

# FES 2021

# Call for Evidence

September 2020



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## Introduction

Thank you for taking the time to participate in this year's Call for Evidence. The responses we receive will help to inform the scenarios for 2021 and be a valuable contribution. The survey will be open from the 7 September for three weeks until the 25 September.

If you have any supporting evidence (reports, public studies, individual analysis) that you would like to submit alongside your response in the survey, then please email [FES@nationalgrideso.com](mailto:FES@nationalgrideso.com) noting the section and question of the survey your evidence relates to.

To participate [please join here](#). Once you have entered the survey, you'll be able to choose from the following drop-down list of areas to read and reply to the questions in that section. You'll be able to complete as many sections as you wish.

- Communiations and engagement
- Scenario framework
- Net zero
- Industrial and commercial demand
- Heat in buildings (demand)
- Transport demand
- Electricity generation
- Bioresource
- Natural gas
- System flexibility
- Hydrogen

If you have any questions or need support, then please email: [FES@nationalgrideso.com](mailto:FES@nationalgrideso.com)

We thank you in advance for taking the time to contribute to the 2021 scenarios. Following the closure of the consultation we will share a summary of the insight we have received via our newsletter and on our website.

Many thanks

FES team

## Further information

To access our **FES 2020** and previous years documents please visit:

<https://www.nationalgrideso.com/future-energy/future-energy-scenarios>

For more information and to access other **ESO publications**, please visit:

<https://www.nationalgrideso.com>

## Confidentiality and data protection

All information provided as part of this *Call for Evidence* will be used for reasonable business purposes only. Your personal information will remain confidential and will not be published as a part of our findings. We will summarise the feedback and include it in our *Stakeholder Feedback Document* in early 2021.

## 1. About you

- Name
- Email address
- Organisation
- Title within the organisation (If applicable)

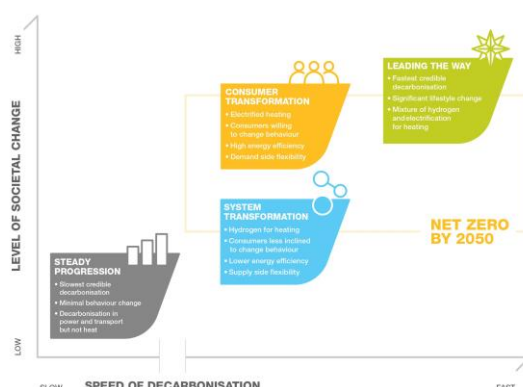
Whilst these fields are not mandatory and we respect your decision to remain anonymous, we would appreciate your details so that we can follow up with you on the responses you provide and potential engagement in the future.

## 2. Communications and engagement

- Do you have any comments about how FES 2020 was launched (i.e. online rather than physical conference)?
- If we continue with a virtual launch for FES 2021 what changes would you like us to consider from this year?
- We made significant changes to the format and structure of the main FES report for 2020. Do you have any comments about how the document was laid out (e.g. splitting content into Consumer View and System View and moving to an online interactive format)?
- We are always keen to make improvements to the range of FES publications for stakeholders. Please provide any feedback you have on the following:
  - FES in 5;
  - Data Workbook;
  - Scenario Framework document;
  - Modelling Methods document;
  - Regional Breakdown (electricity); or
  - FAQ document
- We are continuously seeking to improve the way we communicate with our stakeholder community and use a variety of methods to do so. Which method is your preferred option, and do you have any views on our communication channels and approaches?
- Are there any other comments you'd like provide on this subject?

## 3. Scenario framework

- We introduced a new set of scenarios for FES 2020 in light of the new 2050 net zero emissions target. We consider that this Scenario Framework, its axes of “speed of decarbonisation” and “level of societal change” and our four scenarios are effective in exploring the future of energy out to 2050. Therefore, we don't propose to make any significant changes for FES 2021 as this also provides consistency in downstream processes. Do you agree with this?



