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6th October 2024

Fiona Campbell
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Dear Fiona,

The University of Birmingham welcomes the opportunity to respond to Ofgem's consultation on the Regional Energy System Plan (RESP) arrangements. We have completed our review of the proposed framework and provided detailed responses to each consultation question in the attached document.

This consultation offers recommendations on principles, regional planning, data refresh cycles, and governance structures. It emphasises the importance of flexibility, capacity building for local authorities, and balancing national objectives with local needs to ensure an equitable and effective transition to net zero.

Should you have any questions or require further clarification, please do not hesitate to contact me.

Best regards,

Weiqi Hua

Dr Weiqi Hua
Assistant Professor in Energy Systems

Q1. What are your views on the principles (in paragraph 2.8) to guide NESO's approach to developing the RESP methodology? Please provide your reasoning.

A1: For the place-based principle, the advantage is it takes localised factors into account, including the availability of renewable resources, existing infrastructure, and socio-economic conditions. However, there three challenges:

i) How to move from place-based approach to business as usual from the long-term perspective?
ii) This principle might be against the vision-led principle. A strong place-based approach may create friction if local governments prioritise their own needs over national energy security or broader decarbonisation strategies.
iii) Many local authorities may lack the technical expertise and resources to develop robust energy strategies. How NESO could design the support in order to make equitable planning across regions.

For the whole system principle, it could generate synergies across sectors and maximise the flexibility of energy system. However, NESO needs to make a highly developed governance and operational structure aligning with separate regulatory, market, infrastructure frameworks, and decarbonisation stages of each vector. The whole system approach also needs to consider both long-term low-probable, high-impact scenarios, e.g., extreme weather events, and short-term high-probable, low-impact scenarios, e.g., power imbalances, as documented in our previous research [1].

For the vision-led principle, how to accommodate technological advancements, regulatory changes, or political shifts presents a challenge, since these factors could alter the trajectory of energy development. Concrete interim targets, measurable milestones, and a feedback loop adapting to evolving conditions would be helpful for the delivery of long-term vision.

For the proactive principle, the challenge lies in balancing immediate needs with longer-term uncertainty. For example, premature investment in infrastructure could lead to stranded assets if the energy landscape changes, particularly with regard to the role of natural gas, hydrogen, or emerging technologies. The proposal would benefit from explicitly recognizing the risks of 'over-building' and establishing clear criteria for when and where pre-emptive investment is justified. Additionally, the proactive principle should not only apply to investment decisions but also to policy and regulatory adaptation. For instance, NESO should be empowered to proactively influence regulatory decisions that could affect RESP implementation, ensuring that the plan remains agile and responsive to external developments.

Therefore, the following suggestions are made in addition to the four principles:

i) Clear governance structures to ensure local plans are harmonized with national objectives.

ii) Capacity building for local authorities to effectively develop and implement place-based plans.

iii) Regular review mechanisms to adapt long-term visions in response to technological, economic, or political changes.

iv) Risk mitigation strategies to avoid over-investment in infrastructure that could become obsolete as the energy system evolves.

Q2. Do you agree that the RESP should include a long-term regional vision, alongside a series of short-term and long-term directive net zero pathways? Please provide your reasoning.

A2: Yes, we agree. The long-term vision for net-zero transition ensures each region is pulling in the same direction, and provides certainties for investors and stakeholders. Including both short-term and long-term pathways ensures a balanced approach to planning, in which immediate action provides actionable steps to achieve incremental milestones, while long-term pathways allow for adjustments as circumstances and technologies evolve. The requirement to include a counterfactual scenario where net zero is not achieved is critical, as it allows for a realistic comparison of outcomes and informs policymakers about the consequences of inaction. This is an important tool for illustrating the potential economic, environmental, and social costs of falling short of the net zero goal. Presenting pathways down to LSOA levels can ensure that even small-scale local issues are addressed, increasing the precision of infrastructure investments. In addition, the following suggestions are made from this researcher:

i) The energy landscape is highly uncertain, particularly concerning emerging technologies (e.g., hydrogen, advanced nuclear, and energy storage solutions). The framework of fixed pathways might struggle to accommodate unexpected developments, such as a breakthrough in a particular technology or delays in policy implementation. As in our previous work [1], the long-term pathway should include multiple, scenario-based visions that provide optionality depending on technological and policy shifts.

