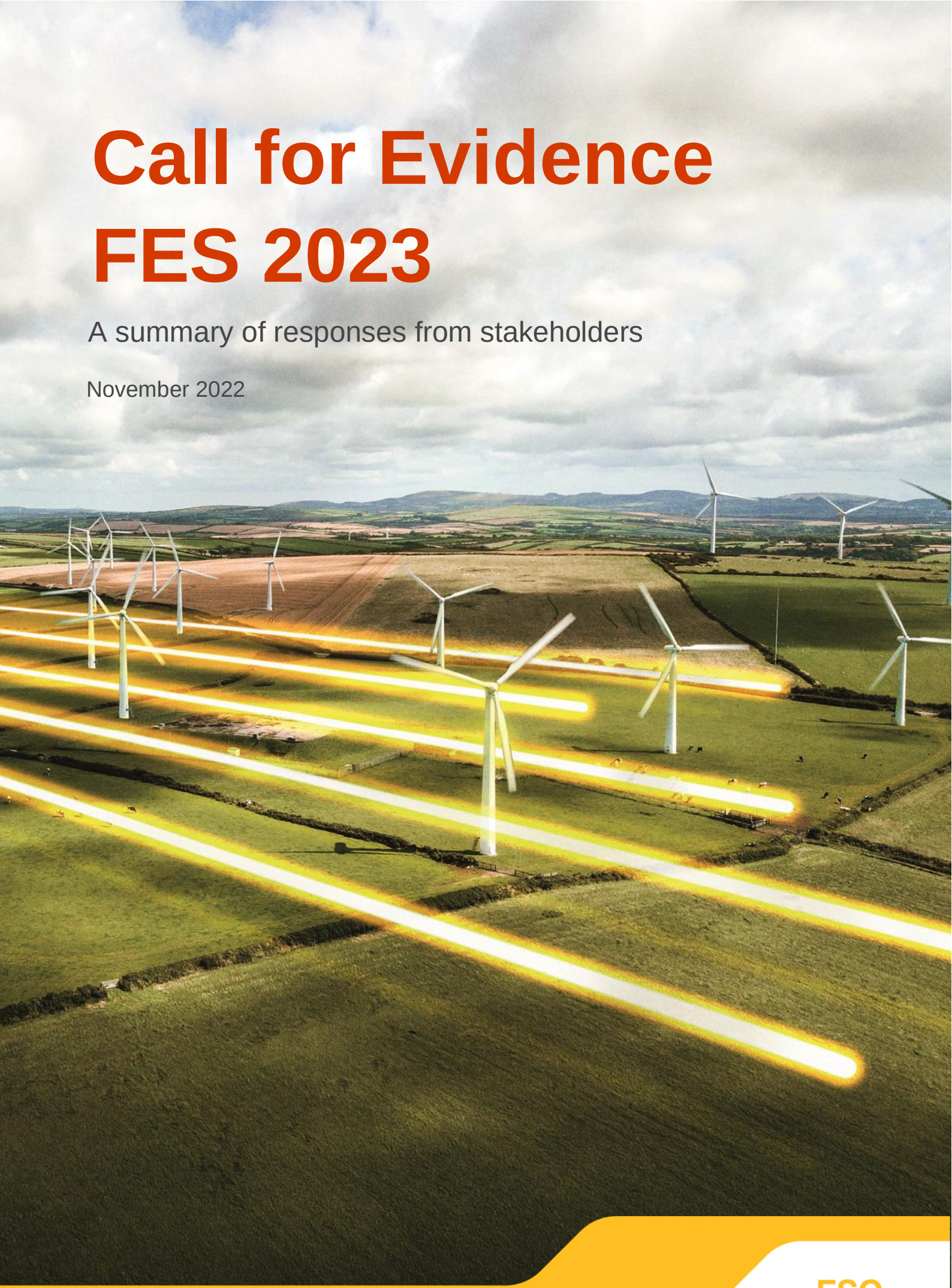
Call for Evidence FES 2023

A summary of responses from stakeholders

November 2022



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Introduction

The Future Energy Scenarios 2023 Call for Evidence was open during October, providing our stakeholder community with the opportunity to contribute to FES 2023 and beyond via this online consultation.

We asked a range of questions on a variety of subjects requesting evidence, insight, and research that we can consider for FES 2023 and future publications. We have provided below summaries of the responses we have received from a broad spectrum of stakeholders and organisations.

