Call for Input: Future of local energy institutions and governance

1st June 2022

Introduction

The IET welcomes the opportunity to respond to this important call for input, which is particularly timely following Ofgem's and BEIS's now closed joint consultation on the Future System Operator to which The IET provided a comprehensive response. We are therefore pleased to provide a similarly full response to this call for input. In preparing this response, The IET has engaged a range of professionals from within its membership. These include members with expertise in electricity system planning and operation, electricity markets, and digital infrastructure, some of whom are actively engaged in local energy initiatives. In so doing The IET has accessed a wide range of expertise and experience in disciplines relevant to local area energy planning. Our response is non-confidential and The IET is therefore content for it to be published in full on Ofgem's website.

We include responses to all 13 questions below, but our overarching views can be summarised as follows:

- **The energy system needs to change profoundly** if it is to decarbonise affordably whilst remaining resilient and secure.
- **Whilst energy infrastructure for heat and transport is of national strategic importance, its development will take place largely at a local (or regional) level**, and hence this will also be a function of local area energy planning.
- **Local or regional approaches can respond to user's needs and make best use of available resources**. Local or regional approaches can also engage users on the wider decarbonisation journey. Importantly, local, or regional approaches can recognise in useful detail the interactions between energy and other systems in society and help to deliver wider social goals and co-benefits of healthy societies, such as inclusive growth.
- **The IET recognises that Ofgem's remit does not currently extend across this wider social agenda**, and that the capacity and knowledge to drive activity is often limited outside the established energy sector. Nevertheless, great care should be taken not to limit the transformational change opportunities that a more local, digitalised, integrated energy system can bring.
- **Local area energy planning is a golden opportunity to establish regional whole system strategies**, including energy, water, digital and transport (not only electricity) with a focus on place-based needs and opportunities that would appear opaque from a central planning perspective. The benefits of such strategies will include faster, more affordable decarbonisation, better stewardship of natural capital, and more healthy, inclusive, and prosperous societies.

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- **The proposals outlined in this call for input explore important steps in the right direction, but not in our view a sufficiently articulated description of the desired (and necessary) end-state.** We provide a full description of the provisions we believe are necessary to achieve and sustain the desired end-state in our response to question 9 but in summary:
    - The necessary support structure must be in place to provide the required independent business and technical support.
    - The requirement for sharing of information between all LAEP stakeholders, and particularly between the FSO and RSPOs, is enabled by a comprehensive cyber-resilient digital infrastructure.
    - National and subnational governance arrangements must be comprehensive, mutually supportive, inclusive, and tailored to each specific local area's energy planning needs and opportunities.
    - Whilst the framework models in this call for input are depicted in simplified form, the overall structure in practice will be considerably more complex.
- **Legislation should be framed to be flexible to allow further change** beyond that envisaged currently. There is much yet to discover on the road to net zero.
- **Critical to local area energy planning capability will be development of an organisational culture which embraces inclusivity and agility in decision making**, knowing how to facilitate technical innovation, and understanding the requirements for successful adoption of smart systems by customers and the wider public.
- **Key to success will be a fit for purpose governance framework and operating environment** that allows us to move forward at pace and change as we learn, whilst managing the transitional risks.
- **Also critical to success will be development of local area energy planning (LAEP) capability**, using compatible methods and tools to ensure quality and consistency of decision making, not only within local authorities but also across the energy community.
- **Funding for LAEP is a potentially serious challenge: -** given that local authorities do not have strong drivers to undertake energy planning as part of informing their overall statutory planning duties. Hence, given their generally tight budgets and need to support urgent issues such as social care and housing, there is a high risk that LAEP will receive low priority for allocation of financial and/or human resources.
- **Effective implementation of an effective local energy plan will depend on identification of individual, sometimes niche, opportunities at a much more granular level** and aggregating these to a regional level, reconciling regional energy objectives with place-specific initiatives.

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We acknowledge that in publishing this call for input, Ofgem is addressing the beginnings of a necessary but difficult transitional journey for Britain's energy infrastructure. We would encourage ambitious strategic thinking, combined with a step-by-step implementation approach. The call provides a valuable opportunity for all stakeholders to air their views and there will no doubt be varying opinions and many perceived issues with each of the four framework models (or hybrids thereof) put forward for consideration.

From The IET's perspective we would suggest that in considering local area energy planning the framework models do not adequately define, or sufficiently differentiate between, 'regional' and 'local'. Nor do they (or arguably could they) cater for all regional circumstances which might call for a hybrid or more tailored framework model approach. An example might be where community energy schemes, including some with peer-to-peer trading arrangements and/or some deploying multi-vector or hybrid energy technologies, are already established, or gaining traction. Most local energy solutions and systems will develop and grow from vey local developments much as today's utilities did in the 1900's.

Irrespective of framework models, for practical considerations, we believe IDSOs/RSPOs will need to operate at a regional level where a region will typically cover several smaller local authorities' geographic footprints. Not least of these practical considerations is that the required skills, competencies, knowledge, and experience do not currently exist at the required scale, either within local authorities (even at county council or unitary authority level) or within the existing energy community. It will take considerable time and funding to develop the necessary capability.

This is because local area energy planning is a learning journey for both national and local government institutions and the energy community at large, with some more advanced on the journey than others. Cross-over learning, building on experience and sharing best practice (but preserving regional specificity geared to local needs and opportunities) will be invaluable to achieving Britain's energy transition objectives in an efficient, coordinated, and economic way. We see the Future System Operator being a key enabler and facilitator of this shared learning, enabling individual regions to quickly gain a deeper understanding of the opportunities, resource requirements, and potential options for delivering their local energy transition strategies.

Common to all local area energy planning approaches will be the establishment of a relationship between energy planning and other devolved government aims. This is important because governance for local area energy planning will underpin many of these ambitions. We are already seeing some examples of this approach across Britain with local authorities working with key stakeholders to develop sustainable energy strategies for their region. Examples include the Oxfordshire Low Carbon Hub[1] and the Greater Lincolnshire Energy Council[2] each focussing on the specific challenges and opportunities for their communities.

[1] https://www.lowcarbonhub.org/

[2] https://www.greaterlincolnshirelep.co.uk/about/boards/energy-council/

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A further example is Southampton and The Solent where the need for an integrated and coordinated approach to decarbonisation of transport is required, recognising all relevant transport sectors including road, rail, aviation and marine[3]. We believe such initiatives should be encouraged and supported (including through government and other innovation funding) as they provide the necessary high-level strategic guidance to implement holistic energy solutions geared to sustainable regional, and ultimately national, long-term energy goals. In that regard, a potential risk is that funding of local area energy planning might not always receive the necessary prioritisation. HMT may be sceptical about local interventions in energy planning, particularly if they do not see the economic case as having been presented in a convincing way; and local authorities, in considering their wider statutory obligations within generally tight budget constraints, might see little incentive to prioritise either financial or human resources towards developing local area energy planning capability. Ideally, funding priorities for local authorities would take into consideration their contribution to the nation as a whole, as well the benefit to the locality.

Leaving aside the need for adequate funding, a further aid to national progress would be a common local area energy planning framework supported by shared tools, techniques, and data standards (albeit tailored to local circumstances). This would facilitate aggregation and disaggregation between national, regional, and local energy planning outputs, as well as cohesive local area energy planning between adjacent local area planning hubs. It would also help accelerate training and hence overall progress towards achieving competency in holistic local area energy planning. The Energy Systems Catapult in conjunction with the Centre for Sustainable Energy has developed an 'LAEP method'[4] and toolkit[5] but it is acknowledged that practitioner experience will be a valuable source of feedback to enable continuous development and improvement of both.

Lastly, we cannot emphasise strongly enough that this task is urgent as we all grapple with the challenges of decarbonisation. We need to be ready to experiment, embrace and learn from failure, and share findings as we discover the path to net zero. Legislation needs to be drafted flexibly to allow this – there is no time to revisit and reconsider legislation that, however well-intentioned, ends up hampering progress in this time-limited environment.