ii) The proposed 5-10 year horizon could face implementation challenges due to the long lead times in infrastructure projects. These challenges may involve supply chain bottlenecks, delays in regulatory approvals, or funding issues. It's vital that the short-term pathway contains robust contingencies and is based on highly actionable steps that are realistic within the regulatory and market context. It is recommended to consider splitting the short-term pathway into more granular 5-year segments that align better with RIIO regulatory cycles, which would provide more frequent checkpoints for adjusting plans as needed.

iii) The availability and quality of this data could vary widely, particularly for less-resourced regions. This poses a risk that some regions may end up with suboptimal or inaccurate pathways. There is also a risk of fragmentation between national datasets and local data, leading to planning mismatches between regions and the national grid.

iv) The counterfactual should explore multiple failure scenarios, not just a binary outcome of reaching or not reaching net zero. It requires careful consideration of various factors such as technological stagnation, slow policy implementation, or economic downturns.

Q3. Do you agree there should be an annual data refresh with a full RESP update every three years? Please provide your reasoning.

A3: A full RESP update every three years is a balanced approach that aligns with regulatory cycles (such as RIIO for network companies) and allows for comprehensive strategy revisions based on updated pathways and long-term projections. However, while an annual data refresh with a full update every three years appears reasonable and offers several benefits in terms of responsiveness and resource management, there are potential issues with this approach that need addressing to ensure it delivers meaningful and actionable insights. Suggestions are as follows:

i) As documented in our previous work [2], for local energy systems, i.e., distribution network level, seasonal data refresh allows to adapt to evolving conditions, such as the rollout of new technologies (e.g., electric vehicles, heat pumps, solar panels, and smart control systems) or changes in policy direction. A seasonally update of critical data ensures that investment decisions are based on the latest information, helping to avoid the risk of overbuilding or under-investing in infrastructure.

ii) Local authorities and energy companies may not be equally equipped to provide accurate and comprehensive data on a yearly basis, particularly in areas with less developed energy monitoring infrastructure. It is crucial to establish clear data governance protocols and provide technical support (e.g., machine learning based approaches for addressing incomplete data as introduced in [3]) to local authorities to ensure that data submitted is consistent and high quality across all regions.

iii) The short-term (e.g., annual) refresh should focus on the most critical data points that directly influence near-term decision-making (e.g., demand forecasts, capacity constraints, and power flow analysis) rather than attempting a collective update across all vectors. NESO should also establish a framework that ensures only significant changes in the data trigger a review of planning decisions, to avoid unnecessary reaction to minor fluctuations.

Q4. Do you agree the RESP should inform the identification of system need in the three areas proposed? Please provide your reasoning, referring to each area in turn.

A4: The RESP's approach to identifying system needs in the three areas appears comprehensive and well-targeted to achieve efficient planning for the energy transition, while each area presents challenges that need to be addressed.

For providing consistent assumption, it helps standardise how low-carbon technologies (like electric vehicle charging and heat pumps) and demand-side responses (like time-of-use tariffs) are integrated into future planning models, to ensure that all regions are working with the same set of baseline assumptions, for more coordinated national efforts and comparability across regions. This also makes network companies easier to design and evaluate investment plans. However, there should be a mechanism that allows for regional adjustments to these assumptions within an agreed-upon range of variation. The RESP should establish clear guidelines on how regions can adapt national assumptions to better reflect local conditions.

For the spatial context, using spatial tools to map demand and generation growth projections against network conditions is critical for understanding where infrastructure investments are most needed. As validated in our research [2], the spatial context provides a clear visual representation of where network constraints are emerging and where capacity upgrades are required. It also ensures that planning decisions are informed by a more granular understanding of local conditions. However, as acknowledged in the proposal, the spatial planning tools need to account for interactions between these vectors. For instance, our research [4] suggested that harnessing flexibility provision from the electrification of heat to electricity consumption could potentially reduce 41.24% of average daily electricity costs for individual consumers.

