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# Distribution Future Electricity Scenarios and Regional Insights

Webinar

28<sup>th</sup> March 2019

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Welcome to our  
webinar

**Victoria Turnham**  
*Strategic Planning  
Manager*



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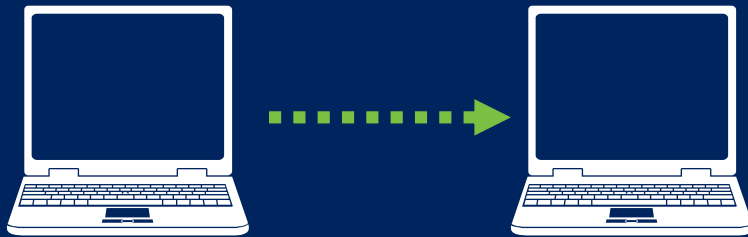
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30 minutes presentation



20 – 30 minutes  
questions & answers



Submit written questions  
online during the webinar



**Victoria  
Turnham**  
Strategic  
Planning  
Manager



**Simon  
Brooke**  
Capacity  
Strategy  
Manager



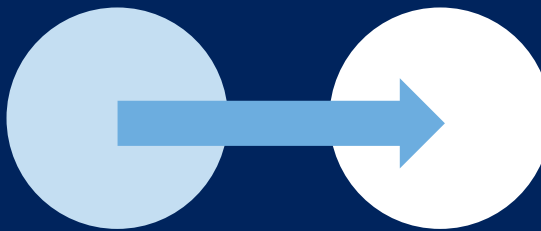
**Christos  
Kaloudas**  
Forecasting  
Manager



**Gill  
Williamson**  
Strategic  
Planning



Objectives



Transition to DSO



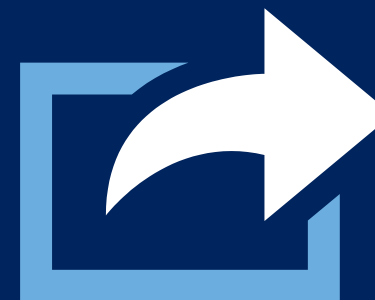
Background



Scenarios & forecasts



Regional insights



Summary & look forward



Introduce our  
scenarios and  
forecasts

Explain how we use  
our forecasts

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



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

Key challenge: To provide all network capacity users require, without expensive additional infrastructure

DSOs required to actively balance capacity, on a minute-by-minute basis, using real time data and automated technology

Achieved by establishing local markets where providers of flexibility services can sell this flexibility

