ESO

Future Energy Scenarios 2024 Call for Evidence

Thank you for taking the time to contribute to the 2024 Call for Evidence: helping to shape the future of energy.

Introduction

Our FES 24 Call for Evidence is an opportunity for you to help shape our future publications. We welcome your insight and evidence for 2024 and beyond. The insight gathered, combined with our own research, modelling and expertise will ensure the pathways to net zero that we produce as part of FES are credible.

The Call for Evidence is split in to nine topics; you are welcome to answer as many or as few questions as you like.

- Introduction
- Publication and engagement
- FES 24 framework
- Net zero
- Energy demand
- Hydrogen, gas, and bioenergy supply
- Electricity supply
- Regional assumptions
- FES Modelling process and publication of data

Whilst providing your contact information is not mandatory, if you do, we will be able to follow up on any points raised in your reply and continue the conversation. The survey closes on 2nd October, and we appreciate all responses. If there are any questions or you would like to provide further supplementary evidence, then please email FES@Nationalgrideso.com

Publication and engagement

- Do you have any thoughts on the format of the main FES report or FES in Five? We are interested in understanding both what you like about the current documents and what could be considered to improve future publications.
- Do you have any feedback on the launch of FES 23 including the executive launch event and webinars? We are interested in understanding both what you liked about the launch events and what could be considered to improve future launches.
- We publish a regular newsletter to share new publications, events, and news throughout the year.
  a) Do you have any feedback on our newsletters?
  b) Would separate notification of publications and events be preferable?
- Do you have any additional feedback on how we communicate and engage with you? Please consider both throughout the year and during launch week.

FES 24 framework

FES has been developed to provide scenarios for electricity transmission network planning in the Electricity Ten Year Statement (ETYS) and Network Options Assessment (NOA) processes, and for gas network planning in the Gas Ten Year Statement (GTYS). These processes are being overhauled with the creation of the Centralised Strategic Network Plan (CSNP).

The CSNP aims to facilitate strategic coordinated development of the whole energy system and networks at the pace needed to meet net zero. As part of this new process, Ofgem have consulted on major changes to FES, which includes a shift away from the broad-based scenario approach to strategic planning pathways to net zero. These changes are likely to result in a new-look FES, with a framework that accommodates the pathway approach and can be used for planning purposes to drive progress towards enabling net zero with cost efficiency to end consumers at the heart of it. Strategic network investment is a necessary, but not isolated, step to achieving net zero and the FES will continue to inform our progression to net zero across the whole energy system.

- Ofgem has stated that they require a narrower range of pathways/scenarios to net zero for network planning purposes. How do you believe FES should represent the wider range of outcomes which are credible but not to be used for network planning?
- Ofgem has set out their expectations for our scenario (pathway) work to feed the CSNP. They have stated that FES should include a counterfactual, though this should not be used for network planning. We currently present Falling Short alongside our net zero scenarios which assumes some policy intervention beyond today but does not reach net zero. What do you believe should be the purpose of a future counterfactual scenario and what should this include by way of progress beyond today?
- We have received feedback that we should include scenarios with high levels of natural gas.
  a) What levels do you believe are reasonable to include as a sensitivity or core planning pathway
  b) Do you believe the carbon budgets will be met in a higher gas world? If so, how? Please include any reference to evidence that you may have to support your view.
- As the ESO becomes the Future System Operator (FSO) we will have a wider whole energy remit and focus as an organisation. Does this change what you would like to see in our scenarios? If yes, please set out what changes you would expect and why.

Net zero

- What are your thoughts on current net zero policy and what is needed to deliver a net zero economy?
- What is the biggest challenge for the UK in meeting net zero by 2050 and what must be done to overcome it?
- What is the biggest opportunity for the UK in reaching net zero by 2050?
- What role do you believe emissions removal technologies such as Direct Air Carbon Capture and Storage (DACCS) should play in delivering net zero by 2050? If you believe they play a role, what is needed to scale up its application? If you believe DACCS plays a role, should the power required be considered as additional demand or only operated using otherwise curtailed electricity?

Energy demand

Our energy demand modelling covers electricity, gas, hydrogen, and other fuels across the following sectors:

- Hydrogen fuelled gas generation
- Heat (including residential, industrial, and commercial)
- Residential (excl. heat)
- Industrial and commercial (excl. heat)
- Transport

Please feel free to address only the vectors or sectors on which you have experience/thoughts.

- Where are our current assumptions/scenarios about the future of demand most and least credible? What do you think we need to change and why? What evidence should we be considering?
- If you were designing an ideal pathway to reach net zero by 2050 in a fair and secure way, what would you want to see on the demand side? What evidence can you share or direct us towards to help us understand that view? How can the UK make those things happen?
- Demand flexibility and decarbonisation of spatial heat are two major areas of interest for us this year. a) What do you think the right mix of technologies for these areas are? b) What do you think would make consumers engage with these changes? c) What evidence can you share or direct us towards to help us understand your view better?
- When assessing current and expected hydrogen demand, which end uses should our scenarios consider within the sectors outlined above? Please also state any applications where hydrogen is preferable over alternatives and why.
- What is required to drive the switch to low carbon fuels and how can this be done fairly? Please state in your answer if you are considering residential, industrial, or commercial consumers.
- Our scenarios show a decline in the use of natural gas in the UK energy mix out to 2050. Do you agree with this approach or is there a stronger role for gas in the long term?