[3] https://www.r-e-a.net/wp-content/uploads/2022/05/REA_Decarbonising-Transport-Enabling-Local-Energy-Solutions_FINAL.pdf

[4] https://es.catapult.org.uk/report/local-area-energy-planning-the-method/

[5] https://es.catapult.org.uk/tools-and-labs/our-place-based-net-zero-toolkit/

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Responses to Questions

1. **Are the three-energy system functions we outline (energy system planning, market facilitation of flexible resources and real time operation of local energy networks) the ones we should be focusing on to address the energy system changes we outline?**

Interrelated power system functionality

The Future Power System Architecture programme undertaken by the Energy Systems Catapult and The IET between 2015 and 2018 identified and defined 35 Functions that need to be implemented to support the future GB power system up to 2030. These functions (further reviewed in 2019) were categorised under four headings**: *investment planning, operational planning, real-time & balancing, and markets and settlement***[6]. Hence the three DSO functions outlined by this call for input align reasonably well with those identified by the FPSA programme (albeit the FPSA functions extend beyond DSO to include ESO, TO, and ultimately all actors involved in managing the power system). As with the FPSA function categories, the three DSO functions outlined by the call for input will have numerous associated subfunctions.

it is therefore important to recognise the importance of subfunctions which are directly associated with these three DSO functions, such as: *system design (subtly different to planning); asset management (applying ISO 55000 principles and methodologies to maintain asset health and manage condition-based risk); and active network management through advanced distribution management systems (ADMS) and distributed energy management systems (DERMs).*

Active network management includes, for example: *advanced voltage control; active power flow management; active generator export management; fault current limitation; 'soft' meshing; phase load rebalancing; and real-time dynamic ratings*.

More traditional DNO activities include: *maintenance and construction; outage planning; routine and fault switching; new connections; and customer services and call handling*.

An additional and complementary function to *market facilitation* is *technological and market innovation.*

Interdependency between DSO and DNO functions as part of network options assessments

By way of an example of functional interdependency, as part of the electricity distribution system planning process to address an anticipated network demand increase (for example due to EV charging and/or heat pump demand) a system planner would undertake a network options assessment to determine the most cost-effective means of meeting the anticipated demand. This might include alternative investments over different timescales.

[6] https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/08/FPSA-Function-Review-Report-v3.0.pdf

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For example, a load transfer scheme might permit deferment - but not avoidance - of major reinforcement for several years; another option might include additional reinforcement beyond what is immediately required in anticipation of further future increases in demand (which might confer immediate and enduring benefits in terms of reduced losses); another might confer additional benefits such as deferment of future renewal of assets which are approaching end of economic life; and another might lead to an improvement in reliability and/or quality of supply (i.e. betterment). Each of these options would involve costs and conferred benefits over different timescales, and so the system planner would use techniques such as incremental cost-benefit and discounted cashflow analyses to determine the highest overall value scheme in npv terms (as well as relative future optionality or risk of asset stranding). Post-investment appraisal (PIA) is a further important aspect of whole energy system planning to evaluate the degree to which anticipated benefits have been realised and overall value has been delivered. Findings arising from PIA will help refine future cost-benefit analyses and inform ongoing risk management strategies.

Role of flexibility in electricity distribution system planning

An increasingly considered option for addressing an anticipated network capacity constraint (especially where the quantum and timing of future demand growth is uncertain) is that of applying a common evaluation methodology[7] to assess the value of flexibility[8] in the form of one or more of the four ENA standard flexibility products: - sustain, secure, dynamic, restore. These can be deployed as an alternative to physical network reinforcement in order to:

- meet ENA EREC P2/7 requirements for design levels of security of supply;
- mitigate the risk of supply interruptions during construction outages; and/or
- facilitate supply restoration following an unplanned network outage in unusually demanding circumstances.

A particular benefit of flexibility is that it might enable deferral of reinforcement until the quantum and timing of demand growth is more certain, hence enabling options to then be considered more objectively with reduced risk of asset stranding, due either to overinvestment or underinvestment – the latter resulting in stranding if the asset has to be subsequently replaced (or overlaid) with one of greater capacity. If procurement of flexibility is part or whole of the immediate solution to a demand growth scenario, then the actual dispatch of services (or issue of 'arming' instructions) will be a function of real-time operation.

[7] https://www.energynetworks.org/assets/images/Resource%20library/ON20-WS1A-P1%20Common%20Evaluation%20Methodology-PUBLISHED.23.12.20.pdf

[8] Standard distribution licence condition 31 E requirements on DNOs for procurement and use of flexibility services, and also now includes a requirement to promote energy efficiency: https://epr.ofgem.gov.uk//Content/Documents/Electricity%20Distribution%20Consolidated%20Standard%20Licence%20Conditions%20%20-%20Current%20Version.pdf

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Holistic network options assessment

The above examples serve to illustrate that distribution system planning is a holistic process whereby the system planner considers all options for mitigating system risk and/or leveraging system benefits over different timescales (investment planning, operational planning and real-time) rather than simply addressing the issue which has triggered the need for investment / intervention. Moreover, network option assessments consider functionality that will need to be delivered by different areas of functional responsibility within the DSO/DNO organisation.

It follows that in focussing on the three functions of energy system planning, market facilitation of flexible resources and real time operation of local energy networks, it is important to be cognisant of their linkages to the functions outlined above. Applying a holistic systematic approach to electricity distribution system asset management and investment/intervention decision-making requires a DNO/DSO to apply a wide range of interrelated functions, including those categorised under investment planning, operational planning, real-time & balancing, and markets and settlements functions derived through the Future Power System Architecture programme. It follows that in focusing on just three functions to address the required energy system changes, it will be important for Ofgem to explicitly encompass these associated subfunctions and how (and by whom) they would continue to be executed under each of its four framework models.

2. Do you agree with the criteria we have set out for assessing the effectiveness of institutional and governance arrangements?

'Accountability', 'credibility', and 'competence' are clearly essential components of any successful system of institutional governance. Assigning accountability between DSOs/IDSOs/RSPOs and local authorities for delivery of local area energy planning will be essential. Ultimately, we would see RSPOs taking overall responsibility for local area planning, closely aligned to national energy strategy through effective engagement with the FSO. However, as we outline in our response to question 9 below, partly due to varying degrees of competence between local authorities in terms of local area planning capability, and both human and financial resources, we do not believe it will generally be credible to immediately establish RSPOs in most cases; rather we believe establishment of DSOs or IDSOs will be a necessary interim step.

In the context of these proposals, 'coordination' is a further criterion for integrating the three energy system functions outlined (energy system planning, market facilitation of flexible resources and real time operation of local energy networks) both within each vector (e.g., electricity system operation, transmission, and distribution) and across different vectors (e.g., electricity, gas, heat, and transport). As desirable as it might seem, 'simplicity' might be unrealistic given the complexity of integrating energy vectors at a regional level, and therefore 'transparency and 'clarity' might be more realistic criteria for assessing effectiveness.

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We would also add 'effective engagement', 'inclusivity', adaptability' and 'agility' (the former two in recognition of the importance of stakeholder involvement; the latter two in recognition of the fact that there is no single energy pathway towards net zero; changing circumstances might give rise to emerging challenges and opportunities requiring effective change-controlled strategic redirection).

In this regard, we would again cite one of the key outputs of the Future Power System Architecture programme which described a radical new approach to energy system governance with the aim of being technically fit for purpose; unlocking innovation at scale; enabling best value for customers; and (importantly given the scale and pace of energy system transformation) being adaptable to ongoing change [9].

3. Do you agree with our assessment of how far the current institutional arrangements are, or are not, well suited to deliver the three key energy system functions?

We agree there are limitations with the current institutional arrangements, particularly with regard to integrated energy system planning across the whole value chain, but also within individual energy vectors.