Many thanks to all those that took the time to respond to the survey throughout October, we appreciate the time taken to complete the questions.

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The Call for Evidence is the beginning of our engagement programme for FES 2023 and compliments the focused topic table talks, 1:1 meetings, and other events that we host and attend.

We will consider the insight we gather from all our engagement and will share how we will take it forward in the FES 2023 Stakeholder Feedback Document that we will publish in spring next year on the FES website.

If you have any queries, please email: FES@nationalgrideso.com

Strategic, insight and engagement

1. Do you believe the current scenario framework remains fit for purpose and covers the credible range of outcomes? Do you have any general feedback on the framework?

Overall people that responded to the Call for Evidence are happy with the framework and appreciate the consistency over the years since it enables easier year-on-year comparison. They use FES as a useful point for planning local energy and climate strategies and point the system towards change. FES also has a clear role in driving the debate to shape the energy system. Some suggestions include changing the technology mixes as further evidence comes out within the established scenarios, impact of severe nature and market events on demand-supply in FES and carrying out analysis linking FES with other frameworks for decarbonisation such as the CCC carbon budgets.

Many studies recommend that electrification will be leading the way compared to hydrogen for all sectors, i.e., heating, power, and transport. Therefore, it should be made clearer that Consumer Transformation should not be compared directly with System Transformation since the latter is a less ideal scenario. However, it should remain a scenario for consistency. In addition, the two faster and slower scenarios, Falling Short and Leading the Way, are useful for all the comparisons that need to be made. Renaming of 'Steady Progression' to 'Falling Short' has been welcomed by our stakeholders. Lastly, the axis being utilised for FES, i.e., speed of decarbonisation and level of societal change remain fit for purpose.

2. Do you see a viable world in the future that is dominated by hydrogen, or a world based on electrification? Or will we always need a combination of the two?

Most stakeholders agreed that currently hydrogen is not the best solution for domestic heating and transport with regards to small passenger vehicles. It should only see application in heavy good vehicles, grid balancing through electrolysis from renewables (especially curtailed one) and power-to-gas hydrogen peaking (replacing fossil fuel generation). Other applications include industrial processes that cannot be electrified (glass, steel, cement) and railway and aviation. It is more likely that electrification of heat will continue to develop with heat pumps, smart thermal stores and heat networks providing heat to buildings and flexibility to the power grid. Stakeholders supported the view of more weight on electrification over hydrogen in FES 2022.
Overall, according to the stakeholder feedback, a combination of hydrogen and electrification is needed, with green hydrogen playing a role in helping to decarbonise specific heavy industrial processes, serving as long-duration energy storage, and finding applications in long-distance shipping, aviation, and specialist equipment, such as refuse collection vehicles.

3. Do you have any thoughts on the dissemination of FES 2022 though the publication and launch webinars? Do you have any other feedback on our continual engagement and communication with stakeholders?

Many stakeholders who responded to Call for Evidence provided comments regarding FES 2022 dissemination and our general engagement.

The FES 2022 launch took place during July with a range of virtual events. Stakeholders have commented that the webinars were good, provided interesting discussion and helped to navigate the scenarios. The current publication and launch dissemination approach is supported and welcomed. Online events help to maximise engagement and provide the option to watch 'on-demand'. The networking element and face-to-face interaction of our engagement is missed though. One comment was received that we should consider spreading out the launch webinars over a longer period to allow more time for reflection and increase the time from publication to when the launch events commence.

We received many positive comments about our communication: excellent, consistent messaging, and openness of consultation and our engagement.

Areas for us to consider improving and making changes:

- Letting stakeholders know when the data workbook has been amended and a new version uploaded was recommended.
- Consider attending trade body conferences to reach out to industrial stakeholders at the same time as well as more direct engagement with local government and generators.
- The ESO and FES should be more pro-active with communication and engagement with end consumers and the public. This includes more coverage in the regional and national press on education and what needs to be done to meet net zero.

Energy demand

4. How much do you feel the impact of higher inflation and energy prices, as well as the economic downturn will impact your electricity and gas usage over the coming years? How do you think it will affect energy usage in wider society?

