies – i.e., allocate licences). It includes stimulating local investments in key privately-owned assets such as heat pumps and EVs, working within national policy frameworks but also using (enhanced?) local planning powers etc.</p>
Driving competition in energy networks	<p>Enable onshore electricity network competition, by allowing parties other than the established network companies to compete for network solution build, ownership, and operation. A regional element of the FSO could be a strong candidate for this role as it is closely linked to network planning. In our model, the RESO is an even better candidate to carry it out, because it includes all the functions listed here and additionally distribution/procurement takes place at a local level.</p>

<p>Local energy system balancing in real time (optimisation)</p>	<p>This means minimising the real-time requirement to call on the national energy system and is linked to responsibility for security of supply. It includes licensing flexibility market operators (for example) and supervising such platform operators (see Electron's notes). In order to do that you need the software to carry it out as well as the ability. You need an organisational structure that can manage this type of transactions.</p>
<p>Security of supply</p>	<p>In practice, this would mean taking responsibility for keeping the energy requirements of Coventry within the national system within (periodically agreed) parameters negotiated with the national system operator. These parameters include system/network resilience, managed maintenance etc. Responsibility for security of supply impacts the quality of resources required to carry out planning and investment functions; it may encourage more balanced engagement in (the right) markets.</p>
<p>Stimulating demand-side investment and optimisation, including delivery of energy efficiency programmes</p>	<p>Arguably part of investment in energy system assets but a worthwhile distinction to make because the key distinguishing feature is that this is about 'encouraging' third parties to act via policy and incentives (e.g., market-making). Energy efficiency in houses and businesses in particular, requiring private individuals and organisations to invest in assets (e.g., insulation, energy efficient equipment etc should be highlighted as the potential economic gains are high (but public) and the individual benefits relatively low. Hence a major public policy challenge.</p>

Data governance	A neutral party acting in the public interest to ensure relevant data is available in a timely fashion to enable efficient market outcomes. On a regional level, as opposed to a national, the local entity will be responsible for policing that the data is accurate.
Consumer protection	Related to data – essentially like trading standards making sure that organisations providing energy-related products and services in the locality do not exploit their market position or misinform and lie to customers. May need to include some ‘buyer of last resort competence’ – e.g., if suppliers fail? You need a local policing system to ensure that the regional monopolies do not abuse their power at the cost of consumers (by increasing prices).
Consumer engagements and behavioural change	Seeking and integrating the views of end users to ensure that the energy transition meets their needs and facilitate required consumer behavioural changes.
Protection of vulnerable citizens	<p>Actively intervening in markets on behalf of and to support those members of society who are unable to engage effectively with service providers on their own and hence are at risk of exploitation or abuse, even when reasonable standards of consumer protection exist.</p> <p>The more complex energy markets become, the greater the need for protection of vulnerable customers. Example activities include identifying elderly people who are paying far too much for energy because they have obsolete boilers and poorly insulated houses, and proactively managing access to support schemes which typically exist but which the vulnerable individuals lack confidence or competence to engage with. A key competence is ability to identify vulnerable individuals efficiently. Localities are often best placed to do this as the same individuals will also be in receipt of other social services and support programmes. Local authorities know individuals who are vulnerable to increase in prices, in a way that Ofgem or national organisations do not.</p>
Coordinate tariff Setting and Local Market Implementation/Allocation of costs and benefits, particularly of infrastructure (e.g., DuoS)	<p>Enables incentives to be aligned to local priorities. However, it requires power to set energy tariffs, which may be difficult to secure.</p> <p>Sometimes used strategically by competitor regions internationally to make localities attractive for energy intense manufacturing (for example) by allocating network and connection costs across domestic customers rather than industrial customers.</p>

Table 9: local level functions as determined by the outputs of RESO.