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Future Energy Scenarios 2024 Call for Evidence

A high-level summary of responses from stakeholders to the FES 2024 Call for Evidence: help shape the future of energy

Introduction

The FES 2024 Call for Evidence was open throughout September, providing our stakeholder community with the opportunity to contribute to the next publication of our Future Energy Scenarios (FES) and beyond.

The online survey gave respondents the opportunity to provide their insights on a broad range of subjects from net zero policy, the FES publication, framework and modelling, to energy and heating technologies. We have provided summaries of the responses received from a broad range of stakeholders and organisations below, many thanks to those who took the time to respond to the survey.

The Call for Evidence marked the beginning of our engagement programme for FES 2024 and compliments the focused bilateral meetings, forums and workshops that we have hosted, attended or scheduled.

We will analyse all the insights gathered from our engagement activities, and in spring 2024 we will share with and update our stakeholders on how we are considering this feedback for FES 2024 and into the future.

Summary of feedback

The Call for Evidence covered the following topic areas and the feedback for each one is presented throughout this document:

- Publication and engagement
- FES 2024 framework
- Net zero
- Energy demand
- Hydrogen, gas and bioenergy supply
- Electricity supply
- Regional assumptions
- FES modelling process.

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Publication and engagement

Generally, the FES document was deemed fit for purpose and well presented. Slight improvements to the document were suggested, such as making it 'lighter' in weight and presenting the document in a portrait orientation.

As for content, recommendations included the publication of a FES year-on-year comparison document and the inclusion of a section outlining which pathway/scenario is the most probable.

FES launch events are largely welcomed and the live stream of the physical event received positive feedback. Suggestions for improvement include the ability to submit questions in advance and for more in-depth responses to questions during the live Q&A session.

The FES newsletter received positive feedback and is deemed a useful tool for updates and event reminders. Several respondents requested more advanced notice of events and calendar changes.

Although a good base exists for the current FES, it was suggested that more engagement with external parties could benefit the development of future FES publications.

FES 24 framework

There were mixed responses on the breadth of uncertainty that the FES should explore. Some stakeholders felt as though the current approach should be maintained or even widened. Others felt that there are significant advantages to narrowing the range presented.

Several stakeholders felt that the FSO should try to exert more influence on policy and decision making, to increase certainty and allow a narrower focus. Another highlighted the FSO's critical role in shaping the energy system of the future, indicating that the FSO should use its role to prioritise increasing the chances of meeting net zero over minimising cost. Another respondent indicated that emphasis should be given to areas of development key to meeting 2035 and 2050 goals.

Views on how short-term uncertainty should be represented were mixed, with one stakeholder suggesting focusing on a central case for the first 10 years and another saying that this approach would not be credible.

Two stakeholders called for the use of more stochastic modelling. There were also calls for more clarity around underlying assumptions and a clear explanation of any changes in methodology.

There was a general feeling that sensitivity analysis was still important, with some stakeholders indicating that this should be secondary to setting strategic direction and one stakeholder suggesting that this could be presented in an appendix. Finally, one stakeholder saw value in providing summaries of alternative routes considered and explaining why they were not selected as the main pathways.

On the inclusion of a counterfactual that does not meet net zero, a minority of respondents thought one should be included. Those that did, indicated that something akin to falling short was fit for purpose. Several respondents thought a non-net zero scenario should not be included at all and stressed that the key driver for planning should be net zero pathways only. Key concerns were that the counterfactual may be seen as a viable option jeopardising net zero goals and that any costing would be unlikely to capture the impacts of not dealing with climate change and would therefore be misleading and could be misunderstood or misinterpreted.

Others could see value in a counterfactual only if it was used to demonstrate the dangers of not meeting net zero. Several respondents felt we should include costs related to dealing with the impacts of climate change and should work closely with other net zero experts such as the Climate Change Committee (CCC) to achieve this. Others indicated that the counterfactual could be used to understand how to get back on track if progress deviates from the pathways.

One respondent wanted more clarity on what the counterfactual would be used for and the methodology for creating it. Several respondents thought that rather than being non-net zero, the counterfactual should instead show a radically different way of meeting net zero not captured in the pathways. Some respondents felt the term counterfactual was not appropriate.

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Most respondents were opposed to including a scenario with high levels of natural gas, with many stating that:

- Natural gas use is not compatible with net zero
- Continued natural gas use would result in missing carbon budgets
- Carbon capture, use and storage (CCUS) should not be relied upon as it is unproven as scale, does not capture 100% of emissions and is expensive and likely to continue to be so
- Direct air carbon capture and storage (DACCS) required to soak up residual emissions caused by continued gas could significantly increase the cost to the energy system as a whole
- Continued reliance on gas imports comes with security of supply and price volatility issues.