- Please provide any additional detail to support your view – including general views on the scenario framework.
- In our analysis for FES 2020, we decided to keep assumptions around non-energy aspects such as land use change, forestry, aviation, direct air capture etc... constant across the scenarios to provide a better comparison of energy aspects. Do you agree with this approach or should we consider flexing these areas across the scenarios?
- Please provide any additional detail to support your view. We are especially keen to receive data in these areas as this would improve our ability to potentially flex them across the scenarios.
- Our Leading the Way scenario represented our credible fastest decarbonisation (assuming that the non-energy aspects were held constant across the scenarios as above). Do you have a view on the earliest year that Net Zero could be achieved and, if so, what is your rationale for this?
- Our Steady Progression scenario represented our credible slowest progress towards decarbonisation. Are there any areas where you feel that our assumptions in this scenario were too ambitious or conservative?
- FES 2021 will consider the impacts of Covid-19, and any related mitigating actions, on the future of energy. We have started to develop our thinking in this area but would appreciate any views you may have on how Covid-19 could be reflected across the scenarios (if at all) and how it could affect different sectors of the economy?
- Are there any other comments you'd like provide on this subject?

#### 4. Net Zero

- Our FES 2020 scenarios relied heavily on the assumption that bioenergy is carbon neutral (provided that bioresources are produced sustainably) and therefore that application of CCUS (e.g. BECCS) delivers negative emissions. Please provide any views on this assumption including any relevant evidence.
- Are there any other potential methods of generating negative emissions which weren't included in FES 2020 that you think should be included in FES 2021 (including any useful detail)?
- In line with other organisations, our greenhouse gas emissions analysis only accounts for emissions occurring within the UK. For instance, it treats interconnector flows as zero in both directions and doesn't account for upstream emissions in relation to the manufacturing of products consumed within the UK (e.g. wider supply chains). Are you aware of any other potential approaches that could be considered for FES 2021 – including any risks associated with this?
- Are there any international or global aspects that should be included in FES 2021 (e.g. an international carbon market or product standards) and, if so, do you have any suggestions for how this could be applied across the scenarios?
- Are there any other comments you'd like provide on this subject?

#### 5. Industrial and commercial demand

- In FES 2020, we made the assumption that all of the UK's trading partners decarbonise at the same rate to the UK and hence there is no incentive for industry to offshore. Do you think it is reasonable to assume that there is no carbon price differential across countries? Would you rather see some degree of industry offshoring in the scenarios?
- BEIS has consulted on reducing I&C energy demand by 20% in 2030, against 2015 levels. How much potential do you think there is for energy efficiency improvements in the industrial and commercial sectors by 2030? Where do you think these improvements could be focused?
- In FES 2020 we used a fixed GDP assumption across all 4 of our scenarios due to the ambiguous relationship between economic growth and energy demand. Would you prefer to see the economic growth assumption stretched in some scenarios since it is a key area of uncertainty? Or does a fixed GDP assumption allow easier comparison between the net zero scenarios?

- The deployment of innovative fuel switching technologies (e.g. hydrogen glass furnace or electric ceramics tunnel kilns) is essential for achieving net zero in the industrial sectors. What policy must be put in place in order to incentivise the investment in such technologies? How soon does policy need to be put in place in order to achieve a full roll out of such technologies by 2050?
- Where do you think our industrial and commercial modelling could improve? Where would you like to see more detail?
- Covid-19 and the associated restrictions have already had a significant impact on the economy. Do you believe that this will lead to fundamental and longer lasting changes across the I&C sector and what do you think the impact could be on industrial and commercial demand (e.g. a potential green recovery)? Could you provide any evidence to support your view?
- Are there any other comments you'd like provide on this subject?

## 6. Heat in buildings

- What are your views about the ways in which building fabric retrofitting (building mass), heat storage (using water, phase-change, or solid-state technologies) and smart controls (with dynamic pricing) can be combined to help manage peak electricity demand for heat? Will we always need the three components working together in a building or would any two be enough?
- In FES 2020 we assumed that for dwellings on heat pumps all space and hot water heating will be met by the heat pump alone. This is a slight departure from existing heat pump sizing design standards which assume some level of back-up direct electric heating especially in cold winter days. Do you believe this is a credible assumption? Do you have any views or evidence to support a different approach?
- In FES 2020 we assumed that existing building stock will reduce their heat demand by as much as 30% by 2050 through retrofitting of building fabric and behavioural changes. We also assumed that new builds will be at least 70% more (heat) energy efficient than an average building today through higher building standards. Do you agree with these assumptions? Could you provide evidence to support a different set of assumptions for maximum potential levels of heating efficiency improvements for new builds and existing stock?
- The Covid-19 lockdown and social distancing has opened a debate about whether this will lead to a fundamental shift in how and where people work post Covid-19. Do you believe Covid-19 will have a lasting impact on domestic or commercial energy consumption pattern for heat? Could you provide any evidence to support your view?
- Do you believe we can achieve net zero target without a ban on gas boiler sales and installation? If yes, why? If no, what is your best estimate of when such a ban could come into effect?
- In FES 2020, we assumed for the net zero scenarios that between 25% and 40% of homes with heat pumps<sup>1</sup> will have thermal storage that supports heating (e.g. hot water tank or phase change material storage). Do you agree with this range?
- Are there any other comments you'd like provide on this subject?

