electricity north west

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# Distribution Future Electricity Scenarios and Regional Insights

Webinar

28th March 2019

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Welcome to our webinar

**Victoria Turnham**
*Strategic Planning Manager*

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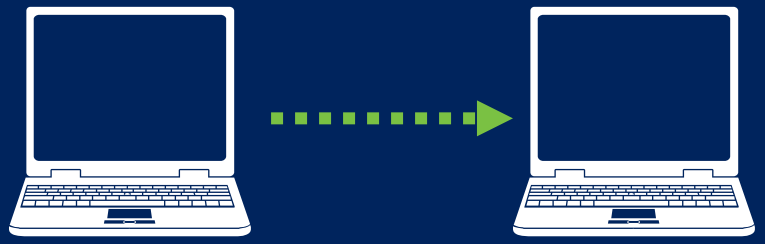
# Webinar format

30 minutes presentation

20 – 30 minutes
questions & answers



Submit written questions
online during the webinar

# Q&A panel

**Victoria Turnham**
Strategic Planning Manager

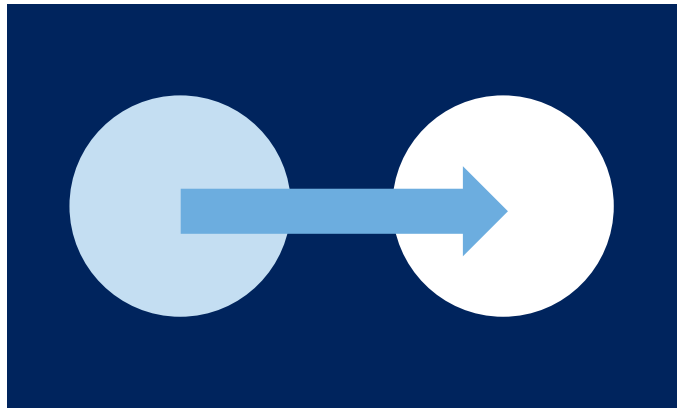
**Simon Brooke**
Capacity Strategy Manager

**Christos Kaloudas**
Forecasting Manager

**Gill Williamson**
Strategic Planning

# Agenda

Objectives

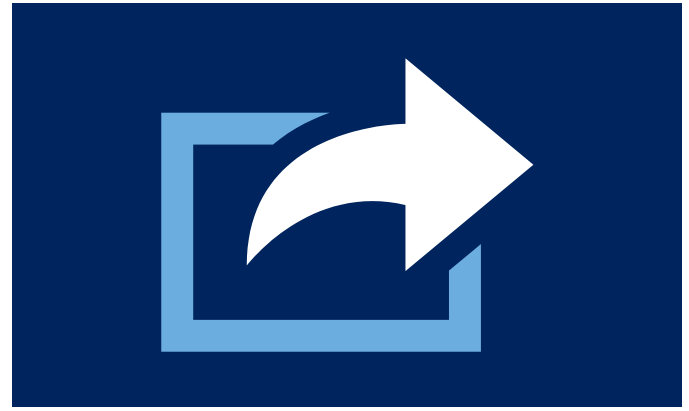


Transition to DSO

Background

Scenarios & forecasts

Regional insights



Summary & look forward

# DFES and regional insights – objectives of this webinar

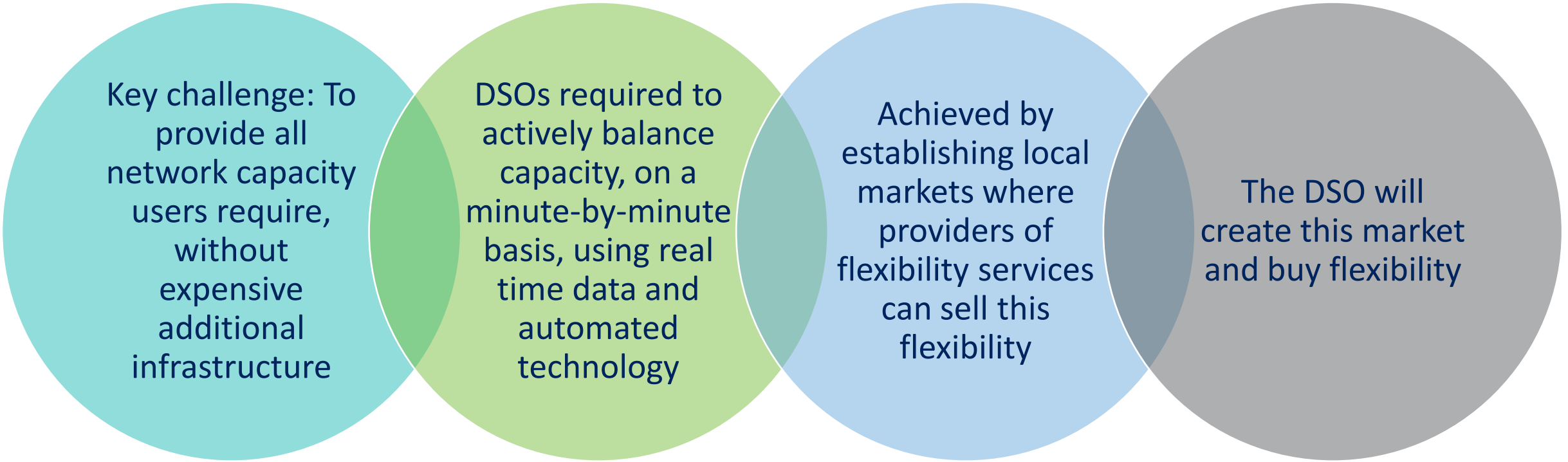
Introduce our scenarios and forecasts

Explain how we use our forecasts

Present our findings on how the network will cope with new connections

# From DNO to DSO

**Fundamental role remains unchanged: The provision of network capacity**

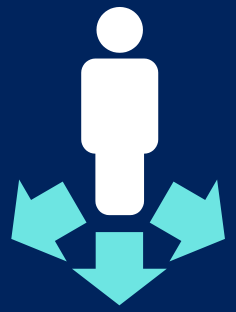



**To enable this transition DSO must become trusted facilitator and advisor**

# DFES and regional insights – document objectives

**Provide information** on our forecasts and share our insights into regional impacts

**Provide a deeper understanding** of network needs to engage and inspire customer involvement and new approaches



**Empower stakeholders** to target beneficial developments in appropriate locations

**Support whole system** co-ordination and collaboration

**Publicise the opportunities** to provide flexible services

# DFES and regional insights – background

**2.4 million customers**

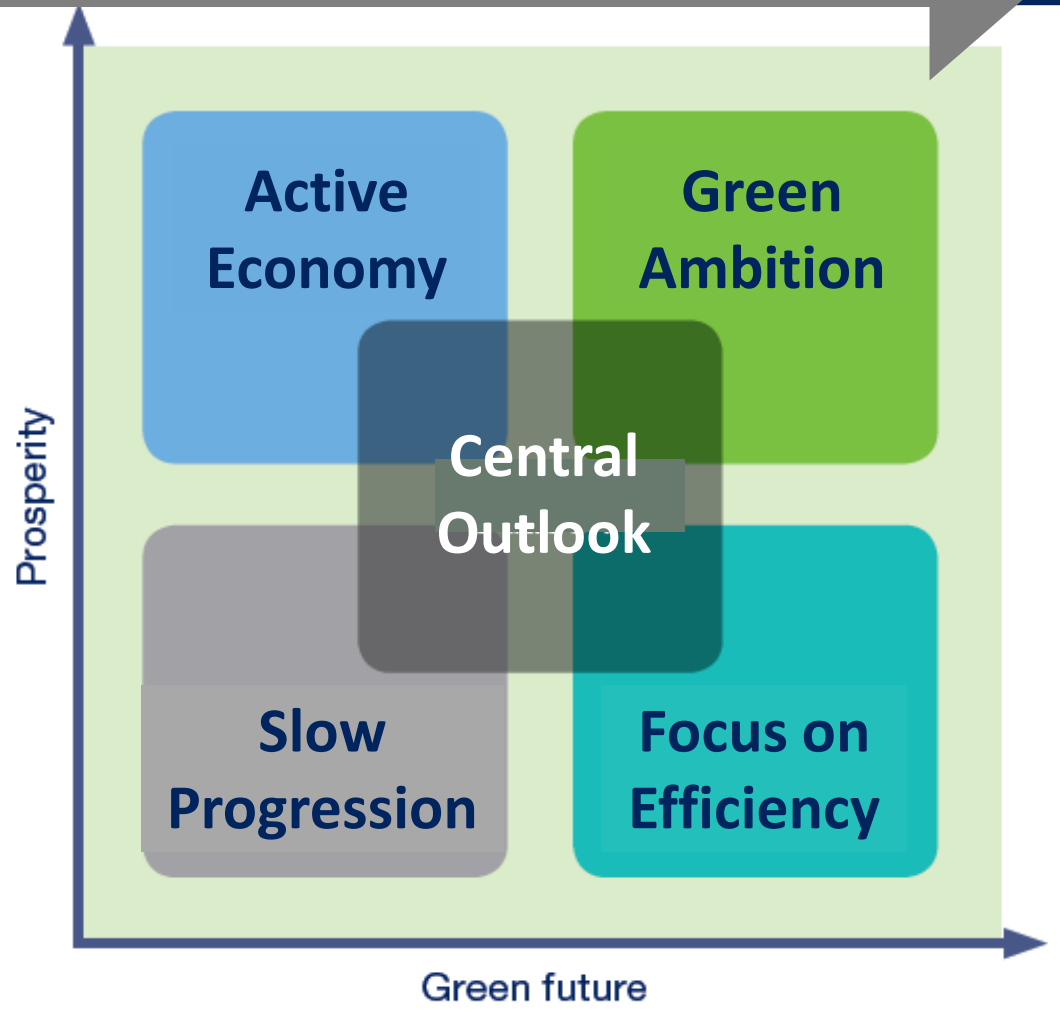
**Max demand 4.4 GW**

Electrical energy **23 million MWh**

| Generation | Existing (MW) | Accepted (MW) |
|---|---|---|
| Fossil fuels | 649 | 1597 |
| Onshore wind | 392 | 28 |
| Offshore wind | 611 | 0 |
| Solar | 139 | 57 |
| Bio fuels | 90 | 57 |
| Battery energy storage | 49 | 647 |