The RESP's role in identifying locations for strategic investments is a critical component of its purpose, as proactive infrastructure investment is necessary to ensure that the network can meet the growing demands of electrification and decarbonisation. Our on-going projects (RIR35231118-1 [5]) has also statistically depicted various Distribution Future Energy Scenarios (DFES) and anticipated where demand will grow due to the adoption of electric vehicles, heat pumps, and other low-carbon technologies. It is important that the NESO should ensure that the benefits of strategic investments are equitably distributed across regions and that cost allocation is fair. A mechanism for addressing regional disparities in investment should be included to prevent imbalances in infrastructure development.

Q5. Do you agree technical coordination should support the resolution of inconsistencies between the RESPs and network company plans? Please provide your reasoning.

A5: We agree that technical coordination should play a crucial role in resolving inconsistencies between the RESPs and the network company plans. Technical coordination will help ensure that network company business plans are aligned with regional strategic objectives. Coordination ensures that the interactions between different vectors (e.g., the impact of increased electric vehicle adoption on electricity grids [6] or the role of hydrogen in reducing gas demand [7]) are considered. While it is important to ensure consistency, some degree of flexibility must be preserved to allow network companies to account for local nuances and regional challenges. For example, a rural network might prioritize maintaining grid resilience, while an urban network might focus on enabling mass EV adoption.

By taking a whole-system approach, NESO can help identify opportunities that individual network companies may miss. NESO should focus on building technical expertise in cross-vector systems and invest in advanced modelling tools to ensure that whole-system optioneering delivers actionable insights. Coordination should also involve clear data-sharing protocols with network companies to ensure timely access to necessary information. While whole system optioneering is beneficial, it could lead to conflicts between the goals of network operators and the RESP. For example, network companies might prioritise short-term reliability and operational efficiency, while the RESP may focus on long-term decarbonisation targets that require more upfront investment.

Through enhanced technical coordination, NESO can facilitate better data sharing between network companies, improving the quality and consistency of the inputs used for system planning.

Q6. What are your views on the three building blocks which come together to form the RESP in line with our vision? Are there any key components missing?

A6: Each building block addresses critical elements of energy system planning that, when combined, offer a comprehensive framework for aligning regional efforts with national goals. There are several areas where further refinement or the addition of key components would enhance the effectiveness of the RESP:

i) Given the rapidly evolving landscape of technologies and policies, the RESP must be able to adapt assumptions as necessary. Emerging technologies such as hydrogen, carbon capture, or advanced energy storage could significantly change the future energy mix, and rigid assumptions may not be able to capture these developments. A built-in mechanism for regularly updating assumptions based on new data and technological advances should be incorporated.

ii) Some regions may face unique circumstances that require deviations from the national assumptions (e.g., climate conditions, rural vs. urban infrastructure). While the framework allows for variation, clearer guidelines should be established to help regions justify these deviations without undermining national coherence.

iii) The spatial tools should be expanded to integrate cross-vector analysis, allowing stakeholders to see how changes in one vector (e.g., gas demand) might affect others (e.g., electricity grid capacity). This will lead to a more holistic understanding of regional system needs.

iv) The success of this approach relies on having access to high-quality, granular data. However, not all regions, particularly rural or less-developed areas, may have access to the necessary level of data detail. This could lead to uneven outcomes across regions, with some areas better positioned to leverage these tools than others.

v) There is a risk that strategic investments may be made in areas where demand growth projections do not materialise as expected. This could lead to stranded assets, where infrastructure is built but remains underutilised due to slower-than-anticipated adoption of low-carbon technologies or shifts in policy priorities.

vi) Strategic investments are likely to be concentrated in regions with the highest projected demand growth, which could leave some areas underfunded, particularly rural or economically disadvantaged regions. This creates a risk of uneven infrastructure development, potentially exacerbating regional inequalities.

Q7. Do you agree with the framework of standard data inputs for the RESP? Please provide your reasoning.