## 7. Overall electricity demand (not including transport)

- What are your views on the overall annual demands in FES 2020?<sup>2</sup>
- What are your views on the peak demands in FES 2020?<sup>3</sup>

<sup>1</sup> This percentage applies to homes with dedicated heat pumps only (i.e. does not include hybrid heating solutions).

<sup>2</sup> Figure EX.2 in the data workbook. Other demand definitions in workbook figure ED1 with tab definition "Grand Total" (Definitions in figure ED2).

<sup>3</sup> Peak demands: figure SV.4 (FES data workbook SV.4, FES document page 57). Summer minimum demands shown in EX.4 in the data workbook. Definitions under "Definitions" in FES Data Workbook ED1, Column "Tab".

- **Electrical appliances:** All of the 2020 scenarios assume energy efficiency of electrical appliances will continue to improve between now<sup>4</sup> and 2020. Over the last 12 months, a small number of appliance manufacturers have committed to carbon reduction or net zero targets by 2050. These are generally carbon reduction targets, rather than efficiency targets directly. What are your views on the 32% and 40% targets assumed?
- **Electrical appliances:** What are your views on any legislation that may be required to improve appliance efficiency and if so, when? Or do you think that manufacturers will take the lead without legislation?
- Are there any other comments you'd like provide on this subject?

## 8. Transport demand

- **Road transport:** The smart charging and vehicle to grid percentages used in FES 2020<sup>5</sup> determine the proportion of UK home owners who will smart charge their EVs to avoid peak electricity prices or for some other incentive, and consider moving their white good load (washing machines, dishwashers, tumble driers) to off peak periods. What are your views on these assumptions?
- **Road transport:** Our scenarios include a number of assumptions<sup>6</sup> around automated vehicles such as the number of miles they do per year and whether they are driver-owner automated vehicles or automated robot taxis. What are your views on these assumptions, particularly in the longer-term post 2030?
- **Aviation and marine transport:** FES 2020 assumes the use of both hydrogen<sup>7</sup> and biofuel in the aviation and marine sectors. Over the last 2 years there has been discussion and development activity on electrification for short distance flying (Domestic flights) and short distance maritime routes (e.g. cross-channel ferries, coastal freight). What are your views on electrification of short distance marine and aviation? When do you think the International Maritime Organisation might revise its current 50% carbon reduction target to net zero?
- **Rail:** FES 2020 assumes significant electrification of rail transport in all scenarios (except Steady Progression) with some hydrogen in System Transformation. What are your views on hydrogen for rail transport? Should it be in more than one scenario?
- Covid-19 and the associated restrictions have led to significantly less car travel. Do you expect any longer-term trends to develop as a result of this which may impact future energy demand from road transport?
- Are there any other comments you'd like provide on this subject?

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<sup>4</sup> Energy Consumption in the UK (ECUK Table A1) states current electrical demand from appliances is around 70TWh/year. Against 2015 demands of 76TWh, Steady Progression assumes the lowest rate of improvement and falls by 15% to 64TWh by 2030. System Transformation assumes a high rate of improvement and falls 23% to 58TWh by 2030. Consumer Transformation assumes we head towards the EU target of around 32% by 2030, achieving 29% or 55TWh by 2030. Leading the Way speculates and assumes the target is changed to ~40% by 2030, falling to ~45TWh.

