July 2024

Distribution Future Energy Scenarios 2024

Stakeholder consultation summary report

East Midlands licence area

nationalgrid DSO

Introduction

Scope of this report

This report provides a summary of the four regional stakeholder consultation webinars organised by Regen and National Grid Electricity Distribution (NGED), held in June 2024. These webinars were part of the 2024 edition of NGED's Distribution Future Energy Scenarios (DFES) analysis. This report focuses on the East Midlands licence area, summarising the stakeholders in attendance, alongside the results of a series of polling questions posed to stakeholders and the comments and questions received throughout the events. The subsequent impact of the input and engagement on the DFES modelling process is also summarised.

DFES project summary

Regen has partnered with NGED since 2015 to develop the DFES methodology and analysis, which forms an essential part of NGED's strategic network investment planning. Regen is currently conducting the 2024 DFES analysis for NGED's South West, South Wales, East Midlands and West Midlands licence areas. The DFES analysis aims to model the connection and integration of technologies into the distribution network out to 2050 across four credible future scenarios, as outlined by National Grid Electricity System Operator's (ESO) Future Energy Scenarios (FES) framework. Each DFES scenario assumes that the three main energy sectors – power, transport and heating – will decarbonise in varying ways and/or on different timescales.

The DFES projections include renewable, low carbon and fossil fuel power generation; electricity storage; low carbon heating technologies; electric vehicles (EVs) and EV chargers; hydrogen electrolysers; and planned new housing and commercial property developments. For 2024, the DFES also considers the decarbonisation of the maritime, aviation, agriculture and rail sectors. Uptake of these technologies is modelled to a high granularity across more than 2,000 geographic areas for larger-scale technologies and over 200,000 low-voltage areas for small-scale Low Carbon Technologies (LCTs).

Regional and local

Each region in Great Britain has unique characteristics and resources. As part of the transition to net zero, each area will follow a different decarbonisation pathway. This could involve varying utilisation of energy vectors (e.g. hydrogen, biomethane and electricity) and deployment of a range of generation, storage and demand technologies.

The DFES makes use of the FES framework and high-level assumptions but seeks to develop bottom-up, local evidence-led projections that reflect the unique characteristics of NGED's distribution network regions. This analysis is, therefore, continuously informed by detailed local and regional factors and stakeholder feedback, enabling NGED to plan strategically and invest appropriately in the electricity distribution network at the local level.

Stakeholder engagement

Engagement and consultation with local stakeholders are crucial to the DFES methodology, ensuring that local and regional factors are accurately represented in our scenario analysis. This involves collaboration with local and national government, project developers, technology installers, commercial and industrial consumers, academia, trade bodies and community energy groups.

For 2024, Regen engaged stakeholders through a series of online workshops, summarised in this report, and through targeted interactions with individual project developers, asset owners and other relevant industry representatives. Additionally, Regen consults with every local authority within NGED's licence areas to understand local energy strategies, climate ambitions, Local Area Energy Plans (LAEPs) and details of planned new housing and non-domestic developments.

To find out more information about the webinars or the DFES project, or if you have any other questions, please contact: nged.energyplanning@nationalgrid.co.uk

East Midlands licence area

Date: 13 June 2024
Attendees: 59
Recording: A link to the session recording is available here
NGED contact: nged.energyplanning@nationalgrid.co.uk
Regen contact: gmillman@regen.co.uk

The engagement webinar provided stakeholders in the East Midlands licence area with an overview of the DFES process, along with a summary of the current status and potential future scenarios for key distributed generation, storage and demand technologies in the region. Stakeholder input was captured through polls, open-form questions and a Q&A session, allowing direct input to be captured for consideration in the DFES analysis. The polling results, stakeholder comments, questions posed and answers provided from all four licence areas are summarised in the stakeholder feedback section of this report, categorised by theme. This also includes a summary of how the feedback will be used to inform the DFES modelling going forward.

Oli Spink, Head of System Planning at NGED, presented an overview of the DFES process and explained how the DFES continues to evolve through the inclusion of new technologies. Oli summarised the current suite of published outputs from the analysis and signposted stakeholders towards NGED's Network Development Plans.

Sharon McGuffie, DSO Strategic Engagement Officer at NGED, outlined her engagement with East Midlands stakeholders to date and routes of engagement for attendees on the webinar. Sharon detailed NGED's continued commitment to supporting the development of Local Area Energy Plans (LAEPs) and reflecting the ambition of local authorities within the DFES analysis.

Stakeholders were asked about their existing knowledge of DFES and level of engagement with NGED, as well as views around any other sectors or technologies that NGED and Regen should be considering in its DFES modelling.

Meagan Reasoner, Energy Analyst at Regen, presented a series of maps detailing the scale and location of existing renewable and flexible electricity generation and battery storage sites, as well as the pipeline of additional contracted projects in the licence area. Stakeholders were invited to provide views, via online polling, on:

- The timeframe of the rollout of large-scale solar projects in the development pipeline
- The factors influencing domestic rooftop solar PV installations
- The future prospects for fossil fuel generation sites in the planning process
- Limiting factors influencing the uptake of battery storage.

Grace Millman, Senior Energy Analyst at Regen, presented an overview of key transport and heat policies, as well as the current locations of non-domestic EV chargers and the uptake of domestic heat pumps. Stakeholders were invited to provide views on:

- Where business will predominantly charge their electric cars and vans
- Where and how electric HGVs might be charged
- The rate of non-domestic heat pump deployment in the region.

Finally, Grace presented some key policies for the decarbonisation of aviation, rail, maritime and agriculture, and invited views from stakeholders on these sectors. Stakeholders were also invited to share any other general views on electricity generation, flexibility technologies, low-carbon transport and low-carbon heat in the licence area, aiming to capture the broader sector and regional knowledge from the attendees present at the event.

Stakeholders

The sectors represented by stakeholders that registered for the East Midlands webinar are shown in Figure 1. Delegates from the energy industry (such as grid consultants, engineering contractors and energy services providers) and local government made up the majority of registrants in the webinar, with varying levels of representation from community energy groups, academia and utility networks.

The 'Other' category includes attendees from the energy industry, such as independent contractors, and non-energy industries, such as housing developers, technology companies, legal and finance firms and landowners.

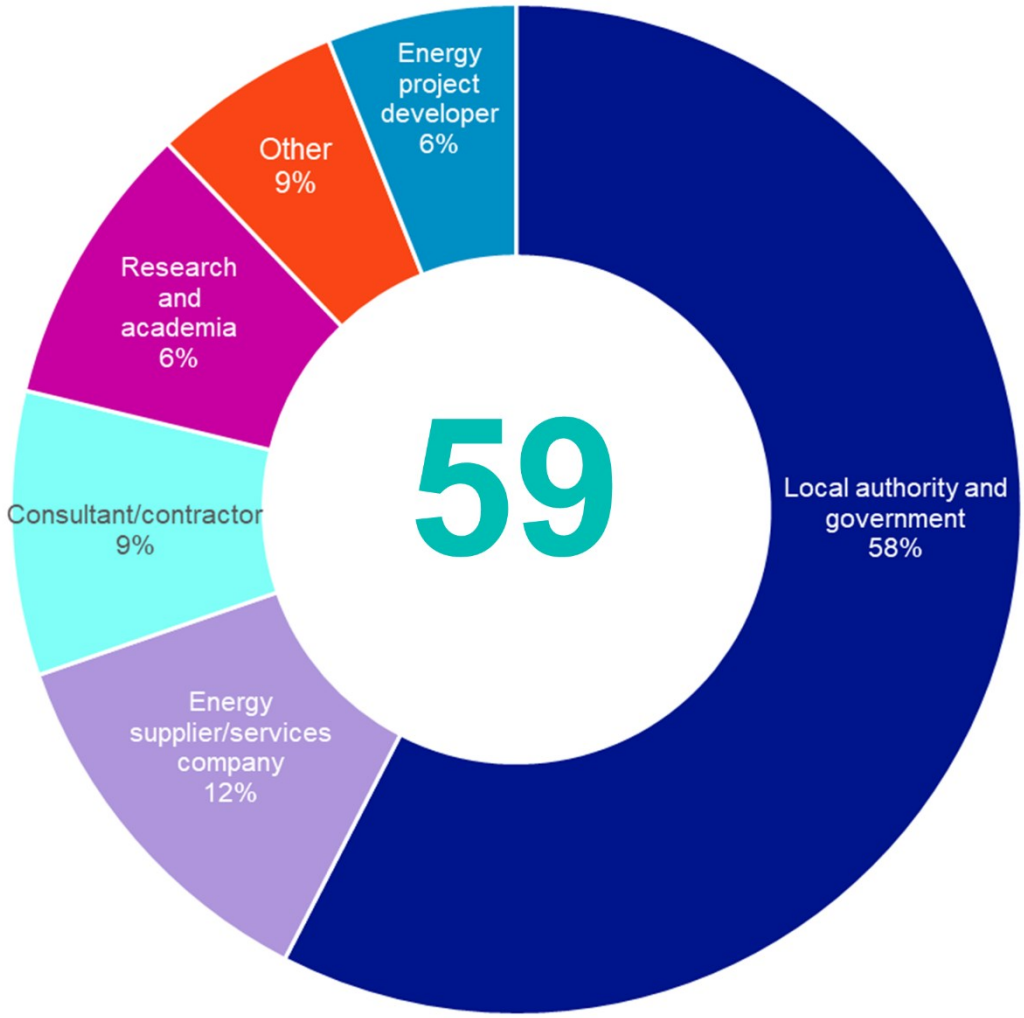

Figure 1 - Attendees from the East Midlands DFES engagement webinar, by sector.

Stakeholder feedback

Engagement with NGED

At the beginning of the webinar, stakeholders were asked to rate:

- Their level of engagement with NGED
- Their awareness of the DFES process and its outputs
- Their understanding of the role of the DFES in strategic network planning.

The results are summarised in Figure 2. Compared to the 2023 webinars, the average level of engagement in the licence area has increased from 2.7 to 2.9 out of 5. The level of awareness of the DFES process and its outputs, and the understanding of the role of DFES in strategic planning have also increased from 2.4 to 3.1 and from 2.8 to 3.3, respectively.

