

**Electricity
Distribution**

DSO Electricity Futures Autumn Conference

**System Planning: ensuring
we can power our future**

21 October 2025

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Elizabeth Hanger

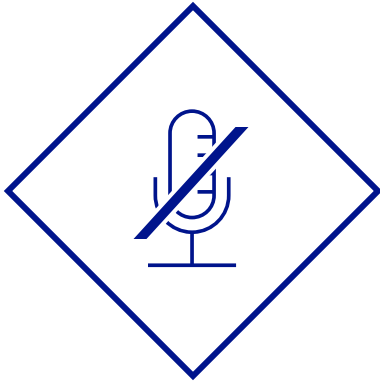
Strategic Engagement Officer
Distribution System Operator

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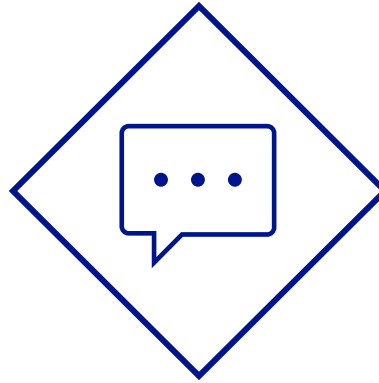
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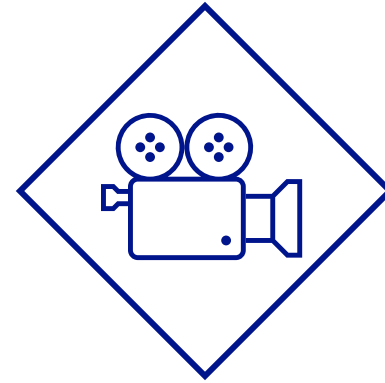
Housekeeping



**Please make sure your
microphone is muted
when not speaking**



**For questions or feedback,
please raise your hand or
use the Q&A/chat box**



**We are recording this
session for sharing with our
stakeholders**

Agenda



10.00 Welcome, housekeeping and session outline
Elizabeth Hanger, Strategic Engagement Officer (East Midlands)



10:05 Our System Planning process
Oli Spink, Head of System Planning



10:10 Our Distribution Future Energy Scenarios (DFES)
Malachi Moses-Gair, DSO Engineer



10:20 Network Development Plans
Jonathan Bluff, DSO Engineer



10:30 Distribution Network Options Assessment
Peter Gaskin, DSO Engineer



10:35 Q&A
Elizabeth Hanger, Strategic Engagement Officer (E Mids)



Getting to know you

It's important for us to understand your needs and how we support your involvement in system planning.

How familiar are you with our system planning work?



How often do you engage with the system planning team?