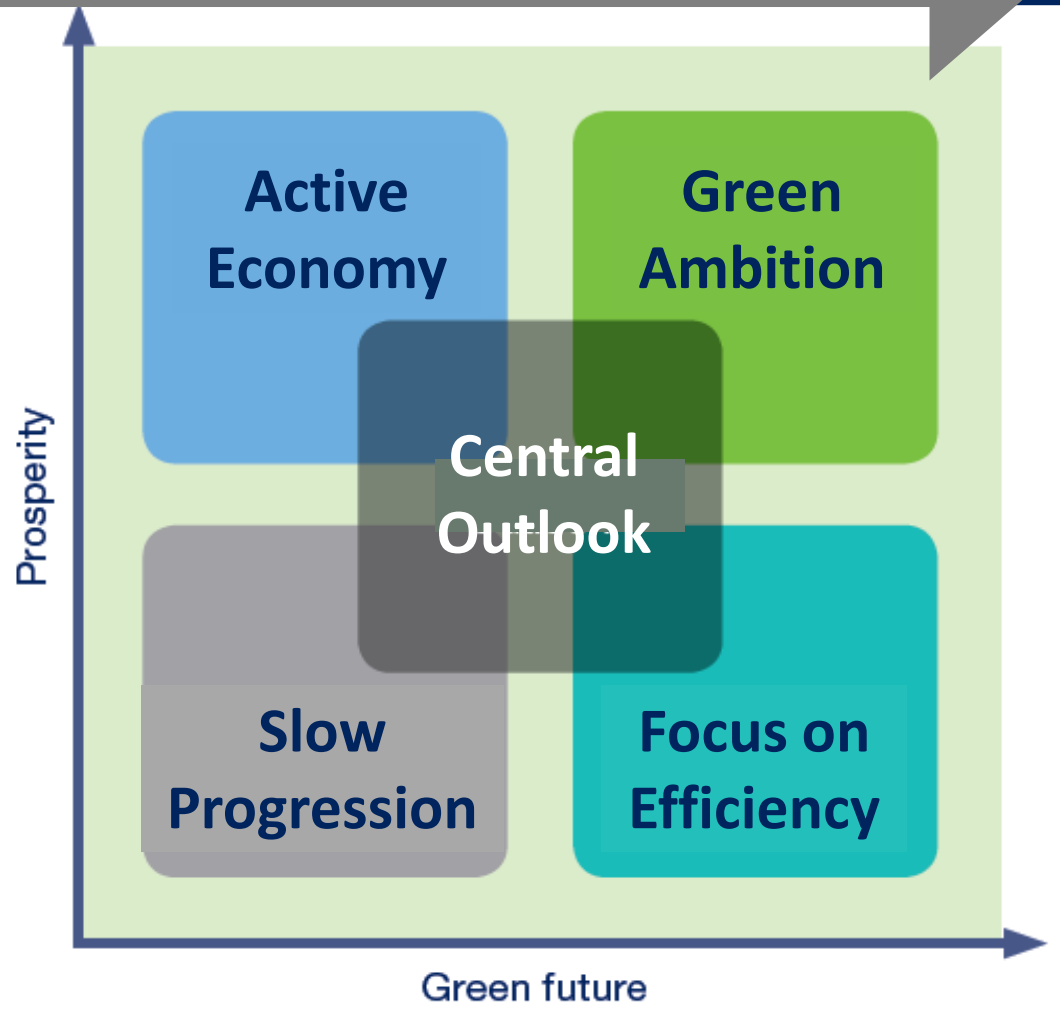
# DFES and regional insights – scenarios and forecasts

**Scenarios** → **Forecasts**



# DFES and regional insights – scenarios and forecasts

**Scenarios** → **Forecasts**




- Electrical demand
- Distributed generation
- Reactive power
- Energy storage

# DFES and regional insights – scenarios and forecasts

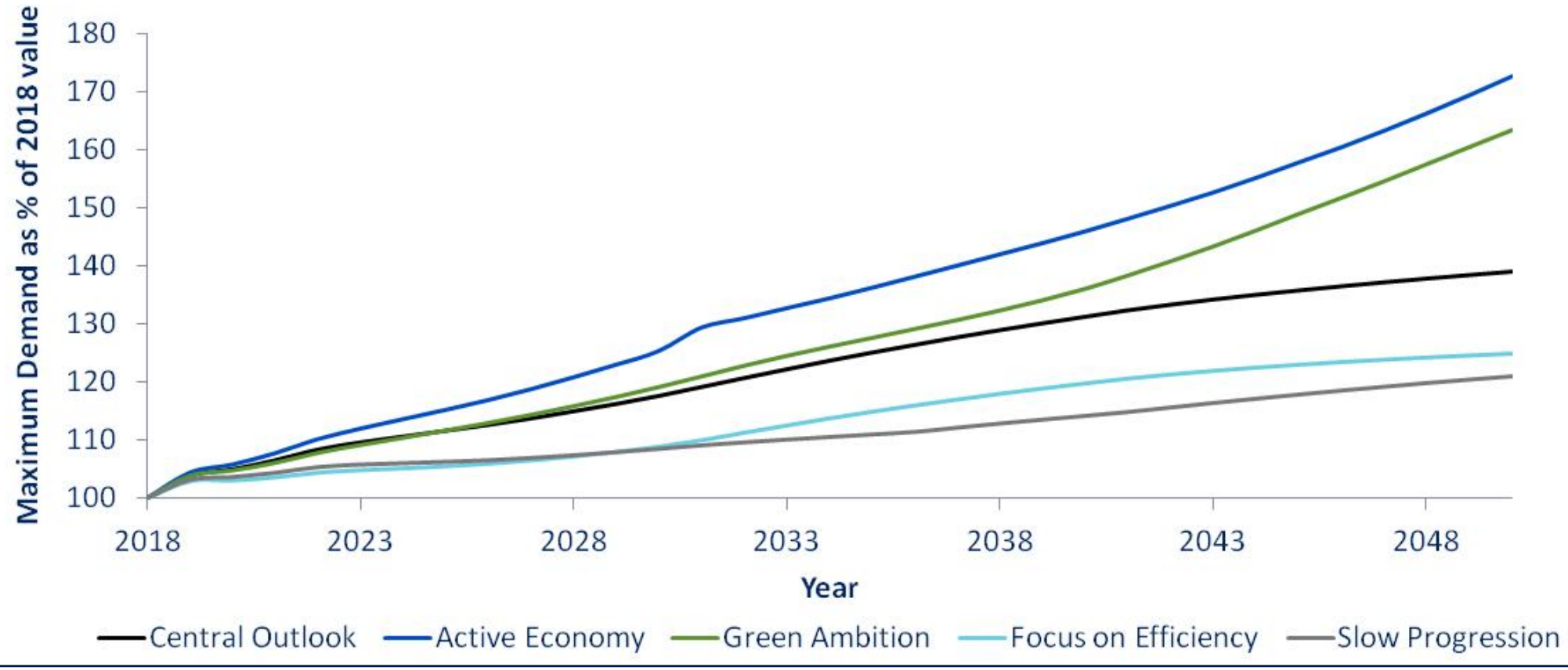
**Drivers** → **Scenarios** → **Forecasts**

- Local economic growth
- Urban/rural
- Policies/incentives
- Efficiency
- Consumer choice
- Access to gas
- New buildings demolitions
- Connection costs