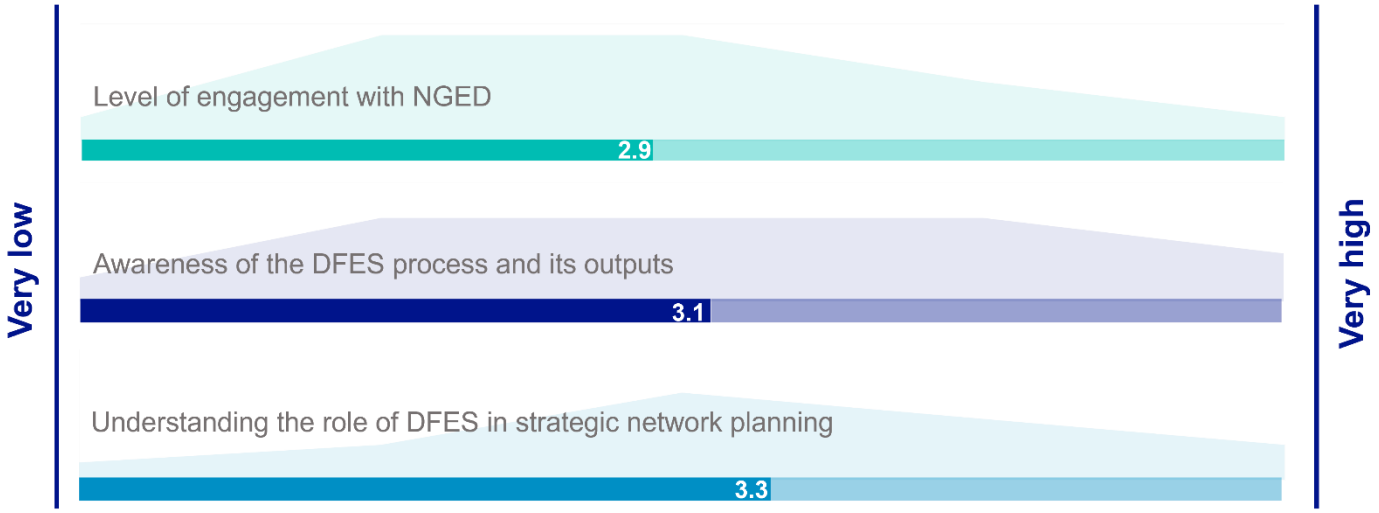

Figure 2 - East Midlands licence area responses around the DFES and engagement with NGED. Scored out of 5.

Relevant policies

Stakeholders were also asked about the major recent or upcoming policies that are most likely to impact how the electricity network is used in the East Midlands licence area, see Table 1.

Table 1 - The key energy-related policies impacting the East Midlands licence area, as defined by stakeholders, and their impact on the DFES modelling.

Policy area	Impact on DFES analysis
The possibility of changes to current legislation as a result of the 2024 General Election.	The DFES considers key UK and Welsh Government policies to inform likely near-term priorities and long-term actions, alongside the FES framework assumptions. Whilst the DFES 2024 analysis will aim to align with the latest policy available during the modelling period, the timescale of the implementation of policies from a new Labour Government may not directly align with the 2024 analysis period and may impact NGED's 2025 DFES assessment more directly.

The influence of LAEPs and other local plans, including the allocation of energy parks through these documents. For the East Midlands in particular, the ambitions and policies of the mayor were noted as being influential.	LAEPs are an example of regional ambition and a regional decarbonisation pathway that has been developed and adopted by the local authority, stakeholders and citizens within the region. LAEPs will be a key input into the DFES analysis moving forward. By reviewing LAEPs for key information, commitments and targets and incorporating this into the DFES, NGED ensures that any investment decisions are future-proofed and stakeholder-informed. In particular, the pipeline of future developments contains several energy parks with multiple technologies being developed within them. These will be directly reflected in the DFES projections.
The Future Homes Standard, which will come into effect in 2025 and ensure no new homes will be built with fossil fuel-based heating systems. Stakeholders also noted that the phase-out timeline for gas boilers in all homes needs to be considered.	The Future Homes Standard is used in the DFES modelling to project the adoption of heat pumps and other low-carbon heating in new housing developments post-2025. UK government policy on the phase-out of gas boilers is also a key input into the analysis, as well as being considered within the wider FES framework assumptions.
Uncertainty around the UK government's decision about the use of hydrogen for residential heat, currently scheduled for 2026.	This will be reflected in the DFES 2024 analysis, with only the Hydrogen Evolution scenario seeing a significant proportion of homes heated by hydrogen.
Grants for building decarbonisation, such as the Boiler Upgrade Scheme or the Home Upgrade Grants, are influencing the uptake of heat pumps.	We will consider the influence of government grants on the uptake and spatial distribution of domestic heat pumps.
Minimum energy efficiency targets for private-rented homes.	The scenarios that include a high level of heat pump uptake also assume accelerated rollout of energy efficiency measures. We will ensure this considers any minimum targets for private rented homes. However, from recent studies on the suitability of homes for heat pumps, such as from Energy Systems Catapult, the modelling does not assume that a home has to be highly insulated before a heat pump is installed.
The publication of heat network zones in England from the Department for Energy Security and Net Zero.	The DFES models connections to heat pump-driven district heat networks, as well as the electricity demand from said heat pumps and associated electrode boilers. The identification of heat network zones by DESNZ will be a key input into the DFES once published. Until then, we will continue to use the previous BEIS heat network study and supplement this with engagement with local authorities and project developers.
The ban on the sale of new diesel and petrol cars was noted, having been revised to 2035.	UK government policy on the ban on the sale of new diesel and petrol cars is a key policy milestone in the DFES EV analysis, as well as being considered in the wider FES framework and assumptions.

The Local Electric Vehicle Infrastructure (LEVI fund), which supports select local authorities in England to roll out local charging infrastructure.	We actively engage with local authorities as part of the DFES to understand current and planned energy projects, such as the rollout of local charging infrastructure. Schemes supported through LEVI are aimed to be flagged through this engagement and data-sharing process.
Grid connection timelines and connections reform.	The DFES seeks to reflect challenging connection timelines in at least one scenario, however, the scenario modelling is designed to be agnostic to network constraints, which allows NGED to invest in areas to unlock new capacity. This means we do not model current grid connection timelines in all scenarios. The recent introduction of reforms to connections policy to fast-track sites that are further progressed is a good example of the type of intervention that shows the benefit of not modelling the worst-case/long connection lead times under all scenarios.
The potential for a future ban on renewable deployment in Sites of Special Scientific Interest (SSSIs).	Based on stakeholder feedback, historic deployment and planning policy, we assume that large-scale onshore wind and solar PV will not be deployed in protected areas such as AONBs and National Parks unless they are already in the pipeline and have secured planning approval. This is reflected in the renewable energy spatial resource assessment that we undertake to inform the long-term projections for technologies like solar and wind. This assessment discounts AONBs, National Parks and other protected areas. While current planning policy does not explicitly restrict the development of renewables in SSSIs, it does state that this should not normally be permitted. We will continue to only model sites connecting in SSSIs where projects have achieved planning permission.
Any reform of market structures, for example, the potential introduction of locational marginal pricing.	Potential market reform, and changes to market signals, will likely have a large impact on the deployment of renewables, in particular the location of developers' chosen sites. Through our assessment of sites with a connection agreement with NGED, we will be able to proactively identify the near-to-medium-term scale of development. For the long-term DFES projections, we undertake a renewable energy spatial resource assessment, which identifies the developable areas of land. Taken together, this provides a comprehensive view of likely future development in the region.
The impact of net zero requirements on the manufacturing industry and associated electricity demand.	The DFES does not currently provide specific projections for the decarbonisation of individual industries. This year, for the first time, we will be assessing the potential electrification of sectors such as agriculture and maritime, however, this will be largely focused on transport elements. Alongside this, industrial demand and transport are both factors that influence the hydrogen electrolysis analysis, in terms of the amount of electrolysis capacity projected and the location of that capacity.

Stakeholder feedback

Input into the DFES process

The following tables present feedback from the webinars for all four licence areas, categorised by theme. This feedback was gathered through responses to the live polls, open-form questions posed by Regen and comments and questions submitted by stakeholders during the webinars.

Ground-mounted solar PV

Stakeholder feedback	Impact on DFES analysis
Stakeholders in the East Midlands thought that around half of the current 8.5 GW solar pipeline would end up being built. There was lower consensus on the timescale for deployment, with polling ranging from the mid-2020s to the mid-2030s. This is shown in Figure 3. This result varied across the four webinars.	The pipeline modelling will consider the envelope of views shared from stakeholder polling around the pipelines of solar projects. This will be combined with site-specific research on individual project progress and direct engagement with project developers. The resultant projections for each licence area will be tailored for each region.
Stakeholders noted the recent tensions surrounding solar PV and agricultural land in the planning landscape.	Alongside the physical location of projects in development, the solar PV DFES projections use a solar resource assessment to allocate future capacity to suitable locations. This excludes agricultural land grades 1 and 2, as these are considered the best and most versatile agricultural land and therefore are not included in the ground-mounted solar PV distribution.
One stakeholder commented that solar farms, and other renewables, need to be distributed across the licence area and not just in certain locations.	The DFES modelling uses several inputs to create a holistic view of the potential future deployment of renewables. Alongside the pipeline of projects in development, it also considers where there is sufficient solar resource and land availability to develop future projects. Policies relating to the cumulative impact of solar farms will be considered in the distribution of future capacity.
Several stakeholders highlighted that renewable schemes may have to be co-located with battery storage to avoid grid constraints and connection issues.	The battery storage DFES projections include a proportion of solar and wind capacity that has co-located battery storage. We will consider whether co-located projects are more likely to progress in the next few years in response to constraints.
Several stakeholders highlighted the potential for ground-mounted and rooftop solar along highways, railways, canals and at car parks via solar PV carports.	The DFES solar projections are distributed to individual locations based on several characteristics, including commercial buildings, industrial areas and car parks. We will consider whether solar installations at highways, railways and canals could be identified and included as factors determining the location of solar projects.