Most respondents admit that they are already being careful with their energy usage by either not turning on their heating/turning down their heating and looking to invest in insulation both at home and at work. Wider society are likely do the same, especially those who are already living in fuel poverty. Some suggested this would focus people on how they consume energy and may trigger investment in solar, heat pumps and increasing their home's energy efficiency – this is noted to be a long-term solution and may not be achievable for many during this cost-of-living crisis. The precise form that this will take will most likely be driven by government policy and incentives.

Support for vulnerable consumers will be essential to avoid further entrenching inequality as increases in energy prices affect lower income people disproportionately. Some call for an independent system planning regime, where prices would be controlled using cost management rather than market indicators.

Gas demand was suggested to be the most likely to be affected through the 2022/23 winter, with further disruption anticipated in spring 2023 depending on government policy with regards to the £2,500 energy price cap. Alternatively, given this energy price cap, some respondents felt that there is scope to be conservative and assume limited impact for FES 2023 as energy usage has low elasticity of demand. They believe that there will be a return to normalised pricing of energy products after 2023/24.

5. FES 2022 Key Messages 2 and 3 highlight the key role digital technology, engaging consumers and markets have in unlocking further Demand Side Response and other forms of demand flexibility for an efficient net zero transition. Do you know of any new evidence you believe FES should be considering as part of its analysis? Are there any challenges you foresee which impact the credibility of the levels of demand flexibility in the scenarios? How might barriers be overcome?

Most responses agreed that demand flexibility can be an important strategy in ensuring security of supply. The challenges of this and how these barriers may be overcome are as follows:

- Government working in silos – lack of communication between departments
- Data invisible to grid and Distribution System Operators – Office National Statistics collecting unsuitable data
- Customers historically disengaged with energy usage and prices – need for more education
- If blackouts occur over the coming winter, people may be less enthused by the idea of demand management and demand driven tariff prices.
- Some areas cannot have smart meters due to their rural location or lack of 2G/internet connection
- Demand Side Response (DSR) trialled with small groups of relatively engaged customers, how will this work long term?
- UK DSR market has been very turbulent, the lack of consistency in value has put off many large players from participating
- Cost of participation – FES 2022 noted that even the most interested consumers would not adjust demand manually, they need automated response – but for those in fuel poverty, they will not be able to afford new appliances that can do this.

- Utilities are not incentivised to engage in digitalisation and seem to have little grasp of the opportunities and threats so posed.

How to overcome these barriers:

- Creating the market conditions for aggregators and suppliers to make their businesses out of engaging consumers is the most likely effective route to sufficient consumer engagement.
- A recommendation was that FES should be talking to the successful suppliers about how they have motivated and engaged their clients to change behaviour.
- Digital systems and Artificial Intelligence will be critically important both to demand side and supply side optimisation.
- Increased deployment of smart appliances, such as speeding up uptake of smart meters that can respond remotely to DSR signals are the long-term aim.
- A programme of multi-faceted engagement over decades will be required to facilitate an inter-generational increase in engagement with energy to meet net zero.
- Grants and subsidies to enable all households to participate in flexibility.
- A new Demand Flexibility Service launched by the ESO for trial in winter 2022 may prove to be successful in engaging more demand reduction and response from households and smaller I&Cs consumers.

6. How do you expect consumer behaviour, specifically around uptake of new/efficient heat and transport technology, to change given the cost-of-living crisis and general developments in the energy industry?

Respondents feel that consumer behaviour plays a crucial role in the UK's 2050 Net Zero target. Arguably it will be even more important, especially in the short term, given the cost-of-living crisis that the UK is currently experiencing. The main changes in consumer behaviours:

- Consumer engagement has been low, heavily influenced by the price of electricity - there is no indication this will change without dedicated policy and support initiatives
- Changes in consumer behaviour will predominantly be driven by financial capacity and ease. Those who can pay will invest in retrofit insulation, local generation, and smart technology resulting in long term savings. Those who cannot afford to pay will be stuck with higher costs or forced to reduce their heat and power use.
- The introduction of price protection measures such as price caps and price guarantee may dilute some of the price signals for consumers, therefore, diminishing the value of expensive energy-efficient technologies.
- Strong policy targets in heat, transport, and power sectors, as well as payment support mechanisms will be required to ensure mass and scalable take-up of new technologies and energy-efficient measures.
- A recession next year will severely impact the rate of adoption of technologies like heat pumps and electric vehicles for several years at least. Rising energy costs and mortgage payments will erode household savings, delaying switching to these technologies for several years.