The DSO will create this market and buy flexibility

To enable this transition DSO must become trusted facilitator and advisor

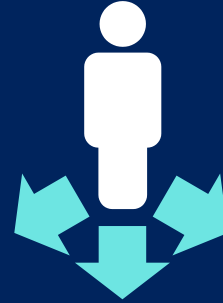




**Provide information**  
on our forecasts  
and share our  
insights into  
regional impacts



**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



**2.4**  
million  
customers

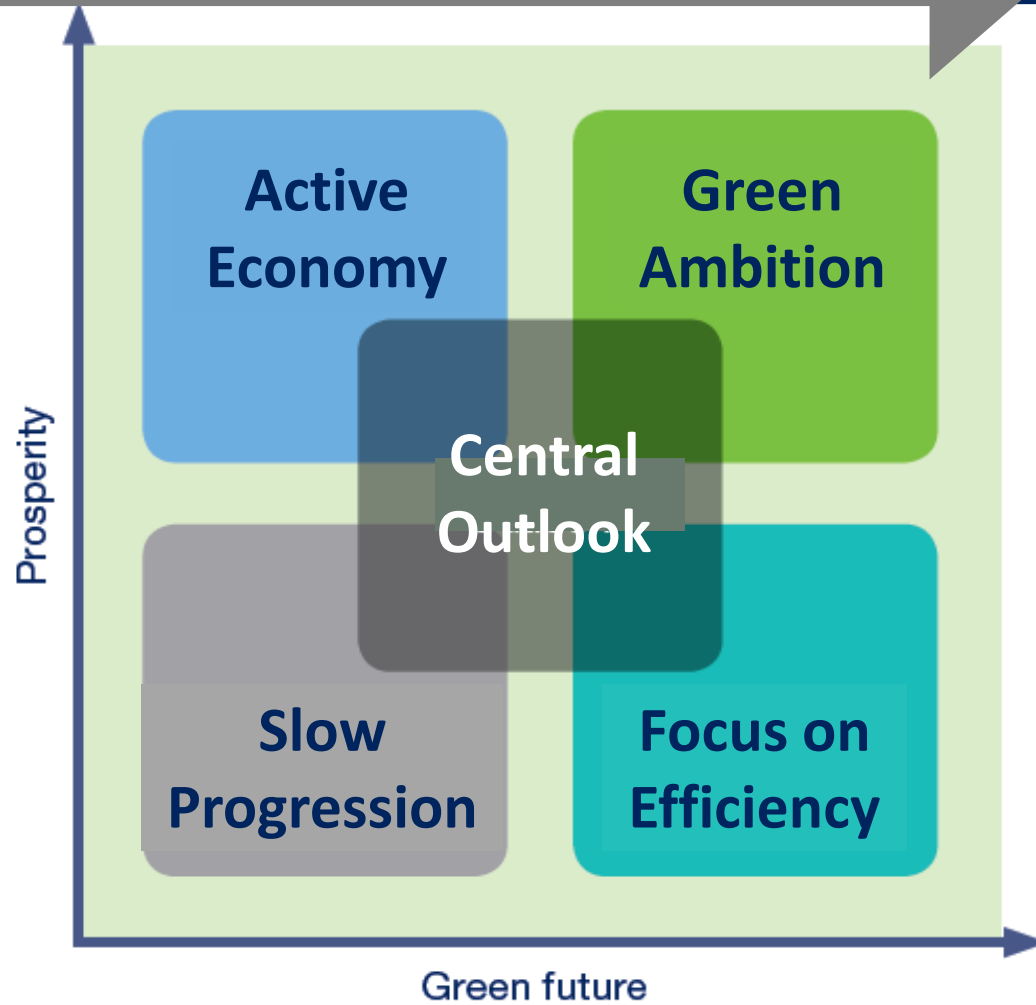
Max demand  
**4.4 GW**

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

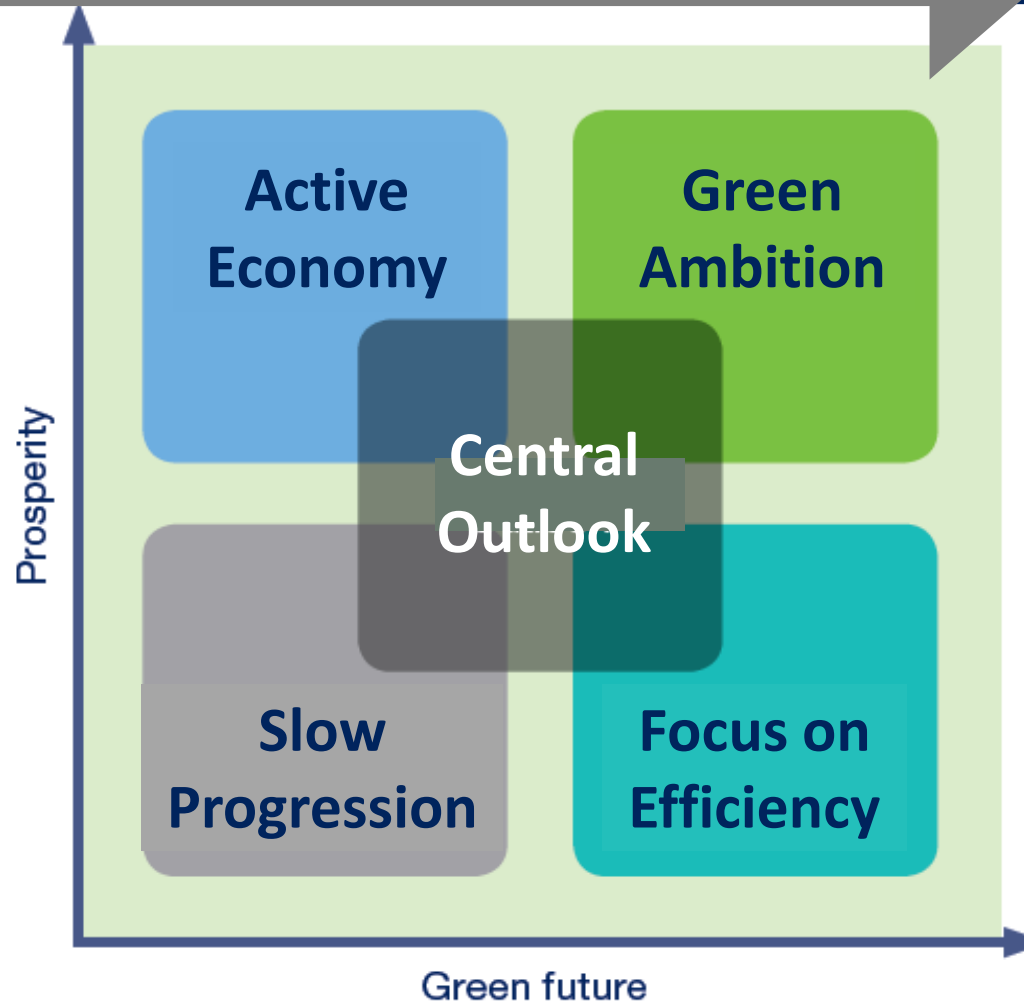






Scenarios

Forecasts



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



## Drivers

- 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

## Scenarios

## Forecasts



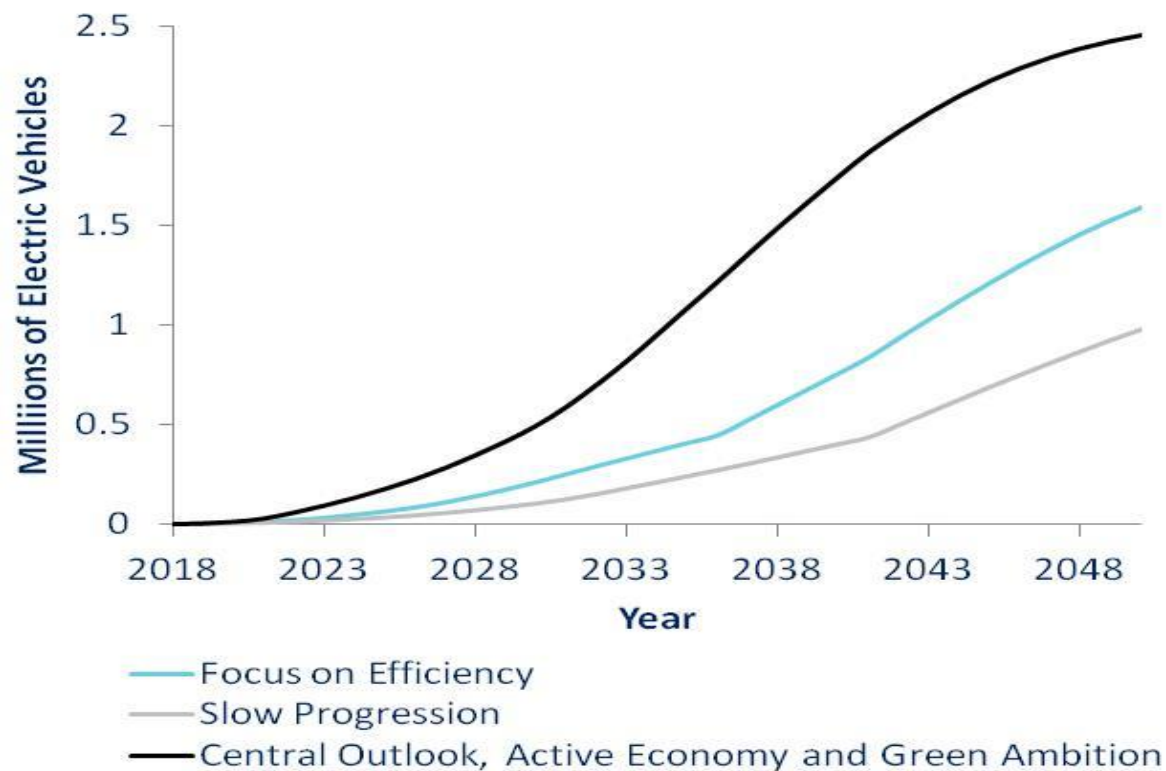
## Peak demand forecasts for all Electricity North West scenarios