Institutional dysfunctionality

By way of an example of disjointed / uncoordinated electricity distribution system planning, DNOs have experienced large volumes of largely speculative applications for connecting onshore windfarms, solar PV farms, and grid-scale energy storage. Each of these applications requires a specific study and this is complicated by the fact that some applications are 'interactive' – i.e., the network impact of one application will affect one or more other applications in terms of power flows and hence the basis of a connection offer. Typically, many of these applications will not proceed to completion due to economic considerations, difficulties in obtaining easements, or planning constraints.

Under these circumstances, efficient coordinated and economic planning of electricity distribution systems becomes almost impracticable (which also limits the coordination between distribution and transmission system planning). There is a risk that uncoordinated rollout of public EV infrastructure will have a similarly negative impact on efficient distribution system planning with the consequent danger of either delayed connections due to inadequate advanced provision of network capacity and/or asset stranding due either to overinvestment or underinvestment in additional network capacity – the latter resulting in stranding if the asset has to be subsequently replaced (or overlaid) with one of greater capacity.

[9] https://www.theiet.org/media/9408/fast-track-to-britains-future-power-system.pdf

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Need for joined-up planning

It follows from the above that, as a minimum, there is an urgent need at subnational level for strategic (whole) electricity system infrastructure planning (electricity infrastructure to include distributed energy resources such as solar PV farms, onshore wind, grid-scale energy storage and public EV charging infrastructure). However, given the regional variability in terms of opportunities for heat networks, community energy, hydrogen production, CCUS, and hydrogen infrastructure, there is a need to extend strategic subnational energy planning to include (whole) energy system infrastructure, embracing region-specific opportunities for economic alternatives to electrification and also to opportunities for supply and demand-side cross-vector energy arbitrage. We therefore agree with the Energy Systems Catapult that the scope of local area energy planning should include electricity, heat, and gas networks; the local potential for hydrogen; the built environment (industrial, domestic, and commercial) and its fabric and systems; flexibility (we would add cross-vector supply and demand-side energy arbitrage); energy generation and storage; and both EV charging and digital infrastructure[10].

Institutional requirements to deliver holistic whole energy system strategic planning

In terms of the institutional structure required to enable holistic whole energy system planning at both national and regional level, we believe the role extends beyond the remit of a 'Regional System Planner and Operator'; the required role is that of a Regional Energy Systems Architect whose remit would extend beyond local area energy planning to include effective engagement with the FSO. For similar reasons, as stated in our response to the BEIS / Ofgem consultation on the Future System Operator, we believe the FSO role should extend beyond the remit of a system operator to embrace the role of a System Architect. Irrespective of this missed opportunity (as we would see it) the imperative is to ensure effective national whole-energy system strategic planning wherein national energy objectives inform, and are informed by, specific (and sometimes unique) regional energy system priorities and opportunities. A recent Innovate UK report emphasised the benefits of a 'place-specific' as opposed to 'place agnostic' approach to local area energy planning, wherein the national objective is achieved far more cost-effectively by maximising regional opportunities[11].

[10] https://es.catapult.org.uk/report/the-future-of-local-area-energy-planning-in-the-uk/#:~:text=Energy%20Systems%20Catapult%20was%20commissioned,government%20to%20meet%20its%20ambitions.

[11] https://www.ukri.org/publications/accelerating-net-zero-delivery/

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4. Overall, what do you consider the biggest blocker to the realisation of effective energy system planning and operation at sub-national level?

Current limitations on LAEP capability

Notwithstanding some helpful guidance for local authorities and energy providers on effective local area energy planning published jointly by The Energy Systems Catapult and the Energy Technologies Institute[12], undoubtedly a significant blocker currently is the limited expertise, capability and resource availability for holistic energy planning at sub-national level, albeit we believe this will be found to be highly variable across authorities (in particular the comparative capabilities of Town, District, County, Unitary, and Combined Authorities). An Energy Systems Catapult study in 2021 investigating the future of local area energy planning in the UK, found variable, but generally limited, capability across the UK, and numerous blockers (or impediments) to progressing effective local area energy planning. The study documented six key recommendations which can be summarised as: having a common definition of local area energy planning (LAEP), local government taking the lead, developing a common methodology, funding to develop more dynamic LAEP tools, establishing governance arrangements, and prioritising development of LAEP resources[13]. More dynamic LAEP tools can enable greater agility and adaptability in terms of energy planning, such that plans can more easily be updated considering new data or changes in policy (for example if national strategic energy planning options assessments were to identify a greater than previously anticipated role for hydrogen). Agility and adaptability within the energy planning process needs to be replicated in terms of effective project planning and management, in other words turning plans into action and managing the logistical challenges of delivering a portfolio of sometimes interdependent projects.

LAEP funding

A further limitation is funding and financial prioritisation. Local authorities have no specific funding to develop LAEP capability; neither currently do they have statutory obligations with regard to net zero. A further contributing factor is that HMT may be sceptical about local interventions particularly if they do not see the economic case as having been presented in a convincing way. It follows that in meeting their wider statutory obligations within generally tight budget constraints, there is little incentive for them to prioritise either financial or human resources towards LAEP.

Data limitations

Notwithstanding financial and human resource constraints, a further impediment to LAEP capability is the current limited availability of relevant data of sufficient quality to undertake integrated energy planning, taking account of other planning obligations, for example towards transport, building development and other infrastructure such as telecommunications.

[12] https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/07/Local-Area-Energy-Planning-Guidance-for-local-authorities-and-energy-providers.pdf

[13] https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/12/ESC-Local-Energy-Plan-Summary-FN-Digital.pdf

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Importance of strategic direction and coordination at national level

Irrespective of regional capability, effective energy system planning and operation at sub-national level depends critically on effective strategic direction of energy policy at national level, and coordination between national and subnational bodies to ensure regional opportunities and priorities are reconciled (and indeed optimised) through strategic alignment between national and subnational objectives. This in turn requires sufficient consistency across local authorities in terms of subregional energy planning outputs to enable aggregation at national level, for example in terms both of their aggregated contribution to net zero and their overall cost-effectiveness in achieving national objectives. Clarity and consistency in CBA methodologies can also help in raising private finance. Given the variable (and as yet largely untested) local area energy planning capability, achieving this objective will not be straightforward and will require more detailed prior appraisal of local area energy planning capability in order to determine each local area's development need (including the extent to which adjacent local authorities might be mutually supportive in developing capability, for example in developing and applying common LAEP tools). In terms of appraising and developing LAEP capability, DSOs or IDSOs also have an important role here as we describe in our response to question 10 below. The Energy Systems Catapult in conjunction with the Centre for Sustainable Energy has published a 'method' for establishing LAEP capability which usefully sets out a recommended approach and criteria for success.[14]

A good-practice toolkit

Recognising current variability in levels of LAEP maturity and capability, a further enabler would be an open-source good-practice toolkit that is: scalable in terms of detail and complexity; adaptable to be usable by a wide range of practitioners at different levels of LAEP maturity; and capable of further development informed by practitioner experience and feedback. It would need to be sufficiently open to support experienced LAEP practitioners and also practitioners at an early stage of developing LAEP capability, for example providing something a heat network developer could use to ensure their proposals are suitably framed to support a business case and hence secure investment approval. The Energy Systems Catapult in conjunction with the Centre for Sustainable Energy has developed an LAEP toolkit[15]

Required supporting structure

The Innovate UK report referred to under 3 above advocates the creation of supporting Local Net Zero Forums, Local Net Zero Hubs, and Regional Skills Academies. Similarly, the DfT Electric Vehicle Infrastructure Strategy[16] proposes Sub-national Transport Bodies which would support local authorities in developing local strategies for rolling out public EV charging infrastructure through a Local Government Support Programme. In terms of formal training, programmes are available that will help enhance local authority capability and embed good practice[17].