There was a common opinion that the uptake of heat pumps will be gradual during a cost-of-living crisis. Many felt that it is unlikely that consumers will choose to pay for an expensive technology whilst also considering factors such as installation time.

7. Which policies do you think are needed in the UK to drive required changes in consumer demand?

When asked about what policies are required to drive the required change in consumer demand, most stakeholders believe that there needs to be clear, targeted and UK wide education and to the public. Some argued that wealthy consumers are already buying EVs/HPs beyond supply. Those who are less well-off are increasingly falling victim to fake news in tabloids and social media, telling them incorrect information about the pitfalls of low-carbon technologies.

Others pointed to the lack of effective government policy for improving Energy Performance Certificates (EPC) of buildings, some recommend updating EPCs and the Energy-Related Products Framework to incorporate flexibility. Stakeholders recommend introducing new primary legislation setting clear end dates for the sale of fossil fuel heating systems and the sale of fossil fuels for heating, as well as additional incentives such as expanding the categories of energy related products that are zero rated for VAT.

The call for incentivising adopting green technologies was supported by many. Stakeholders want consumer reward-driven policies, focused on consumer benefits that also benefit the environment e.g., hydrogen gas tariffs that are lower cost and make energy bills a lot lower, especially in winter. Similarly, a national policy on energy efficiency and demand reduction is viewed as being beneficial by stakeholders, encouraging a feeling of acting together as a community or nation to achieve something that cannot be done by one person acting alone.

Whole system and gas supply

8. How likely is it that shale becomes a reality and if so, when should we expect to see the first gas produced?

Several responses were received regarding shale with a general yet clear negative sentiment for the development of a shale gas industry in the UK. Reasons for this include:

- High levels of public opposition
- Not conducive to GB's net zero commitments
- GB geology and population density are unfavourable
- Would be expensive

9. How do you see the various energy storage technologies interacting to best support GB's energy requirements?

A variety of stakeholders provided a response covering the following points:

- The importance of energy storage and the amount required is only expected to increase over time as the amount of renewable energy sources increases
- Batteries will have a very important part to play; meeting and shifting peak system demand and providing services to help facilitate system operation
- More Long Duration Energy Storage (LDES) will be required as dispatchable generation declines and is replaced by renewable. Inter-seasonal/LDES is key to meeting net zero targets (hydrogen, natural gas, ammonia, and pumped hydro being most popular), driven predominantly by the prospect of Dunkelflaute (cold, dark, windless winter conditions) and variability of renewable generation.

Electricity supply

10. How might the credible range for biomass generation and BECCS (Bioenergy with carbon capture and storage) change? What are the drivers and implications of that?

Most responses are overall sceptical of the potential that biomass and BECCS have to offer in a net zero world. The main drivers for this scepticism in our responses were:

- Land availability and quality of land
- Implications on availability of land for other uses such as food, deforestation, and afforestation
- Ecological impact
- Availability of water and transportation
- Level of carbon footprint in the supply chain
- Availability and economic viability of CCUS for biomass
- Level of financial support from Contracts for Differences (CFD)

- Effectiveness of alternative sources in terms of efficiency and cost
- Release of other harmful gas not properly removed from the environment
- Trade-off between energy production and carbon emissions from BECCS

There are strong views around the uncertainty of properly accounting for carbon levels, sustainability of importing biomass and scalability of BECCS, and so some stakeholders would like to see a scenario with no BECCS. Many responses highlight that for biomass generation to be implemented on a large scale, biomass feedstock would need to be imported from overseas, due to poor availability of land to grow it domestically. Some stakeholders suggest that biomass is more suited for small scale niche problems. One response suggests distributed medium scale BECCS (1-5MW) can play a significant role in net carbon negative heating systems, particularly for heat networks. Another response suggests BECCS is the optimal market-ready technology that has the scale and efficiency to deliver negative emissions required to meet Net Zero targets.

One stakeholder has called for definitive survey on the volume and types of biomass which is credibly available for energy production in UK, sources and any displacement of other activities from using land for biomass; this report may end a lot of speculation in this space. Whilst another stakeholder has highlighted government is planning to publish a Biomass Strategy in the coming months, this document will be important for outlining how biomass can contribute to the UK's net zero targets.

11. Where and when do you expect excess generation to be, and what new sources of demand do you believe we need to make use of that generation to avoid curtailment?