Hydrogen, gas, and bioenergy supply

- What are your thoughts on current government ambitions for low carbon hydrogen production?
- What are the drivers and challenges in determining the location of low carbon hydrogen production? What are the challenges or barriers to delivering low carbon hydrogen to expected locations of demand if this is further from the production location?
- What are the different forms of storing hydrogen that should be considered within FES? How much storage is needed and where will it be?
- Do you believe ammonia should become a significant part of energy storage and/or shipping and/or other applications?
- The last few years have seen a sharp increase in LNG imports to the UK for export to Europe. How long do you see this role being sustained? What is the nature and scale of LNG in the UK's future energy mix?
- Where do you believe policy should go with regards to negative emissions from biomass and imported fuel stocks?
- What do you believe should be the enduring role and scale of bioenergy in the GB energy mix?
- In the transition to net zero, which sector(s) of the economy benefit the most from the application of biomass by way of emissions reductions and why?

- If you believe it necessary, what will drive the growth of bioenergy supply and demand and how will it be funded?

Electricity supply

- In **2035**, which of these electricity supply technologies do you feel should have the highest installed capacity within GB? Rank them from greatest capacity to smallest capacity.
    - Onshore wind
    - Offshore wind
    - Solar
    - Nuclear (all reactor types)
    - Hydrogen fuelled gas generation
    - Biomass with carbon capture and storage
    - Unabated natural gas fuelled turbines
    - Geothermal
    - Hydro and tidal power
    - Interconnectors
- In **2050**, which of these electricity supply technologies do you feel should have the highest installed capacity within GB? Rank them from greatest capacity to smallest capacity.
    - Onshore wind
    - Offshore wind
    - Solar
    - Nuclear (all reactor types)
    - Hydrogen fuelled gas generation
    - Biomass with carbon capture and storage
    - Unabated natural gas fuelled turbines
    - Geothermal
    - Hydro and tidal power
    - Interconnectors
- Are there any generation technologies other than the above that you feel would have a significant installed capacity? Please provide any evidence you have to support this view.
- In 2045, for our Leading the Way scenario we have assumed 38% of generation (8% higher than 2022 levels) to be connected to distribution network, do we have the right balance between generation connected to distribution and transmission? Please select the option below and provide a reason.
    - This is lower than what I would expect
    - This is about what I would expect
    - This is higher than what I would expect
- Why is this, or what would you expect the value to be? Could you point us to additional evidence supporting your view?

- Low carbon, renewable energy generation is expected to make up the dominant share of generation in our net zero scenarios in 2050. However, the output of the majority of this generation is weather dependent. We need to understand how periods of atypical weather might influence the electricity system, for example extended periods of low or high wind or sunshine.

  Could you give examples of rare weather events either locally or nationally that you think may have the greatest impact on the energy system, especially our ability to meet demand? This could be events that influence generation or demand. It could also include coincidences of several weather patterns.
- If you were designing the optimal route to net zero, what would you expect this to look like from an electricity supply perspective? What evidence can you point us to, to support your view?

Our Regional Assumptions

- We are incorporating increasingly granular data into our processes and are keen to include more regional datasets that would be important or relevant in supporting our models. We are particularly interested in data that might help us understand, for a region, what might be an optimum balance between different technologies (and may differ from the national view). Or datasets that may help us place limits or targets on the pace or need for a particular technology.

  Do you have examples of these datasets and/or policy that you would like to highlight, either nationally or for your specific region?
- Within our net zero scenarios, we see a significant increase in the amount of storage technologies, for example battery or compressed air storage.

  We are interested in which policies, markets or drivers may impact the growth of these services at a local level, the balance between short term (e.g. less than four hours) and longer term storage, and the suitability of technologies for a particular region.

  Do you have examples of drivers or barriers to these services, particularly at local level? Do you believe the right mix of technologies are being built or planned either nationally or within your region? Are there additional storage technologies, for example thermal storage, that you feel should have greater prominence within our scenarios?
- In **2035**, what order of these micro generation technologies (defined as less than 1 MW) do you foresee as having the greatest installed capacity within GB? Rank them from greatest capacity to smallest capacity.
    - Anaerobic Digestion
    - Small scale hydro
    - Solar (e.g. rooftop photovoltaics)
    - Small scale wind generation
    - Energy from storage (e.g. domestic batteries)
    - Combined heat and power generators using biomass, biogas or natural gas
    - Combined heat and power generators using hydrogen
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    - Small scale hydro
    - Solar (e.g. rooftop photovoltaics)
    - Small scale wind generation

- Energy from storage (e.g. domestic batteries)
- Combined heat and power generators using biomass, biogas or natural gas
- Combined heat and power generators using hydrogen

FES modelling process and publication of data

- Considering the dashboards added to the FES 2023 data workbook, do you have any comments on how these have worked for you or could be improved?
- How well do you understand the following? (Not well, N/A or Well)
    - How FES is used internally to the ESO
    - What FES data flows in to ETYS and GTYS
    - What other data sets are available from ETYS and GTYS
- Do you have any suggestions for improving the mechanisms by which we make the FES results available?
- We have received requests for more data. We publish the data behind the charts presented in FES, and more, in our data workbook which can be found on the FES section of the ESO website. Do you have any feedback on the data presented in the workbook?
- If you have a request for additional data within the data workbook or data portal, please detail what is requested and how this would be beneficial. Are there any other data items that you would like to see shared in the FES data workbook or via the data portal?
- What do you consider to be the key drivers in changes to industrial, commercial, and residential energy use that we should incorporate into our models?
- Which version of Excel do you use to access the FES data workbook? This will help us to understand compatibility with the formula we use.

Your details

We would like to have your details to continue the conversation and include you in our future engagement. You can sign up to our newsletter, if you haven't already done so, via the ESO website. If you would like to get in touch about any further topics of interest relating to the FES, please email FES@nationalgrideso.com

- Name
- Email
- Organisation
- Role or job title
- Are you happy to be contacted following submission to further understand your views?
- If you answered yes above, please list any particular topics of expertise and/or interest.