**- Bottom up approach**
**- Regional variations**
**- Stakeholder engagement**
**- Focuses on the electricity system**

# DFES and regional insights – demand forecasts

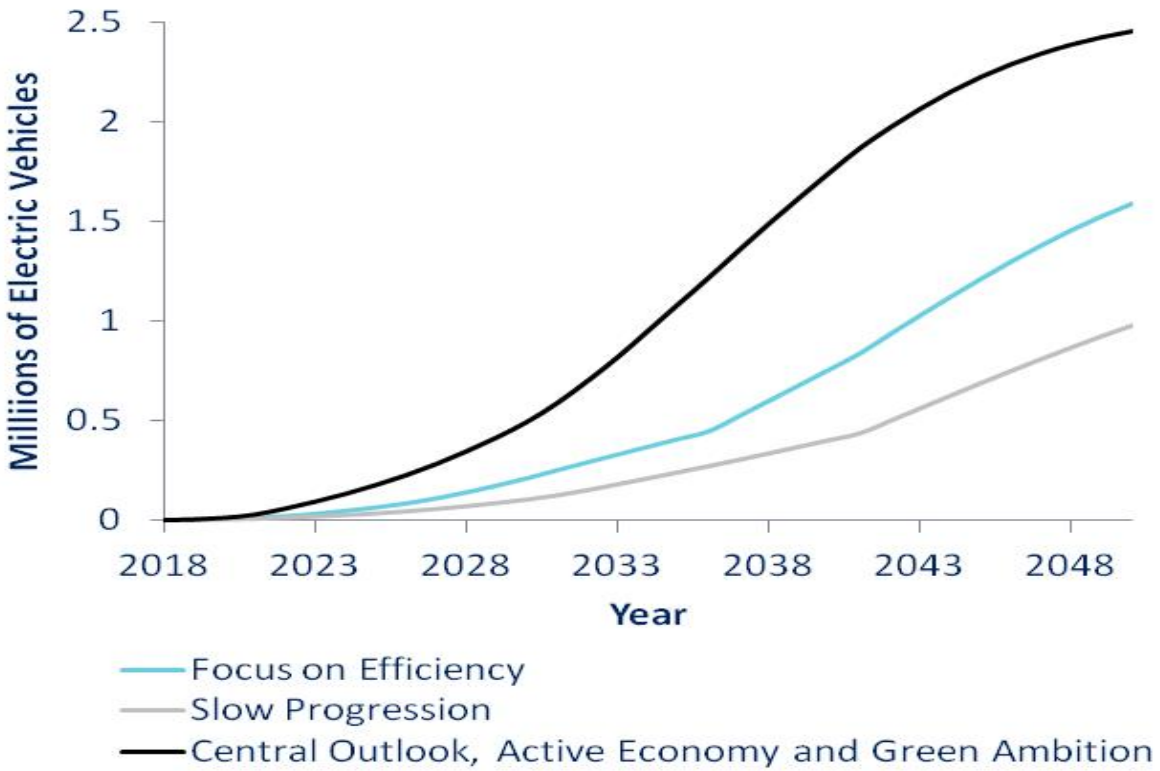
## Peak demand forecasts for all Electricity North West scenarios



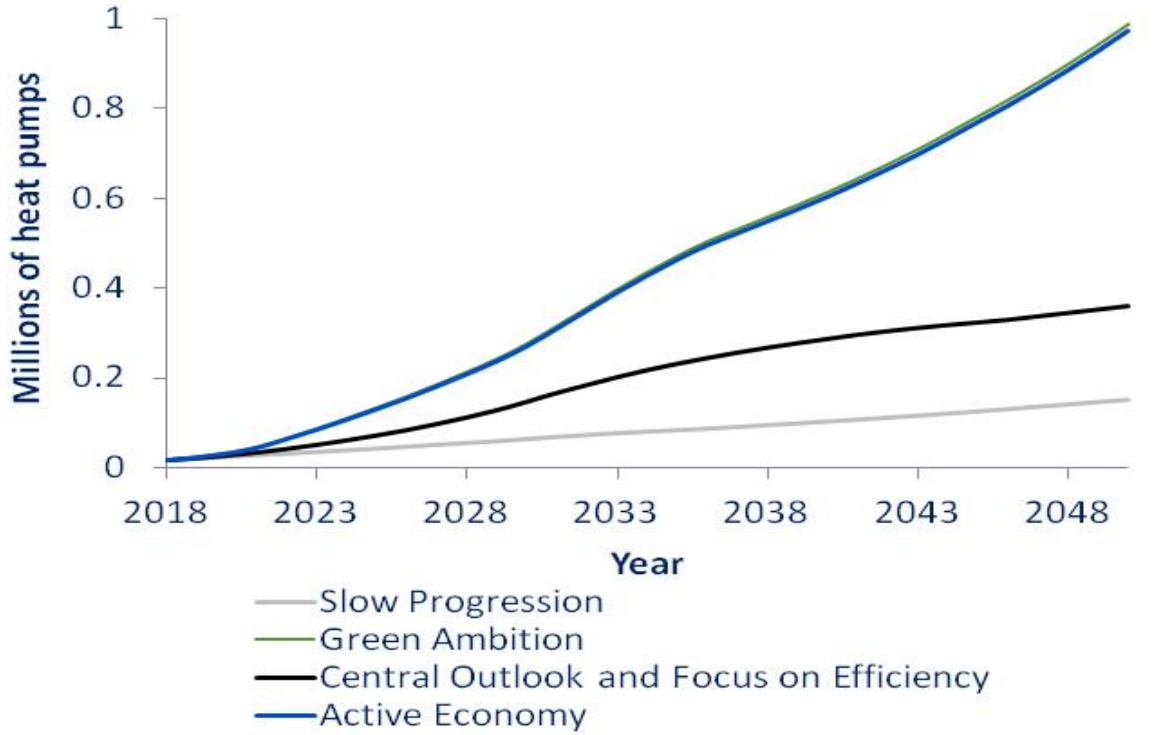

Electricity demand is expected to grow significantly in our region by 2050 at a rate determined by the uptake of low carbon technologies

# DFES and regional insights – demand forecasts

## Future numbers of electric vehicles




## Future numbers of heat pumps




Every customer could have an electric vehicle by 2050

Up to nearly 50% of our customers' properties could be warmed by heat pumps by 2050

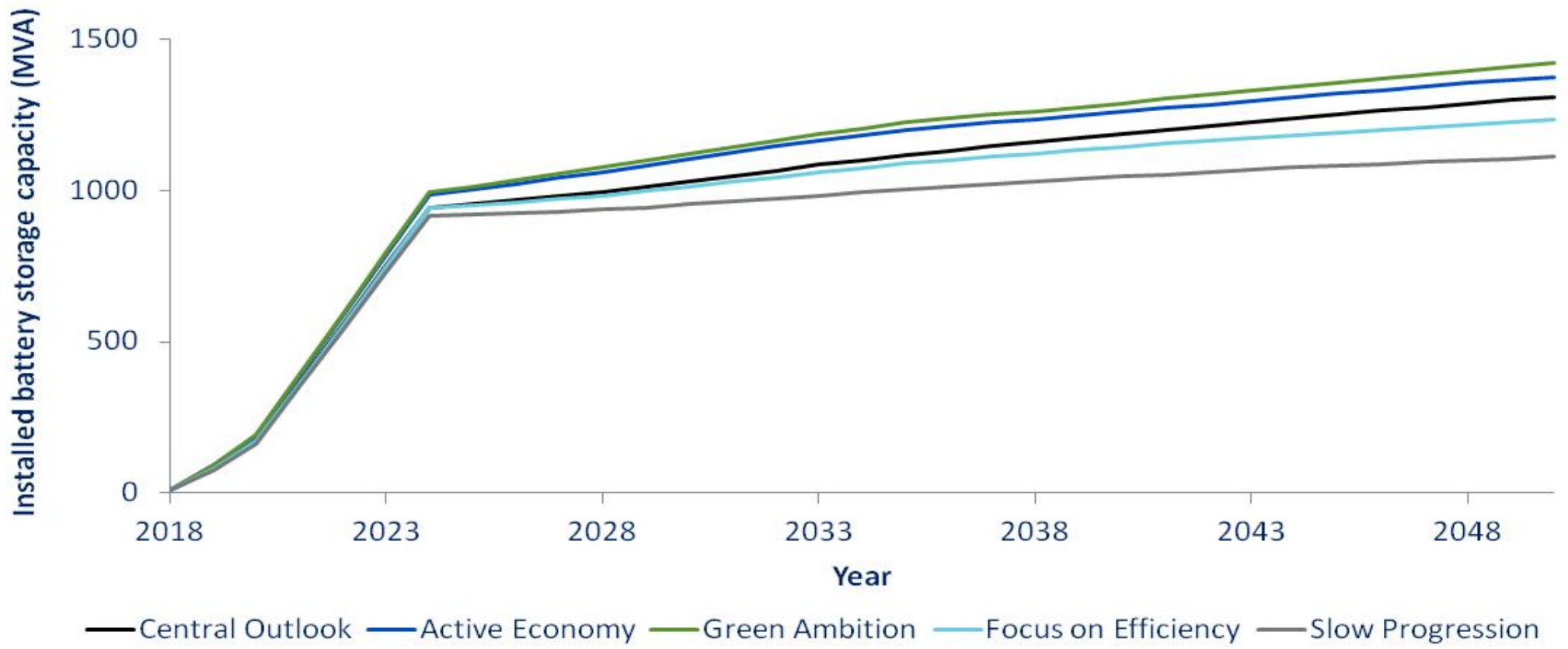
# DFES and regional insights – distributed generation forecasts