Many responses recognised that areas of high intermittent renewable penetration, particularly offshore wind, would be the areas of highest excess generation. Specific areas mentioned were the North and Northeast of England as well as Northern Scotland. Some responses also mentioned the South of England will experience excess solar generation on sunny days. Many of these responses also said the periods of highest excess generation will be off-peak demand periods such as at night as well as periods of high wind and high sunshine.

A wide range of technology options and sources of demand were discussed to avoid curtailment in periods of high generation. These included green hydrogen, storage (in particular long duration storage), interconnectors and demand side responses services such as smart EV charging and appliances, electrification of heat and domestic scale batteries. Some responses recognised that there will be no "silver bullet" and a combination of all these technologies must be utilised through a regional approach. Direct Air Carbon Capture and Storage (DACCS) is mentioned in a small number of responses as a technology which can be used to soak up excess generation. Some responses highlighted the fact that the sites of excess generation are far away from demand and that perhaps a regional pricing model could be used to bring demand closer to areas of supply.

The most mentioned technology was the utilisation of electrolysers to convert excess generation into green hydrogen, which could then be piped to centres of demand. Several responses recognised that green hydrogen currently has no route to market and requires a strong policy framework and a national planning process for the technology to be successfully deployed.

12. Following the selection of a location (the former West Burton power station site) for nuclear fusion development, the government are aiming for a prototype fusion energy plant to be built by 2040. Do you think this is feasible and if not, why not?

This question received a mix of responses. A limited number of responses were favourable to prototype fusion being built by 2040 and half of these responses claimed that commercial scale fusion was feasible by 2050.

Several responses stated they had no views on the matter or that there was not enough information available to answer the question.

Most responses were generally favourable, and that nuclear fusion is something that is worth pursuing, however they recognised the high levels of risk involved and it is unlikely to be delivered by 2040. They suggest 2050 and beyond is more realistic. Some responses were favourable to fusion however stated we should focus more on the technologies we have available today and that more effort should be spent on

optimising our demand profile, building system resilience, and building homes that have low energy consumption.

A small number of responses were highly critical of fusion, claiming it was not feasible by 2040 and that the government announcement of a prototype fusion reactor by 2040 was largely a political move. These responses also say that investing heavily in fusion will be a waste of money and that this money should go towards other technologies.

Modelling and data

13. We currently share data from our modelling via an Excel data workbook and the ESO data portal. Do you have a preference for how we share data in the future?

Many individuals responded to this question indicating a preference or a comment. The most common feedback from stakeholders is that Excel is a good format, and people find the data workbook useful. There were a few requests for alternative data formats and access locations.

There was a common theme in requests for more openness around underlying assumptions, intermediate calculations, and data referred to in the report but not present in the data workbook which we will consider how to address in future publications.

14. Are there any areas of our modelling that you feel we need to develop over the next few years?

Respondents offered suggestions to expand on our modelling. This included:

- Modelling of different socio-economic groups with an interest in fuel poverty and affordability of decarbonisation.
- Interest in sensitivity analysis, particularly price sensitivity.
- More granular regional modelling and results
- Analysis of how the energy system would deal with future shocks and changes to energy consumption patterns
- More transparency on the primary sources of assumptions

Some respondents requested modelling that is currently outside the scope of the FES, such as stability analysis and constrained networks, or which is already included, e.g., modelling energy use beyond electricity. We will endeavour to make clearer what is included in our modelling in future iterations and how FES interacts with network planning and operability and where this information can be found.

15. Are there data sources that you feel that we should incorporate into our future energy scenario modelling?

Several stakeholders responded with suggestions of specific data sources, including sources for emissions data, hydrogen production and consumer uptake trends that we will consider for inclusion in our future modelling. A few responses were received regarding including regional data where possible.

16. Have you found DNO Embedded Capacity Registers useful? If so, where, and how have you used this as part of your investment and planning decisions?

Stakeholders who responded to this question indicating that they are using the capacity registers for modelling and awareness. One stakeholder indicated that they have not used them as the current cut-off of 1MW is too high for their purposes. One respondent replied “no” but did not elaborate on why they had given this response.

Respondents have also that there is some variability in data quality between DNOs which we will continue to work with those parties to improve.