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Our system planning process

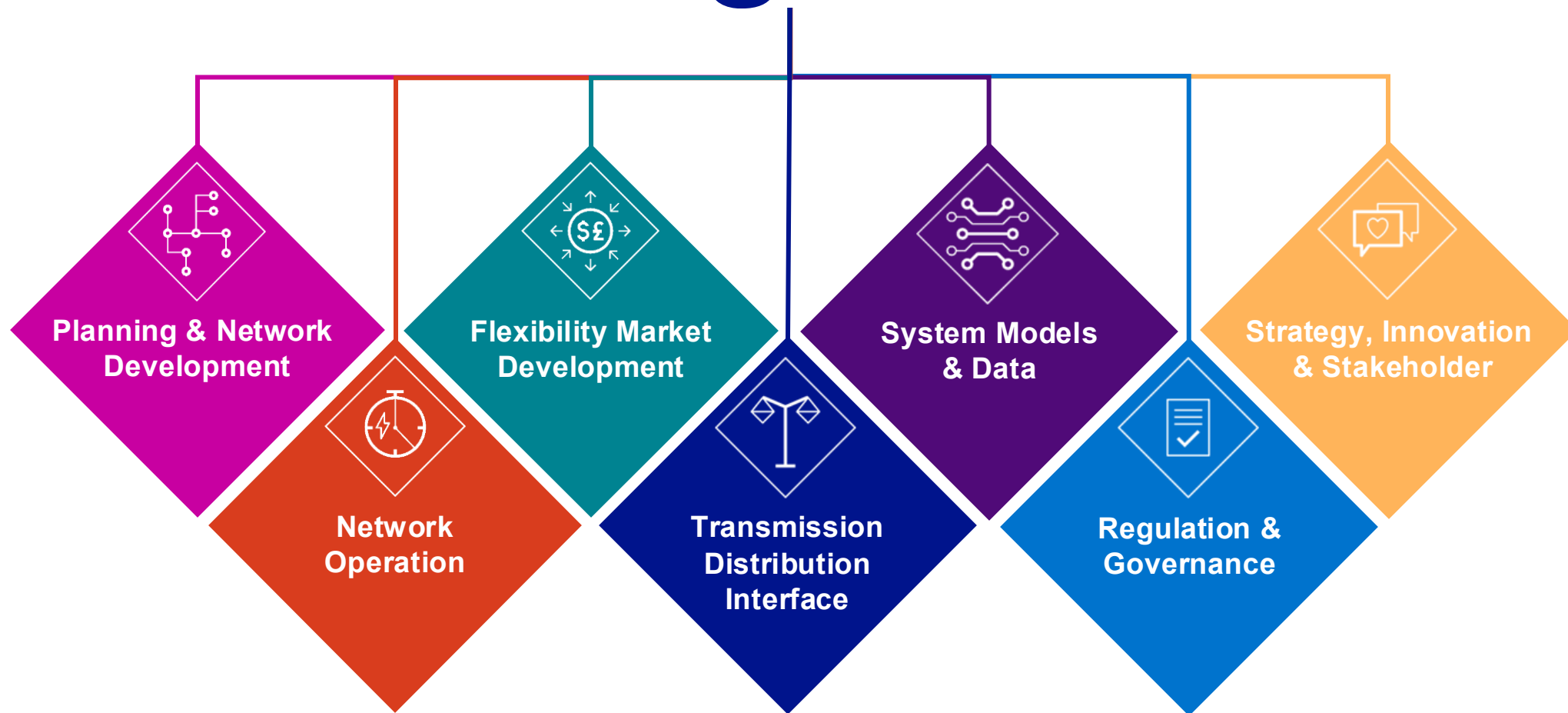
Oli Spink

Head of System Planning

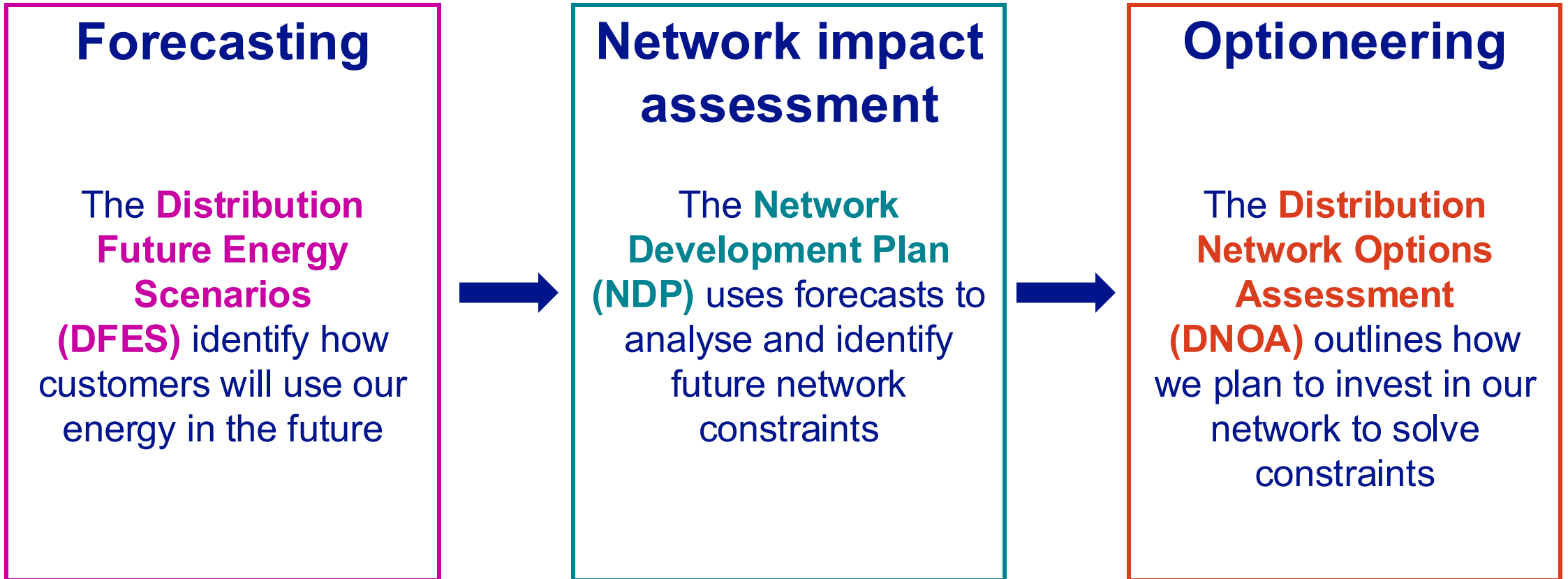
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System planning process



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Distribution Future Energy Scenarios (DFES)

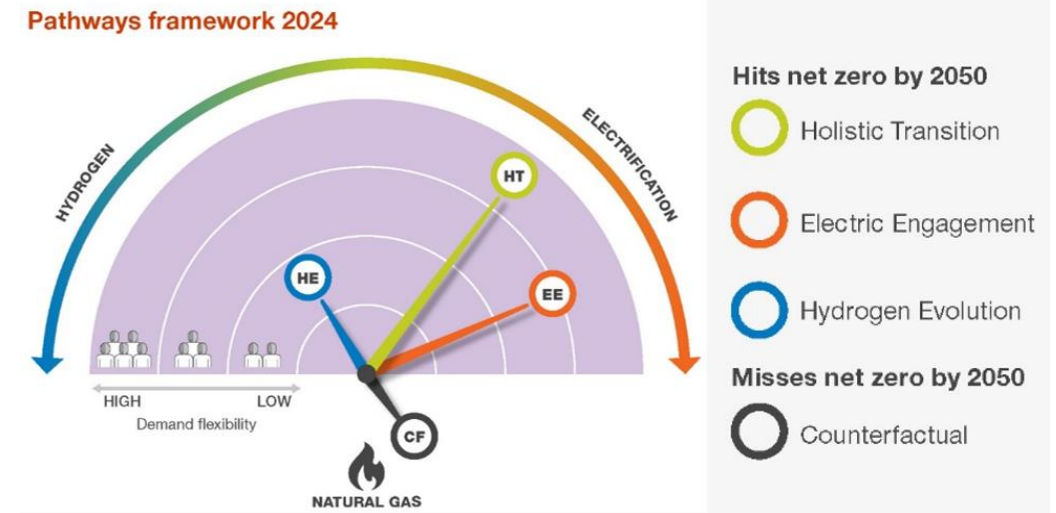
Malachi Moses-Gair
DSO Engineer, System Planning

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Distribution Future Energy Scenarios

- The DFES outlines the range of credible futures for the growth of the distribution network. We began producing it in 2015.
- DFES encompass the growth of demand, storage and distributed generation including technologies such as electric vehicles, batteries, and solar.
- The National Energy System Operator's (NESO's) Future Energy Scenarios (FES) provide the overarching framework.
- DFES is the first stage of our strategic investment process ensuring our network is ready for a decarbonised future.