[14] https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/09/LAEP-method-final-review-30-July-2020.pdf

[15] https://es.catapult.org.uk/tools-and-labs/our-place-based-net-zero-toolkit/

[16] https://www.gov.uk/government/publications/uk-electric-vehicle-infrastructure-strategy

[17] https://www.involve.org.uk/our-work/our-projects/embedding-good-practice/how-can-local-authorities-engage-public-climate-0

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Bringing together these forums, hubs and support programmes, and tailoring each to each local authority's needs, will be a prerequisite to developing effective and consistent LAEP capability, irrespective of which of the four model frameworks (or variations thereof) considered by the call for input ultimately prevails.

In summary, unblocking the barriers or hurdles to establishing effective LAEP capability depends on sufficiency of human and financial resources, and the appetite of stakeholders to embrace both the concept and the published guidance and recommendations for developing and embedding the necessary collaboration, methods, and tools, appropriately customised to each local area's opportunity, recognising that there is no 'one size fits all' solution.

5. Do you agree with the opportunities of change we outline and the potential benefits they may create?

Alignment of national strategic objectives and regional-specific opportunities

We agree there are potential synergies in bringing energy system functionality together within a local area. The overall objective of coordinated and integrated energy system planning must be to recognise and maximise regional and local opportunities for developing and maintaining an efficient, coordinated, and economic local area whole-energy system. Some of these opportunities might be particularly relevant, or even unique, to a given region, with the inherent danger that they might be overlooked by an overly centric approach to energy system planning. However, that's not to say that outright devolution of responsibility for energy system planning is justified. Although local area energy planning should more successfully optimise cross-vector energy solutions at a subnational level, it will nevertheless be important to ensure that the combined output of local area energy planning aligns with national energy system strategic objectives. In practice this will be an iterative process whereby, as we describe in our response to question 3 above, national energy strategy both informs, and is informed by, subnational energy strategies with the overall objective of exploiting synergies. This emphasises the importance of a strong interactive relationship between the new FSO and DSOs (or IDSOs) and/or Regional Planners and Operators (RSPOs).

Market facilitation

As we describe in our response to question 6 below, there are currently opportunities for improved electricity system coordination in respect of integrated electricity markets. The need is to fully exploit full-chain flexibility capability through an integrated flexibility market that maximises synergies, and minimises conflicts, not only between DSO network constraint management and ESO ancillary services (as per an initial objective of the ENA Open Networks project) but also extending coordination to potentially more valuable future markets for flexibility, including wholesale (day-ahead and intra-day), balancing, and capacity markets. This should be a prioritised objective of stronger coordination between the new FSO and DSOs/IDSOs/RPSOs. This extends to real-time operations wherein dispatch of flexibility (for wholesale ancillary, balancing and capacity markets) is coordinated, including through industry codes, primacy rules and unified market platforms, to ensure synergies are maximised and conflicts avoided. Again, this will be dependent on effective coordination between the new FSO and DSOs/IDSOs/RPSOs in their respective capacities of national and regional electricity system operators.

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Improved engagement opportunities for stakeholders and customers

One further opportunity arising from local area energy planning worthy of acknowledgement is that of increased opportunity for customer and stakeholder engagement with the energy planning process. We are conscious that, notwithstanding the best endeavours of DNOs and GDNs, the RIIO stakeholder engagement arrangements are considered only partially successful – not least due to the wide geographic area and the very many (i.e., millions of) customers that each DNO and GDN serves by its licensed networks. This makes it difficult for network operators, even with the help of Customer Engagement Groups (and Customer Challenge Groups appointed by Ofgem) to be confident that the views and challenges they receive represent a balanced perspective of feedback from their overall customer base. The common accusation is that of 'lost voices' in the overall process. Local area planning provides a better opportunity for local stakeholders and energy customers to influence decisions. Nevertheless, a necessary proviso (as with the RIIO process) will be balanced stakeholder engagement such that industrial, commercial, and domestic interests are each given appropriate weighting.

6. Are there additional opportunities for change and benefits that we have not set out?

Integrated electricity markets

Although the call considers the balancing mechanism and other balancing services to be out of scope, it is important to acknowledge there are currently gaps in whole electricity system coordination, particularly in respect of integrated electricity markets. The call for input correctly identifies the importance of coordination across electricity markets and we acknowledge that REMA will have a remit to address this issue. Although the call for input notes progress by the ENA Open Networks project in coordination of flexibility for DNO and ESO ancillary services (constraint management, operating reserve, reactive power, and frequency response), it also identifies the current issue that coordination does not currently extend to other (potentially more valuable as the grid becomes increasingly decarbonised) markets for flexibility, including wholesale (day-ahead and intra-day), balancing, and capacity.

These are functions currently performed by Aggregators / VPPs / VLPs in respect of their individual portfolios, but with each using their own platforms rather than through a common unified flexibility market platform. Hence the opportunity for synergies is compromised (or at best dependent on these parties whose commercial imperative is to maximise revenue stacking opportunities) whilst the opportunity for conflicting procurement and dispatch remains. Although considered to be out of scope for this call for input, it will be important from both a national and subnational perspective to achieve coordination across all electricity markets. We would hope that the new FSO once appointed (and informed by REMA) will take this forward as a priority.

Flexibility opportunities with domestic and SME customers

A further consideration is the future role of Energy Company time-of-use (ToU) and dynamic electricity tariffs which could ultimately become the standard way in which electricity is traded at domestic and SME customer level, once smart meter rollout is nearing completion and half hourly settlement is in place for currently 'profiled' customers (and once the energy price cap ceases to effectively preclude customers switching to variable rate tariffs).

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This would bring domestic and SME customers into play in terms of sources of flexibility services – albeit aimed primarily at wholesale and balancing, rather than ancillary services markets (for example as with the 'Agile Octopus' tariff). It will therefore be important to consider the impact on local energy systems of a much wider customer base providing flexibility.

The key takeaway here is that from an electricity system perspective, flexibility of demand in respect of domestic and most SME customers is most likely to be facilitated through nationally available energy tariffs, and may confer greater value in terms of whole electricity system economics when deployed at a national level with regard to wholesale, balancing and capacity markets (in addition to electricity system ancillary services) than at a local area level for the purpose of electricity distribution network constraint management or local balancing.

Electrical engineering standards

Facilitating SME and domestic customer flexibility of demand will depend on the successful integration of 'smart' technology, for example in the form of smart appliances, smart home energy management systems, and smart home and business EV charging. Disconnects in the supply chain between manufacturers, customers, markets, and operators (for example EV charge point operators) in adoption of common standards would run the risk of suboptimal outcomes and unintended consequences. We expand on this in our response to question 12 below where we cite as an example the risk of high numbers of home EV chargers coincidentally responding to a tariff price change signal. An essential proviso to maximising flexibility opportunities in respect of domestic and SME customers is the universal adoption of electrical engineering standards by manufacturers, developers, and smart technology operators. A comprehensive review of electrical engineering standards was undertaken and published in 2019 and updated in 2021[18].

7. We set out a number of risks associated with change. Do you agree with these risks and the potential costs they create? Are there additional risks of change and costs that have not been set out?

Practicality over ideology

Whilst we agree with the need to facilitate regional energy planning across energy vectors (and transport) through a regional body (or bodies) which can reach decisions without bias or conflict of interest, it will be important not to allow ideology to hold sway over practicality in determining requirements for independence through business and ownership separation.

We note the listed summary of risks highlighted by DNOs in their responses to Ofgem's RFI, and although this might seem to present an overly risk-averse position, the expressed concerns are not without foundation.

[18] https://www.gov.uk/government/publications/electrical-engineering-standards-independent-review

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As we point out in our response to question 1 above, DNOs now apply a wide range of innovative technological and market solutions to the management and operation of their networks, each of which has been carefully developed and field-trialled before introduction to their portfolio of solution options and implemented in a risk-managed way in accordance with established best asset management practice.