## Distributed generation forecasts for all Electricity North West scenarios


Under all scenarios, renewable generation connected to our distribution network continues to grow significantly beyond that already planned

# DFES and regional insights – energy storage forecasts

## Energy storage forecasts for all Electricity North West scenarios




Up to 1500MVA of battery storage is expected dominated by large planned developments in the short-term and more domestic batteries paired with LV after 2035

# DFES and regional insights – reactive power

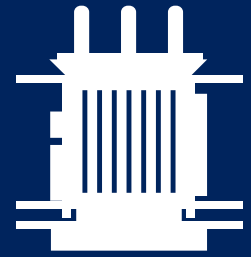
Reactive power demand in our region is predicted to decrease

The amount of reactive power and the length of time when it flows from our network to National Grid's transmission network are expected to increase

Consequently, Electricity North West's network **will be significantly affected by future trends in reactive power**

60%

60% of transformers operate at higher taps by 2026



Even by 2026, we expect more transformers to be operating closer to the limit of their capability

# DFES and regional insights – regional analysis

**Long-term forecasts**

Electricity demand

Distributed generation

Battery storage

Reactive power

**Network impacts**

Thermal capacity

Security of supply

Voltage control

Fault levels

Capacity balancing

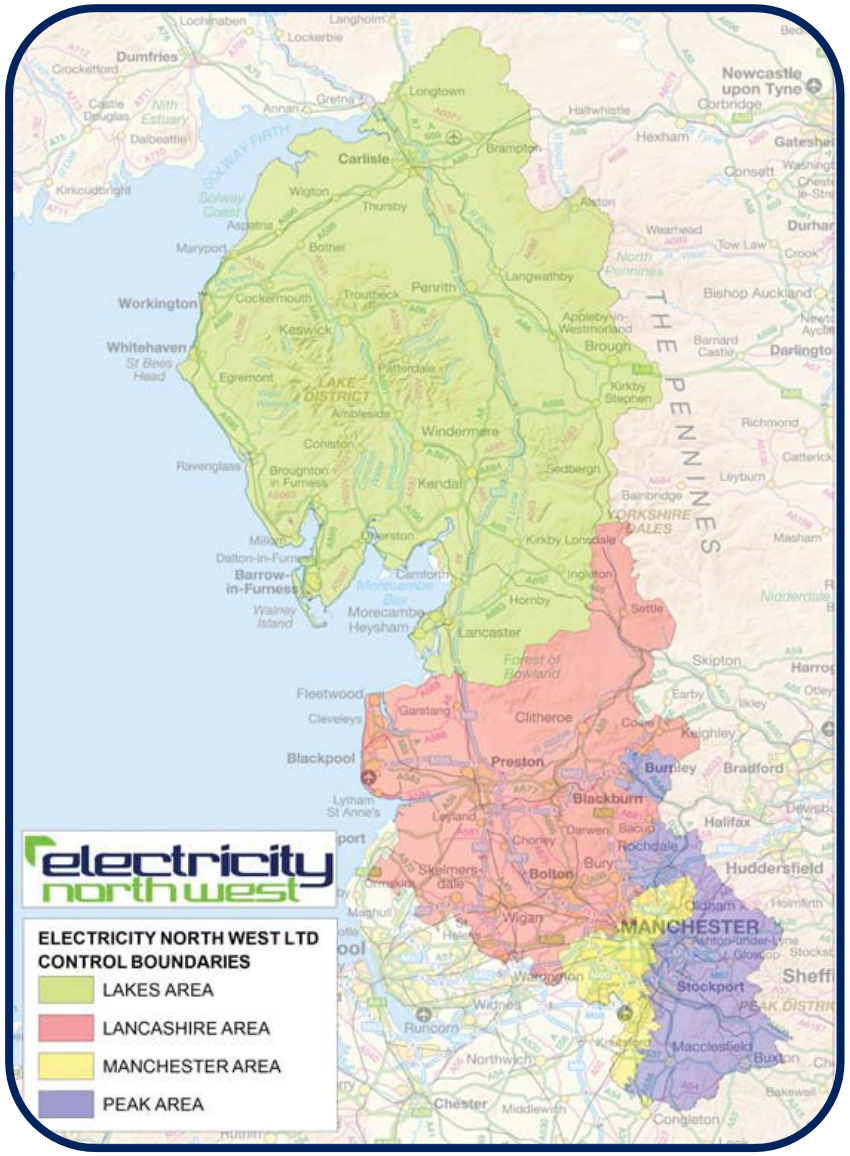
**Planning strategy**

Flexibility services

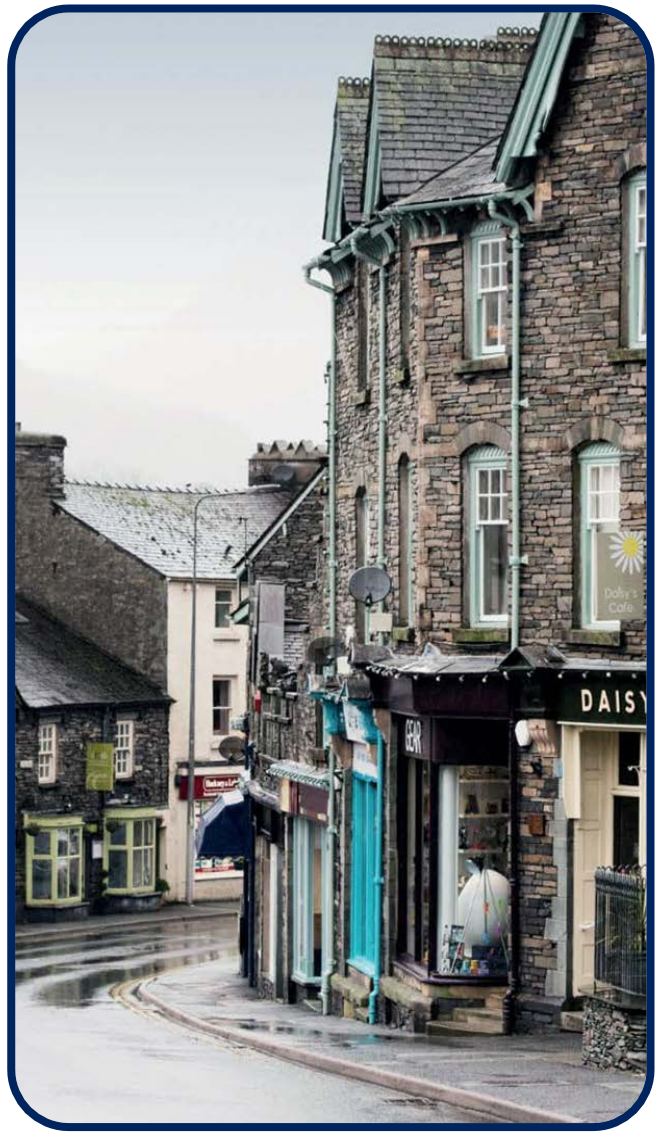
Network reinforcement

Whole system solutions

Methodology considers: ● Central scenario for axis for deviations common reference ● Four geographic regions ● Smaller regions corresponding to area supplied by each bulk supply point (132/33kV transformation point) ● Down to primary substation level (33/11kV)



# DFES and regional insights – Cumbria region



286,000 customers

Area 7,400km$^2$

- Very low customer density
- Nature of the region makes it attractive to DG developers
- Cumbrian Local Energy Plan seeks more DG

Existing demand

**Peak 720 MW**

Existing distributed generation

**480 MW**

Future demand

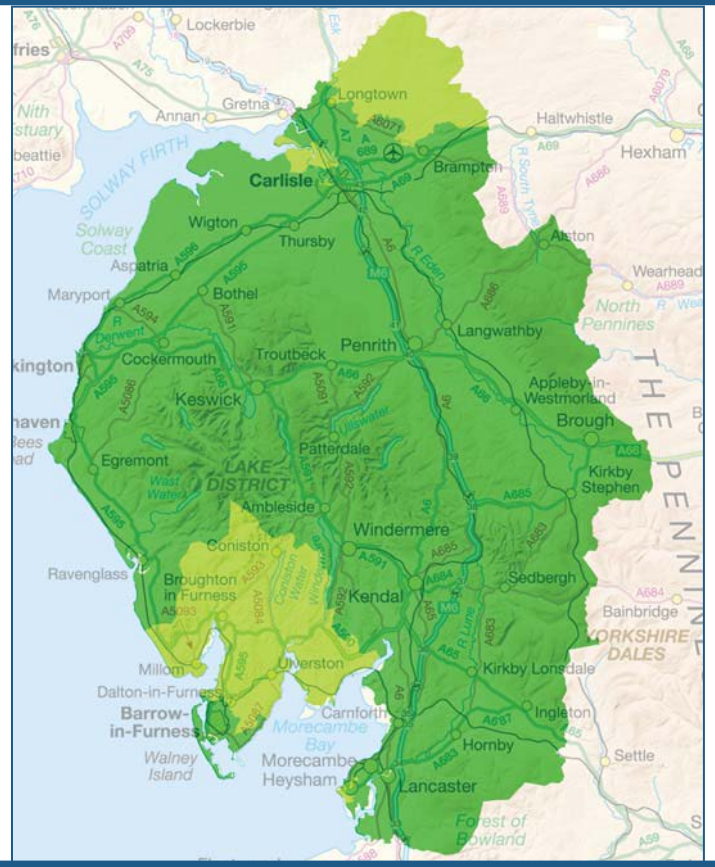
| 2023 | 2050 |
|---|---|
| x **110%** on average | x **140%** on average |
| up to x **150%** | up to x **190%** |

