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**Consultation on Future System Operator supply and demand modelling**

Dear Joanna,

We welcome the opportunity to respond to this important consultation. This non-confidential response is provided on behalf of National Gas Transmission. We recognise the vital role supply and demand modelling will play as part of Ofgem's vision for a future Centralised Strategic Network Plan. We broadly support Ofgem's proposals and provide a full response to the specific consultation questions in the attached annex. Our headline messages are:

- We support a pathway-based approach, but timeframes will need to extend beyond 2050, with a rolling time horizon, owing to the expected useful economic life of investments, owing to the need to continue to invest in networks beyond 2050, and the likelihood of continued management of energy vector lifecycles after this point.
- A key challenge for networks attached to the current FES approach is the presentation of scenarios on an annual volume basis. It is vital that future modelling is also presented on a peak-capacity basis, as this is what networks are required to design and plan to, and there is a fundamental need to ensure network resilience whilst there are users connected to the system.
- If pathways are to be used for investment planning, credibility is paramount, and the achievement of economy wide net zero emissions should not be at the expense of GB energy security or resilience

Conscious that Ofgem is consulting on an end state position for the Future System Operator's role in whole system supply and demand modelling, we are also mindful of the timescales attached to network company business plan submissions for the price control period following RIIO-2, which we anticipate will be required by mid-2024. The next price control period will be crucial for the National Transmission System as we seek to increase investment to ensure that the network is resilient to meet the needs of our connected users out to 2050, and potentially beyond. Whilst we recognise that hydrogen is currently out of scope for the next price control, our plans will need to be cognisant of what is required to support this important decarbonisation opportunity, particularly given that our ambitions to provide a hydrogen backbone for Great Britain involve the cost-effective transformation of existing infrastructure, and that physical construction will need to commence from 2026. Having credible and consistent planning pathways to support the next business planning cycle is therefore vital.

To address this need, we are currently leading on a collaborative project funded under the RII0-2 Network Innovation Allowance titled Common Planning Pathways (CPP). Networks have previously used the ESO Future Energy Scenarios (FES) to test their investments under the prevailing price control framework. As FES is based on illustrative scenarios that focus on an “end state” rather than a forecast or pathway, we believe a different approach is needed to ensure across electricity, methane, and hydrogen energy vectors, a system can be delivered that provides resilience through the energy transition and opportunities to unlock all necessary energy solutions as and when they are ready to connect to the networks (renewable electricity, gas with CCUS, blue or green hydrogen, etc).

Recognising this shortfall in FES for critical network infrastructure planning, we have aimed to tackle the issue proactively and collaboratively, at the same time demonstrating thought leadership through the CPP project, and therefore we support the longer-term approach proposed in this consultation. We believe a common planning pathway, which sets out the potential supply and demand for each sector based on known or assumed decision points over the next decade and out to 2050, and factors in the significant inertia built into the GB’s existing energy system, is needed so that plans reflect the challenges in transitioning the UK energy system to enable Net Zero but have a focus on all aspects of energy security (affordability, accessibility, availability and acceptability).

This project represents an innovative approach to developing a planning pathway that is complementary to existing FES scenarios, attaining and assessing the data required to enable energy wide planning assumptions through the energy transition. The project will capture input and feedback from Ofgem, National Grid ESO, and wider industry, and we believe will provide valuable innovation and learning on the approach to future supply and demand modelling and could evolve to become part of the FSO’s toolkit. For more information on the CPP project, please see the project documentation on the ENA Smarter Grids portal at the following link: [https://smarter.energynetworks.org/projects/nia\\_nggt0208/](https://smarter.energynetworks.org/projects/nia_nggt0208/)

If you have any questions or comments on this response, please do not hesitate to contact Jon Dutton, Gas System Operator T3 Team Lead ([jon.dutton@nationalgas.com](mailto:jon.dutton@nationalgas.com)) or Qasam Sultan, Head of Market Analysis ([qasam.sultan@nationalgas.com](mailto:qasam.sultan@nationalgas.com)).

Yours sincerely

[by email]

Tony Nixon  
Regulation Director, Gas Transmission

## Annex: Consultation Question Responses

**Q1. Do you agree that we should move towards pathways instead of scenarios, to provide greater clarity on the type of investments required under the CSNP?**

**Yes, we agree.**

This approach establishes a clear link to policy choices and provides more realistic demand profiles in the intervening years between the present day and the achievement of Net Zero by 2050, which are key to ensuring security of supply during the transition.