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



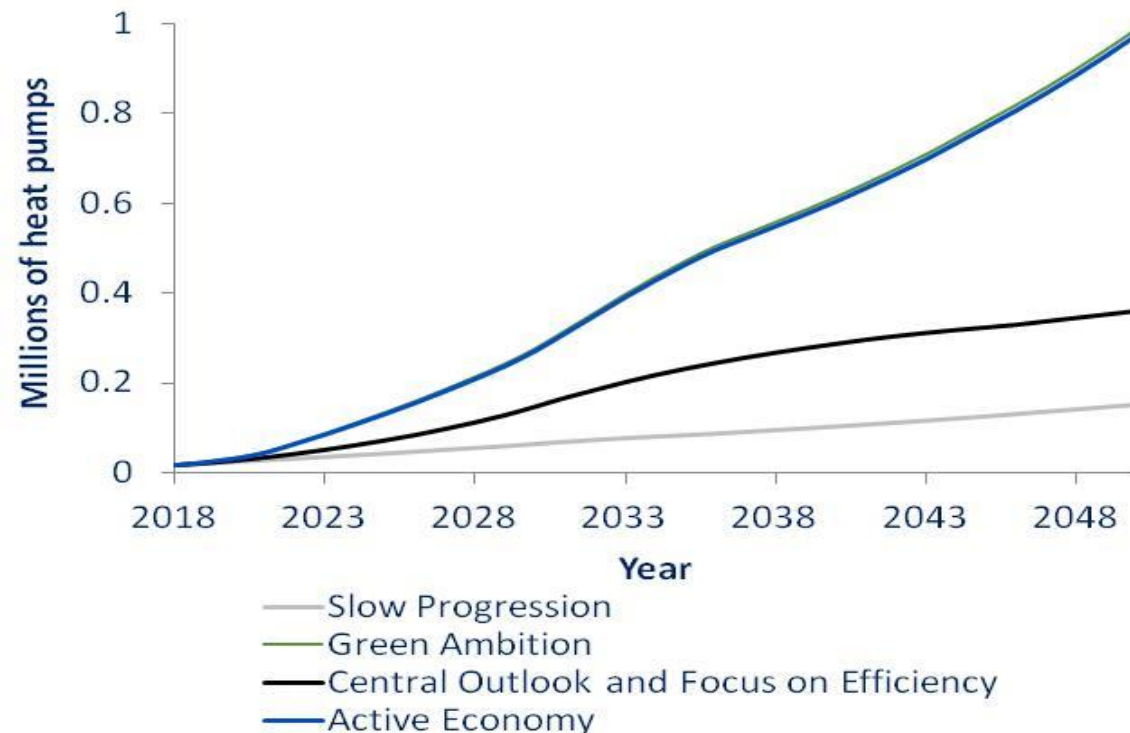
## Future numbers of electric vehicles



Every customer could have an electric vehicle by 2050



## Future numbers of heat pumps



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



## Distributed generation forecasts for all Electricity North West scenarios

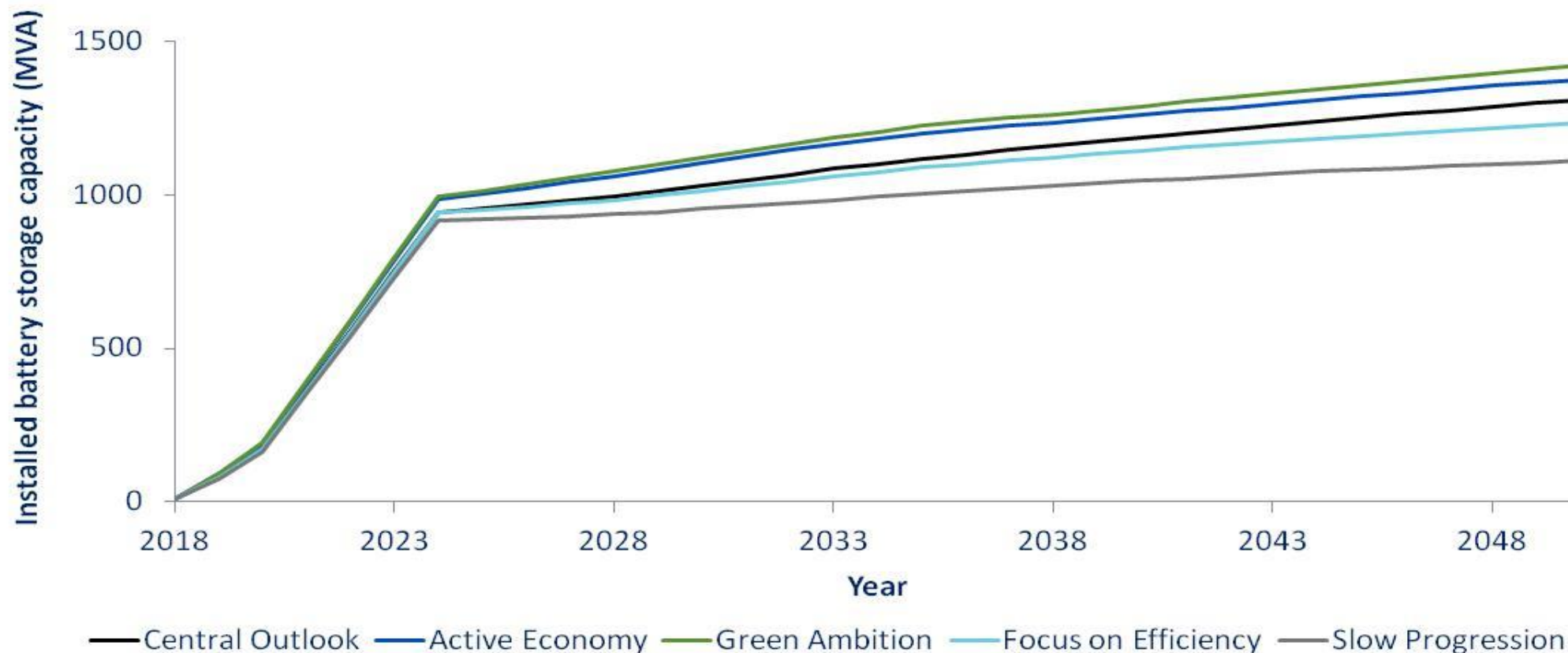


Under all scenarios, renewable generation connected to our distribution network continues to grow significantly beyond that already planned





## 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



Reactive power demand in our region is predicted to decrease



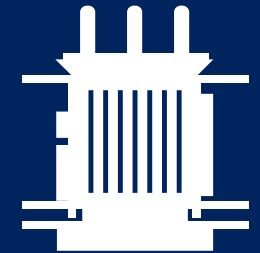
The amount of reactive power and the length of time when it flows from our network to National Grid's transmission network are expected to increase