Future distributed generation

| 2023 | 2050 |
|---|---|
| x **170%** | x **255%** |

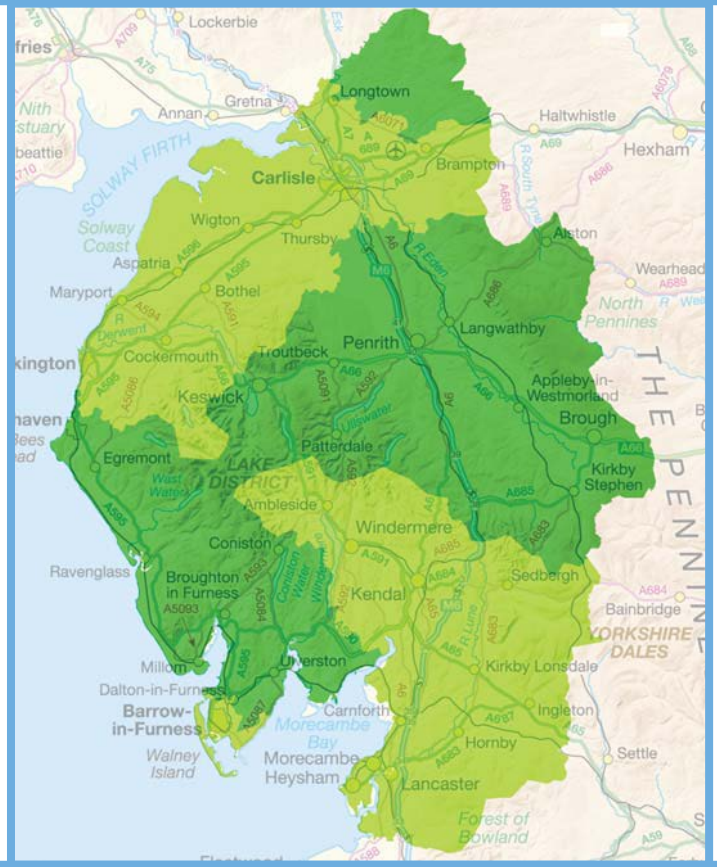
# DFES and regional insights – Cumbria region

## 2023 primary capacity




Overall, sufficient capacity to accommodate 2023 forecast demands and generation is likely to be a bigger influence on network developments

## 2023 BSP capacity




Moorside nuclear power station introduces uncertainty into our expectations for how the Cumbrian network will cope with forecast demand and generation

# DFES and regional insights – Cumbria region

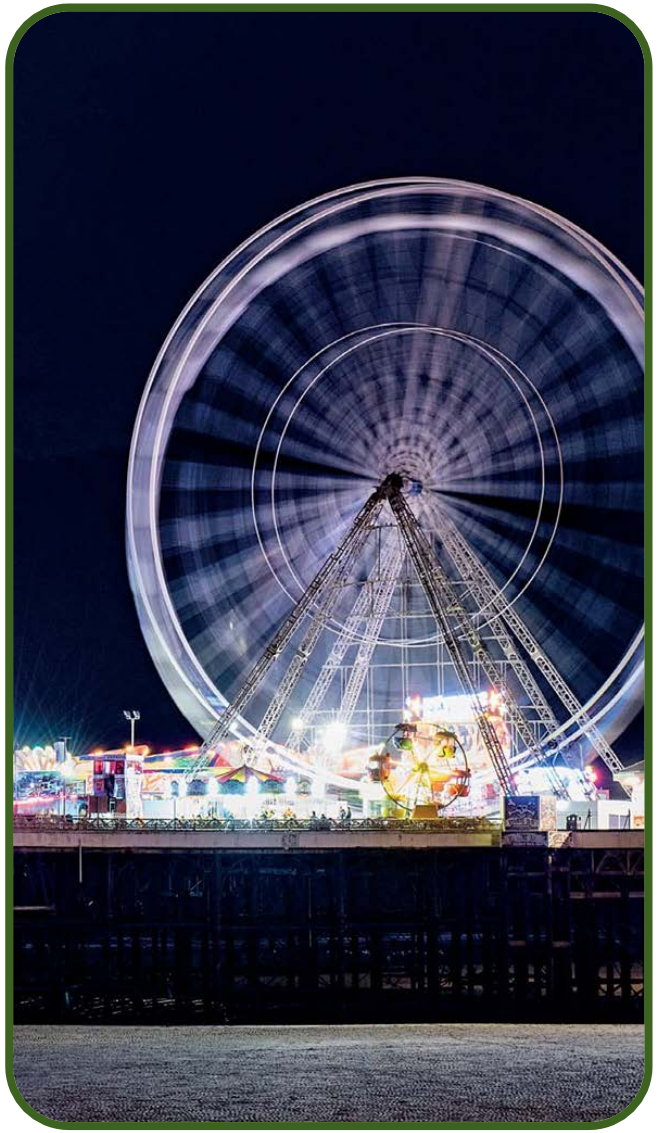
## 2050 primary capacity


Primary capacity is expected to be mainly sufficient for our long-term forecast demand and network enhancements will be required to accommodate generation

## 2050 BSP capacity


In the longer term, maximum demand is forecast to exceed the existing BSP capacity in north and south Cumbria

# DFES and regional insights – Lancashire region



920,000 customers

Area 3,200km$^2$

- Diverse region; rural areas, mill towns and Manchester suburbs
- Rural & brownfield sites for DG (Central Lancashire Core Strategy)
- Mix of cable and overhead line

Existing demand

**Peak 1,880 MW**

Existing distributed generation

**370 MW**

Future demand

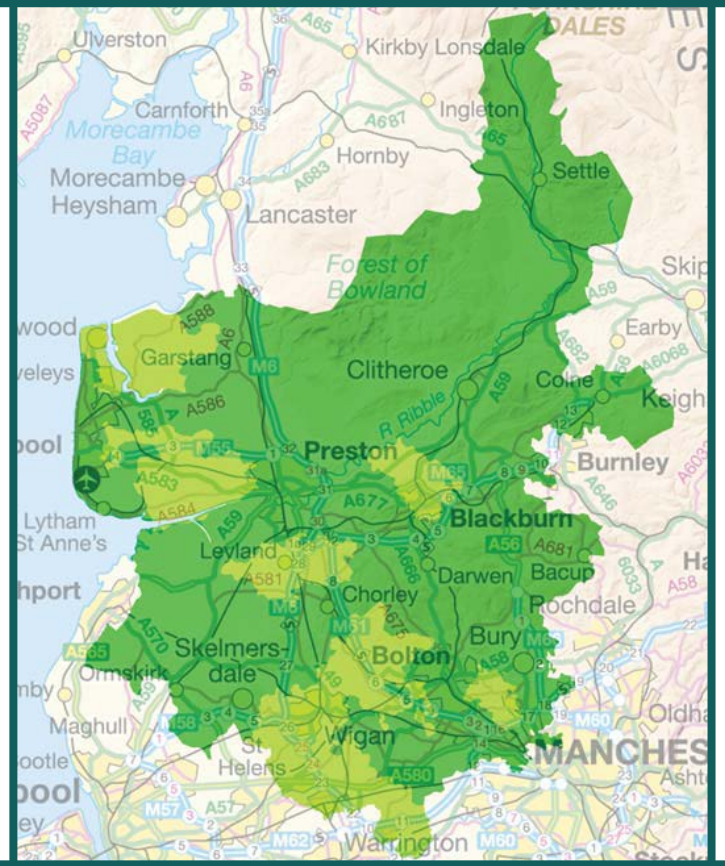
| **2023** | **2050** |
|---|---|
| x **115%** on average | x **150%** on average |
| up to x **330%** | up to x **365%** |