Several respondents pointed to research by respected bodies that indicated continued use of natural gas is not viable.

Most respondents also stated that a route of electrification is likely to be the cheapest in the end state and locking into continued natural gas use would not be economical. Other respondents went on to say that blue hydrogen investment could face similar issues.

Some respondents indicated that biomethane should be used as a substitute for gas in the interim. Some respondents indicated that gas may still have a limited role in providing flexibility. With some saying that this gas was likely to be expensive due to its low use and storage costs.

When asked to indicate what they would like to see in scenarios produced by the FSO no two stakeholders responded with the same suggestion. As such the recommendations are summarised below:

- To continue to explore different forms of flexibility
- To begin to consider regional constraints on distribution networks
- To make a decision on hydrogen to allow the pathways to narrow
- To include Energy Returned on Energy Invested (ERoEI) calculations for 2050 state
- To bring in all forms of transport energy
- To measure the true carbon intensity of energy sources to avoid underestimating carbon emissions
- To include measures of energy independence
- To include a wider range of storage technologies
- To provide more certainty and a clearer pathway to net zero
- To be more realistic in the 2025-2035 timeframe
- To provide cost comparison on energy network build with and without electrolysers and hydrogen networks
- To coordinate better with other strategic workstreams, such as the Centralised Strategic Network Plan (CSNP) and Strategic Spatial Energy Plan (SSEP) and with wider government policy decisions such as on CCUS, hydrogen, decarbonising power, heat and transport
- To include more cost optimisation, less stakeholder driven
- To consider more realistic constraints on technology development and rollout
- To consider a more balanced approach to government policies and targets
- To include at least one scenario that is more cautious on technologies unproven at scale, including blue hydrogen and CCUS.

We have since held further engagement on the draft framework through a dedicated workshop in September and the FES Network Forum in October. We will be considering all feedback as we continue to finalise the framework.

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Net zero

Several opportunities from meeting the net zero target were mentioned in our stakeholder feedback, with emphasis given to a greater level of energy security, overall environmental benefits to the UK population and the opportunity to become a world leader in innovative energy management and co-ordinated offshore/onshore networks.

Stakeholders gave varied responses on whether various emissions removals technologies (such as DACCS) could play a role in delivering net zero. The general observation was that further proof of its viability as an economically efficient technology is needed and the removal of fossil fuel production should take precedence.

Respondents were given the opportunity to express their views on a range of topics surrounding net zero challenges and opportunities. A summary of the recurring themes and views submitted by our stakeholders is set out below.

A number of stakeholders used our Call for Evidence to suggest further development to net zero policy for delivery of a net zero economy by 2050. Recommendations included:

- An acceleration of consumer incentives. Examples mentioned included the enhancement of the Boiler Upgrade Scheme, the Great British Insulation Scheme and the Smart Metering Implementation Programme
- Assurance in policy direction to drive investment in new technologies, infrastructure and capital-intensive projects
- A decision on the use of hydrogen as an energy source to heat UK homes as soon as possible
- A focus on analysing the cost of reaching net zero (both direct and indirect costs) and how it will be funded
- A focus on achieving net zero targets as soon as possible
    - Several respondents stated that policy should focus on what can be achieved in the immediate future (including existing technologies)
    - One respondent suggested focussing on technologies and economics to determine which is the fastest way to decarbonise
    - Several stakeholders cited that there should be more focus on sector including power, transport, heat, agriculture and manufacturing
- Several respondents indicated that they believe the decarbonisation of home heating was the biggest challenge for the UK in meeting net zero by 2050
- Several respondents expressed views that they believe infrastructure and connection capacity present a challenge with accelerating decarbonisation projects
- One respondent recommended that capacity targets for technologies should not be set in isolation and that a balanced approach is required to establish and ensure infrastructure adequacy.

One respondent suggested that more focus should be held on embedded carbon (emissions associated with construction processes) when exploring the use of low-carbon technologies. The manufacture of solar panels was cited as an example.

More generally, some respondents used the Call for Evidence to highlight their concerns and frustrations surrounding the pace of delivery of net zero.

Energy demand

Stakeholders felt that support for emerging technologies, especially in terms of research, demonstration and early market penetration, would be crucial in facilitating the transition to lower-carbon fuels. Additionally, assistance should be provided to vulnerable domestic customers and international competition-exposed companies in the commercial sector during this transition.

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Some stakeholders were sceptical about the viability of net zero technology growth targets and suggested consideration should be given to alternatives to traditional wet heating systems, such as air-to-air heat pump heating and cooling.

To address the transition to a low-carbon future, several key strategies were suggested by stakeholders. First, implementing sector-specific regulatory interventions, gradually phasing out unabated fossil fuels. Some stakeholders stated that regulatory mechanisms, like product standards and a Carbon Border Adjustment Mechanism (CBAM), could ensure that imports to the UK adhere to comparable standards and carbon prices.