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

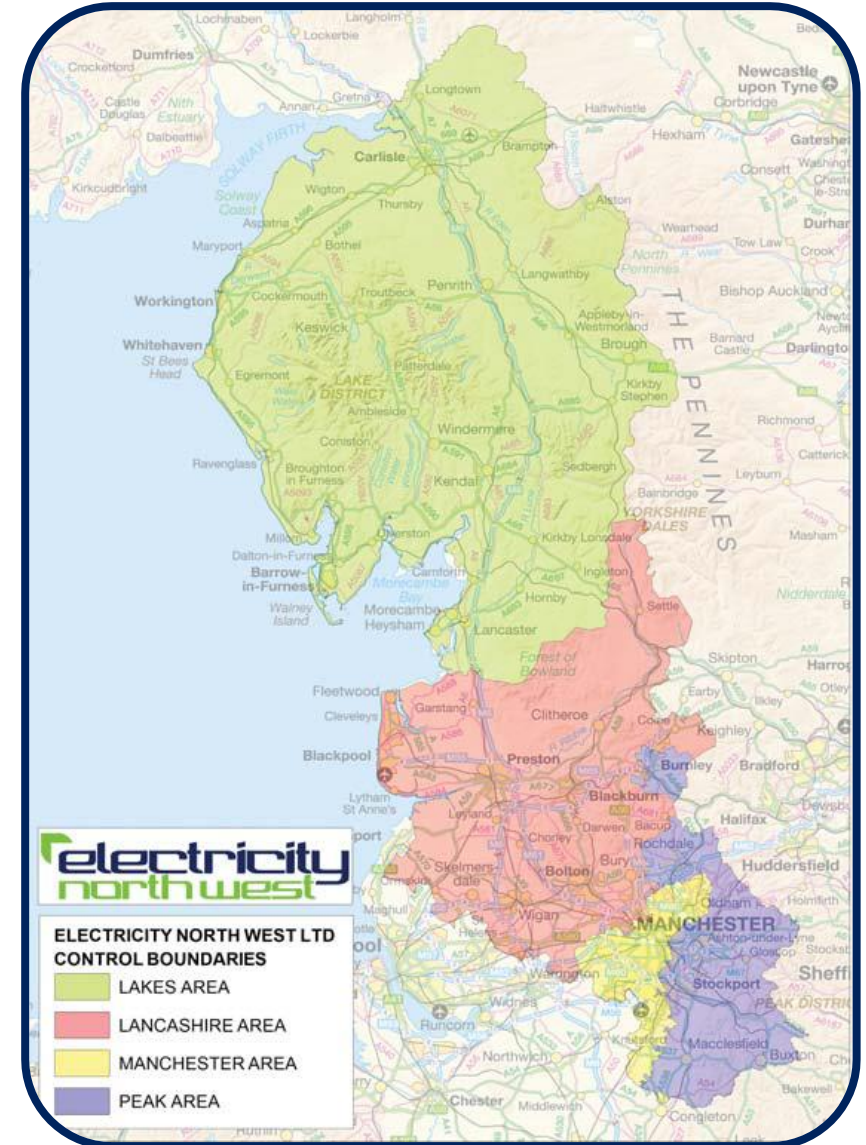


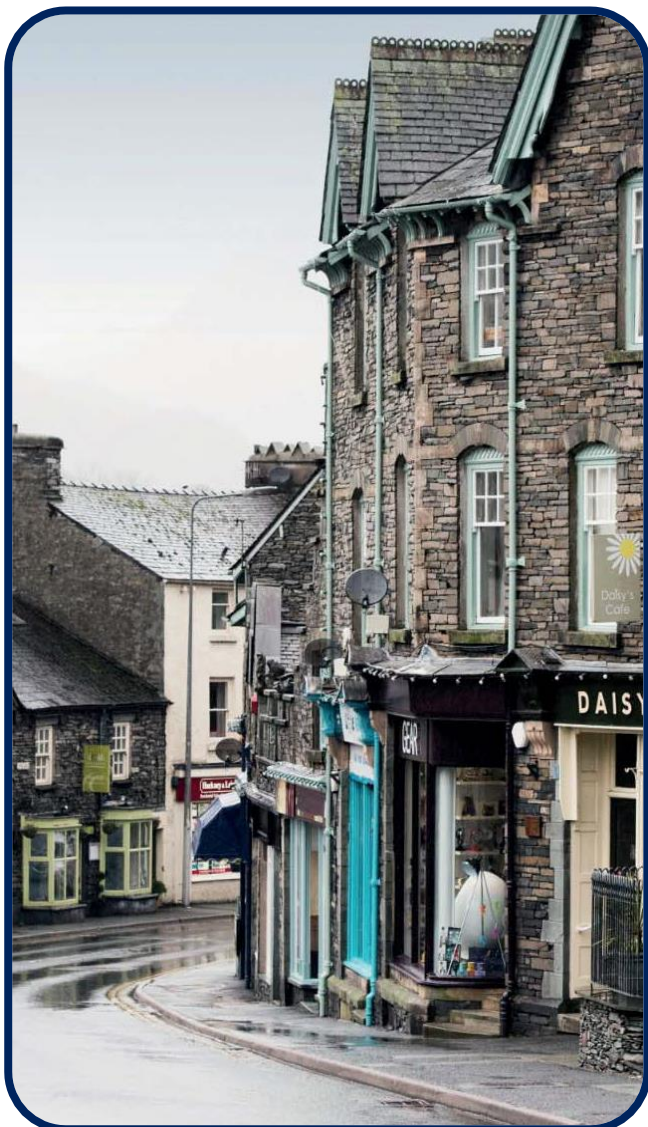
## Planning strategy

- 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)