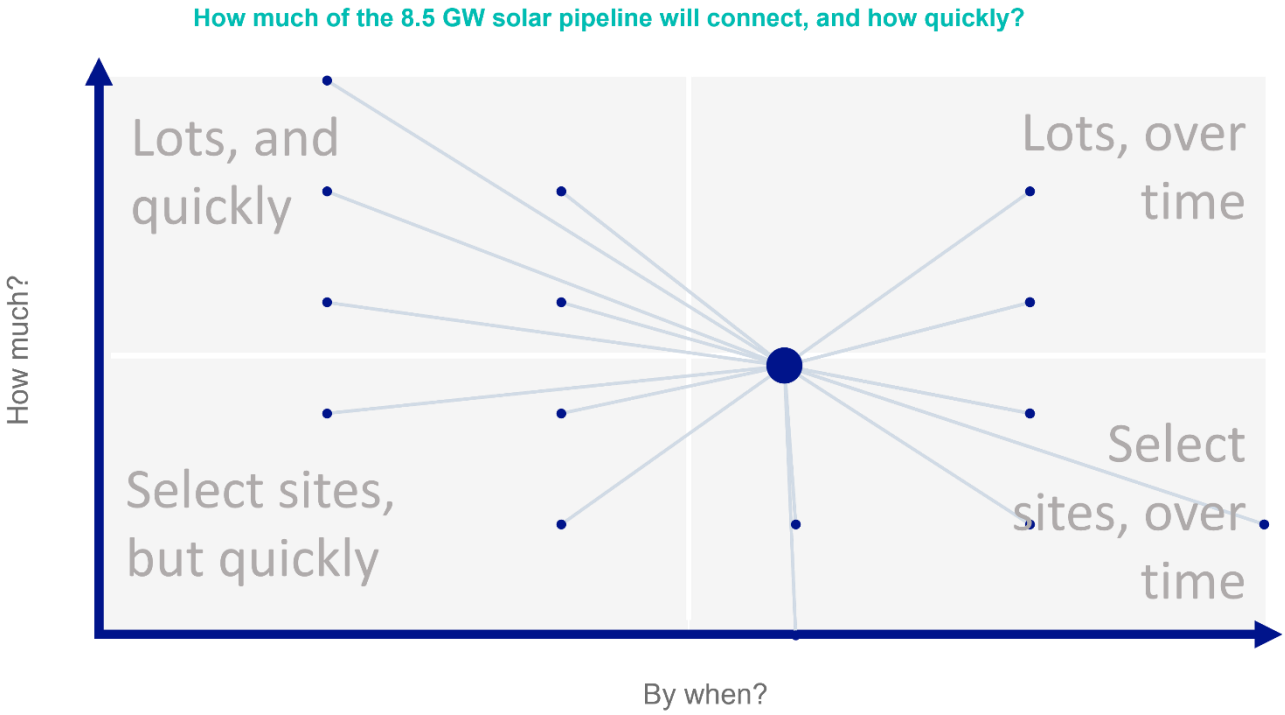

Figure 3 - East Midlands licence area webinar responses regarding the pipeline of large-scale solar PV. The larger dot represents the average response.

Rooftop solar PV

Stakeholder feedback	Impact on DFES analysis
Stakeholders thought that domestic rooftop solar PV installations would accelerate as installations become cheaper.	Rooftop solar uptake at both a domestic and commercial scale is currently increasing. This trend will be modelled to continue in all scenarios, and an accelerated uptake will be modelled specifically under Electric Engagement and Holistic Transition, as these scenarios have the most ambitious consumer-driven decarbonisation pathways.
Stakeholders commented that household income, owner-occupied status and high electricity bills would be the main factors driving domestic rooftop solar PV uptake in the near term, with EV ownership and use of electric heating having a smaller impact, as shown in Figure 4.	We will continue to directly use household income indicators, owner-occupied status and EV ownership as key factors to model the spatial distribution of domestic rooftop solar PV in the near term, under all scenarios. We will consider whether existing heating type should also influence uptake.
Stakeholders noted that current tariffs for domestic solar PV do not give significant incentives to encourage installation and that any changes in tariffs could influence future uptake of rooftop solar.	Within the DFES envelope, some scenarios assume more encouraging policies and tariffs to incentivise consumers to play an active part in the net zero transition. The impact of this is modelled, reflecting different rooftop solar PV adoption rates across the four scenarios.

Stakeholders thought that non-domestic installations would be focused on 'easy-to-install' properties, and less so on properties with high energy demand such as supermarkets and larger schools or universities.	The location of these types of properties will be directly reflected in the spatial distribution of commercial-scale rooftop solar PV. Whilst weighting towards these property types may be applied, all suitable non-domestic property types are broadly included in the spatial modelling.

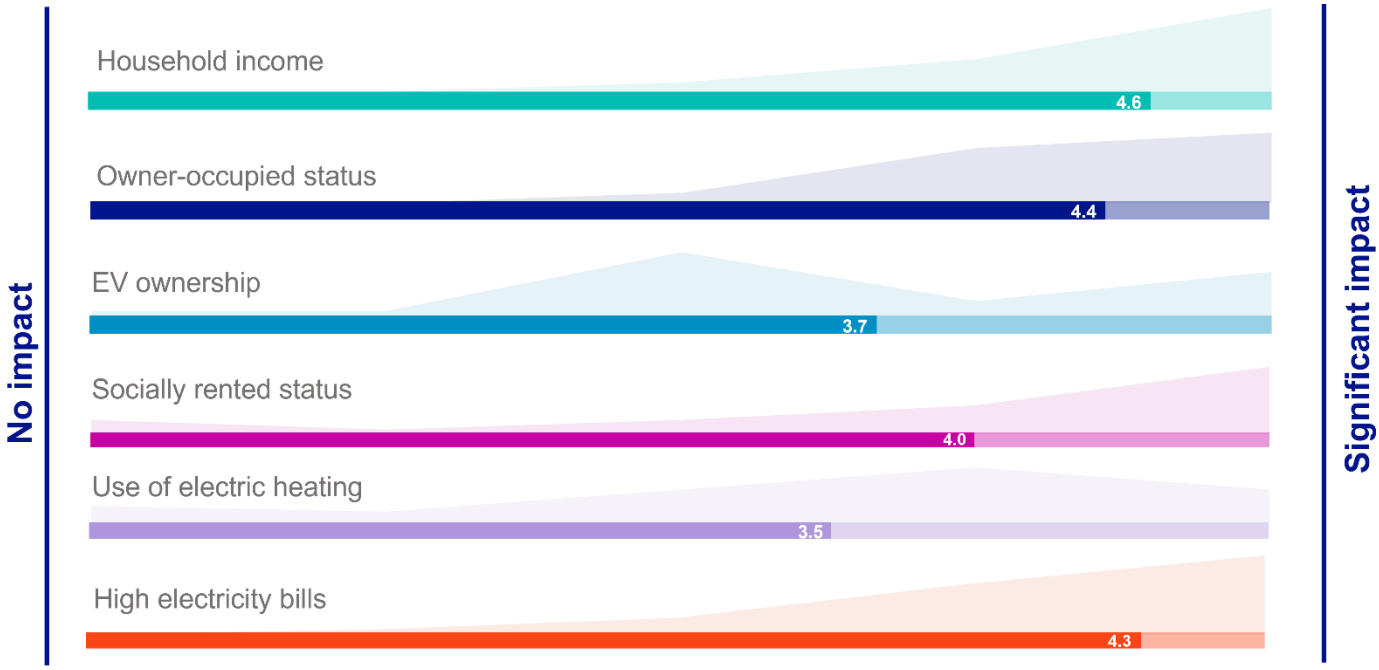

Figure 4 - Factors that might impact households installing rooftop solar PV over the next five years, as voted for by the respondents from the East Midlands licence area scored out of 5.

Onshore wind

Stakeholder feedback	Impact on DFES analysis
Stakeholders agreed that wind farms would not decommission at the end of their operational life, with most agreeing that the wind farms would most likely be repowered with additional capacity using higher power turbines.	Our projections directly include the repowering of existing onshore wind projects at the end of their planned operational life at either existing or greater capacity. This is with the exception of scenarios that are less supportive of renewable energy generation, in which smaller turbines decommission at the end of their operational life.
Stakeholders noted that the planning system hampers onshore wind in England compared to other renewables.	The scenarios reflect a range of possible outcomes for onshore wind, including ones where existing planning constraints in England are removed. Our onshore wind resource assessment also accounts for protected and designated areas to understand which parts of the licence area are less likely to host onshore wind, regardless of a positive spatial planning policy environment.

Stakeholders thought that, if planning policy for onshore wind in England were to change, there wouldn't be immediate local support for new onshore wind developments, but that this would improve in the longer term. Stakeholders also fed back that support for onshore wind would be driven by community energy groups in the area.	This feedback is already considered as part of the assumptions and analysis behind our onshore wind modelling. Regen's resource assessment for onshore wind aims to capture areas with high onshore wind potential. The scenarios also consider a range of future deployment rates, reflecting a less accelerated uptake across the region. The role of community energy groups in driving local community support is a factor that supports the scenarios where a more significant deployment of onshore wind is seen.

Electricity storage

Stakeholder feedback	Impact on DFES analysis
Stakeholders across multiple licence areas felt that electricity storage could be one of the technologies that existing fossil fuel sites may convert to in the long term.	We will model a range of scenarios for the decommissioning of existing fossil fuel generation. Existing fossil fuel sites may look to diversify their energy asset, for example through installing battery storage. We will therefore consider whether the location of existing fossil fuel sites should be used as a locational factor in the modelling of electricity storage.
Stakeholders fed back that storage co-located with solar PV will be an increasingly popular business model, as a route to achieving better prices for the sale of exported solar generation and to share grid connection costs. Stakeholders thought it was likely that developers would look to retrofit battery storage onto existing generation sites, in particular sites that are constrained or looking to repower.	The scale of the contracted pipeline of solar and battery co-located projects reflects this view of the increased popularity of co-located storage in the near and medium term. The DFES battery storage modelling also includes a specific projection for battery storage co-located with solar PV and onshore wind. Therefore, the location of a proportion of projected battery storage capacity will be influenced by the location of existing and proposed renewable energy sites.
Stakeholders thought grid connection timelines would be the main limiting factor for the uptake of grid-scale battery storage. They also thought that uptake is likely to be impacted by planning barriers and market saturation, as shown in Figure 5.	The DFES scenario envelope allows us to model pipeline projects to connect in different years, depending on evidence of their development progress. We reflect the current Statement of Works delays to pipeline projects under the Counterfactual scenario within our DFES modelling, and consider the positive impacts of recent connections reform within the other scenarios.
Many stakeholders commented on the vast quantities of energy storage that will be needed to help balance a renewables-based system.	The battery storage pipeline within NGED's licence areas stands at 26.5 GW as of April 2024. We use planning information to determine the likelihood of individual sites connecting and vary this between scenarios. This results in a substantial amount of battery storage connecting to the distribution network in NGED's region between now and 2050.

