

Shaping our energy future: Distribution network future energy scenarios

- Briefing document for attendees -

Background

Regen has been working with the team at Scottish and Southern Electricity Networks (SSEN) since 2018 to deliver Distribution Network Future Energy Scenario (DFES) assessments for the electricity distribution networks in the North of Scotland and Southern Central England licence areas.

Our DFES work supports SSEN's future forecasting, network analysis and investment planning processes.

These annual DFES studies use the overarching scenario framework of the National Grid ESO's [Future Energy Scenarios](#), but seek to develop bottom-up, local evidence-led projections that reflect the unique characteristics of SSEN's network regions.

The scenario projections model the potential increase of key electricity generation, storage and demand capacity that has connected, or will connect, to SSEN's network in the period out to 2050. Essentially, the DFES process helps SSEN to understand:

- **What** technologies will connect/disconnect from their network out to 2050
- **How much** installed capacity of each technology will connect
- **When** this capacity will come online and begin supplying/consuming electricity
- **Where** across SSEN's licence areas these technologies could potentially connect

SSEN uses the DFES projections to analyse potential impacts on the distribution network. This provides an evidence base to support SSEN's network reinforcement and investment planning, as well as to identify opportunities for the use of non-network solutions such as flexibility.

Previous iterations of SSEN's DFES analysis can be found online via the links below.

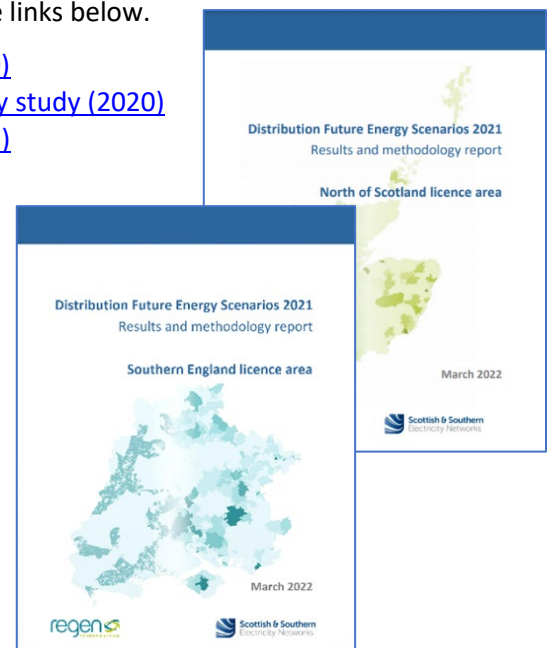
- [Southern England DFES \(2020\)](#) | [North of Scotland DFES \(2020\)](#)
- [North of Scotland & Southern England Low Carbon Technology study \(2020\)](#)
- [Southern England DFES \(2021\)](#) | [North of Scotland DFES \(2021\)](#)

For key low carbon technologies, a more detailed, granular, analysis was completed as part of the DFES 2021 assessment, producing 'street level' future scenario projections for electric vehicles (EVs), EV chargers, heat pumps, rooftop solar and domestic battery storage. However, Regen will be modelling all technologies in-scope to 11kV level for the 2022 DFES analysis.

2022 DFES project overview

The DFES 2022 study will again look at the growth of electricity generation and storage and the projections for low carbon technologies, with an extended view out to 2050. The DFES will also be conducted in the context of the net zero commitments made by the UK and Scottish governments, as well as broader energy policy updates across 2022.

Both the 2020 and 2021 DFES assessments fed into [SSEN's business plan](#) submission for investment in the next RIIO (ED2) price control period of 2023 to 2028. Stakeholder engagement will be as crucial as ever to inform this year's analysis in the context of energy security challenges, cost-of-living crisis and political upheaval in the wake of Brexit, the COVID-19 pandemic and the war in Ukraine.



There is an ongoing need for electricity network operators to demonstrate to customers and stakeholders that they are delivering a network that meets a variety of economic and societal objectives, including the UK's net zero greenhouse gas emissions target.