DFES Methodology

Distribution-connected electricity generation

Renewable and low carbon

- Onshore and offshore wind
- Ground-mounted and rooftop solar PV
- Hydropower
- Marine

Fossil fuels and waste

- Biomass CHP
- Renewable engines (anaerobic digestion, landfill gas and sewage gas)
- Energy from waste
- Diesel generation
- Gas fired power

Distribution-connected energy storage

- Large-scale battery storage
- Non-battery storage, such as LAES and High-Density Pumped Hydro
- Domestic battery storage
- Domestic thermal storage (w/ heat pumps)

Large-scale electricity demand

New conventional demand

- New housing developments
- New non-domestic developments
- Data centres

Low carbon demand

- Hydrogen electrolyzers

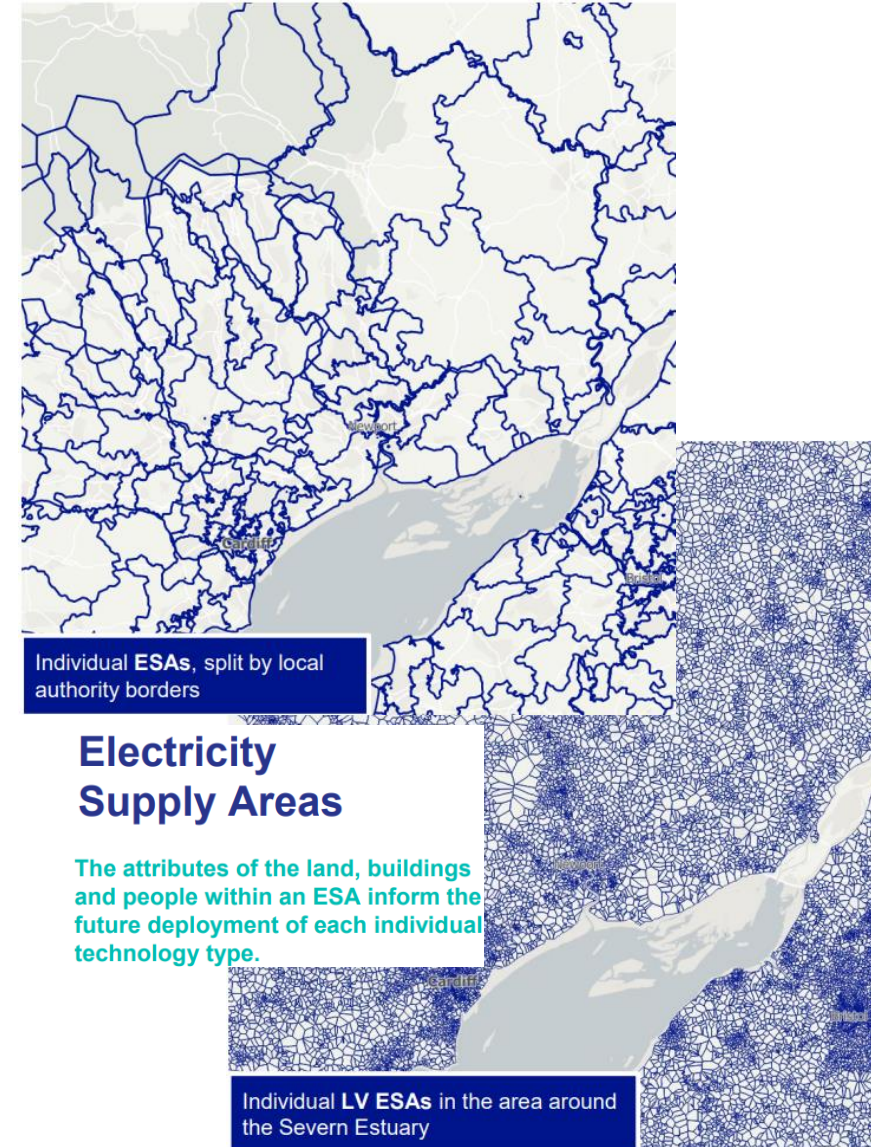
Small-scale new electricity demand

Low carbon heat

- Heat pumps (all types)
- Direct electric heating
- Domestic air conditioners

Low carbon transport

- Electric cars and motorcycles
- Electric LGVs
- Electric HGVs
- Electric buses and coaches
- Domestic EV chargers
- Non-domestic EV chargers



Baseline

Pipeline

Projections

Spatial Distribution

Stakeholder Engagement

Licence area specific
engagement webinars

New developments data
exchange

Local energy strategy survey
and data share

Industrial cluster engagement

Major energy user engagement

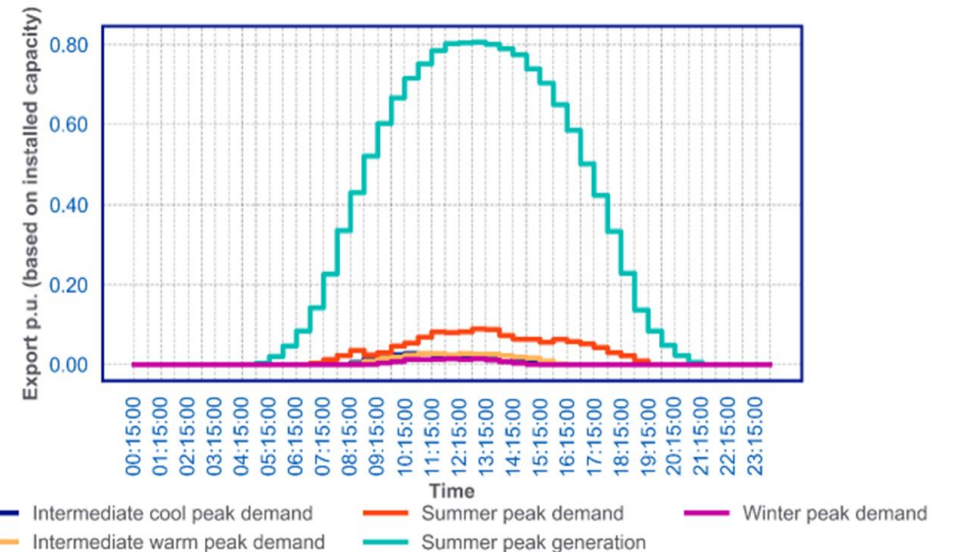
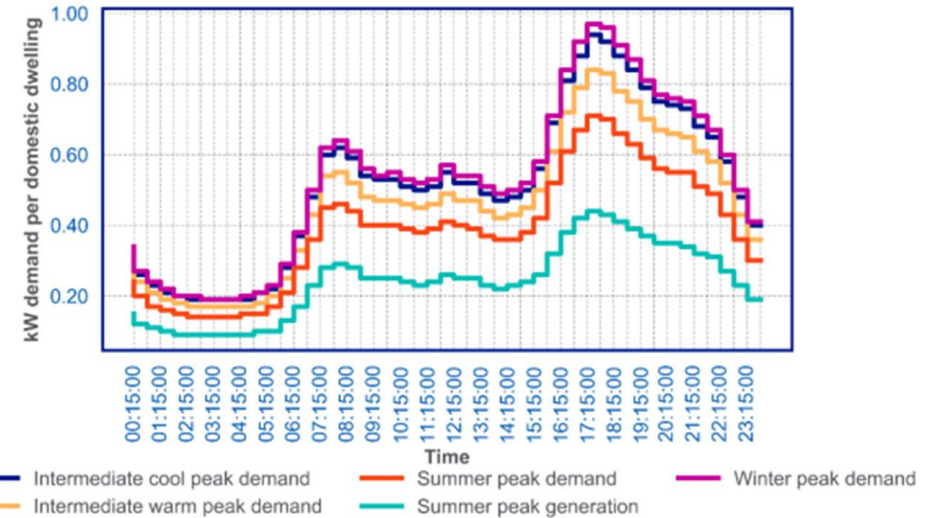
Use of local authority planning
status / information