Stakeholders highlighted the importance of flexibility in the future energy system, with a focus on flexibility from air source heat pumps (ASHP), thermal storage and electric vehicles (EVs). Stakeholders agreed an effective market design is crucial to unlock flexibility on a larger scale and that electric vehicles offer significant opportunities in the shorter term, contributing to a cleaner energy landscape.

There was a recurring theme regarding the importance of price signals and automation in achieving reliable flexibility. Though initial assessments have provided insights, stakeholders feel a more robust approach to automation for flexibility seems to be the most suitable path forward.

There were a range of views on the future role of hydrogen. Stakeholders broadly agreed that hydrogen research and development should continue and that our analysis should consider industrial processes as end users of hydrogen demand, but a focus on hydrogen as a primary solution should come later, post-2030. There were mixed views on the role of hydrogen for heat, with some stakeholders saying it should continue to be explored alongside other solutions and others in opposition. Some stakeholders suggested that the demand for hydrogen in a net zero situation may be smaller than current industry-guided volumes.

The need for hydrogen for inter-seasonal storage also saw broad agreement, regardless of decisions on heating technology, either for direct use or electricity generation for electric heating. Stakeholders felt that electrolysers may be needed to alleviate constraints, but their operation should be flexible to accommodate variations in renewable energy generation.

Stakeholders also suggested some further considerations, including:

- The economics of hydrogen may change over time
- The cost of decommissioning the gas grid
- Carbon tax for industry or offering strong incentives to transition to renewable energy
- Shifting taxation from fossil gas to electricity and creating disincentives for pollution
- When transitioning from natural gas to low-carbon alternatives, it is vital to address upstream leaks and flaring during fossil gas production and transportation

Hydrogen, gas and bioenergy supply

There were a wide range of opinions on ambitions for hydrogen production. Among the more positive comments were that current policy reflects that hydrogen may have a useful role for long-duration energy storage (LDES) and some industrial processes. In addition, the potential use of electrolysis as a system balancing tool was welcomed. Other respondents stated that the decision on hydrogen in home heating is needed as a matter of urgency while considering cost effectiveness.

In developing low-carbon hydrogen production assets, responses stated that the proximity of renewable energy sources to hydrogen production facilities was a barrier or challenge. For electrolysis, access to a sustainable water supply is also an issue. Meanwhile, there was also the view that there are logistical problems in transporting hydrogen. Further to this, there was the expectation that initial low-carbon hydrogen projects would need to be located close to areas of demand due to the lack of a hydrogen transport and storage network.

To improve the network, respondents called for a ‘roadmap’ for developing a transport and storage network to provide investment certainty. Stakeholders felt that transporting hydrogen using existing methane pipelines via blending should be considered a ‘stepping-stone’ for delivering low-carbon hydrogen to areas of demand. Those discussing this issue added that if a network is developed, then the nature of a nationwide market

should also be considered, in that will this lead to a single ‘national balancing point’ price or numerous bilateral prices.

Hydrogen storage issues also drew some strong comments, principally that the scale of any storage would reflect the development and demand for low-carbon hydrogen in the UK, particularly any network options. Specifically, comments included the potential to combine hydrogen storage with carbon storage plans and create new fuels for industry. Linked to this notion is the conversion to ammonia for storage and transport. Respondents commented that this method could also be employed to decarbonise the shipping sector.

Respondents also commented on the application of negative emissions technologies. The views received were generally negative and instead the focus should be reducing overall emissions, not changing what type of fuels are burned. Some respondents felt that the use of biomass could be unsustainable and still generate emissions. Ultimately, those who responded indicated that the use of bioenergy with carbon capture and storage (BECCS) may be a necessary step towards net zero, though long-term use was discouraged. In the near term, however, there was some acknowledgement that biomass would be of notable benefit to the heat-based economy, as its seasonal nature needs long-term storage, and biomass is one of the few ways that renewable energy can be stored cost-effectively.

Electricity supply

There was agreement on the broad ordering of most generation technologies, with offshore wind, onshore wind and solar all featuring highly in responses. Nuclear, for some stakeholders, featured in the top three, especially in 2050. There was some clear disagreement on the role of gas generation, with some stakeholders choosing unabated natural gas generation as having significant capacity even in 2050.

When addressing the question of what other technologies future FES publications should consider, many stakeholders noted the importance of storage, both thermal and electrical, and demand flexibility. A subset highlighted gas generation (often with CCUS) as playing an important role both within the energy mix and for peak generation. The ranking question on hydrogen-fuelled generation prompted some comments from stakeholders who were keen to see synthetic fuels considered as an alternative technology. This was especially linked to the potential of synthetic fuels to provide inter-seasonal storage and location-tailored generation. Energy from waste was also mentioned as a technology that may benefit from proximity to high urban demand centres.