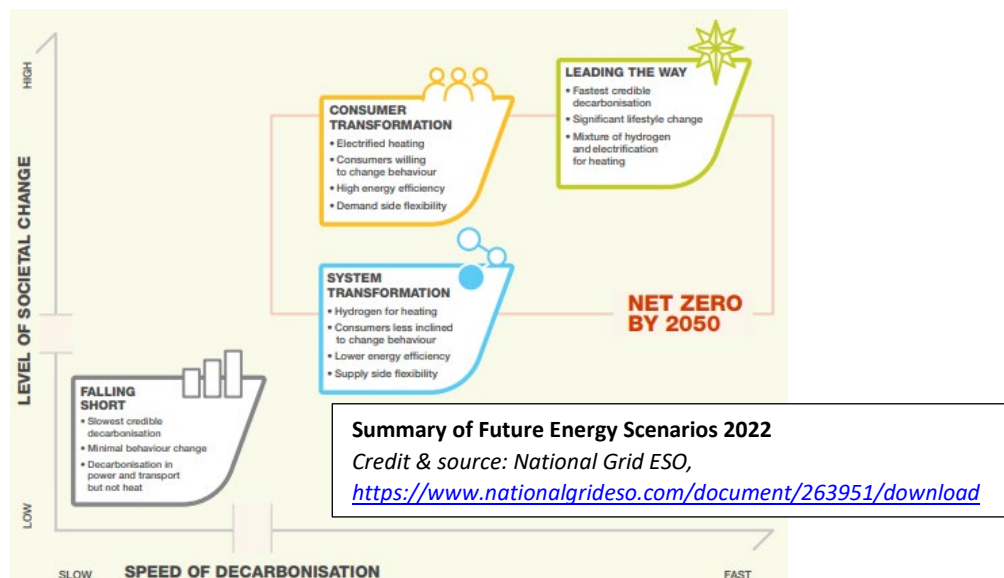
Despite concerns of reduced development off the back of COVID-19 and a cost-of-living crisis, [SSEN responded](#) to Ofgem's RIIO-ED2 Draft Determination consultation, highlighting evidence of sector growth and the need for SSEN to play their part in protecting consumer bills and energy security while not being a barrier to net zero commitments.

Regen worked closely with SSEN across July to September 2022 to undertake a near term growth review that supported this response, highlighting evidence of developers' ongoing appetite for grid connections for new solar, wind and battery storage projects as well as low carbon technology uptake, across both of SSEN's licence areas. These reports are available online:

- [SSEN 2022 Near Term Growth Review – North of Scotland Licence Area](#)
- [SSEN 2022 Near Term Growth Review – Southern England Licence Area](#)

Use of the national future energy scenarios framework

The project will be using National Grid ESO's 2022 edition of their [Future Energy Scenarios](#) (FES), as the underlying framework that the DFES will be based upon.



The FES 2022 proposes four scenarios that are mapped against two national progress axes: **Speed of Decarbonisation** and **Level of Societal Change**. Three of the four scenarios proposed, **Leading the Way**, **Consumer Transformation** and **System Transformation**, are consistent with achieving net zero carbon emissions by 2050, while only one, **Falling short**, does not achieve net zero by 2050.

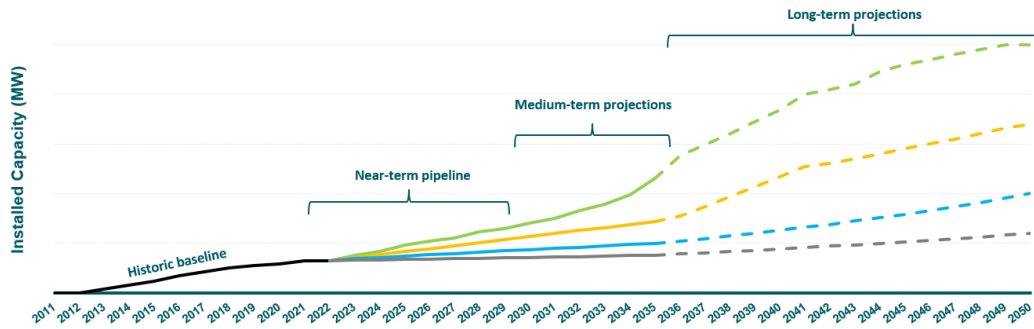
Use of these national scenarios provides a common framework of future 'worlds' to draw from and an overarching set of national societal and economic assumptions to reconcile. However, the DFES analysis provides an opportunity to develop a more detailed set of regional scenarios that are produced through a bottom up process of regional data gathering, investigation of prospective project developments, energy system analysis and local stakeholder engagement. The webinars will be a key part of that process.