Stakeholders commented on the need to include long duration energy storage e.g. Compressed Air Energy Storage, Liquid Air Energy Storage and green hydrogen, in the DFES modelling.	Hydrogen electrolysis is one of the technologies modelled in the DFES. The scenarios present a range of use cases for low-carbon hydrogen, including energy storage and excess generation. We model the other technologies under an 'Other Storage' category based on analysing the pipeline of accepted connections to the NGED distribution network. With grant funding and proposed cap and floor revenue support schemes for long-duration technologies, there may be the need to consider and model non-battery storage technologies more specifically in future DFES assessments.
Stakeholders across all four webinars referenced the high potential for Vehicle-to-Grid (V2G) and Vehicle-to-Home (V2H) connectivity and whether this might reduce uptake of standalone battery storage.	An increased presence of V2G and V2H technology is already considered in the envelope of the DFES scenarios for standalone batteries. We will consider whether the presence of V2G and V2H technology might dampen the uptake of standalone battery storage in certain areas.
Stakeholders said that major energy-consuming organisations will install battery storage to maximise onsite power generation, participate in flex services and reduce connection capacity. However, it was not thought that battery storage would be used to displace backup diesel generators.	The DFES battery storage modelling includes a specific projection for 'high energy user' assets, which considers the uptake of batteries behind the meter at high energy user premises. We will consider the drivers highlighted by stakeholders in the spatial distribution of this high energy user battery storage capacity projection in all scenarios.
Stakeholders thought that already having rooftop solar PV would be the biggest influence on households to invest in domestic batteries, to maximise self-consumption.	We directly link the uptake of domestic battery storage systems with the uptake of domestic rooftop solar PV in our modelling.
Stakeholders noted that a significant influencing factor for the uptake of domestic battery storage would be the pay-back time for an installation.	The cost of the battery system will be considered in the overall level of uptake of domestic batteries across the scenarios.
One stakeholder commented that domestic battery uptake will increase in line with heat pump uptake.	The DFES doesn't currently use the adoption of heat pumps as a driver for domestic batteries. We do, however, model thermal storage for heat pumps. In broader terms, the spatial factors we use to determine the type of property that will adopt low-carbon technologies will influence the spatial distribution of heat pumps, rooftop solar, EVs and domestic batteries.

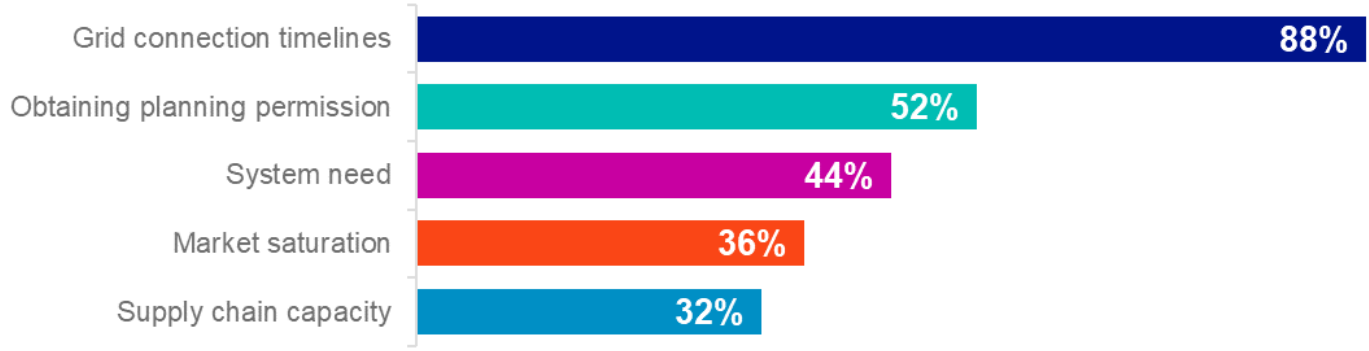

Figure 5 – Factors impacting the uptake of grid-scale battery storage projects by percentage of respondents in the East Midlands licence area webinar

Fossil-fuelled generation

Stakeholder feedback	Impact on DFES analysis
Stakeholders thought that new fossil fuel generation projects would have issues securing planning permission, either being refused in planning or taking longer to achieve planning approval, as shown in Figure 6.	Where fossil fuel electricity generation sites in the pipeline haven't yet attained planning permission, these sites will be modelled to only go forward to connect in the Counterfactual scenario. Sites that are modelled to connect in other scenarios will be based on other evidence of progress identified through research of each individual project.
Stakeholders felt it was more likely that existing gas peaking sites would convert to energy storage or hydrogen-fuelled generation than completely decommissioning. However, there was little consensus on the technology that sites would predominantly convert to, as shown in Figure 7. Stakeholders also thought it was likely that sites would continue to operate but with strict emissions controls.	We will model a range of scenarios for the decommissioning of existing fossil fuel generation, reflecting the range of views shared. This will include sites converting to battery storage or hydrogen-fuelled generation, or continuing to operate with emissions controls, under different scenarios. Conversions to hydrogen-fuelled generation will depend on national-scale scenario assumptions on the future energy system and the availability of low-carbon hydrogen for power generation.

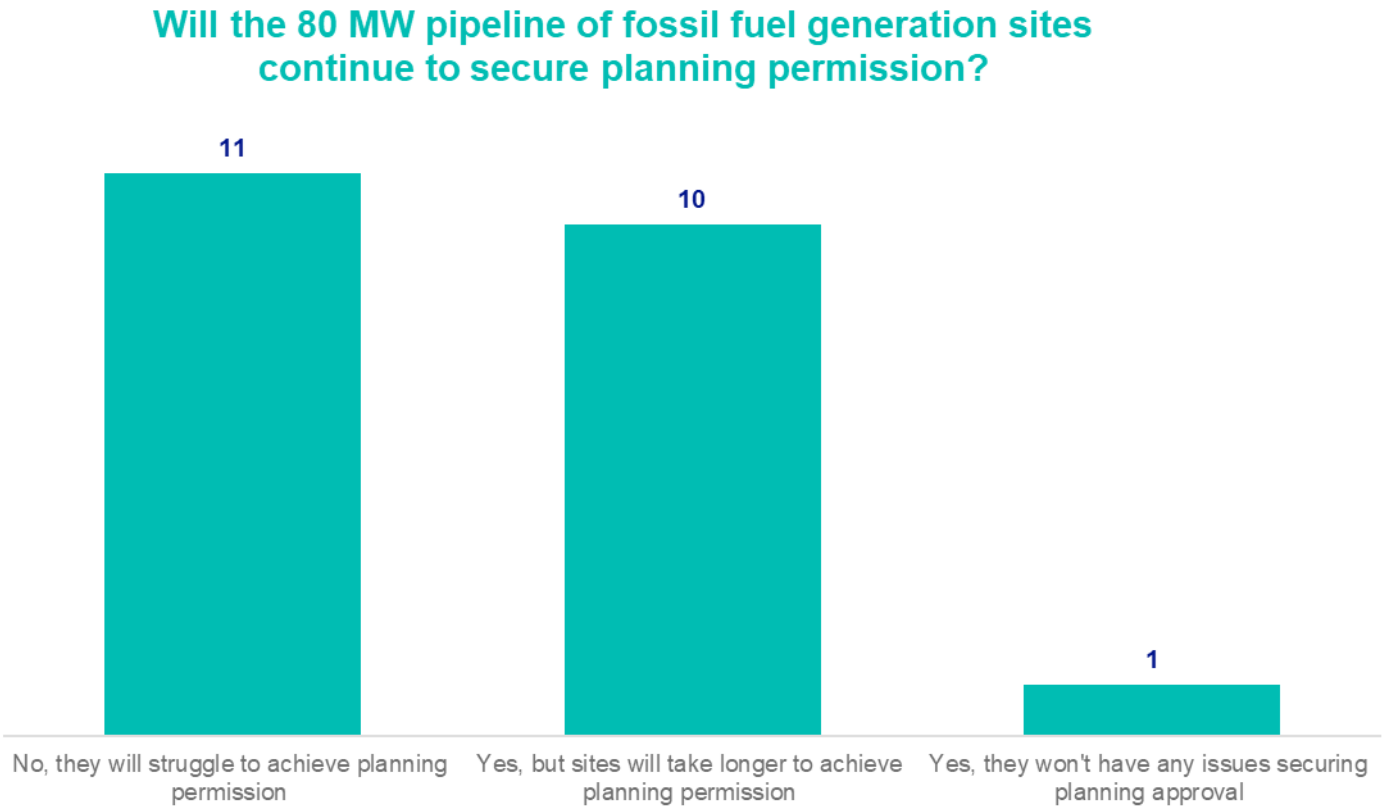

Figure 6 - East Midlands licence area webinar responses regarding the planning landscape for new fossil fuel electricity generation.