LAEP – reflect specific local
energy plans/targets

Direct contact with project
developers and sector experts

Customer Behaviour Profiles

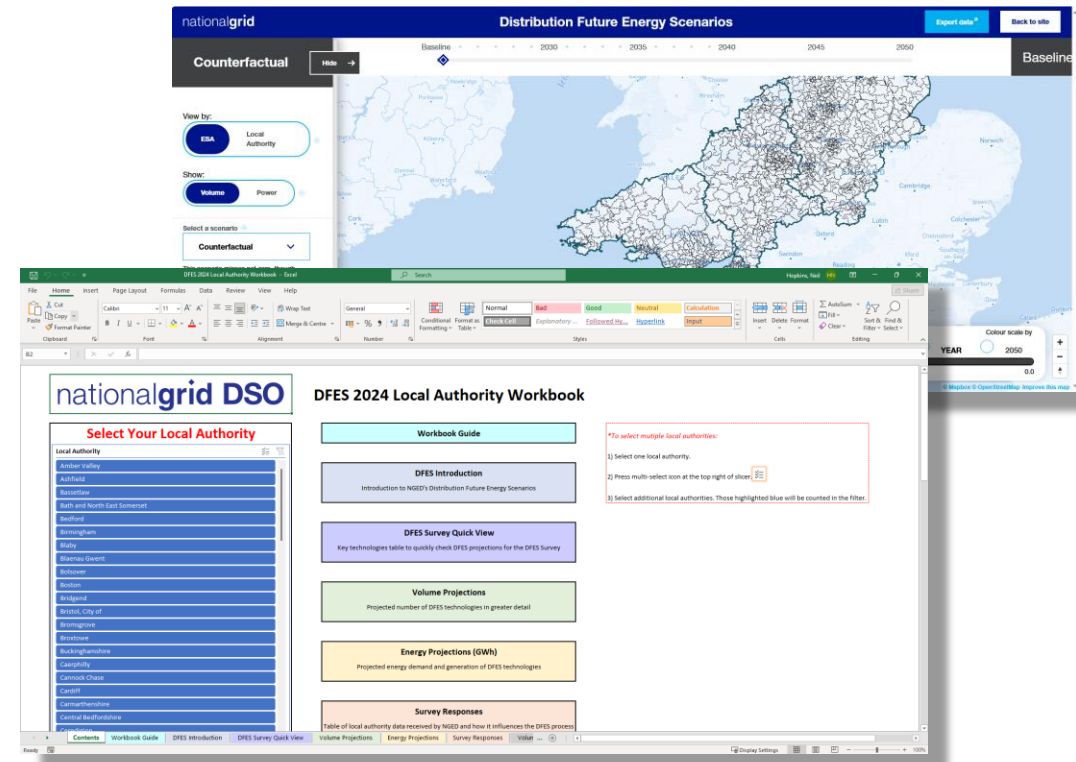
- To translate the DFES volume projections into a dataset that can be used for network analysis, customer behaviour assumptions are made.
- Customer profiles are used for a variety of representative days, to test the edge cases of what our network might experience.



Continuous improvement

Each year, we update our analysis and expand the scope to include emerging technologies. In 2024, we added **Maritime, Aviation, Rail, and Agriculture**. In 2025, we're including **Data Centres**.

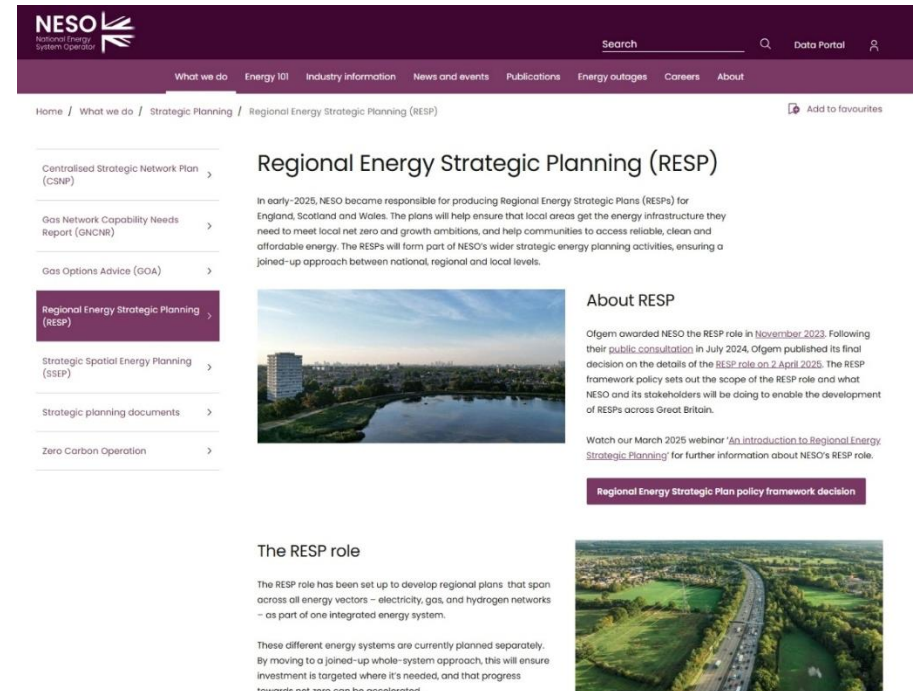
We work with stakeholders to improve how they use our DFES data. This led to the creation of the **DFES interactive map** and a **Local Authority workbook** showing projections by local authority.