286,000  
customers



Area  
7,400km<sup>2</sup>

- 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

Future distributed generation

**2023**

x **110%** on  
average

up to  
x **150%**

**2050**

x **140%** on  
average

up to  
x **190%**

**2023**

x **170%**

**2050**

x **255%**

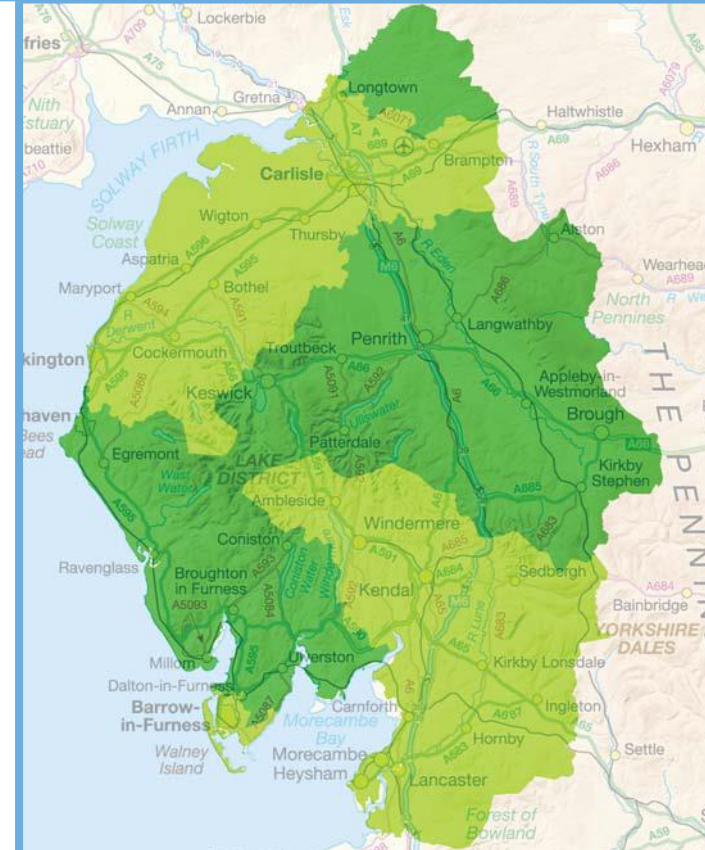


## 2023 primary capacity



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

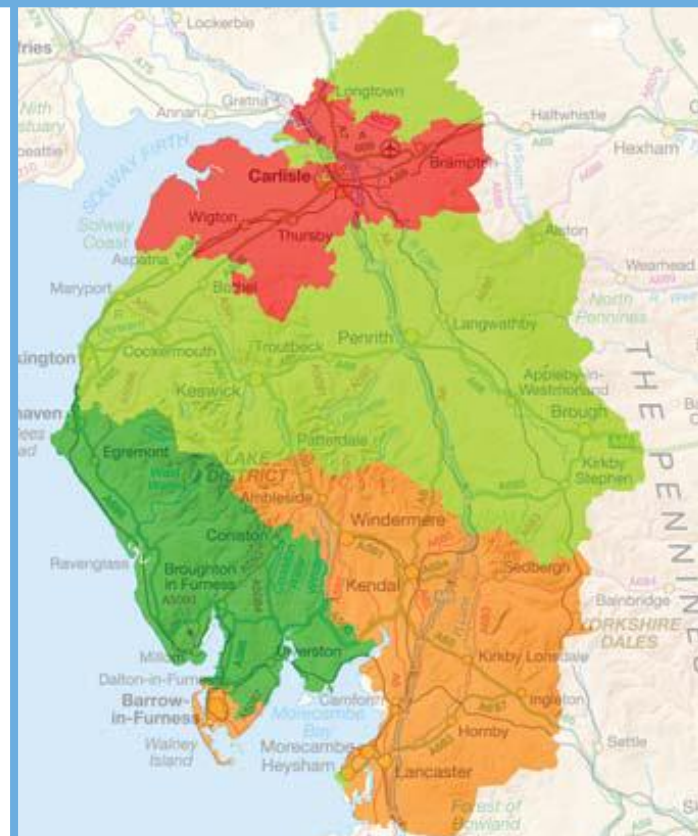


## 2050 primary capacity



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<sup>2</sup>

- 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

Future distributed generation

**2023**  
x **115%** on  
average  
  
up to  
x **330%**

**2050**  
x **150%** on  
average  
  
up to  
x **365%**

**2023**  
x **260%**

**2050**  
x **400%**

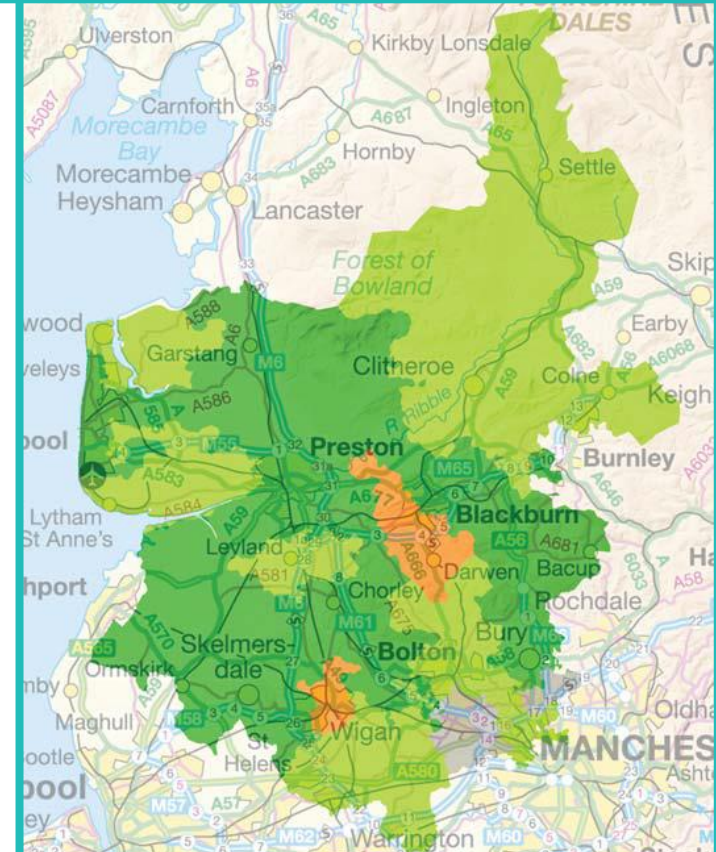


## 2023 primary capacity



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





## 2050 primary capacity



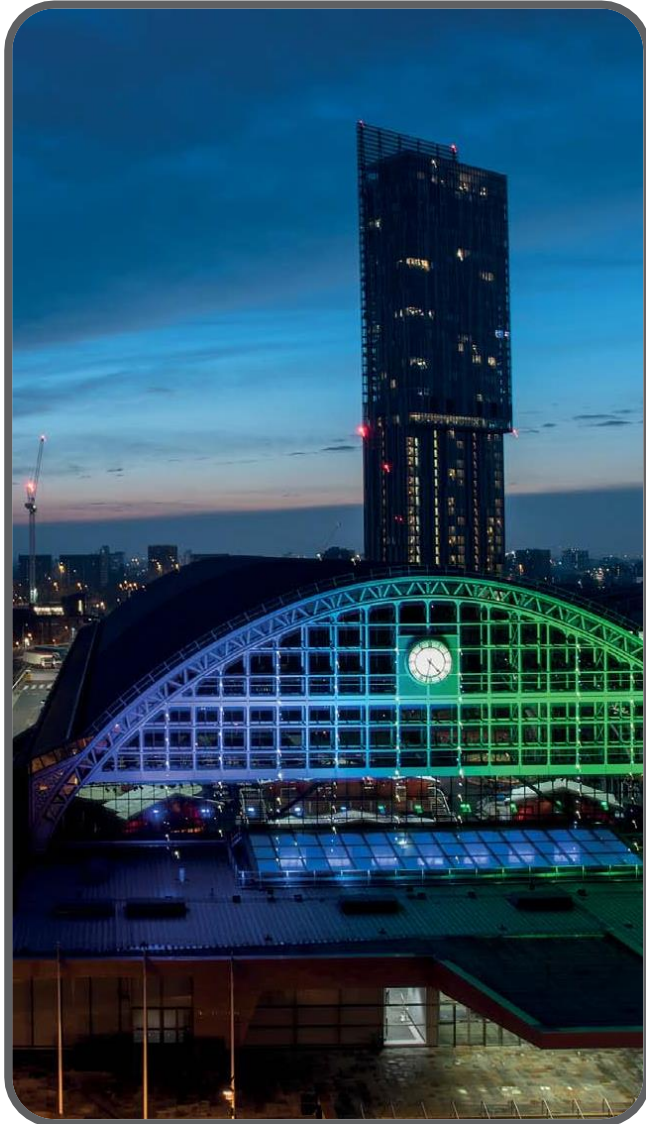
Long-term overloading is expected in central and southern areas of Lancashire