Pathways (forecasts) are a forward extrapolation of what we know today, combined with future policy targets, which provides a more prudent basis for supporting investment decisions than illustrative scenarios that are back solved from a target end position, as is the case with three of the four scenarios within FES. However, it is vital that pathways also take account of all aspects of the energy trilemma: reliability, affordability, and sustainability.

**Q2. Do you agree that there should be a single forward view of the near term for all pathways?**

**We agree in principle.**

We think this would create much needed certainty and credibility, particularly where these take account of near-term ground realities, such as macro-factors and real-life system inertia, which are currently absent from the FES scenarios. However, it is vital that these have a whole system orientation with all energy vectors given due focus and attention.

We would anticipate that major updates and variations to pathways are triggered by the significant policy decisions that create material divergences, with the profile and timing of the expected impact being critical.

**Q3. Do you agree with our proposal to have Net Zero compliant pathways (number to be determined by FSO), with a separate counterfactual demonstrating the scale of activities and investment that falls short?**

**We agree in principle, but further consideration is needed.**

If pathways are to be used for investment planning, credibility is paramount, and the achievement of economy wide net zero emissions should not be at the expense of energy security or resilience. The FSO's engagement with industry will be critical, as pathways cannot be developed in isolation, and must be underpinned by broad stakeholder support from all energy vectors.

Whilst we understand the logic for the exclusion of non-compliant pathways, focussing entirely on Net Zero compliant pathways risks unintentional bias in the modelling, and is akin to "putting all eggs in one basket". It would be prudent for the FSO's modelling to include all credible pathways, which may include scenarios where political ambitions are not entirely met.

To expand on this further, focussing on compliant pathways might necessarily include routes that adopt uneconomic solutions, depending on the assumptions being made, for instance, only allowing for existing technologies. This issue is exacerbated if unrealistic course correction is applied, leading to a risk of increasingly undeliverable or uneconomic outcomes. It is important that pathways are cognisant of the real challenge attached to hitting Net Zero, and therefore should not preclude the existence of pathways that miss the target. This is not to say we should plan to fail but considering these scenarios may support the identification of credible mitigation

options. It is necessary to ensure that security of supply is maintained in all credible pathways, regardless of whether they achieve Net Zero or not.

Ultimately, from a whole system perspective there will be solution optionality, and this necessitates consideration of the full spectrum of credible pathways. The priority for the next 10 years should be delivering the no regrets investments that must be made now in order to safeguard GB energy security throughout the transition to Net Zero, at the same time being realistic about how precise we can really be about the longer-term.

**Q4. Do you agree that the pathways should run to 2050, and if not, why not?**

**We think that 2050 should be the minimum requirement, but there is a need to consider a longer, rolling timeframe.**

Given the UK commitment to Net Zero, 2050 would be the minimum requirement. We think there is a need to consider a longer, rolling time frame, owing to the expected useful economic life of investments, the need to continue to invest in networks beyond 2050, and the likelihood of continued management of energy vector lifecycles after this point (for instance management of natural gas user bill profiles, network investment recovery via the RAB, and decommissioning).

**Q5. Do you agree that the model should develop the capacity to include extreme data ranges when requested of the FSO in its role as strategic advisory body?**

**We agree, but with additional considerations.**

We agree that the FSO should have the capability to assess extreme data into the core pathways, but these could be modelled and presented separately (for instance via sensitivity analysis), and assessment of the extreme data ranges should involve collaboration with relevant stakeholders across industry that have the required insights and capabilities, as there will be a need to understand and quantify impacts, which goes beyond pure modelling capability. We think this collaborative approach would also help foster trust and respect for the FSO in its role as a strategic advisory body to the Government and Ofgem.

Stress testing pathways for future shocks and risks will be important, and the resilience of individual energy vectors will become increasingly important during the transition. From a practical perspective however, we will need to strike the right balance in the volume of analysis undertaken of ever more extreme scenarios. Ongoing development and review of resilience standards will also be important here.

In considering extreme data ranges, it will also be important to be clear on and mindful of accountabilities. For instance, National Gas Transmission holds the accountability to design its network to meet “1 in 20” peak capacity requirements, which is traditionally derived from a statistical distribution of simulated historical peak days. The provision of supplemental analysis supporting analysis could be helpful, but ultimately this cannot encroach on the network design responsibilities that sit with the networks, and there is a fundamental need to ensure network resilience whilst there are connected users.