Risks of functional discontinuity and effectiveness of DNO-DSO transition

This transitional journey from DNO through Active Network Manager to DSO is being further facilitated by the establishment of roles within companies that are specific to delivering their DSO strategies – whether through ring-fenced functions within the regulated distribution business or (as in the case of UK Power Networks) through the establishment of an IDSO with separate reporting lines to Ofgem. Given that electricity is set to do the bulk of the 'heavy lifting' in terms of decarbonisation of heat and transport, it would be a mistake to compromise either the quality of, or timetable for, the DNO-DSO transition.

Moreover, whilst the call for input makes reference to DNOs having perceived conflicts of interest between delivering DSO roles and their network ownership roles (and other business interests) we would suggest there is little if any evidence to suggest this is happening in practice. DNOs have built, and are continuing to further build, capability in active distribution network management across all three of the high-level functions cited by the call for input (i.e. energy system planning, market facilitation of flexible resources and real time operation of local energy networks) as well as progressing the cross-cutting enabling function of digitalisation to enhance 'network visibility' (nodal time-series data for voltage levels, power flows, etc.) through both more extensive network monitoring and smart meter data, both for investment planning and real time operational purposes.

It follows that perceived conflicts of interest (which in any case could be effectively monitored and addressed through regulatory governance) should not lead to steps which might compromise delivery of effective regional energy policy as a consequence of distractions and delays to the delivery of a decarbonised power system by 2035 (and ultimately net zero by 2050) - for example through (albeit possibly temporary) loss of continuity and coordination between traditional DNO and evolving DSO functions if legal independence of IDSOs is considered a necessary early priority.

Whichever framework model prevails, transition will need to be facilitated through a risk-managed approach, with particular emphasis on the need to maintain capability in performing system-critical functions.

8. For each model, we have set out the key assumptions which need to be true for the model to offer the right solution. Which of these assumptions do you agree with?

Although we understand the rationale underpinning the stated (basic) key assumptions for each framework model, the extent of our agreement is caveated by the risks and opportunities we have highlighted throughout this response, including in particular our response to questions 4, 5, 6 and 7 above.

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Prioritising relationship structure over ownership structure

Whilst each model assumes a specific ownership arrangement for the DSO/IDSO/RSPO, we do not accept that any one of these *'ownership'* arrangements is necessarily critical to the *'relationship*' structure that each framework model is based on, or how effectively the involved organisations would interact in practice (assuming persons responsible for the electricity DSO functions in model 3 would be embedded within the RSPO organisation).

In reality, we would see the alternative framework models as developmental milestones (rather than mutually exclusive alternatives) with the adopted model in any given case being selected according to current LAEP capability within a given region. That said, it should not be assumed that every LAEP unit (which could be based on a single local authority or a group of local authorities, for example a single combined authority or a group of town and district authorities) would need to progress to any specific stage beyond model 1 over a prescribed timescale. We expand on this thinking in our response to question 9 below but our overriding message would be that the ownership structure for the DSO is far less important than the effectiveness of the relationship structure between the DSO and other constituent members of the overall LAEP organisation.

9. Out of the framework models we have developed which, if any, offer the most advantages compared to the status quo? If you believe there is another, better model please propose it.

Rather than comment on which, if any, model offers the most advantages (which in any case would be a largely subjective assessment) we instead offer our thoughts on the relative merits of each of the four framework models as follows:

Model 1 - Internal separation of DSO roles within DNOs

This is broadly reflective of how most DNOs' are currently implementing the DSO function – i.e. with DNOs continuing to perform all DSO roles but 'separation' currently extending only to the extent of senior managers being appointed to a specific DSO role (e.g. 'DSO Director', 'DSO Manager', 'Head of DSO', 'Head of Smart Grid Development', etc.) but otherwise with little, if any, 'separation' in terms of executive responsibility (i.e. no separation at Board level).

Indeed, SSEN's 'DSO Action Plan'[19] notes that in establishing its DSO governance framework, SSEN commissioned a review of options for potential governance models from economic consultancy, NERA[20]. The independent report assessed costs, benefits, and overall economic impact, concluding that any form of DSO separation beyond ring-fencing would be likely to lead to negative net effects, because the costs of separation or ownership unbundling would exceed the anticipated savings that could potentially be available to DNOs. The report also cautions that legal separation of the DSO functions could jeopardise the UK's net zero goals.

[19] https://www.ssen.co.uk/news-views/2022/dso-action-plan-provides-next-step-on-road-to-net-zero/

[20] https://www.nera.com/content/dam/nera/publications/2022/2022.03.21_NERA_Report_DSO%20Strategy_for_publication.pdf

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An exception to the above is UK Power Networks (UKPN) whose RIIO-ED2 Business Plan[21] commits to the establishment of an Independent (fully separated) DSO (IDSO) and to co-developing a DSO-DNO code that will clearly and unambiguously set out the respective roles, decision-making processes, operating and reporting procedures and ongoing governance arrangements for the DSO as distinct from the DNO. UKPN states that the IDSO will operate very differently to a traditional DNO. bringing in new skills, people and systems for a business unit that will be highly technology, data and customer focused, and signal transparency and independence of investment decision-making in the best interests of consumers. The IDSO will deliver direct benefits by reducing the need to reinforce the network and deliver wider system benefits, including by reducing the need to build larger scale renewable generation plant.

In summary, whilst there are variations between DNOs in terms of their DSO vision and the scope of a DSO's functionality, they (with the exception of UKPN) generally appear not to favour legal or regulatory separation from the DNO; rather they see the DSO function as an integral value-adding function within the DNO business, some of the benefits of which might be lost by legal separation. Hence model 1 (limited to internal separation) appears to be their favoured option.

Model 2 - Independent Distribution System Operator(s) (IDSO)

As stated above, this is broadly the model favoured by UKPN with the IDSO being (internally) separated at executive level with 'regulatory' independence in terms of having separate reporting lines to Ofgem, but without legal separation (which as Ofgem notes would require primary legislation). Hence this is close to model 2 in all but the fact that 'independence' would be established through business separation but not extending to separate ownership at company (or parent company) level. At the heart of UKPN's DSO vision is the provision of support to local authorities and local energy communities in achieving their energy planning objectives (which is also stated by some DNOs as a function to be undertaken by the DSO within their DNO businesses).

In summary, models 1 and 2 consider options for simply creating a DSO role out of a DNO business, either within the DNO business or legally separated from it (but otherwise performing the same functions) and both having primarily an electricity remit with capability in respect of other vectors such as gas, heat and transport being dependent on input from other parties. However, there is no indication in either model 1 or model 2 as to how the DSO would interact with the ESO or TOs to ensure coordinated whole electricity system planning and operation - albeit there is now a 'whole system' licence obligation on TOs and DNOs (but not ESO) to this end[22].

Whichever (if either) of these two models prevail there would seem merit in the DSO having overall responsibility for long-term development statements and distribution future energy scenarios (DFES) and for coordinated strategic long-term regional (whole) electricity system infrastructure planning (electricity infrastructure to include solar PV farms, onshore wind,

[21] https://ed2.ukpowernetworks.co.uk/

[22] file:///C:/Users/David/Downloads/whole_electricity_system_licence_condition_-_decision%20(1).pdf

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grid-scale energy storage and public EV charging infrastructure). We expand on this further below under 'desired end-state'.

Model 3 - Regional System Planner and Operator(s)

This model assumes that new regional system planners and operators would take on some of or all DSO roles as well as wider cross-vector integrated planning across energy vectors at a sub-national level. Ownership could be public or private but separated from the private DNO to manage perceived potential conflicts of interest in carrying out DSO functions.

Whist this model appears to have the advantage of easier facilitation of local area planning functions across vectors, there is no explicit consideration as to how regional system planners and operators would acquire the necessary technical capability to undertake functions across all vectors, or of the need to interact with the new FSO in order to align national and regional integrated energy objectives and strategies, and hence whole energy system planning and operation.