## 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<sup>2</sup>

- 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**  
x **140%** on  
average  
  
up to  
x **280%**

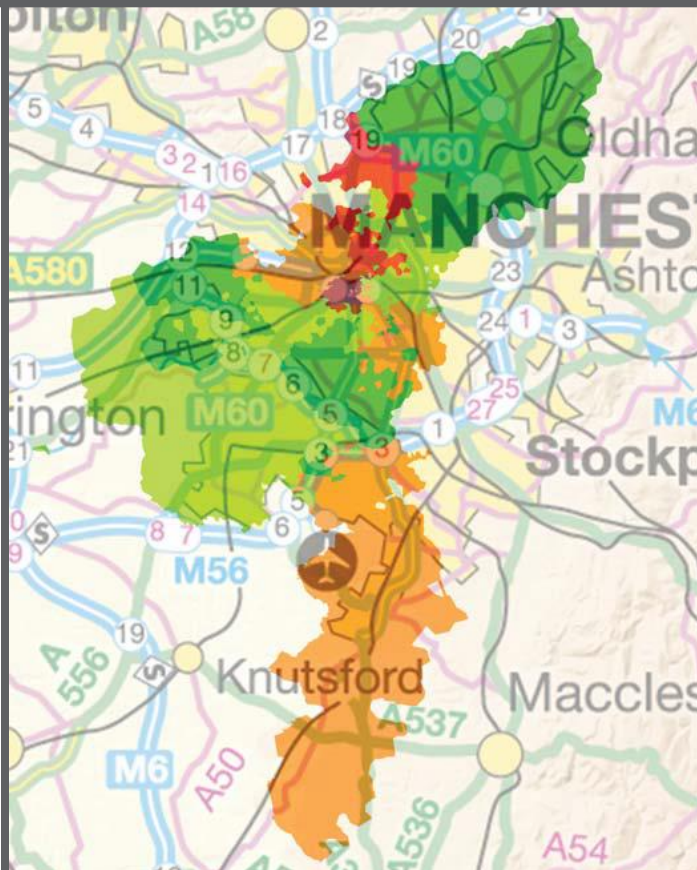
**2050**  
x **170%** on  
average  
  
up to  
x**280%**

**2023**  
x **300%**

**2050**  
x **390%**

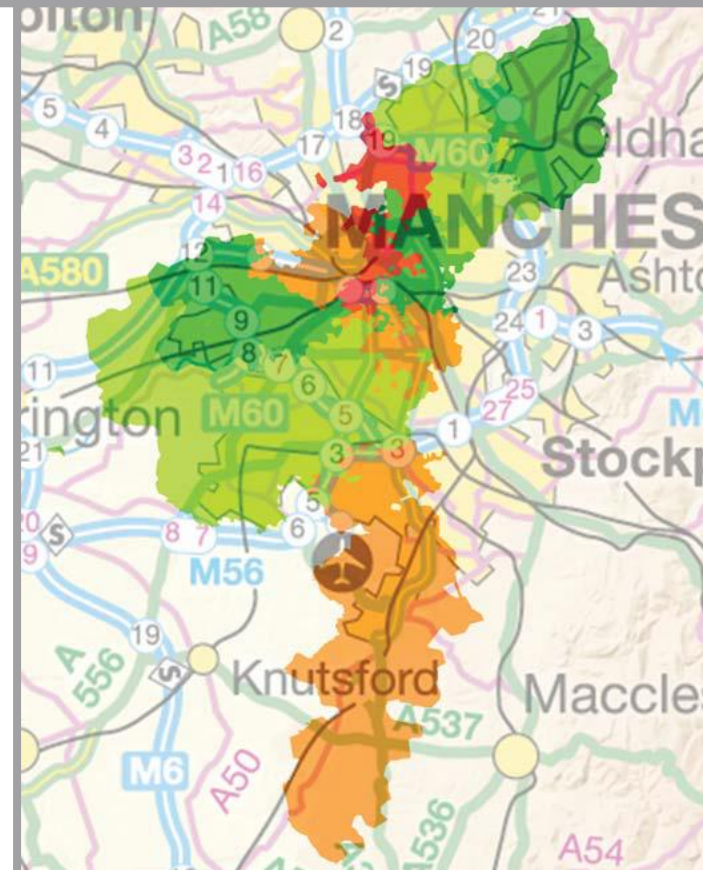


## 2023 primary capacity



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