Future distributed generation

| **2023** | **2050** |
|---|---|
| x **260%** | x **400%** |

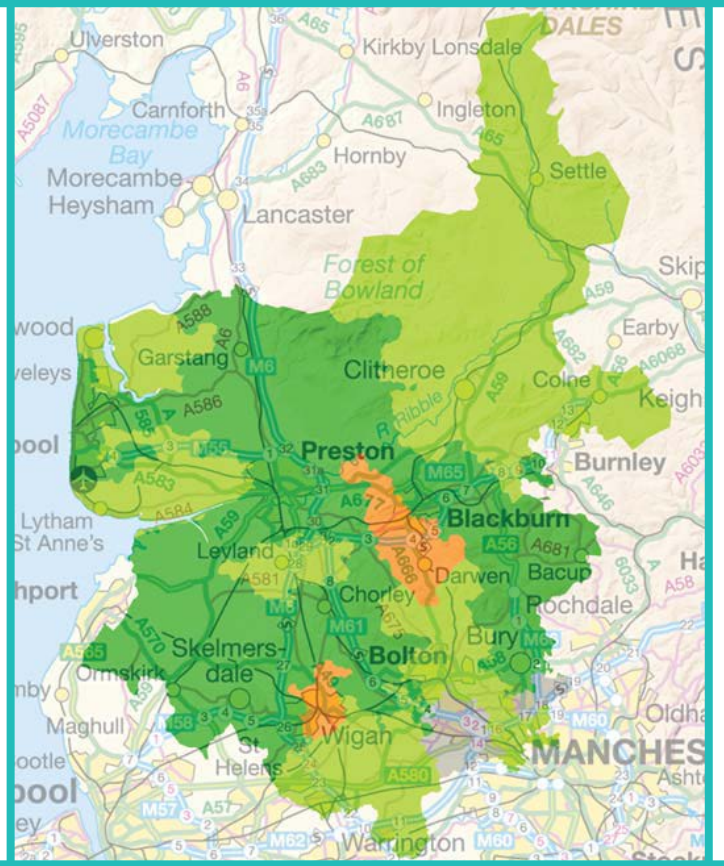
# DFES and regional insights – Lancashire region

## 2023 primary capacity




Primary capacity is sufficient to meet the predicted short-term growth in demand, however localised overloads may occur

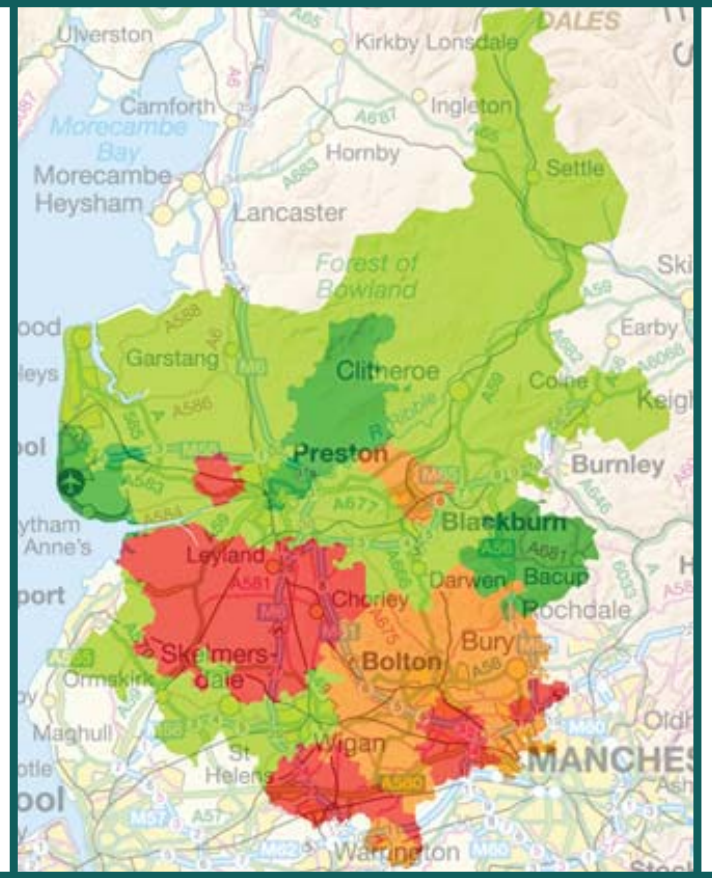
## 2023 BSP capacity




BSP capacity is sufficient to meet the forecast short-term demand growth

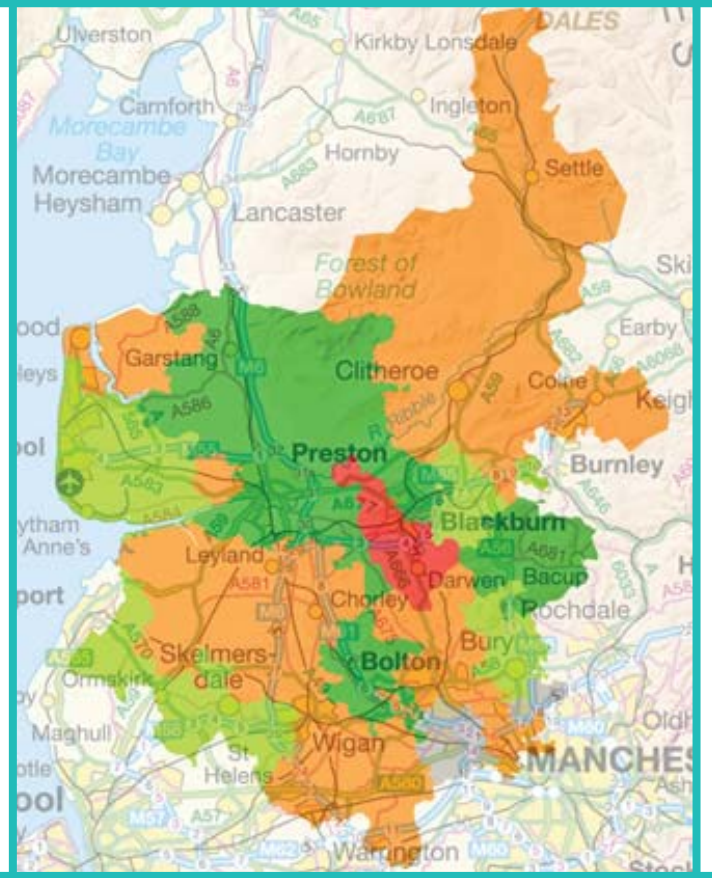
# DFES and regional insights – Lancashire region

## 2050 primary capacity



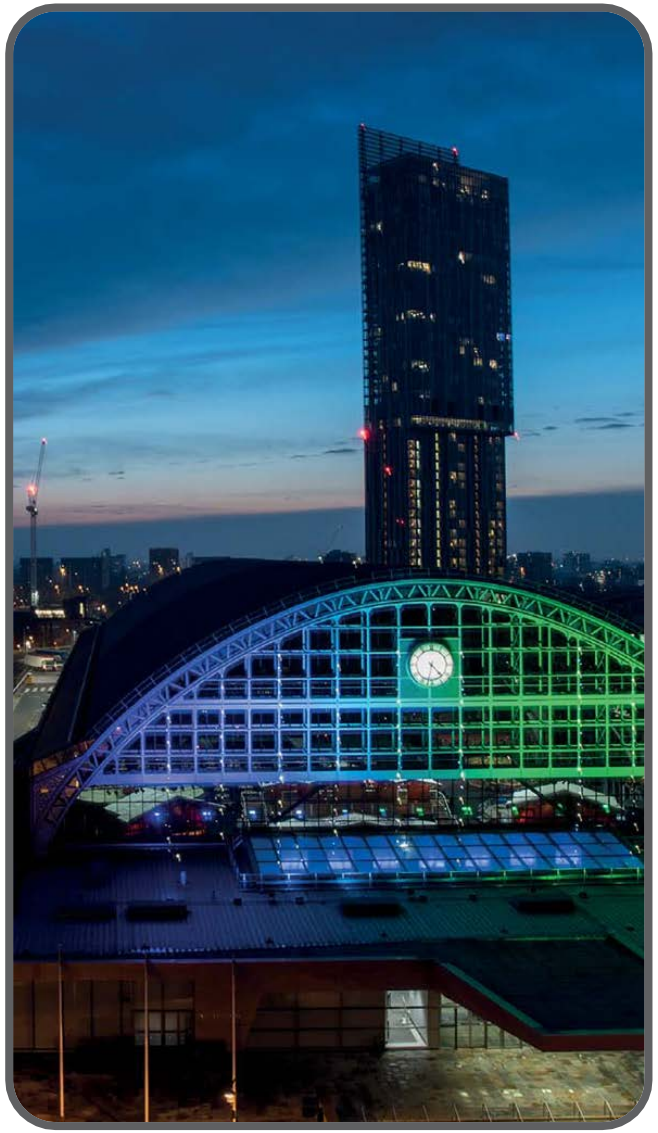

Long-term overloading is expected in central and southern areas of Lancashire

## 2050 BSP capacity




Long-term reinforcement of BSPs will be required although it may be possible to defer reinforcement by using smart solutions including flexible services

# DFES and regional insights – Manchester region



581,000 customers

Area 430km$^2$

- High customer density
- Mainly cable
- Central business district and airport
- Ambitious decarbonisation plans