Given the necessary interaction with the FSO, we would regard model 3 as an aspirational framework wherein there is seamless integration of local area energy planning across all energy vectors (along with transport and digital infrastructure) within a defined region, with the energy infrastructure embracing all local sources of energy and demand, including the built environment. However, this would be a challenging transition which would need to be carefully risk-managed to ensure no critical functionality is compromised over the transition period.

Model 4 - Interacting organisations

The creation of clusters with roles assigned according to the strongest functional synergies and existing core competencies describes a more flexible approach which might cater for the differences in local authorities' capabilities (e.g., between Town, District, County, Unitary, and Combined Authorities) which we highlight in our response to question 4 above. The 'base' model wherein roles could be assigned without establishing new institutions is assumed to be 'fairly simple' for Ofgem to implement, albeit the creation of new bodies would require primary legislation.

Again, there is no consideration as to how the mutually interacting organisations would further interact with the new FSO in order to align national and regional integrated energy objectives and strategies, and hence whole energy system planning and operation. Moreover, unless limited to a number of defined sub-models, integration of national and regional planning might prove difficult due to the need for a large number of bespoke interfacing arrangements.

Nevertheless, adequately managed and coordinated, this more flexible framework might permit more rapid development of LAEP capability across Great Britain and earlier delivery of benefits. Hence this might be a beneficial interim step pending progression to model 3 provided the many potential sub-variants of the model is limited so as not to result in a proliferation of disjointed regional implementation approaches which could give rise difficulties in establishing a common framework for coordination between national and regional energy planning.

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Balancing risks and trade-offs

Overall, the answer to the question of which, if any, of the models offer the most advantages compared to the status quo depends ultimately on two key considerations:

i. The effectiveness of measures which mitigate the risks of separating out (what are considered by the call for input to be) DSO from DNO functions. Risks to be mitigated would include loss of synergy in terms of the ability to consider options that will address several business drivers rather than simply the dominant driver and hence represent a superior benefit/cost ratio (but also recognising the potential cross-vector opportunities that might be more easily facilitated by assigning DSO functions to a separate body).

ii. The effectiveness of coordination between national and regional energy strategy (which we see as a key role for the FSO) and the capability of (or ability to recruit capability for) RSPOs (but with the potential risk of reduced power system functional synergies if the DNO and DSO roles are separated).

Each of the four framework models effectively represents a different balance (or trade-off) of risks between, on the one hand, reduced electricity distribution network investment synergies due to separating DSO and DNO functions and, on the other hand, failure to fully exploit local area cross-vector energy planning synergies through not establishing Regional System Planners and Operators to undertake some of or all DSO roles, as well as wider cross-vector planning roles.

Whichever framework model (or variation thereof) prevails, we regard effective coordination between national and regional energy strategy as a critical success-determining factor. In that respect, whilst the call for input cites ease of implementation as potentially high for model 4, we would caution against disjointed regional implementation approaches which could give rise to risks of difficult coordination between national and regional energy planning. That in turn might give rise to misalignment between regional and national energy objectives due to lack of a common national-regional methodology for engagement. A further risk is potential consequences for the Government's levelling-up strategy if some regions are allowed to fall behind those with greater local area energy planning (LAEP) capability.

A possible hybrid interim framework model

Although we hesitate to comment on which if any of the framework models offers the most advantages, we would advocate a staged risk-managed approach to establishing IDSO and RSPO capability. In that regard we would suggest a credible first step would be to implement a variation to framework model 1; i.e., establishing an IDSO within each licensed DNO geographic area - but with 'independence' initially limited to the establishment of an Independent (fully separated) IDSO within the parent organisation. This aligns closely with the UK Power Networks model whereby the IDSO will operate under a DSO-DNO code that will clearly and unambiguously set out the respective DNO and DSO roles, decision-making processes, operating and reporting procedures, and ongoing governance arrangements for the DSO as distinct from the DNO. We believe this approach optimises the balance (or trade-off) between the risks we describe above. This has the further advantage that it can be implemented almost immediately (without primary legislation) and hence potentially deliver early benefits through the IDSO building relationships with local authorities and other vector

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operators within each DNO licensed network geographic area, whilst also establishing a relationship with the new FSO as soon as (if not before) it is formally established.

A further benefit of immediately building relationships with local authorities is that the IDSOs (along with GDNs and any local heat network operators) could begin to evaluate LAEP capability within each of the local authorities covered by their licensed networks (jointly with other IDSOs and GDNs where local authorities' geographic boundaries overlap DNO/GDN boundaries) and hence agree with each local authority how LAEP capability might be jointly developed. As LAEP capability builds, consideration can then be given to establishing RSPOs (incorporating IDSO capability) whilst maintaining continuity of function with the established DNOs.

In general, we would suggest that RSPOs should have a geographic span of control broadly consistent with DNO's licensed network areas. Hence 'local' area energy planning would be consolidated at 'regional' level where development of LAEP capability might be a more practical and economic proposition.

The desired end-state

Whilst the four framework models represent implementation options (or stages of progression) none of these should be considered to represent the final milestone in the evolutionary process of establishing LAEP functionality. In our critique of the four framework model options above we characterised framework model 3 as an aspirational framework wherein there is seamless integration of local area energy planning within a defined region with the energy infrastructure embracing all local sources of energy and demand, including the built environment. However, this is dependent on a number of key enablers of which the following are some of the more critical.

- The necessary support structure must be in place to provide the required independent business and technical support (for example we have referred in our response to question 4 above to Net Zero Forums, Local Net Zero Hubs, and Regional Skills Academies). In this respect the RESO project centred on Coventry should provide some practical insights into how energy stakeholders can most effectively engage[23]
- The requirement for sharing of information between all LAEP stakeholders, and particularly between the FSO and RSPOs, is enabled by a comprehensive cyber-resilient digital infrastructure. The ability of the FSO and RSPOs to reconcile national strategic objectives with subnational energy priorities and opportunities will involve many iterative studies requiring high mutual visibility of (both national and regional) project pipelines, energy infrastructure development plans, future energy scenarios across all energy and transport vectors, real-time progress updates, and post-investment project appraisals. Only through having sufficient visibility across FSO and all RSPOs will it be possible to ensure national strategic energy objectives are being fulfilled and that subnational energy strategies are consistent with the national objective.

[23] West Midlands Regional Energy System Operator (RESO) project – Coventry City Council

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- National and subnational governance arrangements must be comprehensive, mutually supportive, inclusive, and tailored to each specific local area's energy planning needs and opportunities. Governance arrangements must also be inherently agile and adaptable to changing regional and local circumstances. In this regard we would refer again to the Innovate UK report referenced in our response to question 3 above[24] which describes a local net zero delivery framework and three optional framework models for system governance. Of these three models, the hybrid model has much in common with framework model 3 in the call for input but is more expansive in describing relevant stakeholders and their interactions.
- Whilst the framework models in this call for input are depicted in simplified form, the overall structure in practice will be considerably more complex. Again, we would refer to the above-mentioned Innovate UK report which presents under each of its framework models a much more comprehensive relationship mapping. The above-mentioned RESO project centred on Coventry also provides an illustration of the range of organisations and stakeholders that will need to be accommodated within any given regional energy planning hub.

Under this structure we believe that both the FSO and RSPOs should be independent executive public bodies, whilst DNOs, GDNs and public heat network operators would remain private regulated companies. From an electricity system perspective, IDSO functionality would be incorporated within the RSPO rather than as a fully separated businesses within the DNO organisation with independent reporting lines to Ofgem.