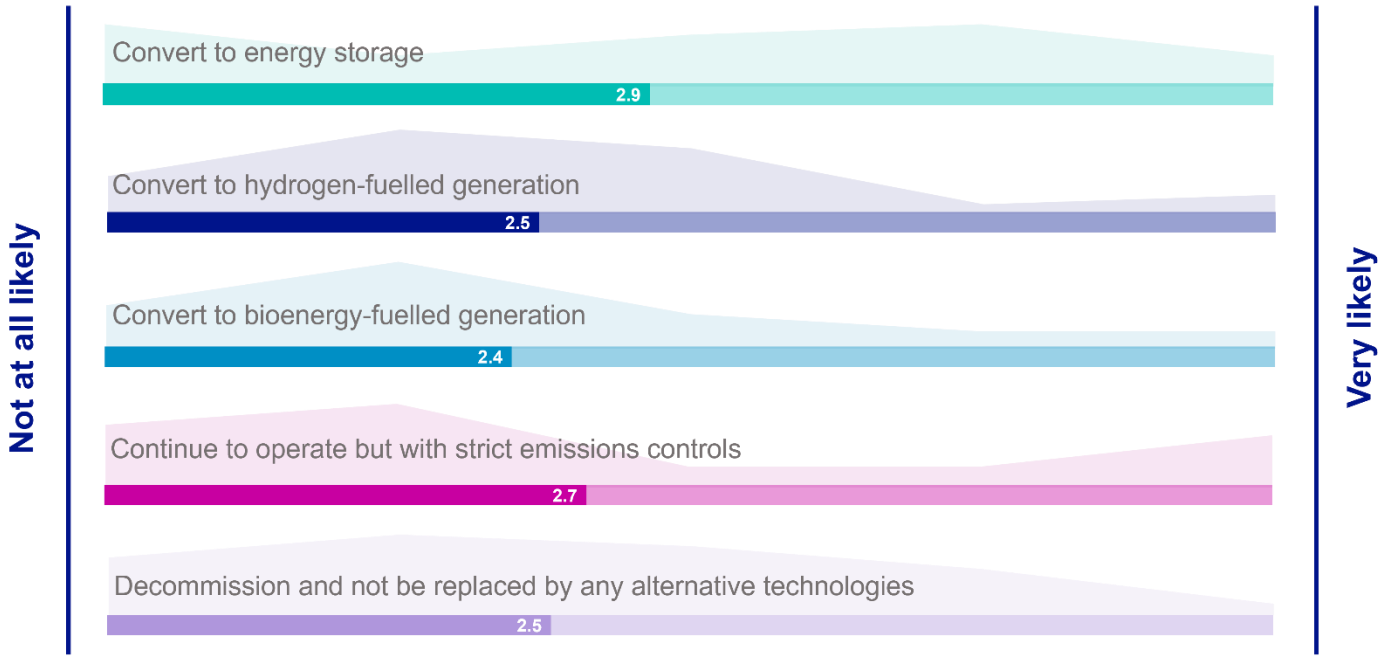

Figure 7 - East Midlands licence area webinar responses regarding the future of gas peaking sites, scored out of 5.

Electric vehicles (EVs) and EV chargers

Stakeholder feedback	Impact on DFES analysis
Stakeholders felt very strongly that the cost of an EV was a significant influence on individuals who are considering buying an EV, as well as access to a driveway or off-street EV charger. Vehicle range was also noted as an influential factor. The influence of neighbours' and friends' choices of cars was noted as not particularly significant.	In the near term, the influence of access to an off-street driveway, and to a lesser extent, affluence, reflects where EVs are likely to connect. In the medium and longer term, the above factors have less of an impact as EV ownership ramps up in all four scenarios.
Stakeholders were split on whether rapid en-route charging hubs or opportunistic charging at car parks and workplaces would be the most popular solution for EV owners without off-street charging. However, stakeholders did not feel local neighbourhood charging hubs would be a popular solution.	We will reflect this uncertainty through variation in the scenarios, assuming a different percentage of energy that will be delivered at rapid en-route charging hubs, car parks and workplaces, as well as local neighbourhood charging hub, in each scenario.
Stakeholders noted the high LV connection costs for local authorities could affect EV charging installations.	We will use the Counterfactual scenario to reflect a future where EV charging installations are slowed by, among other factors, high connection costs and other barriers to deployment.
Stakeholders thought there would be a spread of where electric HGVs would charge, with overnight charging at depots being the most popular. Rapid charging at truck stops and motorway services were the next most popular options.	In the near term, we will allocate more energy at overnight charging at depots, as well as rapid charging at truck stops and motorway services. In the medium and longer term, we will reflect the uncertainty in the future of e-HGV charging, through the range of scenarios.
Stakeholders thought business car and van fleets would most commonly be charged at company depots, followed by en-route using public charge points. Charging at employees' homes via domestic charge points was seen as likely, but did not make up a majority of charging use cases, as shown in Figure 8.	To recognise this uncertainty in where fleet vehicles will charge, we will assume variation across the scenarios in the percentage of fleet energy that will be delivered at depots and public locations.
Stakeholders raised the scale of the challenge of upgrading bus fleets, especially for smaller operators who typically operate in rural areas.	Buses are one of the vehicle types that we consider as part of our EV modelling. We recognise that for more rural areas of NGED's licence areas, the electrification of bus fleets will happen on a different timescale to more urban areas. We will use the rurality of an area to influence the distribution of e-bus

	fleets, with more rural areas seeing a slower uptake of electric bus fleets.
Stakeholders also raised how the decarbonisation of transport will relate to air quality concerns, for example, clean air zones.	We will consider the location of clean air zones and Ultra Low Emission Zones in the modelling of EV and EV charger uptake.
Stakeholders raised the need to think about the visitor economy on the coast and associated demand changes, for example at caravan parks.	We currently include the location of non-domestic properties, such as car parks and holiday parks, in the distribution of EV charging capacity. The expected usage profiles for these chargers are modelled by NGED, who take into account seasonal fluctuations caused by areas with a large visitor/tourist economy.
Several stakeholders referenced the high potential for V2G and V2H.	V2X is included within the scope of DFES, albeit at a high level looking at the proportion of EV chargers that are V2X-enabled. As the use cases and potential uptake of V2G become clearer in the coming years, this will likely expand into a full technology analysis in future DFES assessments.

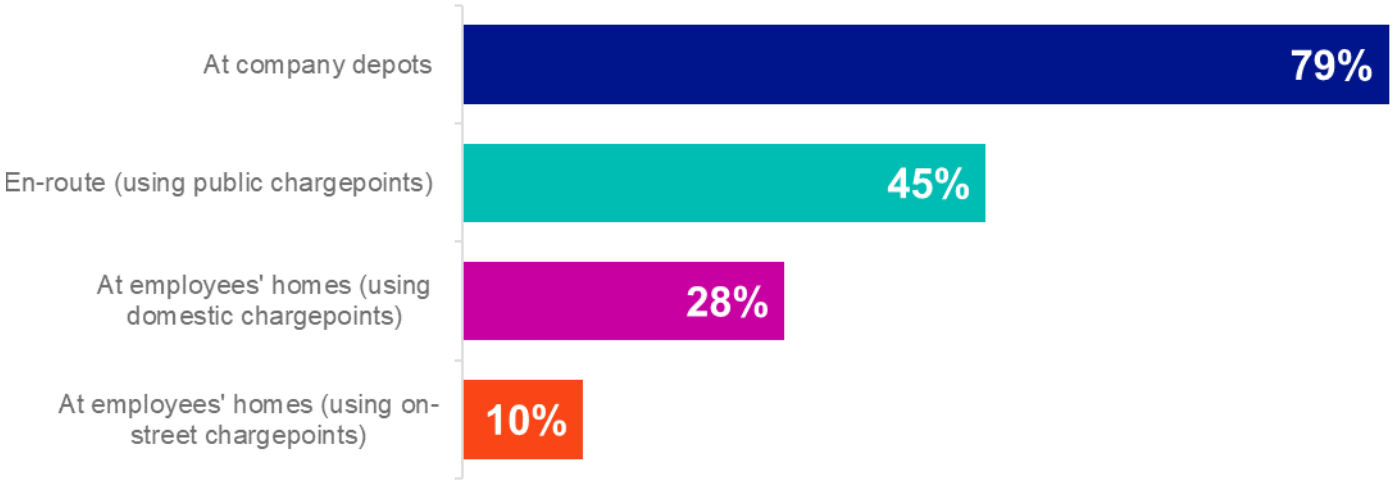

Figure 8 - The future of businesses charging their electric cars and vans by the percentage of respondents in the East Midlands licence area webinar.

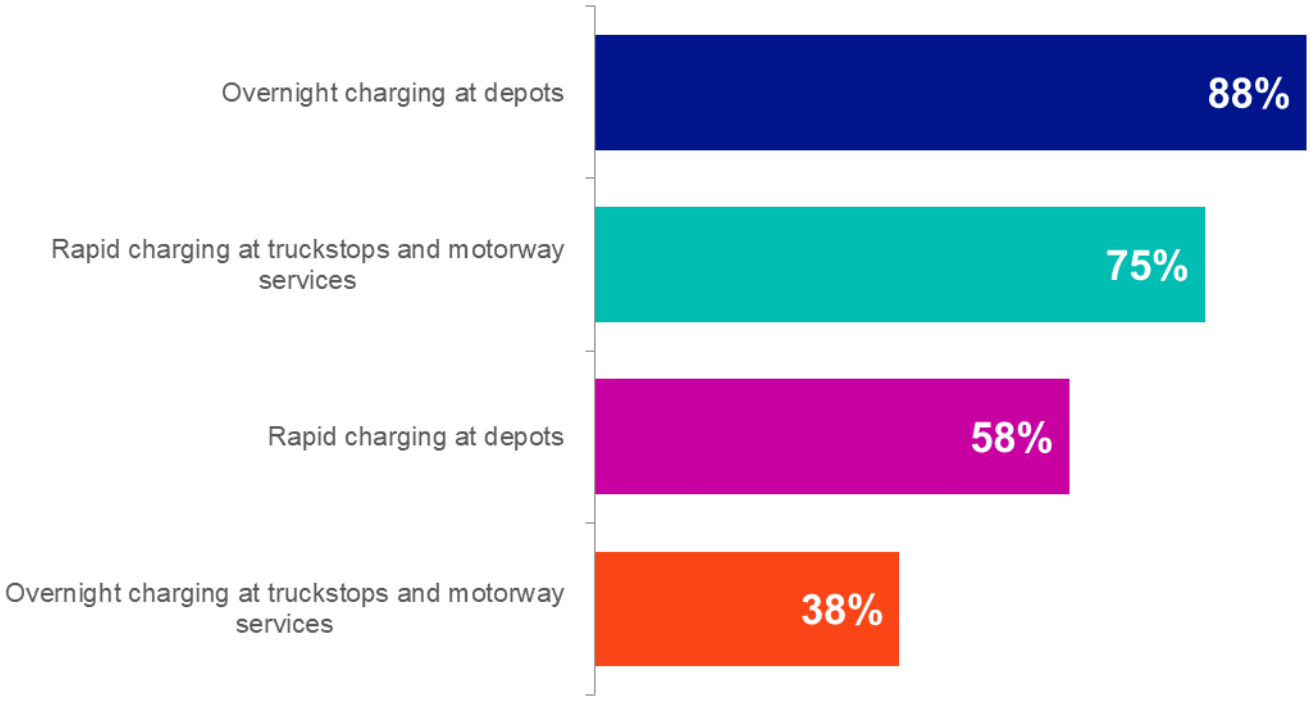

Figure 9 - Percentage of respondents from the East Midlands licence area webinar who thought HGVs would charge at the given locations.