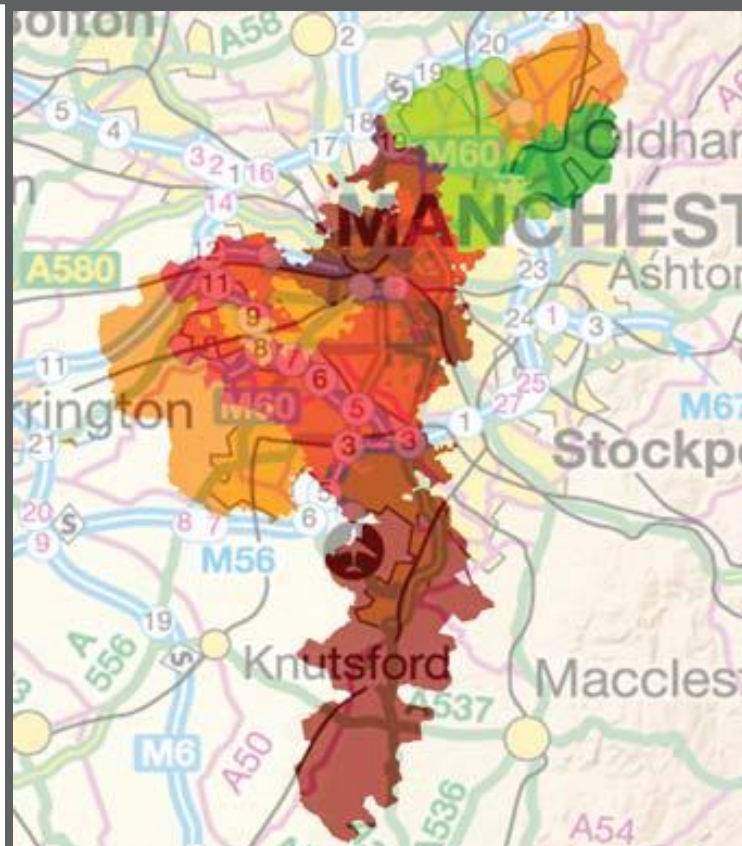
## 2023 BSP capacity



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

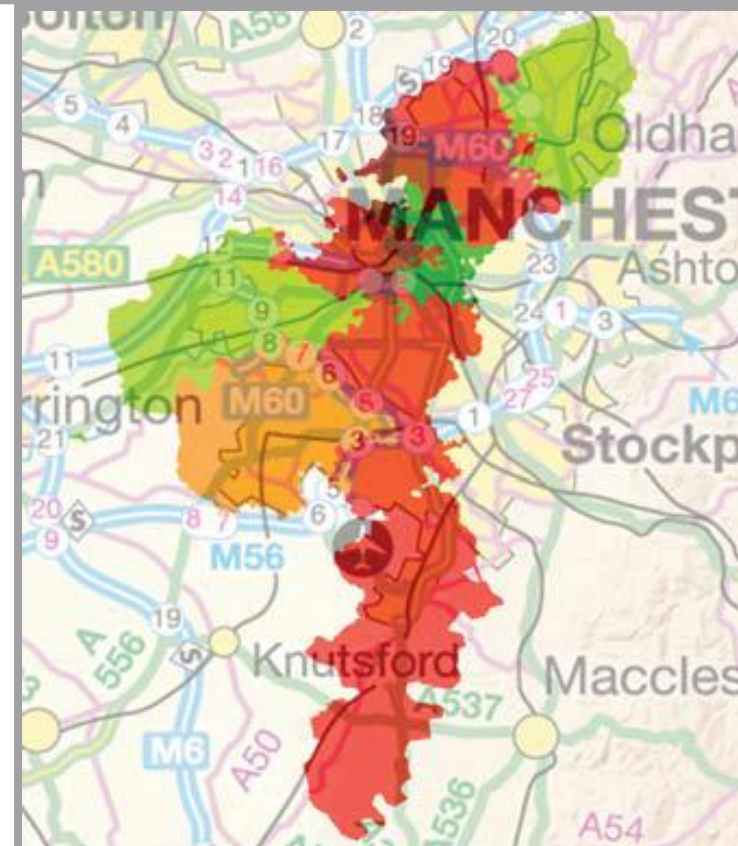


## 2050 primary capacity



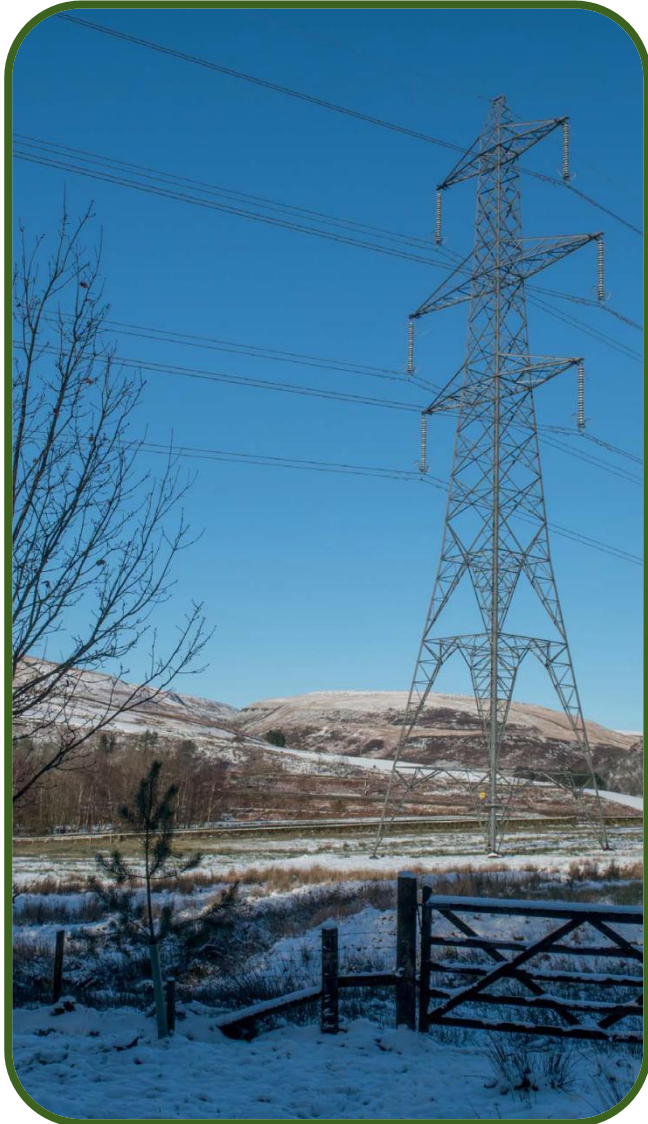
Need for investment in the region's primary distribution capacity is driven by demand due to the ambitious plans for development of the region