Existing demand

**Peak 910 MW**

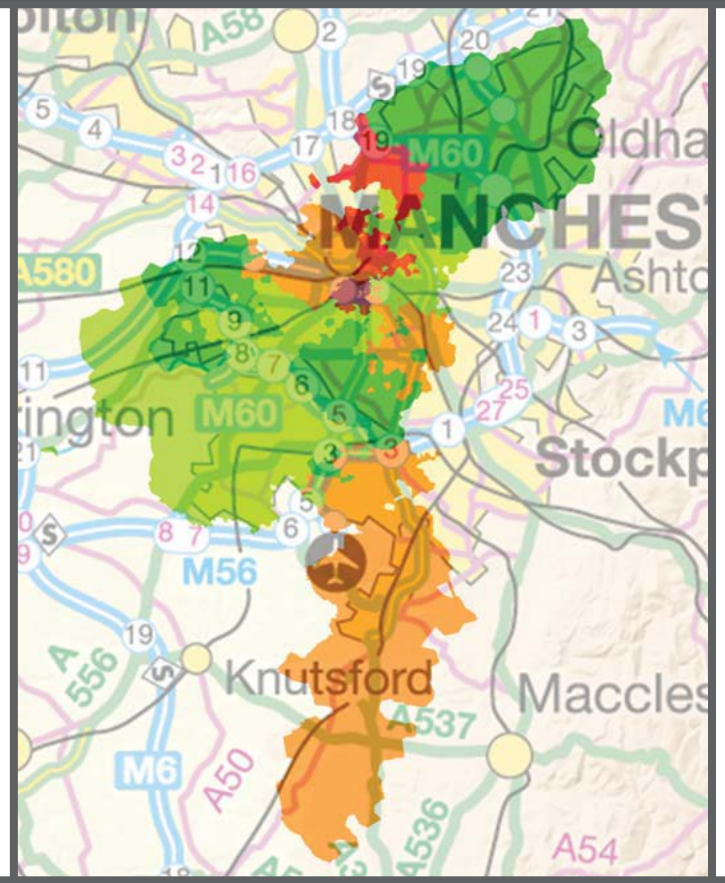
Existing distributed generation

**140 MW**

| Future demand | | Future distributed generation | |
|---|---|---|---|
| **2023** | **2050** | **2023** | **2050** |
| x **140%** on average | x **170%** on average | x **300%** | x **390%** |
| up to x **280%** | up to x**280%** | | |

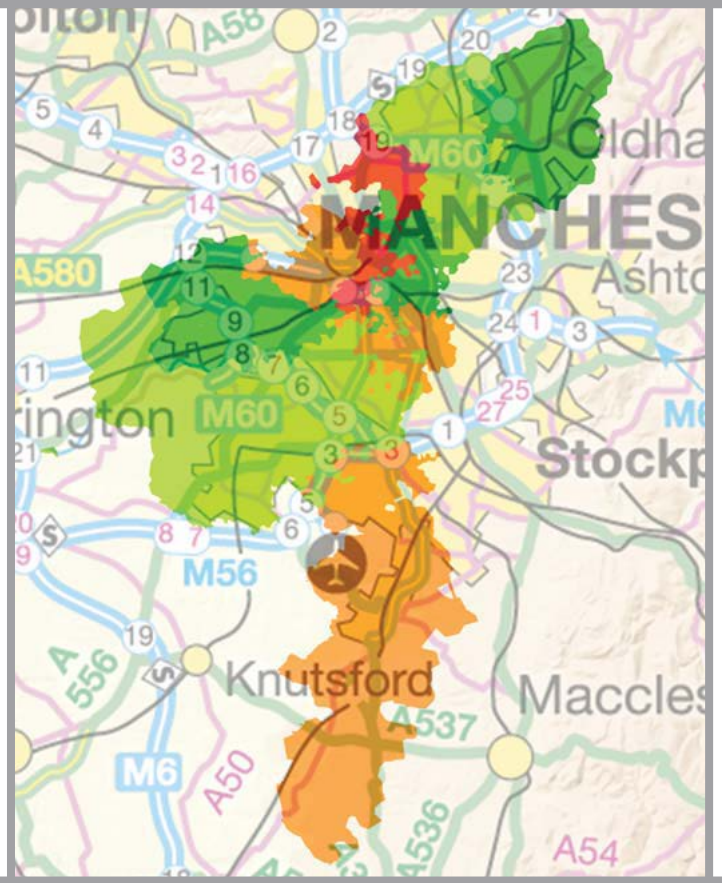
# DFES and regional insights – Manchester region

## 2023 primary capacity




We are strategically investing to provide additional primary capacity so the region can realise its development ambitions

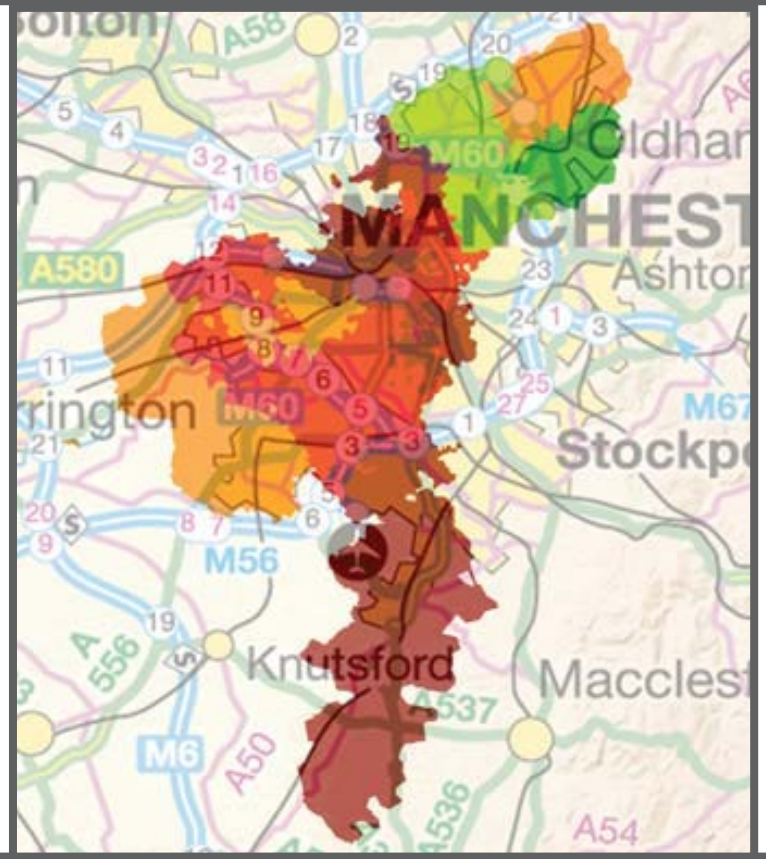
## 2023 BSP capacity




The additional capacity created by the upgrade of Stuart St BSP will play a key role in alleviating city centre overloading

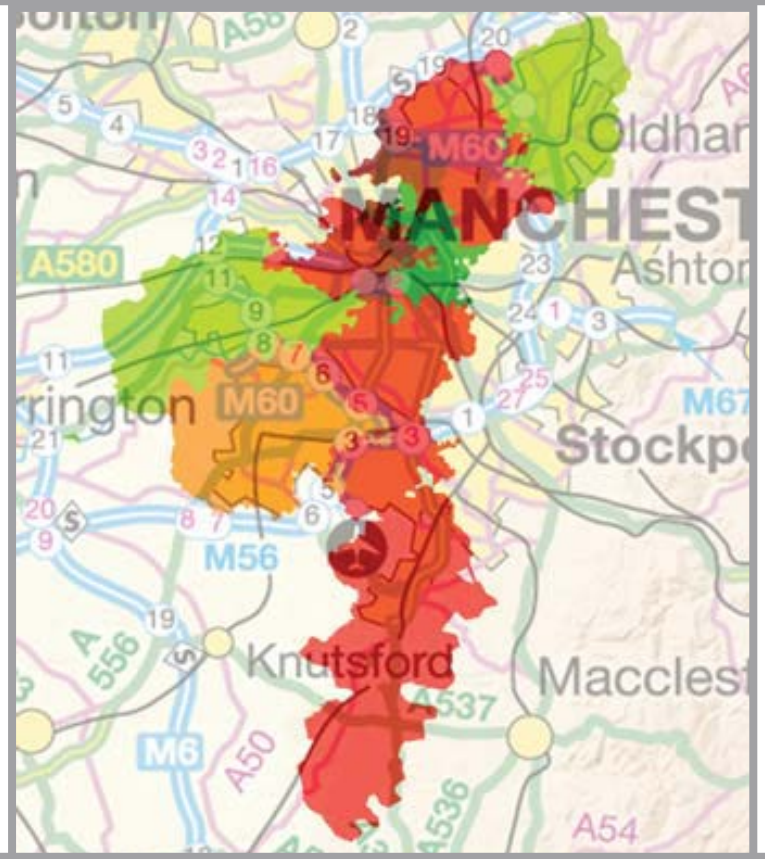
# DFES and regional insights – Manchester region

## 2050 primary capacity




Need for investment in the region's primary distribution capacity is driven by demand due to the ambitious plans for development of the region

## 2050 BSP capacity




Low-regret short-term reinforcement of the region's BSP capacity is required considering the extent of the projected overloads in neighbouring areas