Low-carbon heat

Stakeholder feedback	Impact on DFES analysis
For on-gas households, stakeholders thought that switching to a heat pump would most likely be due to gas boiler bans and emissions limits, as well as reduced running costs. A desire to move away from gas, and the presence of a shared ground source heat pump (GSHP) or heat network were thought of as the least influential factors by stakeholders.	We will directly use these results in the spatial distribution of our heat pump projections for on-gas households, alongside assumptions from the FES around the uptake of hydrogen boilers and the availability of networked hydrogen by region. The net zero scenarios will also reflect the potential ban on gas boiler installations from 2035. The government's decision on hydrogen for domestic heating is set for 2026; ahead of this, the scenarios depict a range of outcomes for decarbonisation of heat.
When asked about the factors impacting the current uptake of heat pumps, stakeholders said that upfront costs, lack of consumer knowledge/confidence, perceived building unsuitability and a disconnect between the property owner and property occupier were all major factors. Conversely, uncertainty over the potential role of hydrogen in heating in the future was not seen as an impactful factor.	We will reflect the above factors in the following ways: • Upfront costs are reflected in the modelling through greater deployment of heat pumps in detached and semi-detached homes and owner-occupied homes, reflecting historic trends. Income or affluence is not used directly as a factor. • Lack of consumer confidence impacts the overall uptake of heat pumps in the near term on a national level, which has been lowered in FES 2024.

	• Building suitability is reflected in the modelling through greater deployment of heat pumps in larger homes, homes with greater ease of energy efficiency implementation (based on construction age) and homes with an existing 'wet' central heating system in the near term. • A disconnect between property ownership and occupation is reflected in the modelling through greater deployment of heat pumps in owner-occupied and socially rented homes compared to private rented homes in the near term. In the medium and longer term, the above factors have less of an impact as heat pump deployment ramps up in all four scenarios. Hydrogen Evolution will be the scenario that reflects a higher uptake of hydrogen-fuelled domestic heating, resulting in a lower uptake of heat pumps and resistive electric heating.
Stakeholders felt that for terraced houses and flats in urban areas, district heat networks and smart electric storage heaters are likely to be the most popular future heat technology solutions, as opposed to hydrogen boilers and standalone air source heat pumps (ASHPs).	We will consider these results in the spatial distribution of heat pumps, weighting areas with lots of flats and terraced housing towards shared ambient loop ground-source heat pumps alongside other solutions including smart electric heating and district heat networks.
Stakeholders thought that new build housing would see the most uptake of heat pumps, followed closely by off-gas homes currently heated by other liquid/solid fossil fuels. Conversely, households in fuel poverty and on-gas houses were likely to have the slowest uptake of heat pumps.	We will directly use these results in the spatial distribution of our heat pump projections, focusing on off-gas fossil fuel heated properties and new builds in the near term and on-gas homes in the longer term.
Several stakeholders noted that heat pump uptake and load profiles depend on consumer acceptance and behaviour, as well as electricity tariffs. They also noted that domestic heat flexibility might have a role to play in a future energy system.	The FES framework allows the DFES to explore a wide range of outcomes for heat pump uptake, much of which is based on national assumptions around consumer acceptance and behaviour. In scenarios with higher levels of heat pump uptake, domestic heat flexibility plays a key role in terms of both the energy system and in terms of making heat pumps an attractive proposition for a large number of consumers.
Retrofit was highlighted as becoming increasingly popular, which could cause a surge in installations of heat pumps.	The scenarios that include a high level of heat pump uptake also assume an accelerated rollout of energy efficiency measures. However, due to recent studies on the suitability of homes for heat pumps, such as from Energy Systems Catapult, the modelling does not assume that a home has to be highly insulated before a heat pump is installed.

One stakeholder noted that rural areas may not have the LV network capacity to enable heat pump uptake.	The DFES modelling aims to be agnostic to network constraints and conditions, to allow the scenario projections to be used to identify areas of the network that may require prioritised investment. In addition to this, Regen models the spatial distribution of domestic heating projections (and other key low carbon technologies) down to low voltage asset level. This will be fed through the secondary system planning process to identify areas requiring investment.
Stakeholders said that anchor loads (e.g. public buildings or business parks) would be the most significant factor in driving the location of future heat networks, followed by local government planning on heat zoning. They also felt that areas of fuel poverty and off-gas areas would influence the location of these networks significantly.	These factors will be directly used in modelling large-scale heat pumps for district heating, alongside the homes and businesses modelled to connect to a district heat network.
Stakeholders noted the location of heat networks will be influenced by the publication of DESNZ's district heat zoning plans. Others commented that the location and scale of heat networks could coincide with centres of industry providing waste heat and new housing developments.	In the net zero scenarios, we assume that a proportion of heat network uptake occurs in new homes driven by large-scale heat pumps. Previous engagement suggests that waste heat will be utilised where possible, but not as the primary heat source or without a backup heat source.
Stakeholders raised the potential uptake of novel high-power heat pumps, as well as mine water heat.	The DFES modelling assumes that a variety of heat pump solutions will be used, including high-temperature heat pumps that require fewer upgrades to homes before installation. Mine water heat is a clear resource across much of NGED's licence areas. The DFES district heat modelling input sources reflect the potential for mine water heat as a heat source.
The possibility of a government decision ruling out support for hydrogen space heating was highlighted as a potential driver for an increase in biomethane gas networks for space heating.	We will consider these heat sources directly in our heat network resource assessment and associated modelling. We currently assume that a higher proportion of rural properties will use non-electric low-carbon heating fuels such as biomass and bio-LPG. We will review the role of biomethane.
Stakeholders did not agree on how the rate of non-domestic heat pump uptake would compare to domestic uptake; stakeholders in the East Midlands thought strongly that non-domestic uptake would be slower than that seen in homes, as shown in Figure 10.	We will reflect a range of outcomes for the adoption of non-domestic heat pumps, using the FES framework to model an accelerated uptake and a slower uptake.

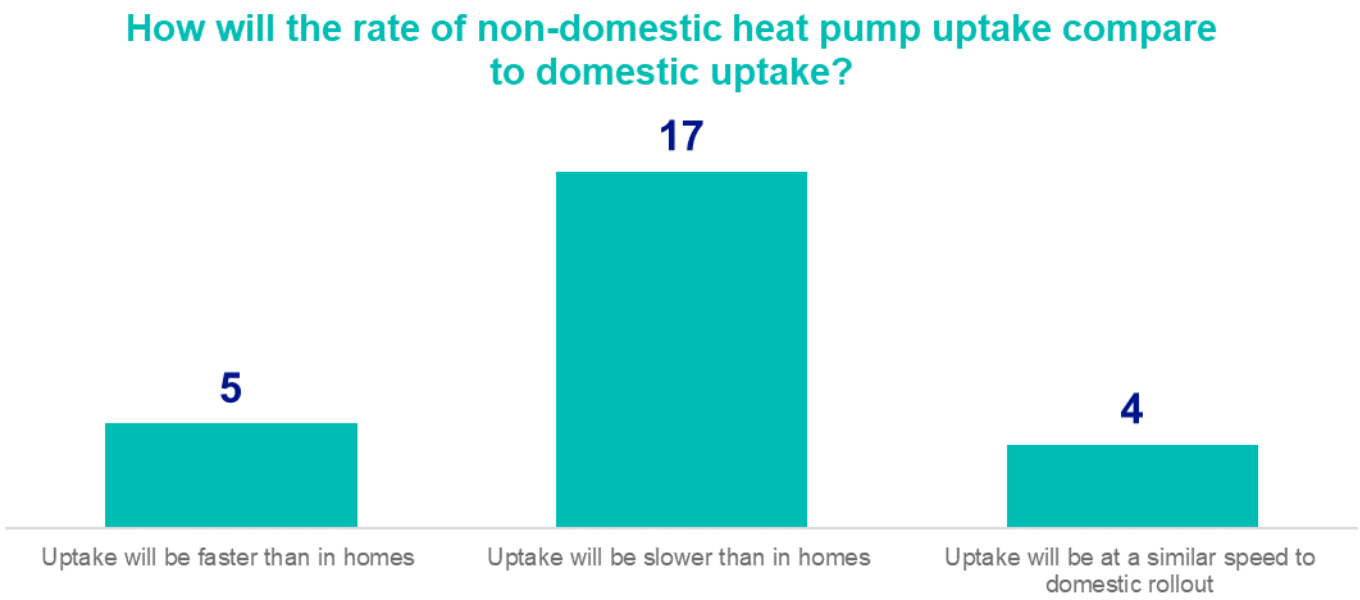

Figure 10 - Responses to the question 'How will the rate of non-domestic heat pump uptake compare to domestic uptake?' in the East Midlands licence area webinar

New sources of demand

This year's DFES analysis includes modelling of decarbonisation of the maritime, aviation, rail and agriculture sectors.

Stakeholder feedback	Impact on DFES analysis
A stakeholder noted that there is currently a lack of credible decarbonisation plans for aviation and agriculture.	As National Grid ESO's FES does not include specific decarbonisation pathways for these sectors, and there is a lack of credible decarbonisation strategies in the public domain, our approach is to base the long-term decarbonisation pathways on the Climate Change Committee's 6th Carbon Budget for these sectors.
Stakeholders in the East Midlands thought that sustainable aviation/maritime fuels were likely to be the predominant approach to drive the decarbonisation of maritime and aviation, followed by liquefied hydrogen/ammonia and HVO. Only 16% of respondents thought battery electrification would be the predominant method of decarbonisation, as shown in Figure 11.	The production of green hydrogen through electrolysis is already modelled in the DFES, and its use for aviation and maritime is considered in this analysis. When modelling the electricity demand from the maritime and aviation sectors, the mix of fuels will be an important factor. A low prioritisation of battery electric vessels/craft will be reflected in the scenarios we develop for these sectors.