DSO areas of focus

However, with reference to our response to question 1 above (where we refer to interdependency between DSO and DNO functions) we believe that the focus of DSO functionality either within an RSPO setting as per model 3, or as an IDSO as per model 2, should be towards:

- In conjunction with DNOs, efficient, coordinated, and economic development of regional electricity distribution systems (similarly with regard to gas and heat networks)
- In conjunction with DNOs, longer-term strategic planning of electricity distribution network capacity and functional capability (including through developments in advanced distribution management systems)
- Preparing long-term electricity distribution network development statements and future energy scenarios (DFES)
- in conjunction with the FSO, strategic high-level transmission and distribution network options assessments in respect of credible future energy scenarios (based on ESO FES and DFES studies)

[24] https://www.ukri.org/publications/accelerating-net-zero-delivery/

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- in conjunction with the FSO, overall coordination of longer-term strategic planning of energy infrastructure across all energy vectors including power infrastructure related to public EV charging and heat networks
- integrated strategic electricity distribution infrastructure planning, incorporating distributed energy resources such as onshore wind and solar generation (including those associated with community energy schemes and microgrids and in future AMRs), energy storage systems, and public EV charging infrastructure
- strategic coordination of infrastructure investment across all energy vectors to ensure efficient and economic development, including through maximisation of synergies and economic opportunities for cross-vector supply and demand-side arbitrage
- In conjunction with the FSO, coordination of energy-related digital infrastructure investment at both national and regional level
- In conjunction with the FSO, ensuring adherence of behind-the-meter technologies to codes and standards relevant to electric system stability and security, for example in respect of EV chargers and smart home and business energy management systems
- market development – in particular to support whole electricity system ancillary services requirements whilst maximising overall full-chain value of flexibility.

In each case the RSPO (or IDSO) and FSO would need to work closely and interactively to ensure national and subnational coordination of strategic planning of electricity and wider energy infrastructure.

DNO retained functions

Under these arrangements, responsibility for detailed shorter-term energy network design and planning at project level would remain with the DNOs (similarly with GDNs and heat network operators) - as would responsibility for network asset management, inspection, testing and maintenance, provision of new connections, day-to-day network operations, and arming and dispatch of market-based ancillary services – but all within the strategic framework created by the RSPO.

This ensures 'independence' of strategic planning and market development from the regulated DNO and GDN businesses whilst minimising risks to suboptimal electricity system functionality arising from loss of correlation between interdependent DSO functions (again as we outline to our response to question 1).

Our recommendation

Taking all the above factors into account reinforces the view we express in our response to question 3 above that the required role of an RSPO is more accurately that of a Regional Energy Systems Architect. For similar reasons, as stated in our response to the BEIS / Ofgem consultation on the Future System Operator, we believe the FSO role should extend beyond the remit of a system operator to embrace the role of System Architect. This better reflects the required strategic oversight, unencumbered by responsibility for shorter-term planning and operations.

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In conclusion, notwithstanding our above appraisal of benefits and risks under each framework model, we believe the arrangements depicted by model 3 (in simplified form) but with the necessary interactive relationship with the FSO is ultimately the one most consistent with realising the full potential of local area energy planning in supporting the development of an efficient, coordinated and economic whole energy system, and consistent with transitioning to a decarbonised electricity system by 2035 and making net-zero by 2050 a practical proposition. However, the challenges surrounding human and financial resources, establishment of even minimum required levels of expertise, and overall development of LAEP capability should not be underestimated, nor should the transitional risks be ignored.

10. What do you consider to be the biggest implementation challenges we should focus on mitigating?

Multiplicity of national energy strategies

Notwithstanding our response to question 4 above regarding blockers, one of the biggest implementation challenges is the lack of consistency with, and coherence between, the following elements of national energy policy, and the absence of an overall strategy to develop and deliver (and coordinate between) them.

- The Government's Ten Point Plan (November 2020)
- The Energy White Paper (December 2020)
- The Government's UK Hydrogen Strategy (August 2021)
- The Government's Net Zero Strategy (October 2021)
- The Government's Heat and Buildings Strategy (October 2021)
- The Government's Electric Vehicle Infrastructure Strategy (March 2022)
- The British Energy Security Strategy (April 2022)

The Net Zero Strategy commits to UK being powered entirely by clean energy by 2035 subject to security of supply, and National Grid ESO has published its report 'The Road to Zero Carbon' which outlines broadly how this might be achieved[25i]. National Grid ESO's current Network Options Assessment report[26] outlines the scale of onshore transmission system investment that will be required to achieve the decarbonisation of the electricity system by 2035 and net zero by 2050 under different future net-zero compatible energy scenarios, including the ability to accommodate 40GW of offshore wind capacity.

However, the subsequent publication of the British Energy Security Strategy in April 2022 set out new targets and objectives, including a further 10GW of offshore wind generation and up to 24GW of nuclear generation (including through AMR and SMR technologies). Integrating 24GW of nuclear generation capacity into the electricity system will have major additional implications for transmission infrastructure that were not envisaged under either the Government's Net Zero Strategy or under National Grid ESO's current Network Options Assessment.

[25] https://www.nationalgrideso.com/future-energy/our-progress/road-zero-carbon/report.

[26] https://www.nationalgrideso.com/research-publications/network-options-assessment-noa

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In terms of other energy vectors, the Government's Heat and Buildings Strategy and Electric Vehicle Infrastructure Strategy will largely be reliant on local energy infrastructure for delivery, whilst the UK Hydrogen Strategy will be dependent on local opportunities and regional logistics for hydrogen production, storage, and usage (and in the case of blue hydrogen CCUS infrastructure).

Need for an overarching coordinated national energy strategy

It follows from all the above that a prerequisite to the realisation of effective energy system planning and operation, at both national and sub-national level, is coordination between national and regional strategic energy objectives. This in turn requires holistic national strategic planning and direction with facilitated coordination between national and regional energy policy delivery. Establishment of the FSO will be key to this objective with the FSO having a close interactive working relationship with Regional System Planners and Operators.

Regional variability in LAEP capability and experience

A further implementation challenge is the sheer number of local authorities (for example across UK Power Networks' footprint there are apparently 127 local authorities) and the variable depth and breadth of local area planning capability and resources they have available. Also, whilst some local authorities have made notable progress with specific initiatives to decarbonise heat and transport (for example Newcastle, Bury, Bridgend[27] and Leeds[28]) others are at a much earlier stage of progress. As stated in our response to question 4 above, funding (and certainty of future funding) to support local area planning initiatives is a further limitation for many local authorities. It follows that priority tasks for DSOs, IDSOs or RSPOs (depending on framework model adopted) will be facilitating engagement, assessing current state of progress, and appraising capability and availability of both human and financial resources to undertake holistic local area energy planning.

Identification and aggregation of place-specific opportunities

for practical considerations, we believe IDSOs/RSPOs will need to operate at a regional level. However, establishing a regional energy strategy depends on identification of individual, sometimes niche, opportunities at a much more granular level. For example, economic opportunities for heat networks might be very place-specific, such as urban brownfield redevelopments, whilst a local community energy scheme opportunity might be centred on a particular village or parish. Development of a regional energy strategy is likely to be an iterative process reconciling regional energy objectives with local place-specific opportunities, much in the same way that national energy objectives and regional opportunities will need to be reconciled. In each case, identifying and supporting the lower level to feed into the higher level will be key to developing an efficient, coordinated, and economical local area energy plan.

[27] https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/07/case-study-laep-final-21.12.pdf

[28] https://www.leedsclimate.org.uk/hydrogen-gas

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As mentioned previously, the Energy Systems Catapult in conjunction with the Centre for Sustainable Energy has developed an 'LAEP method'[29] for establishing LAEP capability which usefully sets out a recommended approach and criteria for success.

Structured implementation framework

We would also broadly support the recommended seven steps to LAEP implementation described in the aforementioned Energy Systems Catapult Local Area Energy Planning: Guidance for local authorities and energy providers[30] which provides a structured implementation framework, albeit recognising that some of these steps will prove more challenging to some local authorities than others; hence the need for a tailored approach and acceptance that speed of initial implementation, and rate of progress thereafter, will be variable across Great Britain.