Continuous improvement

We're **working in close partnership** with the National Energy System Operator (NESO), sharing our DFES data to support the development of their Regional Energy Spatial Plans (RESP). We'll also be **using insights from the transitional RESP** to inform our DFES 2025, ensuring alignment and consistency across planning processes.

For our 2025 data collection, we **worked with UKPN and SSEN** so that local authorities with shared boundaries **only had to submit data once**. We then shared this across DSOs to inform all DFES outputs.



The screenshot shows the NESO website's 'Regional Energy Strategic Planning (RESP)' page. The header includes the NESO logo, a search bar, and navigation links like 'What we do', 'Energy 101', 'Industry information', 'News and events', 'Publications', 'Energy outages', 'Careers', and 'About'. A breadcrumb trail reads 'Home / What we do / Strategic Planning / Regional Energy Strategic Planning (RESP)'. A left-hand menu lists various documents, with 'Regional Energy Strategic Planning (RESP)' highlighted. The main content area is titled 'Regional Energy Strategic Planning (RESP)' and contains an introductory paragraph about NESO's role in producing RESP plans for England, Scotland, and Wales. It includes a large image of a cityscape and a body of water. To the right, there's a section titled 'About RESP' with text about Ofgem awarding NESO the RESP role in November 2023 and a link to a public consultation. Below that is a section titled 'The RESP role' with text explaining that the RESP role is to develop regional plans that span across all energy vectors (electricity, gas, and hydrogen networks) as part of one integrated energy system. It also mentions that these different energy systems are currently planned separately, and by moving to a joined-up whole-system approach, investment targeting can be accelerated towards net zero.

The background of the slide is a photograph of high-voltage electrical equipment, likely a substation. It features several large, grey, ribbed insulators (pilot wires) hanging from metal structures. The sky is a clear, bright blue. The image is partially obscured by a diagonal graphic element that splits the slide into a blue upper-left section and a magenta lower-right section.

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Network Impact Assessment

Jonathan Bluff
DSO Engineer, System Planning

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Network Impact Assessment – what does it involve?

- Identifying network **constraints**
- Identifying **mitigations** to these constraints

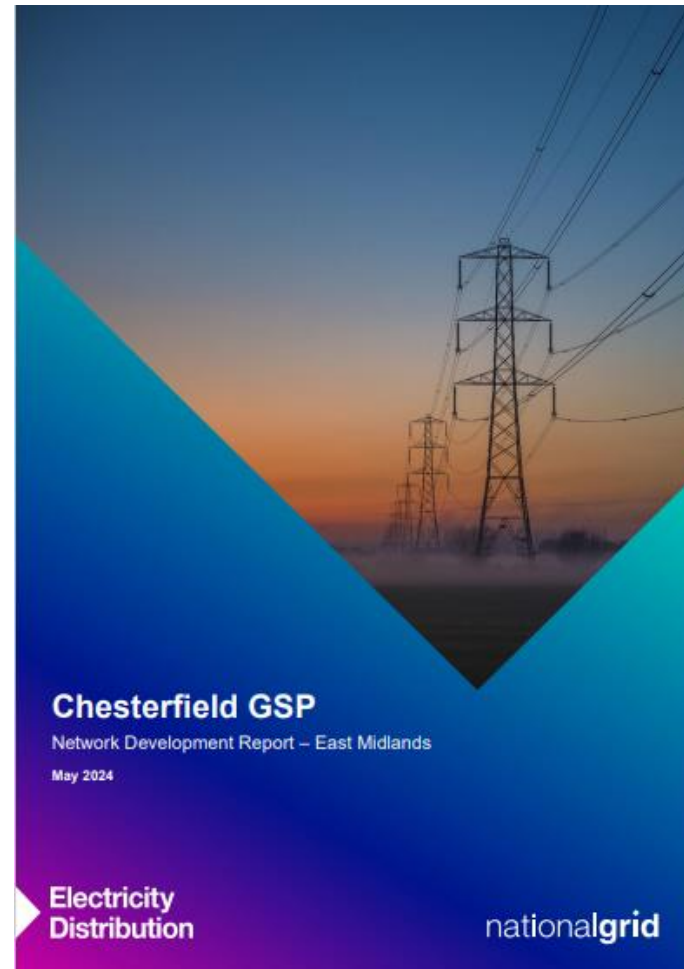
Inputs

1. A digital model of our primary distribution network, published in the Long Term Development Statement.
2. Forecasts of how network usage will change over the next 10 years, across different times of day and different seasons (our Distribution Future Energy Scenarios).

By combining both, we can simulate future network use under various decarbonisation scenarios.

Network Development Plans

- **NDPs** are produced for all **Grid Supply Points (GSP) & Bulk Supply Points (BSP)** across the four NGED licence areas.
- Derived from the DFES analysis, the NDPs assess a **10-year projection** on the future suitability of the Primary Distribution Network to **continue to deliver for our customers**, under the **credible future energy scenarios**.
- The latest NDPs were published on **1st May 2024** and are available on our website.



DistributionSystemOperator

1.1 Network Topology

Chesterfield GSP is a 275/132 kV substation comprising four 275/132 kV, 240 MVA Super Grid Transformers (SGTs). The 132 kV busbar configuration is a standard wrap-around, with four busbar sections. Chesterfield main 1 and reserve 1 busbars are rated at 1200 A, whilst main 2 and reserve 2 are rated at 2000 A. The site is normally run as a 2+2 arrangement, with bus-section circuit breakers closed and bus-coupler circuit breakers open. BSPs are split between the two halves of Chesterfield 132 kV such that during certain running arrangement, opening the bus-section circuit breakers creates two separate networks. Running the site with more than two SGTs on a busbar is not possible currently due to fault level constraints at Chesterfield 132 kV.