It was noted that alternative sources need to be cheaper than traditional methods to make the decarbonisation of the maritime, rail, aviation and agriculture sectors attractive.	We will be engaging with key stakeholders to understand the drivers for change in these sectors in more depth and the potential pathways for decarbonisation. While we have not currently made any firm assumptions, it is worth noting that National Grid ESO's FES does not include specific decarbonisation pathways for these sectors. Our approach is to base the long-term decarbonisation pathway on the Climate Change Committee's 6th Carbon Budget, which will consider broader socio-economic and technical developments around these sectors.
Stakeholders noted that there is a current lack of government direction on hydrogen, particularly for heavy vehicle fleets e.g. tractors and HGVs.	While the scenarios consider multiple roles for hydrogen for transport, this is mainly as a fuel for HGVs. This year's DFES analysis models agricultural transport electrification and will consider the role of hydrogen as an alternative fuel and the current lack of policy clarity.
Stakeholders thought that expanding ports would prioritise innovation and trials of new sustainable marine fuels, as well as scaling up electrical demand for shore power requirements as part of wider decarbonisation.	We will consider the electrical demand from shore power requirements in the DFES modelling for the maritime sector.
Stakeholders said airports will explore offsets as a priority area for decarbonisation, followed by short-term decarbonisation of on-site operations. No stakeholders felt that airports would prioritise replacing ageing aircraft with battery electric propulsion technology.	In the near term, we will focus the DFES modelling on the decarbonisation of airports' on-site operations.
Regarding the decarbonisation of the agriculture sector, stakeholders raised the possibility of HVO and biomethane being more likely for larger tractors, especially where biomethane is produced on-site. Whereas smaller tractors (both in weight and runtime) it was highlighted could convert to batteries.	We will consider the classification and scale of agricultural vehicles and their potential decarbonisation solutions within our analysis.
A stakeholder raised the possibility of electricity demand rising due to an increase in warehouse vertical farms.	This is something we will research further to feed into the DFES modelling for the electrification of the agricultural sector.
It was highlighted that many farmers may hire their farm machinery and vehicles from a plant hire firm or cooperative, rather than owning these outright.	We will consider the location of these plant hire firms or co-operatives in the spatial distribution of EV charging capacity for agricultural vehicles.

A stakeholder raised the possibility that a government decision ruling out support for hydrogen space heating may cause an increase in biomethane gas networks for heavy-duty vehicles.

We will draw on research into the viability of different decarbonisation options for different types of vehicles to identify the scale of electrification in these sectors across the scenarios.

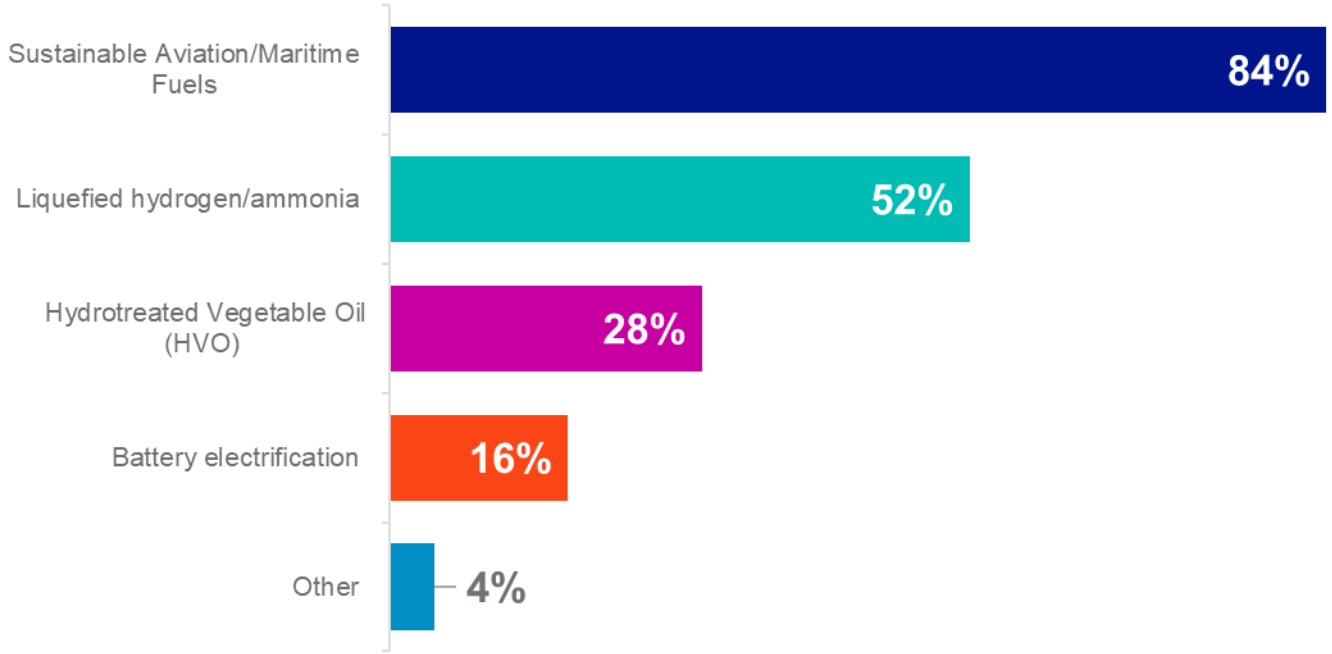

Figure 11 - The future predominant fuels used in the decarbonisation of maritime and aviation by percentage of respondents in the East Midlands licence area webinar

Audience Q&A

The following tables present the questions submitted by stakeholders during the webinars for all four licence areas, categorised by theme, and the answers provided by Regen and NGED.

Local Area Energy Plans (LAEPs)

Stakeholder questions	Our response
How does the renewables pipeline compare to the targets now established through the LAEPs?	The pipeline of renewable energy generation projects provided from NGED connections data is directly used to inform the DFES projections. These projections are then compared with targets from published LAEPs. If the LAEP targets are outside of the modelling envelope, we will consider some adjustments that may be required to reflect local authority ambition. It may be the case that the numbers do not align due to difference in scope between a LAEP and the DFES (e.g. LAEPs not including sites larger than 100 MW, which may be included in the DFES or the DFES not including transmission or IDNO-connected generators if they do not connect to NGED's network)
How best can DSO and local authority plans be made compatible? Should this be a role for LAEPs/RESPs?	It is important that the DNOs support the development of LAEPs, however, they are ultimately led by local authorities. They act as the best example of regional ambition and a regional decarbonisation pathway that has been signed on to by the local authority, stakeholders and citizens within the region. By taking the information from these LAEPs, supplementing it with DNO data and insight and incorporating this into the DFES, National Grid ensures that any investment decisions are future-proofed and stakeholder-informed. National Grid Electricity Distribution is closely engaging with local authorities about their LAEP plans, via its Strategic Engagement Officers. To be able to continue to evolve the approach for incorporating LAEPs into the DFES analysis, increasingly granular data is needed from local authorities. This will enable the analysis to not only consolidate the DFES draft projections with specific local authority target years, but be able to do a side-by-side comparison with local authority pathways.
Interesting to hear about the role with LAEPs - does that disadvantage any LAs who don't have an LAEP	The method that has been developed to recognise and reflect local characteristics and ambition is not reliant on the publication of LAEPs. However, they enable an additional evaluation to be conducted, fine-tuning the DFES projections by comparing them to a data-driven and regionally-informed view of local plans. Local authority ambition is already reflected in the DFES through other modelling factors, as well as LAEPs.
The policies & ambitions of the East Midlands mayor are going to be	National Grid's Strategic Engagement Officer for the East Midlands, Sharon McGuffie, has engaged with all of the local

important in shaping energy in our region. What engagement is currently taking place with the EMCCA?	authorities in the East Midlands over the last year. In addition, Sharon is engaging with the D2N2 LEP which is now part of the East Midlands Combined Authority.

Network capacity and reinforcements

Stakeholder questions	Our response
Where is data on the total capacity of network substations available? How accurate is the demand headroom provided in the NDP dataset when advising clients on where headroom might be available to connect?	National Grid's network capacity map looks at the amount of demand and generation capacity available at each substation on the primary network. National Grid is working to ensure that the map is more regularly updated and shows more granular data. The Headroom report from the NDP is generated once a year and as such is a snapshot in time, so would not be able to guarantee capacity but may be a helpful indicator. If you have a particular connection in mind, please organise a free connections surgery through National Grid's website.
Will the whole LV network eventually need reinforcing to enable net zero?	There is a lot of latent capacity in the network, in particular at the low voltage and distribution transformer boundary. Approximately 60% of National Grid's c. 200,000 distribution transformers already have enough capacity to serve a decarbonised energy system and so will not need to be reinforced before 2050.
In the net zero transition, is the DNO's focus on balancing demand and storage at the low voltage level, or towards major grid upgrades?	In order to meet net zero, National Grid is seeing the need for both traditional reinforcement and flexibility services. Although the webinar did highlight how DFES is used to identify the need for reinforcement, it is also very much used to identify areas suitable for flexible solutions. If you would like to learn more about how National Grid is continuing to develop its flexibility capability, please read the DSO Strategic Action Plan, which also details the innovation projects underway in this space.
It would be interesting to see a scenario that models a national policy to deliver demand reduction. Can the DNO implement usage limits to achieve net zero faster and manage demands on the grid?	Future energy consumption is expected to increase significantly in the transition to net zero. Demand reduction and tariff-led approaches will be able to shift energy consumption away from certain time periods, where co-located with generation this can reduce demand. When planning the distribution network we need to account for the credible worst-case network utilisation conditions, which could be for periods where high consumption is required without the available generation, which is the network capability we need to design our network to. National Grid is exploring developing our assumptions around this in two ways: greater visibility of demand and utilising flexibility. National Grid currently only has visibility of half-hourly consumption profiles at c.2% of its local distribution substations. Smart meters have helped DNOs and ESO to