A7: Yes, the framework of standard data inputs for the RESP as outlined provides a comprehensive and well-structured basis for aggregating local and national data into a cohesive and actionable regional energy plan. The approach is balanced, incorporating both top-down national inputs and bottom-up local and regional data, to ensure that the RESP can reflect regional characteristics while aligning with national decarbonisation goals. The reasons are explained as follows:

i) By incorporating national inputs such as UK Government and devolved government targets, as well as outputs from national frameworks like FES and CSNP, the RESP ensures that regional planning is aligned with the national decarbonisation strategy. The inclusion of local and regional data, such as Local Area Energy Plans (LAEPs), housing stock data, and transport plans, allows the RESP to reflect the unique characteristics and energy needs of each region. This ensures that the RESP does not take a one-size-fits-all approach but instead adapts to regional realities.

ii) The framework rightly includes data sources that address multiple vectors, such as heat network zoning, transport plans, and housing stock data, which are all critical to achieving decarbonisation. Local plans for heat networks, transport infrastructure, and housing stock offer insights into the specific characteristics and constraints of each region. This ensures that energy system planning accounts for local realities, such as the availability of renewable energy resources or the feasibility of electrifying heating in different areas.

iii) The proposed feedback process allows the RESP to evolve over time, incorporating new data, technologies, and policy changes. This ensures that the RESP remains relevant and responsive to changing conditions.

iv) By requiring a higher level of credibility for short-term inputs, the RESP reduces the risk of over-building or making costly infrastructure investments based on uncertain data. This ensures that the most reliable data is used to guide immediate investment decisions, while longer-term pathways can accommodate more uncertainty.

In addition to the above reasons, the following recommendations are made to enhance this framework

i) NESO should establish clear protocols for handling data gaps, particularly in regions that lack detailed local energy planning. In cases where local data is limited, NESO must either create standardised assumptions or provide support for capacity building within local authorities to ensure that all regions can contribute meaningfully to the RESP.

ii) NESO should develop clear data governance standards to ensure consistency and comparability across regions and how to incorporate cross-vector data into the RESP. This includes standardising how data is collected, ensuring it meets certain quality benchmarks, and developing robust tools for integrating and reconciling disparate data sources into a cohesive plan.

iii) NESO should ensure that data from different vectors is integrated into a unified model, allowing for the identification of synergies and trade-offs between vectors. This could include developing multi-vector modelling tools that provide a holistic view of energy system needs.

iv) There is a risk that feedback from local actors may not be fully incorporated into the final RESP, particularly if it conflicts with national objectives or if there are delays in data sharing. NESO should establish clear timelines and mechanisms for incorporating feedback from local actors into the RESP. This includes regular review cycles where local authorities can provide input and NESO can respond to their concerns.

v) There is a trade-off between setting a high bar for credibility and ensuring that all relevant data is included in the RESP. If the credibility threshold is set too high, important local data might be excluded, particularly from regions that lack robust energy planning processes. NESO should establish flexible criteria for assessing credibility, allowing for a range of confidence levels depending on the type of data and its relevance to the short- or long-term pathways. This approach will ensure that valuable local insights are not excluded due to overly strict criteria.

Q8. Do you have any suggestions for criteria to assess the credibility of the inputs to the RESP?

A8: The suggestions for criteria to assess the credibility of the inputs to the RESP are detailed as follows:

i) The data source reliability should prioritise inputs from established, trusted sources such as government agencies, regulated network operators, and recognised industry bodies. For less-established sources, transparency in data collection methods would be required.

ii) Inputs should be based on the most recent available data. Outdated or historical data should be flagged and reviewed for relevance. For long-term projections, they should prioritise those regularly updated datasets based on evolving trends or technologies.

iii) The data should be granular enough to inform local and regional planning, e.g., down to LSOA level for demand projections. The data should be relevant to the specific regional or cross-vector context.

iv) Inputs should be cross-checked against multiple data sources to ensure consistency and validity. For example, comparing network demand forecasts with independent local or national projections.

v) Previous projections can be calibrated with actual outputs to validate the projection methods and strengthen credibility.

vi) Clear documentation of assumptions is needed in the input data, particularly for model-based projections. Assumptions must be reasonable, transparent, and aligned with national or regional standards.

vii) Inputs should be applicable across different future energy scenarios (e.g., rapid decarbonisation, hydrogen uptake), allowing flexibility in how the data informs strategic planning.

viii) Inputs should be reviewed by independent experts or endorsed by recognised industry or academic bodies, especially for novel or region-specific datasets.

Q9. Do you agree with the framework for local actor support? Please provide your reasoning.