Chesterfield GSP has 132 kV interconnection with Staythorpe GSP via Clipstone BSP, normally open on 132 kV circuit breakers at Staythorpe, and via Annesley BSP, normally open on 132 kV isolators at Annesley BSP and 132 kV circuit breakers at Staythorpe GSP. Chesterfield GSP is also interconnected with Willington GSP via Annesley BSP.

Chesterfield BSP is situated on the same site and comprises two 132/33 kV Grid Transformers (GTs). Alfreton, Goldside, Staveley, and Whitwell are all 132/33 kV BSPs supplied from Chesterfield GSP via dedicated, radial 132 kV dual circuits which connect to a pair of GTs at each BSP.

Mansfield and Clipstone BSP share two 132 kV circuits from Chesterfield GSP (the CS route). A 132 kV switching station is present at Mansfield BSP which facilitates the transfer of Clipstone BSP into Staythorpe GSP.

Pinxton 132/11 kV and Annesley 132/33 kV BSPs share a 132 kV double circuit from Chesterfield GSP (the HR route). This section of 132 kV network is normally run closed at 132 kV at Annesley BSP, creating a ring arrangement. Annesley 132 kV is configured to enable 132 kV transfers to either Staythorpe GSP or Willington GSP (via Heanor BSP / Loscoe Switching Station / Stanton BSP / Spondon BSP).

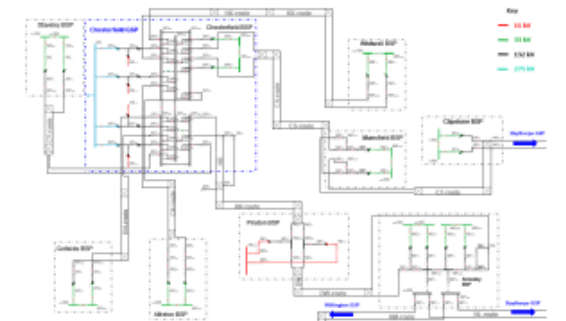
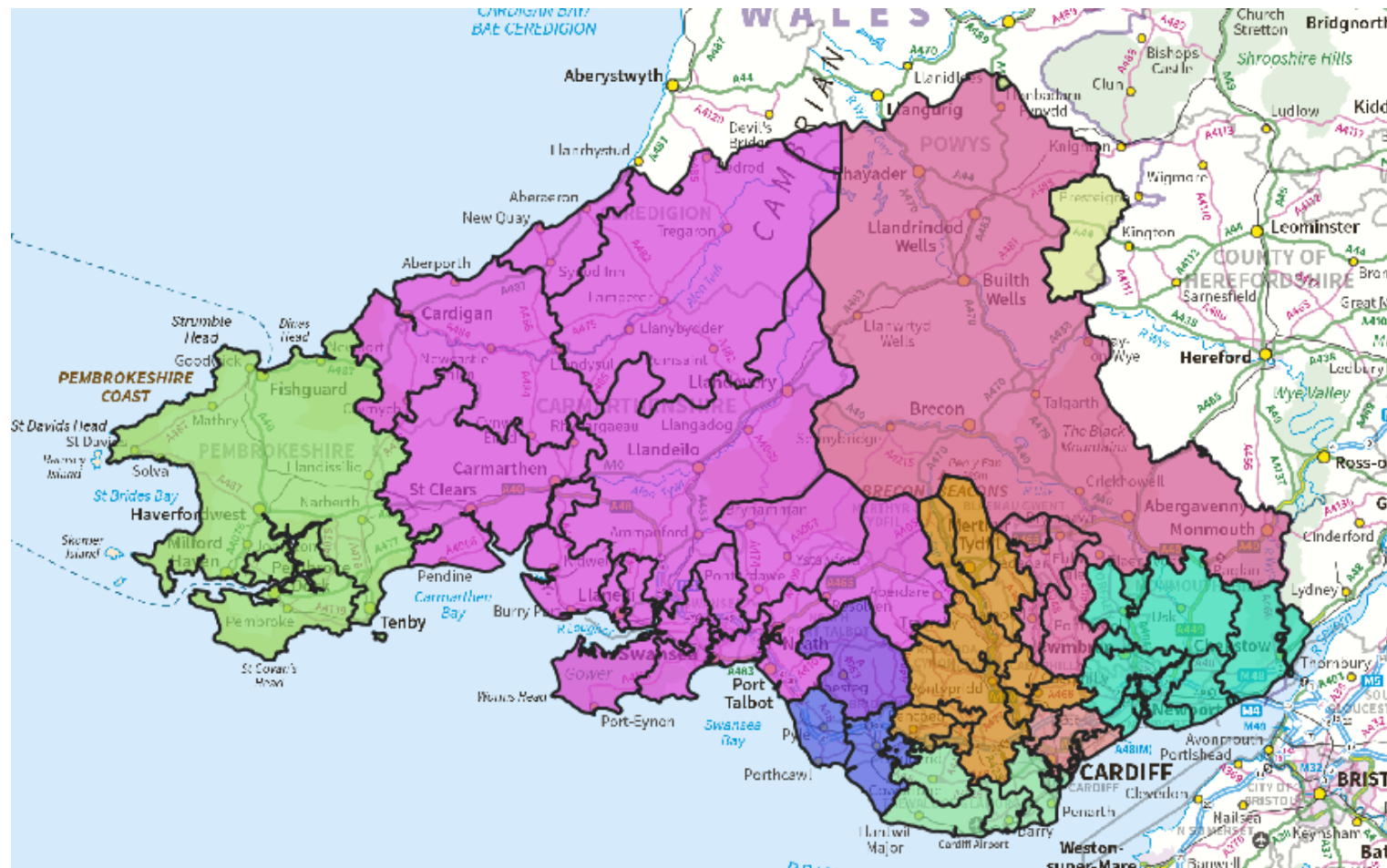


Figure 1.1.1 Chesterfield 132 kV network single line diagram

Example – South Wales licence area

- 25 reports covering all primary networks (from primary substation to Grid Supply Point)
- Reports either split by one per Grid Supply Point, or further split by the Bulk Supply Points fed downstream
- We have presented our NDP to all local stakeholders and are incorporating feedback into our NDP refresh plan