	better understand the utilisation of the networks, allowing them to move away from some historic assumptions of how customers use electricity at different times of the day and year. Utilising demand reduction and the inherent flexibility of customers will be key as a mechanism for DNOs to avoid or defer the need for traditional build solutions. This is an option that is always considered by National Grid through its flexibility-first approach to investment.
Does moving to a more active approach to network reinforcement mean that the costs of reinforcement will tend to be socialised rather than paid by the new connection operator?	This element of the load-related expenditure of DNOs (spending money to increase the capacity of our network) is funded through Distribution Use of System charges and therefore socialised across all bill payers within a licence area. In addition to this, recent changes have been introduced by Ofgem in April 2023, known as the Access and Forward Looking Charges: Significant Code Review. These reforms have changed how reinforcement driven through customer connection requests is funded, which also socialises a greater proportion of the costs through bill payers.
Do we need to reform Ofgem to make the changes required to enable DNOs/DSOs make net zero by 2030 more achievable?	Ofgem has introduced changes for the current price control period to make things more agile for DNOs to help keep pace with changing policy and connection requests. For reinforcing secondary networks, the 'volume driver' mechanism allows DNOs to request additional funding from Ofgem if the demand for connections is higher than anticipated and the DNO can show it is delivering necessary infrastructure at a reasonable cost.
What can be done to urgently address the issue that council's net zero targets are becoming more difficult to achieve due to energy infrastructure timelines?	We are committed to supporting our customers in their transition to net zero and are doing this through multiple routes: 1. We are currently making a lot of changes in the connections reform space to help speed up the timeline in which generation projects can connect. We held a connections reform webinar on this topic on the 27th June. 2. We are continuing to ask that council's provide us with their plans such that we can include them within our DFES forecasting, and are targeting hard-to-engage councils or councils with lower response rates to ensure we are able to include the most recent plans from these councils in our DFES. Through these plans being incorporated within DFES, we are able to proactively invest in our network to support connections onto our network as our customers decarbonise.
Have you compared your plans with Ireland? They have a national	We are working closely with Ofgem as the role of the Regional Energy Strategic Planners continues to develop, and

decarbonisation plan that the electricity supply plans fit within. They are upgrading LV from 11 kV to 22 kV with fast changeover of standard package transformers in just a few days.	anticipate that DNO Network Development Plans and Price Control Business Plans will be a key part of the decarbonisation plans within the UK. There are areas of our HV network that we will be increasing the voltage of to support local decarbonisation. We were able to start fine tuning the optimal date for these works to be carried out following the network impact assessment stage of our strategic investment process. This activity is something we have been preparing for many years through strategically installing assets that are able to be changed over quickly and with minimal disruption.
Has there been a reduction in demand due to the cost of living crisis, and if so when do you model that reduction bouncing back to pre-crisis levels?	Annual energy consumption did decline significantly during COVID and has been slowly returning to normal levels in the years since. It is more difficult to see the effects of the cost of living crisis, however with more customers now on the network and energy consumption similar to previous years, it may be likely that individual households' energy consumption has decreased. However, peak demand – when stress on the network is highest – has not decreased in recent years and is increasingly becoming decoupled from energy consumption patterns. As this is the period for which the electricity networks are designed to cope, the reduction in energy consumption from COVID and the cost of living crisis does not have as much impact on how the distribution network needs to be sized as may be expected.
For extracting the technology uptake within the DFES areas, can you comment on a modelling approach for averaging out the 4 scenarios to come up with an average singular year on year uptake of the technology categories?	While the DFES benefits from modelling four scenarios, National Grid requires one single view to enable it to plan its investment and present its business plan to Ofgem. This is called the 'Best View' scenario. The 'Best View' is created for different technologies based on a range of inputs, including external policy factors (e.g. upstream transmission constraints), current uptake of technologies within that local authority and engagement with local authorities. Local authorities are then assigned a 'Best View' scenario which aligns with one of the four DFES scenarios. National Grid's Strategic Engagement Officers will be engaging with stakeholders in each local authority on this process for DFES 2024.

DFES modelling assumptions

Stakeholder questions	Our response
When evaluating potential locations for EV charging hubs, how might the favouring of sites with current grid capacity skew forecasting? Is there an up-to-date energy capacity tool that	The pipeline of new EV charging hubs is considered in the DFES analysis but future projections of EV charging are made based on a number of other data sources, including OS Addressbase data. The projected volume of EV chargers is also compared with the stock of EVs projected to ensure that

can handle multiple requests in the same location?	the DFES does not over- or under-forecast EV charger capacity. In addition to the above, we have a budget estimate tool, which can be used to get a rough idea of connection costs before submitting your application. NGED are also continuing to explore the use case of a whole systems digital planning tool to bring in plans from local authorities such as EV chargepoint roll out. More information on this can be found on the PRIDE project pages.
What assumptions have you made about the decarbonisation of the agricultural sector?	Agriculture is a new technology sector for DFES 2024. We will be engaging with key stakeholders to understand the agricultural sector in more depth and the potential pathways for decarbonisation and specifically electrification. While we have not currently made any firm assumptions, it is worth noting that National Grid ESO's FES does not include agricultural decarbonisation. Our working assumption is to base the long-term agricultural decarbonisation pathway on the Climate Change Committee's 6th Carbon Budget.
With the creation of NESO, how do you plan to incorporate a whole system planning approach to deliver value for consumers?	While the DFES focuses on the electricity distribution network, any look into the future has to be a whole systems view for it to be credible. By working in the framework of the four FES scenarios, the DFES already includes a cross-vector view of net zero. Going forward, with the creation of NESO and RESPs, the DFES would be able to interact with more whole-systems regional energy pathways, providing a more regionally-informed view. DFES can then continue to fulfil its role of forecasting future load to inform network solutions.
Does the DFES look at other forms of energy storage, as well as batteries? Current battery installations are for short-term local balancing, not long-term energy storage solutions. How does this factor into the DFES?	Currently, the DFES focuses on battery storage projects, categorised as either co-located, grid services, high energy users or domestic batteries, because these dominate the GW-scale pipeline of new electricity loads looking to use National Grid's distribution network. However, we are aware of the potential of long duration energy storage and other types of energy storage in the future of the energy system. For example, the government's Longer Duration Energy Storage Demonstration (LODES) competition, which provided over £69 million of capital funding to 32 projects across a range of technologies, including high-density hydro (HDH), compressed air energy storage (CAES) and pumped thermal energy storage (PTES). Many of these are still in the pre-commercial stage and may even be transmission-connected in the future due to their scale. We will continue to monitor any new projects of different energy storage types that seek to connect to the distribution network in the future.
Have you considered additional demand on cold winter days for houses with heat pumps using extra	The DFES domestic heat analysis considers a number of heat pump sub-technologies, including hybrid heat pumps (heat pumps coupled with a boiler backup) and heat pumps coupled with thermal storage, such as a hot water cylinder or a phase

heaters where heat pumps may struggle?	change material-based 'heat battery'. These are projected in households where heating load is less likely to be met by a heat pump alone. The demand assumptions for a heat pump on NGED's network have been developed through assessing the most onerous conditions that our network would see, in this case, we look at a cold winter's day and the heating demand associated with this. This has been developed through analysing data from innovation projects and literature reviews are refreshed on an annual basis. For DFES 2024 we will be particularly using the findings from DESNZ's Electrification of Heat Demonstration Project to inform any changes to our assumptions. Energy Systems Catapult's interim findings indicate that there have been recent advancements in the performance of heat pumps in cold conditions.
Has there been any modelling of future electricity market reform? For example, scenarios where it is no longer tied to gas prices, or where non-commodity charges (carbon, social value) are re-allocated to gas.	The FES scenario framework that the DFES projections are developed within include a number of systemic, societal and economic assumptions about the future of the UK energy system. These assumptions include considerations around the depth and speed of market reform and the economic perspective of the net zero energy transition. The FES 2024 framework is due to be published in July 2024. NGED and Regen will be reviewing and digesting the new scenario framework and the assumptions that underpin each scenario to inform the DFES future uptake trends for each technology building block in scope.
Does the DFES take into consideration constraints around the physical network for predicting technology uptake trends? As an example, DFES model the residential installation of EV chargers, heat pumps, overall increasing the residential electricity demand. In this case does this modelling take into consideration the physical constraints of the houses, which would prevent you from installing and operating these technologies?	In terms of network constraints, the DFES analysis intentionally does not reflect distribution network constraints. This is to ensure that the DFES projections reflect future demand and inform where the NGED network is likely to require upgrades or management. In terms of physical constraints, each DFES models considers physical constraints where our analysis and stakeholder engagement suggest they impact uptake. For example, our domestic EV charger modelling accounts for the likelihood of homes across the NGED licence areas having off-street or on-street parking, which is directly reflected in the types of EV charger projected in each area. Similarly, our domestic heat modelling accounts for the suitability of different heating solutions in different types of homes. For example, we project smaller flats and terraced homes to be more likely to be heated by storage heaters and heat networks, and that larger semi-detached and detached homes are more likely to include more space-intensive technologies, like heat pumps with thermal storage or standalone ground-source heat pumps. Physical constraints are even considered in larger-scale technologies. For example, our solar PV and onshore wind resource assessments account for land slope angle and

	gradient, agricultural land classification, waterbodies and windspeed, among other factors.

New generation and demand connections

Stakeholder questions	Our response
Is information recorded on the potential generation sites that do not get a connection agreement?	As part of National Grid's licence obligation to not prevent, restrict or distort competition in the generation of electricity, it is their duty to collect this data and ensure it is available to customers where appropriate. This is published in the form of the Embedded Capacity Register. However, a lot of sites fall away between application and acceptance (approximately 90%) and are therefore not included in the DFES analysis. For sites looking to connect below 950 kW does not require National Grid to notify NESO of the status of the queue. That limit is set such that the queue can be managed and the system can be operated and maintained within its technical limits.
Is there a role for National Grid in managing unrealistic expectations of new housing developments in the planning system?	National Grid's role is to serve the needs of our customers, and so the answer to this is largely no. If there is historic evidence of underperforming in building out proposed developments compared to the ambitions of a local authority, this is incorporated within the forecast values and reflected across the different DFES scenarios.
Could the Reserved Developer Capacity (RDC) limit of 1 MW in respect to embedded generation projects be increased to 5 MW to help community projects?	The Statement of Works process is designed to ensure that the national electricity system is able to operate within its technical limits. If the capping of generation schemes under 1MW not needing to go through the SoW process were to be increased to 5MW, this could mean the system is no longer operating within its technical limits, which could result in system imbalance and an inability to operate the system safely. A proposal to increase this threshold to reduce the number of projects needing to pass through the Transmission Impact Assessment was reviewed in March 2024; however, due to the volume of generators that are requesting to connect in the 1–<10 MW range, neither NGET or NGESO supported the proposal.

Thank you

We would like to thank everyone who attended our webinar sessions and shared their views with us. If you have any questions about this report, please contact us at: nged.energyplanning@nationalgrid.co.uk

nationalgrid DSO