**Q6. Do you agree with our consultation position on modelling network constraints?**

**We agree with the inclusion of network constraints, but this should draw on modelling undertaken by gas system operators.**

Network constraints are a notable exclusion from the current FES modelling, and we agree with the principle that these should be factored into the pathways. We think that the FSO should develop the capability to factor in network constraints into pathways, but actual network constraint modelling for gas networks is likely to be better undertaken by gas system operators, who have decades of experience, analytical tools and know-how of complex operational markets, and an operational need to model short term constraints. Modelling of constraints requires a detailed understanding of within day flows and the operation of the network and is a distinct competence from estimating future network capability. It will take some time for the FSO to build its modelling capabilities and competences, which should be targeted towards its role as a strategic planner. It would therefore appear to make logical sense that the FSO would draw on the network constraint modelling performed by Gas Transporters as part of its overall pathway modelling.

**Q7. Do you agree with our consultation position [transparency of all data, models and process], and do you have a view on which data principles should be possible to adopt for the first FES?**

**We agree in principle, but there are likely to be practical, technical or even commercial constraints attached to this.**

There are likely to be practical issues associated with making data and models open access, for instance, intellectual property rights, data volumes and model complexity. We also draw a distinction between making data and models available and transparency – ultimately published materials need to be accessible, usable, understandable and consistent, and the transparency objective may be best served by considering these later principles within the thinking.

With regard to specific areas of data principles and transparency, some key areas might include:

- Input data field definitions and sources
- Key modelling assumptions
- Sensitivity of outputs to input and assumption variation
- Descriptive pathway frameworks

**Q8. Are there specific stakeholder needs cases for publication of data, including the format of outputs?**

**We expect that there would be, but this needs more thorough exploration.**

We think a specific exercise to assess specific stakeholder needs should be undertaken, to ensure that modelling outputs fully support their intended application.

Output needs will differ depending on the intended purpose / usage. As an example, annual flow data is an indicator of overall energy supply / demand but is less valuable for networks that need to plan on the basis of peak capacity.

As a general point, we think Microsoft Excel format outputs are a generally accessible medium and supports further processing compatibility.

**Q9. Are there specific data outputs associated with the FES that we should mandate?**

**Similar to our response to question 8, we think this should be considered as a separate exercise.**

Provision of data associated with planning or security standards (such as the 1 in 20 peak day demand for gas) could be mandatory, although networks should retain ultimate responsibility for procuring their own forecasts. We think that mandating additional outputs should be approached with caution, as this may create inflexibility that, in an extreme circumstance, might require licence change to resolve where needed. Generally, we think the critical needs should be assessed via a separate specific exercise, and that any approach should retain a sensible degree of flexibility, particularly in the earlier stages of development.

**Q10. Do you agree that regional and/or industrial hub pathways should be included in the FES?**

**We think this is necessary, but there are questions regarding roles and responsibilities, and how regional level considerations are consolidated into an overall whole system position.**

We foresee that regional and industrial hub pathways will be necessary element of the overall picture, as all pathways will need a degree of regionality in order to be meaningful for network planners/operators. However, we also expect this to come with some challenges. With regard to roles and responsibilities, at this stage it is unclear what the interactions with proposed Regional System Planners will be, as these have yet to be defined. How regional dimensions interact with a national whole system consolidate view will need careful consideration. There may also be commercial sensitivities attached to data provision at this level, which will need to be accommodated, and may limit the granularity of a regional view.

**Q11. Do you agree with our proposal for a ‘major’ FES in the year prior to the main CSNP publication, with smaller annual updates in the intervening years?**

**We don’t agree.**

Major iterations of the FES will need to align to regulatory business planning cycle, which means that prima facie, a 3-year cycle may not work. Additionally, short term positions are likely to be more volatile, and require a more rapid response. Conversely, we might expect the longer-term views to be more stable, until there are material changes in policy or direction. This perhaps points to a need for regular updates of short-range views as opposed to the vision of “major” and “minor” releases. At the same time, we recognise that more frequent publications may inhibit meaningful ongoing model development.

**Q12. Do you consider that longer-term evolution of energy supply and demand modelling should head in the direction outlined above and if so how?**

**Unclear at this stage.**

This is difficult to address beyond our responses to the previous consultation questions. However, we would stress that modelling capabilities will not be able to deal with infinite scenarios and need to be married to resilience and reliability decisions to inform the credible and/or low likelihood risks that energy networks should be designed to protect against. This also requires decisions on which risks should not be planned for and these will require some trade-off between escalating costs of resilience versus higher impact/lower likelihood risks.