A9: The framework for local actor support is a well-rounded approach that enables local authorities to actively participate in the RESP development process, while fostering transparency, accountability, and coordination. However, a few key areas need further consideration to ensure that local actors can engage effectively:

i) The lack of funding or personnel to assist with local projects may limit the capacity of resource-constrained regions to participate fully. Without funding, the technical advice and coordination provided may not be actionable in some areas.

ii) The framework allows NESO to adapt support based on the specific needs of a region. This is important, but the criteria for determining which regions receive additional guidance or resources in ensuring equitable transition are unclear.

iii) The success of the framework hinges on NESO building on existing relationships between local authorities and network companies. However, some regions may lack strong pre-existing relationships, which could slow down engagement. NESO should proactively facilitate the development of these relationships where they are weak or non-existent, particularly in less advanced regions.

Q10. Do you agree with the purpose of the Strategic Board? Please provide your reasoning.

A10: The Strategic Board's purpose is aligned with the principles of democratic legitimacy, collaboration, and whole-system planning. While the role is necessary, several areas of concern need to be addressed to ensure it functions effectively:

i) While the Board has an important advisory role, NESO retains the final decision-making authority. This creates a risk that the Board's recommendations could be disregarded, potentially undermining its legitimacy and the sense of collaboration it is meant to foster. There should be stronger accountability mechanisms for NESO to justify deviations from the Board's recommendations, with clear documentation and reasoning provided. This would help ensure the Board's steers are given meaningful consideration.

ii) Given the complexity of balancing regional priorities, cross-vector optimisation, and national objectives, the Board could become a bottleneck if decision-making processes are too slow or conflicted. NESO should streamline the Board's processes, ensuring that conflict resolution is integrated into the governance model to avoid unnecessary delays. Structured timelines and a clear process for escalating unresolved conflicts to NESO will help maintain efficiency.

iii) While the Board aims to represent local priorities, it remains unclear how much flexibility the RESP can accommodate in responding to diverse regional needs. The Board's advisory status could lead to homogenised outcomes that may not fully reflect local contexts. NESO should ensure that the Board's steers allow for meaningful regional variation within the RESP framework, particularly in areas where local decarbonisation strategies differ significantly from national projections.

Q11. Do you agree that the Strategic Board should include representation from relevant democratic actors, network companies and wider cross-sector actors in each region?

A11: Involving local authorities ensures that the Board remains grounded in place-based needs and democratic mandates, while network companies provide essential technical expertise to align energy system planning with real-world infrastructure needs. Cross-sector actors (e.g., utilities, transport providers) add valuable insights on how energy planning intersects with other sectors. This model encourages collaboration between democratic and technocratic actors, facilitating better integration of energy system and spatial planning. It also ensures that decisions take into account broader regional priorities, including economic and social concerns. Democratic actors ensure transparency and accountability in the energy planning process, aligning with the Board's purpose of fostering trust and balancing local interests with technical needs.

While the inclusion of democratic actors, network companies, and cross-sector actors is necessary for the Strategic Board's effectiveness, several concerns need addressing to ensure this model functions efficiently without becoming overly complex or imbalanced:

i) There is a risk that the democratic actors' influence could be overshadowed by technical experts, particularly network companies that may dominate discussions due to their expertise and stake in the outcomes. This could skew decision-making towards more technical priorities, sidelining local social or spatial planning concerns. NESO should establish clear guidelines to ensure balanced participation, with processes in place to prevent any group from dominating. Regular reviews of member contributions should ensure equitable input from all sectors.

ii) Representing all relevant actors, particularly in large regions with multiple local authorities and cross-sector stakeholders, may make the Board unwieldy and slow decision-making. This is especially a concern in regions like Scotland and Wales with many unitary authorities. To maintain efficiency, NESO should keep the Board's size manageable by using representative structures, such as combined authorities, or including cross-sector actors in working groups rather than directly on the Board. This allows for broader input while keeping the Board focused and efficient.

iii) Including cross-sector actors (e.g., utilities, businesses, environmental bodies) directly on the Board may complicate its structure, as these actors have diverse interests and may introduce conflicting priorities. Instead of direct Board membership, NESO could engage cross-sector actors through specialized working groups or advisory panels.