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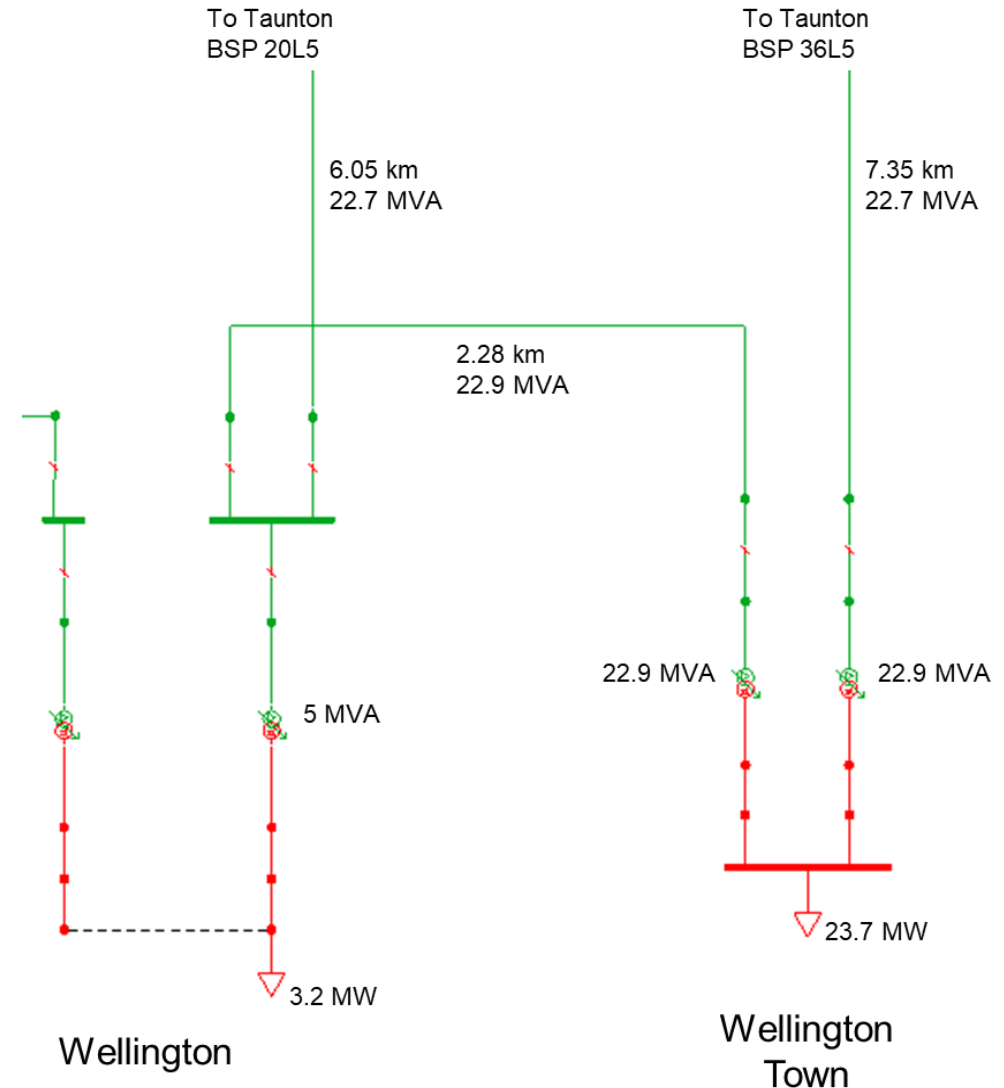
Example – Constraint and Optioneering

- Constraint identified in 2033

Constraint	N-1 Condition	Subsequent N-2 Condition	First studied year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Wellington Town T1/T2 overload	Wellington Town T1/T2 fault	None	2033	2033	2033	2033

- Different solution options considered

Solution Options	Description	Solves Constraint	Wider Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	x	x	x	Discounted
Reinforcement					
1	Replace existing transformers	✓	✓	✓	Viable
2	Install additional transformer	✓	✓	✓	Viable
Operational Mitigation					
3	Transfer demand to other Primaries	x	✓	x	Discounted
Load Management Schemes					
4	Uprate the existing transformer at Wellington Town via use of cyclic ratings	x	x	✓	Discounted
Flexibility services					
5	Procure flexibility at Wellington Town	✓	✓	✓	Viable



Network Development Plans 2026

- We are currently developing our next set of Network Development Plans, scheduled for **publication by May 2026**.
- These plans will be **informed by DFES 2024 and 2025 data** to ensure alignment with the latest forecasts.
- Where possible, we will **incorporate insights and learning** from NESO's tRESP to strengthen our approach.
- **Feedback from our Local Authority engagement** (Summer 2025) is being considered to reflect regional priorities and needs.
- Once published, **we will engage with stakeholders** to share the outputs relevant to their areas.
- The Network Development Plans will also play a key role in shaping our **ED3 business planning**.



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Distribution Network Options Assessment

Peter Gaskin
DSO Engineer, System Planning

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Optioneering

Distribution Network Options Assessment (DNOA)

- The viability of utilising flexibility to resolve constraints identified in the NDP is assessed.
- Gives visibility of NGED's decision-making processes.
- Helps Flexibility Service Providers (FSPs) to identify revenue opportunities.