Scenario forecasting method

At its heart, the assessments follow a method of four key analysis stages, which, for each of the energy technologies in scope:

1. Determines the **existing baseline** position (e.g. how much is connected now)
2. Assesses the **near-term pipeline** (e.g. what known projects or developments are in the area)

3. Develops **medium and long term projections** (e.g. what might happen out to 2050)
4. **Geographically distributes** these technologies/capacities (e.g. where will they be located)



Energy technologies in scope

The project aligns closely to the Energy Networks Association’s [Open Networks ‘building block’ technologies](#) for DFES assessments, which identifies all major ‘grid scale’ electricity generation and storage technologies connecting to the distribution network, and key low carbon technologies (LCTs) connecting at lower voltages, including those at domestic level. In summary, the technologies that are being assessed in the DFES are shown below:

DFES Generation & Storage Technologies		Low Carbon and Demand Technologies	
Category	Technology (distribution network only)	Category	Technology
Renewable energy technologies	Ground mount solar PV (>1MW)	Electric vehicles	BEV buses & coaches
	Commercial rooftop solar PV (10kW-1MW)		BEV cars
	Domestic rooftop solar PV (<10kW)		PHEV cars
	Onshore wind (>1MW)		BEV heavy goods vehicles
	Onshore wind (<1MW)		BEV light goods vehicles
	Offshore wind		PHEV light goods vehicles
	Hydropower		BEV motorbikes
	Geothermal	Electric vehicle chargers	Domestic off-street chargers
	Marine technologies		Domestic on-street chargers
	Hydrogen peaking generation		Workplace chargers
	Hydrogen electrolyzers		Fleet/depot chargers
	En-route/local charging stations		
Renewable generation - waste technologies	Anaerobic digestion	Destination chargers	
	Biomass CHP	Car park chargers	
	Landfill gas	Heating technologies	Domestic pure electric heat pumps
	Sewage gas		Domestic hybrid heat pumps
	Energy from Waste		Domestic direct electric heaters
	Advanced Conversion Technologies		Non-domestic pure electric heat pumps
Diesel (excluding ‘back-up only’)	Non-domestic hybrid heat pumps		
Natural gas Closed Cycle Gas Turbines (CCGT)	Non-domestic direct electric heaters		
Natural gas Open Cycle Gas Turbines (OCGT)	Rooftop solar PV	Domestic	
Natural gas reciprocating engines		Disruptive sources of demand	Hydrogen electrolyzers
Natural gas Combined Heat & Power (CHPs)	Battery storage – Standalone grid services		Commercial scale data centres
Electricity storage technologies	Battery storage – Generation co-location		
	Battery storage – Behind-the-meter high energy user		
	Battery storage – Domestic batteries		
	Pumped hydro		

Project team and contact

Regen and SSEN welcome your input at this stakeholder workshop, and at any time during the project.

If you have any questions relating to this overview document or about the DFES elements of the event, please contact **Tamsyn Lonsdale-Smith**, Energy Analyst at Regen on tjonsdalesmith@regen.co.uk.

If you have any questions relating to accessing the webinar, please contact **Emma Madray**, Events Manager at Regen on emadray@regen.co.uk.

Lastly if you would like to speak to someone at SSEN regarding DFES or wider future network issues, please contact: **Steve Atkins**, DSO Transition Manager, steve.atkins@sse.com