# DFES and regional insights – Peak region

456,000 customers

Area 1,150km$^2$

- Rural and urban areas
- Mainly overhead line
- Local Enterprise Partnership, D2N2, Energy Efficiency scheme

Existing demand

**Peak 828 MW**

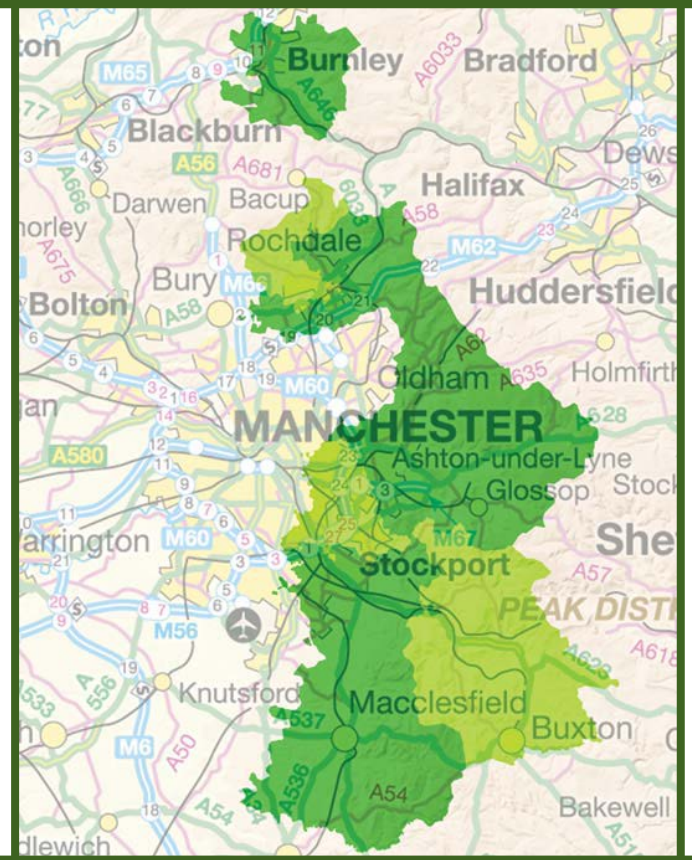
Existing distributed generation

**120 MW**

| Future demand | | Future distributed generation | |
|---|---|---|---|
| **2023** x **115%** on average up to x **135%** | **2050** x **140%** on average up to x**210%** | **2023** x **270%** | **2050** x **370%** |

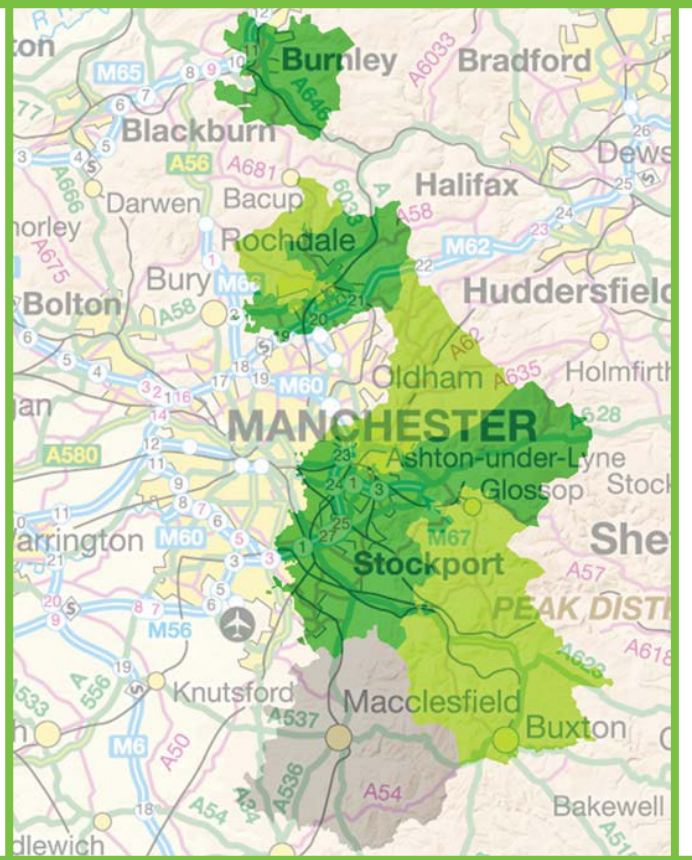
# DFES and regional insights – Peak region

## 2023 primary capacity




Primary capacity is sufficient to meet forecast demand growth until at least 2023

## 2023 BSP capacity




There is sufficient BSP capacity in the short-term

# DFES and regional insights – Peak region

## 2050 primary capacity


Long-term forecasts predict overloading of primary capacity in the south and on the border with central Manchester

## 2050 BSP capacity


BSP capacity will be sufficient to accommodate forecast demand growth except at Buxton where intervention will be required

# DFES and regional insights – summary


Provide understanding of the impact of future load and generation in the area

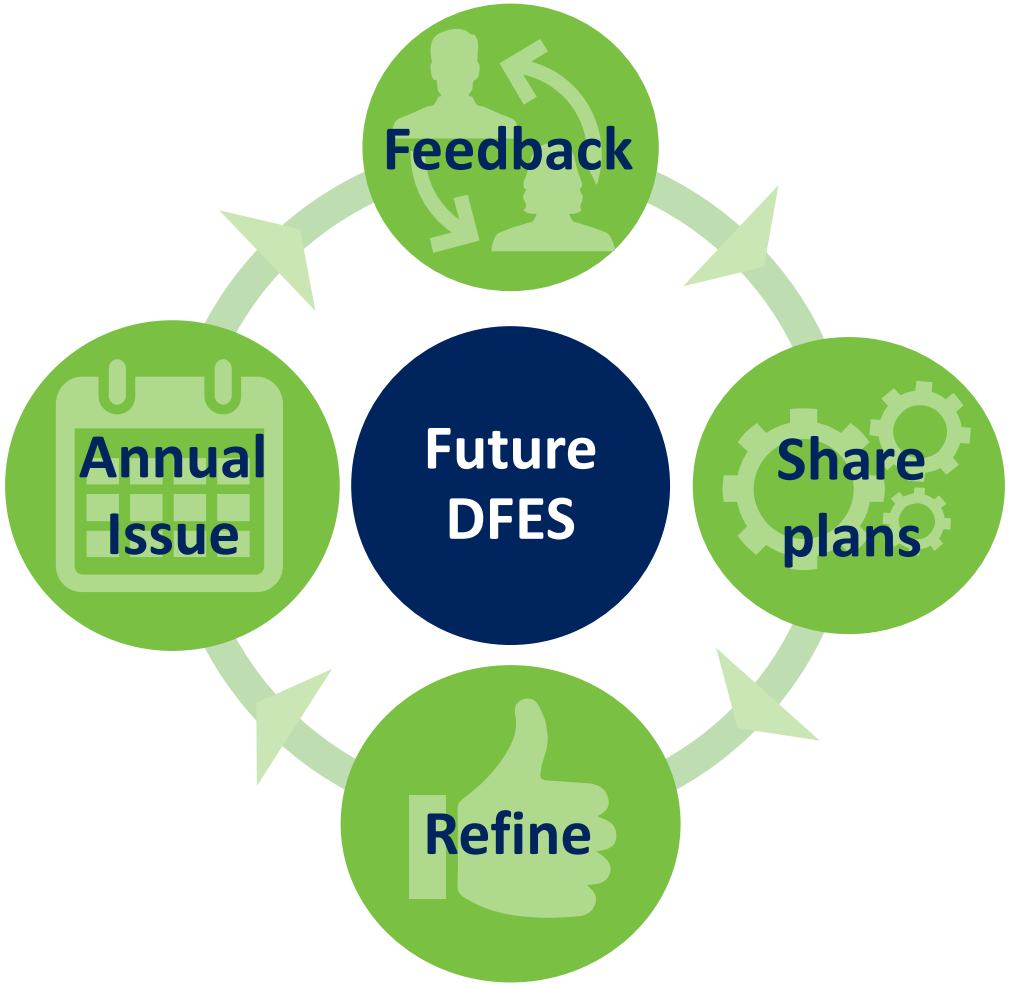
Confirms justification for our planned reinforcement projects

Inform our strategy for ensuring our network continues to be safe, reliable, affordable and sustainable for all outcomes

Results and network needs are heavily scenario dependent

# DFES and regional insights – looking forward

"Working closely with stakeholders is important to us as we work to meet the changing needs of our customers, support local economic development and transition to a low carbon future."




We will publish our DFES annually

We would appreciate your feedback

Stakeholder information will assist with continual improvements

We will refine our forecasts and strategy according to our stakeholders' development plans to support them better

We are keen to understand how your pipelines are developing

Please engage further via our existing stakeholder forums

# Q&A panel

**Victoria Turnham**
Strategic Planning Manager

**Simon Brooke**
Capacity Strategy Manager

**Christos Kaloudas**
Forecasting Manager

**Gill Williamson**
Strategic Planning

**Submit written questions online**

**Please complete the post-webinar poll after the Q&A session**

# For more information

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