Q12. How should actors (democratic, network, cross-sector) be best represented on the board? Please provide your reasoning, referring to each in turn.

A12: For the democratic actors, upper-tier authorities (England) and unitary councils (Scotland, Wales) should have direct representation, given their strategic oversight of local planning and economic development. They can represent the interests of lower-tier authorities where necessary, avoiding duplication. For regions with combined authorities, these bodies should represent local authorities to streamline participation and avoid excessive representation from lower-tier councils. This ensures that local democratic priorities are integrated into energy system planning while keeping board membership manageable. Combined authorities can provide a consolidated regional perspective without overloading the Board with multiple layers of representation.

For the network companies, they should have direct seats on the Board, as they are central to understanding and implementing the technical aspects of the RESP. To keep the Board streamlined, different network companies (electricity, gas) could rotate representation, ensuring that all perspectives are considered without overwhelming the process. Network companies must be involved directly to ensure that technical feasibility and infrastructure requirements are appropriately factored into decisions. Rotating representation can help balance this involvement if multiple companies are present in one region.

For the cross-sector actors, utilities, transport, environmental bodies provide critical input on how energy system changes impact other sectors, but they also bring diverse and potentially conflicting priorities. Rather than direct Board membership, cross-sector actors should be included in specialised working groups or advisory panels that report to the Board. These groups can provide sector-specific insights and recommendations without complicating the decision-making process of the Board. One or two cross-sector representatives could be nominated to liaise with the Board and ensure that the views of working groups are considered.

Q13: Do you agree with the adaptations proposed for Option 1?

A13: Yes, Option 1, which blends Sub-national Transport Body (STB) and International Territorial Level 1 (ITL1) boundaries, presents a pragmatic solution for defining the RESP regions in England. It balances the need for aligning energy system planning with existing institutional arrangements while maintaining manageable population sizes for effective governance. By retaining familiarity with STB names and boundaries, while addressing size disparities through strategic adaptations, the model facilitates smoother transitions to RESP regions without unnecessary complexity.

Dividing the large STB regions (Transport for the North and Midlands Connect) into smaller regions better reflects the diverse functional economic geographies and energy challenges. Smaller regions allow for more focused, place-based planning and ensure that energy system requirements are more accurately represented. The split aligns well with existing ITL1 regions, which enhances the administrative coherence and allows for better regional management, making these regions more comparable in terms of population size and energy needs.

Combining Western Gateway and Peninsula STBs into a single South West region addresses the challenge of scale and ensures that the region reflects similar economic and energy challenges, such as rural dispersion and common transport issues. A single South West region, serving 5.47 million people, aligns more closely with the average population size of other RESP regions, which creates more balanced regions for effective strategic energy planning.

Q14. Do you agree with our assessment that Option 1 is a better solution than Option 2? Please provide your reasoning.

A14: Yes, we agree that Option 1 is a better solution than Option 2. Option 1 balances existing institutional frameworks while addressing the challenges of large regions through strategic splits. This ensures smoother implementation, respects established governance structures, and balances population sizes for effective energy planning. While Option 2 (ITL1-only) offers statistical reporting benefits, Option 1 better reflects functional geographies and institutional arrangements, leading to faster and more context-specific outcomes.

Q15. Do you agree a single region for Scotland is optimal? If you think a two-region solution is better, do you agree the split should occur at the SSEN and SPEN DNO boundary? If not, please provide your reasoning and alternative option(s).

A15: The two-region solution for Scotland, splitting the regions at the SSEN and SPEN DNO boundary is logical. This reflects the existing energy infrastructure, transmission networks, and distinct regional characteristics. The Highlands and Islands face unique challenges related to rurality and isolation, while Central and Southern Scotland are more urbanised, with concentrated energy demand and infrastructure. The specific reasons are as follows:

i) The northern region (Highlands and Islands) has different energy needs due to its sparse population, remote communities, and renewable energy resources, which requires tailored planning compared to the more urban and industrialized south.

ii) The DNO boundary naturally divides the regions based on existing transmission networks, allowing for more efficient energy planning specific to the infrastructure and challenges of each area.

iii) A two-region approach ensures that the specific needs and priorities of both urban and rural communities are better addressed, enhancing the granularity of energy and spatial planning.

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