Some stakeholders suggested exploring technologies that currently have lower technology readiness levels.

Some stakeholders felt that asking the questions in terms of installed capacity was misleading and should be phrased as volumes of electricity (which would emphasise the importance of high load factor generation such as nuclear and thermal generation over solar or wind).

Examples of rare weather events, that could have the greatest impact on our ability to meet demand included volcanic events requiring turbines to be switched off, high-pressure weather events over northern Europe impacting solar and wind, cold weather impacting interconnectors, air-conditioning demand during heat waves and storm damage impacting infrastructure. Suggestions about focusing on a more robust dunkelflaute policy were also made.

Designing the optimal route to net zero from an electricity perspective offered responses supporting an increase in nuclear power for electricity and industrial heat, taking the lead from academia and innovation, encouraging close cooperation between the UK and European partners in areas such as electricity trading, carbon markets and joint pilot projects.

Regional assumptions

Suggestions for datasets nationally and regionally included local generation data, such as feed-in-tariff solar and the Tees Valley Industrial Decarbonisation Cluster Plan and strategy document.

There were a range of positive and negative responses regarding regional storage technologies. Many highlighted the significant pipeline of battery storage capacity, but questioned its deliverability either on cost, time, or space constraints. However, there were some comments on the rapid evolution of battery technologies which would see costs and capabilities changing to deliver this change.

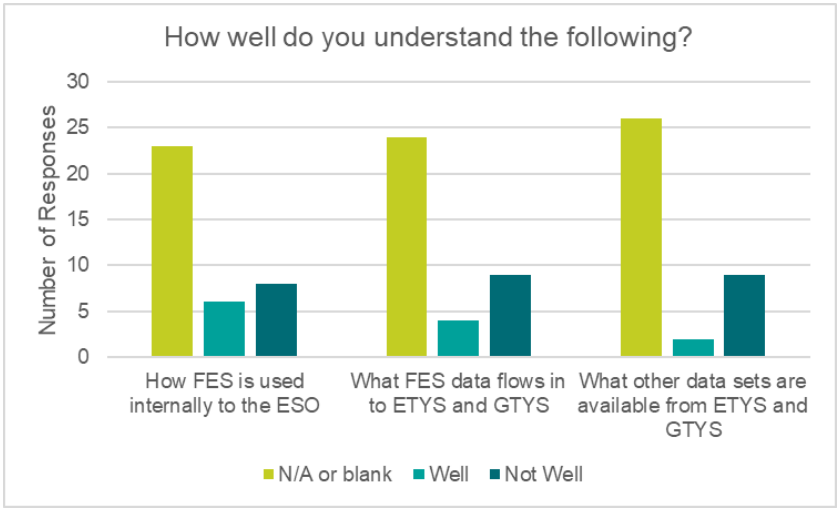
In terms of additional regional storage technologies, both vehicle-to-grid and thermal inter-seasonal storage were highlighted as developments that would significantly add to storage capacity.

There were few responses to the questions on distributed generation. Of those received, some stakeholders highlighted the significant pipeline of distributed generation projects. Most responses listed solar as being one of the top distributed generation technologies in terms of installed capacity.

Several stakeholders commented on the importance of locating generation near to areas of high demand.

FES modelling process

Most stakeholders that responded did not include an indication for how well they understood how FES data is used across the ESO or in the Electricity Ten Year Statement (ETYS) and Gas Ten Year Statement (GTYS) processes. Where a response was received, “Not Well” was the most common outcome.



Most responses received on the version of Excel indicated that Office 365 was used. Excel 2016, Excel 2019, and Libre Office were also mentioned.

It was suggested that we could improve communication around when new versions of the data workbook are published providing notifications in the FES newsletter.

Ensuring consistency of data formats was mentioned by a few stakeholders. This was to make it as easy as possible to load into their internal systems.

Some responses indicated a desire for more information on the uptake of heat technologies across the scenarios, while others indicated inclusion of more network elements into the data and modelling and more nodal information in the outputs to better enable their own modelling.

Finally, suggestions were received from some respondents to extend the modelling to cover supply chains and macroeconomic feedback between power prices and the wider economy.

Next steps and continuing the conversation

Thank you to all those who responded to our Call for Evidence. As our engagement continues through the autumn and into the new year, we will be considering all the feedback and evidence we receive for FES 2024 and beyond.

If you are not yet subscribed to receive the FES newsletter you can register here.

You can contact us at any time by emailing: FES@nationalgrideso.com

Thanks again for your ongoing support and contribution to FES.