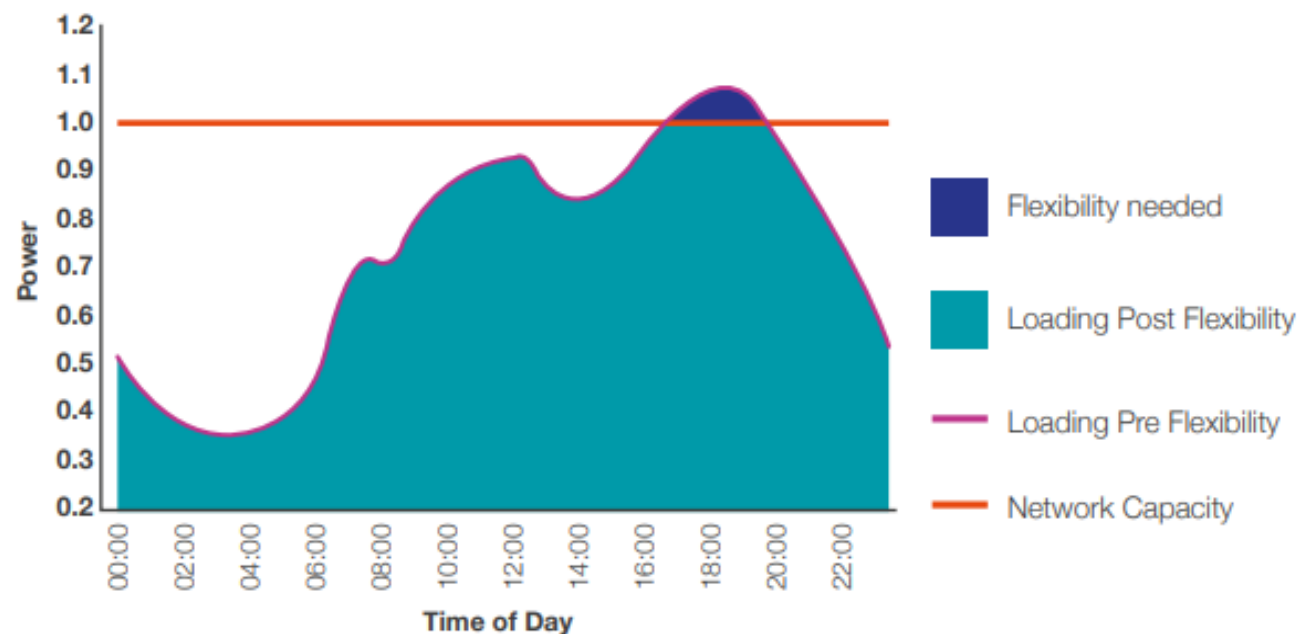
Optioneering – Flexibility

Flexibility Overview

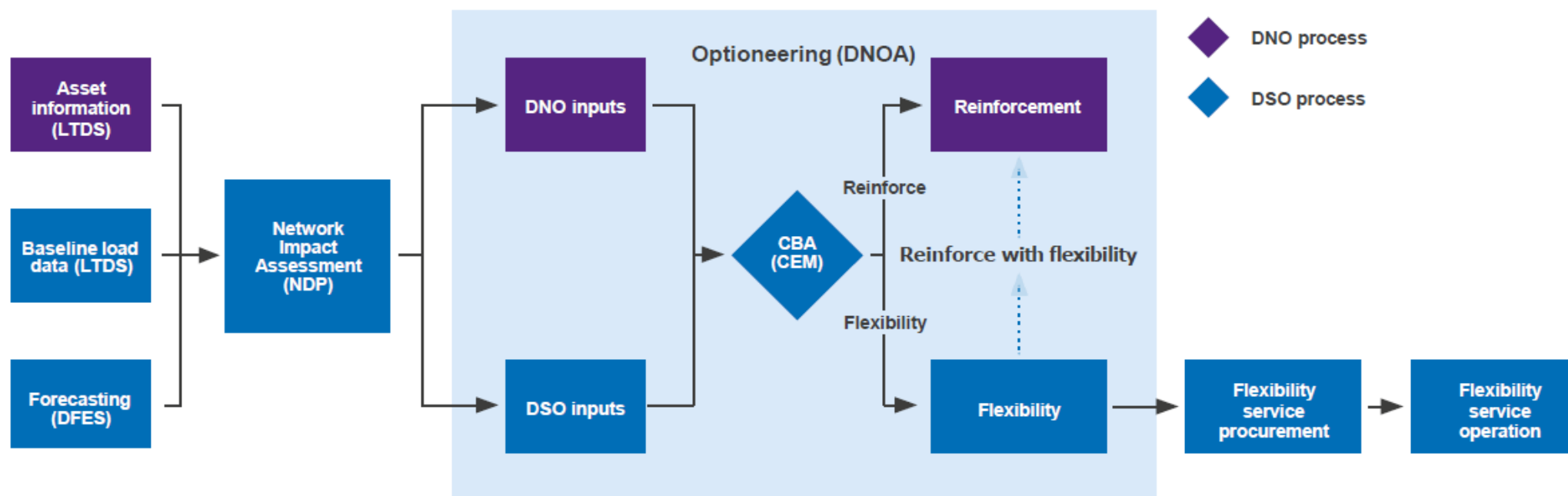
19.8 GWh of flexibility procured across our four licence areas last year.

63 HV and **744 LV** active flexibility zones.

162,800 flexibility assets signed up to our market platform. This is more than double the amount we had last year.



Optioneering – DNOA Process



Key:

LTDS: Long Term Development Statement
DFES: Distribution Future Energy Scenarios
NDP: Network Development Plan
DNO: Distribution Network Operator
DSO: Distribution System Operator
CBA: Cost Benefit Analysis
CEM: Common Evaluation Methodology



Optioneering for ED3 – DNOA Roadmap

Distribution Network Options Assessment (DNOA) Roadmap

- The upcoming DNOA Roadmap will set out NGED's vision for the evolution of our Optioneering process in RIIO-ED3 (2028-2033).
- This report will discuss some of the new ways we are planning to utilise flexibility to drive benefits for customers.
- The DNOA process will continue to provide transparency in NGED's decision-making process.

System planning process



Go you our system planning pages to find out more

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The screenshot shows the 'nationalgrid DSO' website. The main heading is 'Planning our future network'. Below it, a section titled 'Planning for the future' lists bullet points: 'Maximise the use of "hidden" capacity on the network, while ensuring network investment is delivered when it's needed, at the lowest cost to consumers', and 'Collaborate and coordinate across the whole system, to help stakeholders achieve their decarbonisation plans'. A photo of a person charging a car is shown. At the bottom, a 'Strategic investment process' section contains three cards: 'Forecasting' (Distribution Future Energy Scenarios (DFES)), 'Network impact assessment' (Network Development Plan (NDP)), and 'Optioneering' (Distribution Network Options Assessment (DNOA)).



<https://dso.nationalgrid.co.uk/planning-our-future-network>

We want to hear your views

It's important to us to make sure we are delivering what you need.

Has today improved your understanding of our system planning work?

What else could we do to keep you informed of our system plans?



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Questions and Answers

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