The regulatory framework

The regulatory framework for electricity and gas networks, which is set to extend to heat networks with Ofgem as the common regulatory authority, is currently based on 5-year review periods. Albeit there is provision in the RIIO process for stakeholder engagement through Customer Engagement Groups and (Ofgem appointed) Independent Customer Challenge Groups, the five-year cycle does not actively support ongoing interaction between stakeholders and their representatives over the review period; nor does it readily enable change during the five-year period, other than through meeting prescriptive criteria and thresholds to trigger uncertainty mechanisms. Engagement between DSOs/IDSOs and local authorities in identifying subnational energy priorities can be expected to be a continuous process (not based on five-year cycles). Moreover, to be fully effective, there needs to be greater within-period adaptability in terms of DNO and GDN allowed revenues, and greater agility to change. Moreover, the 'whole system' licence obligation which currently applies to DNOs and TOs (but not ESO) will need ultimately to apply to both gas and heat networks and their operators if both national and subnational whole energy system objectives are to be realised.

In that regard, it is relevant to note that included in Ofgem's 2022/23 Forward Work Programme consultation[31] (now closed) is a commitment to an 'Energy Systems Governance' strategic change programme which will help shape Ofgem's role in the energy system transition, transforming Ofgem's capabilities to become a more adaptive regulator, that can flexibly respond to a rapidly changing energy landscape. Ofgem commits that during 2022/23, it will identify any strategic changes required relating to how Ofgem regulates, including developing new regulatory approaches related to any additional responsibilities given to them by government (for example a more specific obligation towards net zero).

[29] https://es.catapult.org.uk/report/local-area-energy-planning-the-method/

[30] https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/07/Local-Area-Energy-Planning-Guidance-for-local-authorities-and-energy-providers.pdf

[31] https://www.ofgem.gov.uk/publications/202223-forward-work-programme-consultation

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A further relevant commitment in the context of subnational energy planning is that through their 'Low Carbon Infrastructure' strategic change programme, Ofgem will ensure that the necessary enablers are in place to facilitate a more coordinated approach to the transition of Great Britain's network infrastructure for net zero.

11. Taking into account the varying degrees of separation of DSO roles from DNOs under framework model 1, do you consider there are additional measures we should consider implementing, in particular in the short term (e.g., changes in accountability etc)?

As stated in our response to question 7 above, we believe the perceived risk of conflict of interest under the internal separation option in framework model 1 are overstated. DNOs are effectively encouraged under RIIO incentive mechanisms to apply innovation to all aspects of their operations which are able to drive investment efficiency, quality of supply, and customer service. Ofgem's annual reports on DNO output delivery and financial performance provide ample evidence that DNOs are delivering against performance targets and secondary deliverables whilst delivering cost (totex) efficiencies. Moreover, projects undertaken under NIA and NIC (and latterly SIF) funding demonstrate DNOs' commitment to explore opportunities to deliver wider system (and customer) benefits beyond those which accrue to their own distribution businesses.

As we suggest in our response to question 9 above, we feel that establishment of an IDSO within the DNO parent company as advocated by UK Power Networks offers the best initial trade-off between benefits and risks in the shorter term. However, in the case of all framework models, a key measure for implementation is effective liaison between the DSO and FSO to ensure effective coordination of whole electricity (and ultimately energy) system planning.

12. Are there other key changes taking place in the energy sector which we have not identified and should take account of?

Establishment of a Future System Operator

Although the focus for the call for input is on subnational energy planning, this should be considered in the wider context of national energy policy which, as we have outlined in our response to question 10, comprises many individual elements. Successful delivery of each of these elements of energy policy depends on minimisation of risk and maximisation of opportunity, which will vary across regions of Great Britain. Overall coordination is therefore key, and hence we believe the role of the new FSO will not only be critical, it will also need to be rapidly developed and further extended in scope and capability for UK's overall national energy and net zero objectives to be efficiently and economically delivered.

Significant Code Review – wide ranging review of DUoS charging - locational DUoS charges

As outlined in our response to question 6 above, a further development in the energy sector is the introduction of Energy Company time-of-use (ToU) and dynamic electricity tariffs which could ultimately become the standard way in which electricity is traded at domestic and SME customer level, and the means by which domestic and SME customers provide flexibility.

Following Ofgem's Access and Forward-Looking Charges Significant Code Review - final decision under phase 1 regarding distribution network connection charges and access rights,

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Ofgem now proposes (post 2023) a wide-ranging review of DUoS charging methodologies. One anticipated outcome of phase 2 is a proposal to apply a more locational use of system charging methodology reflecting the long-run marginal cost of distribution network capacity at a more granular level (DUoS charging statements currently apply universally to the whole of a DNO's licensed network).

Both real-time (or in practice day-ahead) energy and long-run marginal cost-reflective network charges are particularly important in the context of electrification of domestic space and water heating and home EV charging where *minimisation* of coincidence of home heating and EV charging with peak network demand periods will be essential (as will *maximisation* of alignment of home heating and EV charging with periods of high renewable generation output). As well as providing cost signals reflecting near-real time short run marginal costs of generation, half-hourly based ToU and dynamic (e.g., day-ahead) energy tariffs should also incorporate the time-banded DUoS charges (red, amber, and green band) detailed in DNOs' Use of System Charging Statements.

A further necessary mitigation (for example through the randomised offset feature built into SMETS-compliant smart meters) will be to ensure the avoidance of demand spikes arising from high numbers of home EV chargers and/or heat pumps coincidentally responding to a tariff price change signal. Ignoring this requirement could give rise to grid instability due to a rapid fall in system frequency (similarly a rapid rise in system frequency in the event of an upward tariff price signal).

Relevance to local area energy planning

It follows that an important aspect of local area energy planning will be to ensure that initiatives to electrify domestic heating and provide EV charging facilities (both public and domestic) take full account of the availability of smart home energy management systems and smart EV charging functionality. Such provisions will be essential to both ensuring consumers (and prosumers) are able to minimise electrical energy costs by aligning as far as practical demand with zero marginal cost generation, whilst also minimising (more locationally-specific) DUoS charges by limiting electricity consumption during network peak demand periods. A further important provision, especially where electric heating is provided by heat pumps, is to ensure adequate levels of home thermal insulation which in turn will not only reduce electricity consumption but also enable heat pumps to operate more flexibly. These measures will be key both to making both the energy transition affordable for customers, and to making feasible the decarbonisation of the power system by 2035.

13. What do you consider to be the most important interactions which should drive our Project timelines?

We would again emphasise the need for strategic alignment and coordination between IDSOs (or regional System Planners and Operators) and the new FSO with clear accountability between parties for delivery of both national and regional energy policy objectives. The means by which this essential interaction is facilitated under any of the four model frameworks (or alternatives thereto) should be established, at least in principle, from the very beginning of the project.

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Overall, the call for input (and the four framework models) illustrates why there needs to be a whole-energy system strategy, built on systems engineering principles, before finalising decisions on local area energy planning priorities. The establishment of the FSO is key to this, and although we understand the urgency of driving progressive change to current local energy institutions and governance, the timetable needs to be aligned with that of implementing and subsequently developing the FSO role. In that regard, the British Energy Security Strategy[32] commitment to establishing the Future System Operator 'as soon as practicable' might be considered both ambiguous and insufficiently ambitious in terms of timing[33].

In the meantime, given the enormity of the challenge in bringing together potentially hundreds of local authorities, we would advocate DSOs (whether in-house or independent) beginning the engagement process as soon as is practicable to develop a common understanding, and a degree of consensus, on how the process of building LAEP capability might be most effectively initiated, applying, as applicable to local circumstances, the Energy Systems Catapult / ETI guidance we have referred to in this response to this call for input.

In terms of overall project timelines, interactions which should be on Ofgem's project critical path include implementing structures and processes that will enable local energy system participants to be identified and consulted, and local whole-energy system plans to be developed, aggregated, and integrated with national strategic energy plans.

Notwithstanding the above, the most important interaction which should drive the project timeline is to establish local governance and decision-making structures that will assign clear accountability for local area energy planning and delivery.

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[32] https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

[33] Ofgem set out in their FSO consultation response that the FSO could be established by, or in, 2024, depending on a number of factors, including timings of legislation