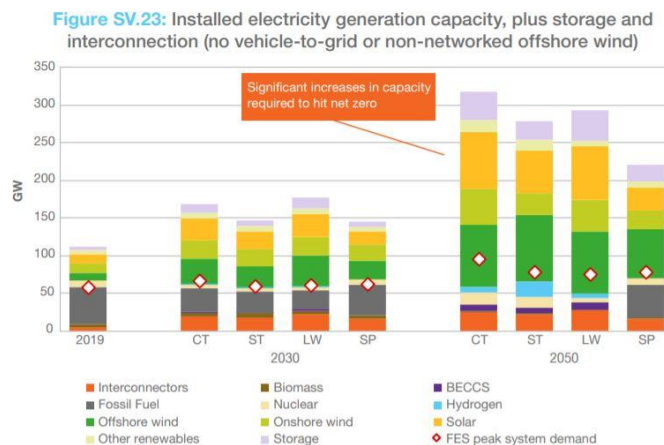
<sup>5</sup> See *Figures CV.28* and *SV.40* of the main FES 2020 document (on pages 50 and 106 respectively) and full datasets in the Data Workbook (SV.40)

<sup>6</sup> See *Figure CV.21* of the main FES 2020 document (on page 46) and in the Data Workbook.

<sup>7</sup> Ammonia as a possible high density energy carrier

## 9. Electricity generation

- Our scenarios include multiple different generation technologies rather than assume a single dominant technology. What top 5 technologies do you think will be dominant by 2050, and why those technologies?



- Considering the capacities of the technologies in FES 2020, are there any comments you would like to make relating to the ranges across the scenarios?
- New technologies, as well as advancements on current technologies continue to come forwards all the time; the commercial viability of new technology is something we must consider when looking towards 2050. What emerging technologies do you think will become commercially viable over the period up to 2050?
- What reports or research related to electricity generation have you undertaken / seen over the last 18 months that you think it is worth us looking at? Are there any new stakeholders, industries, or research institutes that you think we should add to our engagement plan for FES 2021?
- How do you see the electricity generation market changing in the next 5 to 10 years? Which technologies will dominate, how quickly will existing sites retire, and how will policy impact the generation mix? How will these changes help to achieve the net zero target?
- Are there any other comments you'd like provide on this subject?

## 10. Bioresource

- What do you believe is the optimal use of bioresources?
- How much bioresource should we assume to be available for import to the UK? Should the range of import level in our scenarios (34TWh to 68TWh) be pushed further?
- How much land in UK do you believe can be available for growing bioresources for energy use and what are the limiting factors?
- Are there any other comments you'd like provide on this subject?

## 11. Gas Supply

- What needs to happen in order to make shale gas extraction a reality in the UK and do you believe shale gas is compatible with a net zero scenario?
- What are the key benefits of green gas over other sources of low carbon energy?
- What is the growth potential in terms of both in size and timescales for green gas (e.g. considering feedstock, production build rates etc.)?
- In a scenario with high levels of hydrogen what do you believe would be the optimal use of the interconnectors.



- Are there any other comments you'd like provide on this subject?

## 12. System flexibility

- **Supply side:** What technologies do you expect to provide reliable back-up capacity to meet demand when weather conditions are not favourable for renewable generation?
- **Demand side:** The percentages assumed for engagement and adoption of smart charging<sup>8</sup> determine the proportion of UK home owners who will smart charge their EVs to avoid peak electricity prices or for some other incentive, and consider moving their white good load (washing machines, dishwashers, tumble driers) to off peak periods. What are your views on these assumptions?
- **Demand side:** For our Industrial & Commercial DSR projections, we split these into “pure DSR” (turn down from industrial processes, ventilation, refrigeration and heat) and “response from I&C heat pumps” in the period up to 2050 (assuming commercial heat pumps could provide a service in response to pricing for short periods at peak times). What are your views on these assumptions and the scenario ranges? Do you have any Information which could help us further develop our scenarios?
- **Demand side:** In our modelling, we assume that V2G supplies flexibility across the scenarios. To what extent do you think this will be delivered by commercial vehicle fleets as opposed to at a residential level by cars in homes?
- **General:** Do you have any views on the scenarios we presented on system flexibility?
- Are there any other comments you'd like provide on this subject?

## 13. Hydrogen

- Do you believe blue hydrogen is required to enable green hydrogen? If so why?
- When do you see a hydrogen market developing, and who will be the major importers and exporters?
- What do you believe is the maximum build rate of electrolyzers year-on-year in the UK and what drives this?
- Are there any technologies for hydrogen production that you believe were missed in FES 2020?
- What do you see as the main barriers to development of hydrogen storage?
- Are there any other comments you'd like provide on this subject?

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<sup>8</sup> See *Figure SV.40* of the main FES 2020 document (on page 106) and a full dataset in the Data Workbook (SV.40)