Regionalisation of FES

17. We are working on the feedback loop and interaction between ESO scenario projections and regional projections produced by regional network companies as well as the interaction with Local Authority led Local Area Energy Plans. Do you have any views on how this feedback loop should work in practice?

- Add up the DFES projections (for relevant technologies) and see how close they come to the national FES projections.
- Drive the data flow to local authorities about plans and programmes since they may not have the bandwidth to be forthcoming (due to understaffing / budget cuts etc).
- Be as transparent as possible, contact and include major players in the regional schemes.
- Sharing of assumptions / data sources would be useful to the regional network companies.
- As more local areas develop LAEPs, FES should use as much of this high quality, high granularity data about local areas as possible.

18. We currently publish regional electricity data via our Regional breakdown of FES data workbook and FES visualisation platform. We want to explore enhancing this data and information as well as agreeing a similar dataset for our gas and hydrogen pathways - we are interested in your views on this.

- It is useful to drill through FES projections in the local area, and then compare this to local council plans, however we would prefer if the visualisation defaulted to grid supply points rather than regions.
- The inclusion of the number of heat pumps, EVs etc in the regional breakdowns would complement the demand values (MW).
- Show the difference between gross demand as 'incurred' by the user and net demand as seen by the networks and perhaps savings / reductions from a net demand approach.
- It would be interesting to add trendlines and compare current generation and demand mix to FES projections from 2016 onwards.

19. What are the top three elements where you believe your local region or area may see a different pathway compared to the main FES predictions? We're particularly interested in ideas we may not have considered.

Southwest:

- Has a high volume of tourism traffic, which would lead to more EV charging capacity needed relative to the number of registered vehicles.
- Has many of the early wind turbines in the UK (from 2000s) and solar farms (from early 2010s), and so the impact of these technologies repowering after ~25 years of operational life will be felt in the Southwest first.
- Marine energy of the Southwest and South Wales coast - especially tidal stream and floating offshore wind. (Not wave, utility scale wave appears to be near dead).

South coast:

- The existence of two major commercial ports and a naval base makes this an interesting case for developing a pathway with large demand side response and demand turn up potential involving a few large users.
- Ports will have to become significant energy hubs to meet their own decarbonisation targets. There is an opportunity to integrate these into wider energy system optimisation. Work on business models to incentivise ports in this role is needed.
- Explore how the pathway for constrained areas with significant renewables may differ from other areas.

West Sussex:

- Higher levels of inequality leading to disparities in take up of low-carbon heating and technologies.
- Rural areas with larger numbers of off gas grid homes and communities.
- Large areas of national park and AONB, which will limit opportunities for renewable generation.

Dorset:

- Major uncertainties relating to local planning constraints, Green Belt and AONBs. Likely to slow down the transition to net zero.

Shetland:

- Shetland as a region will soon have a renewable energy capacity which is 14x our demand. If a balance can be struck to enable local consumers access to lower electricity prices (e.g., to reduce curtailment, demand side management etc) then Shetland has the possibility of rapid electrification uptake, if grid reinforcement can be achieved.

Ideas, which may not have been considered:

- The use of waste heat from hydrogen production, which may well be a significant trigger for district heating.
- The use of DACCS to absorb renewables.
- At what point do local networks start to become unviable due to low number of customers and economics.
- Roll out of hydrogen filling stations in the Midlands to encourage the awareness of the potential of hydrogen and the use for transport.
- Roll out of electrified heat, due to the make-up of the building stock in the north of Scotland.
- Potential for wave and tidal growth in the north of Scotland could be high based on available resource but scenarios show this being limited due to difficulties with route to market.
- Concern around the deployment of CCUS within some regions, as it is far more reliant on a transport system due to the location of the storage compared to the location of the industry that will use it.
- Retrofitting insulation to a large stock of poor housing is vital to make use of air or ground source heat pumps feasible, though cost and suitability of measures in homes presents challenges. These considerations may shape technology changes, which may require further disaggregation of data below regional levels.
- Areas with lower average income may see themselves on a different pathway.
- There is arguably a need for an ‘Enabled Consumer Transformation’ scenario, and a ‘Restricted Consumer Transformation’ scenario, reflecting the pathways where consumers are either able or not able to access their desired decarbonisation options.
- Areas benefiting from community energy generation projects and stronger locational signals may end up on an accelerated pathway compared to areas that are equivalent in terms of population size or socio-economic demographics.