## 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<sup>2</sup>

- 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%**

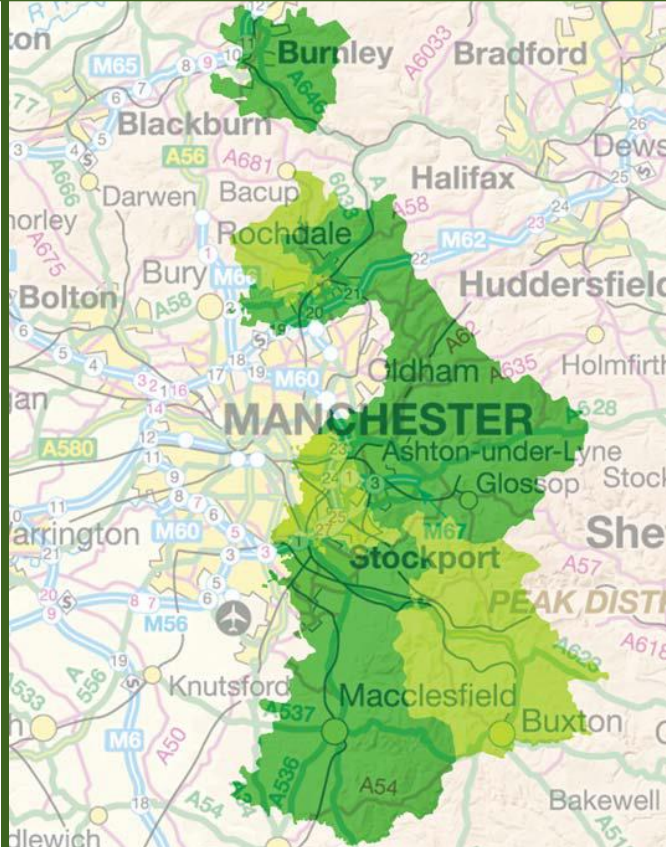
**2050**  
x **140%** on  
average  
  
up to  
x**210%**

**2023**  
x **270%**

**2050**  
x **370%**

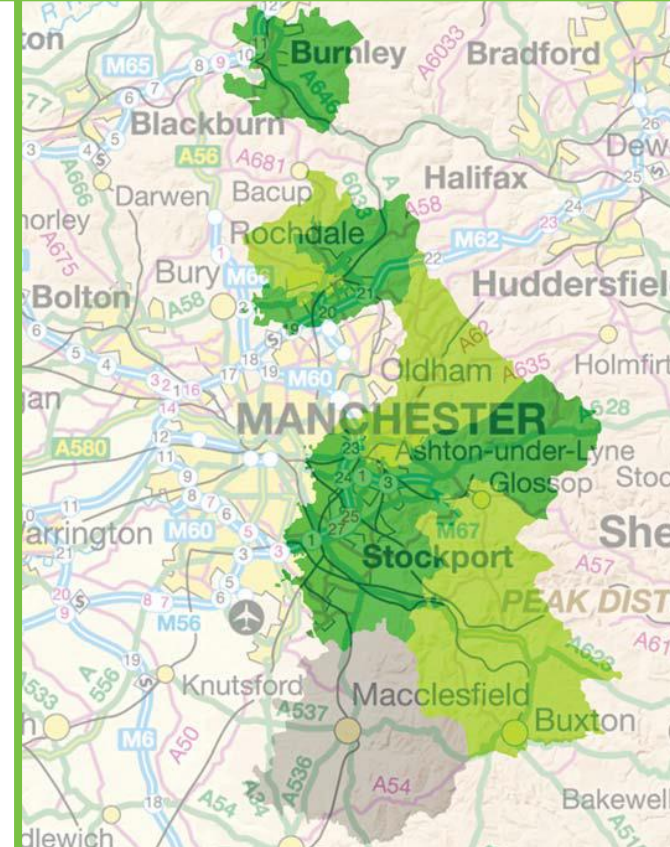


## 2023 primary capacity



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



## 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



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

Confirms justification for our planned reinforcement projects

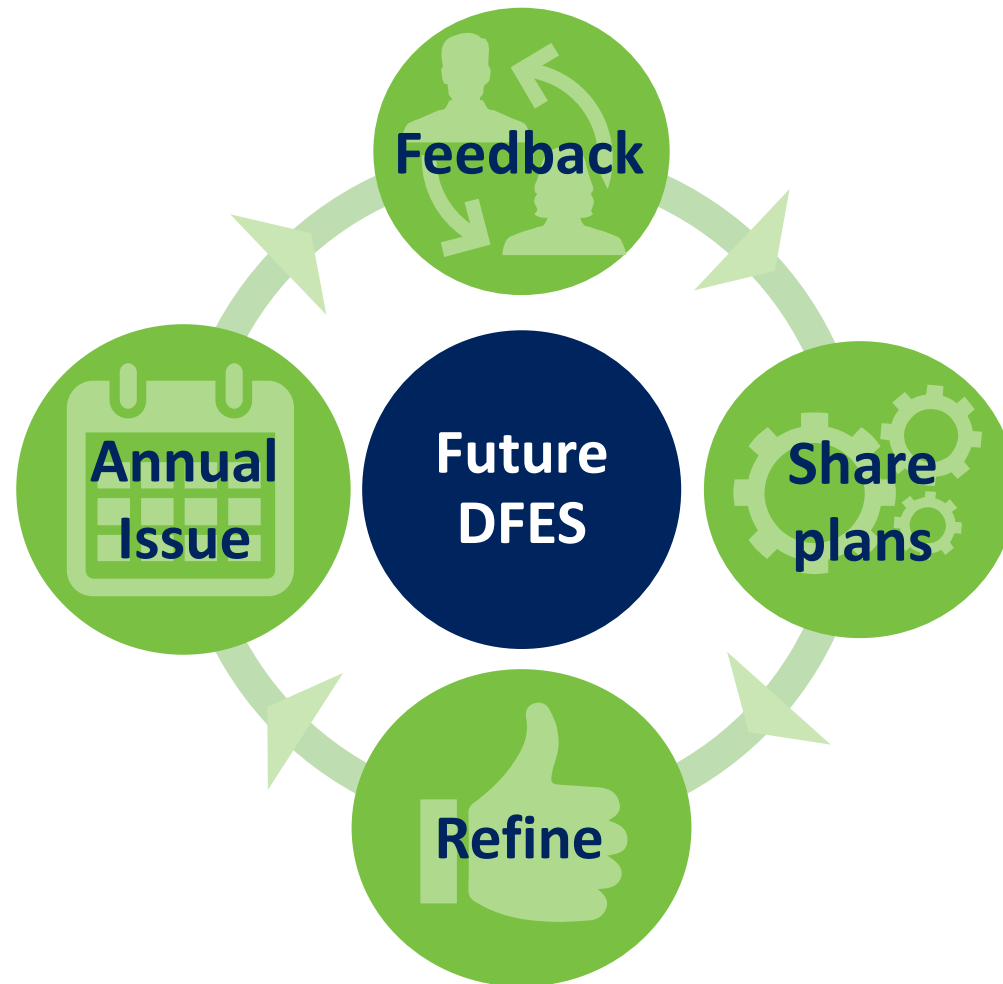
Inform our strategy for ensuring our network continues to be safe, reliable, affordable and sustainable for all outcomes

Results and network needs are heavily scenario dependent





“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



**Victoria  
Turnham**  
Strategic  
Planning  
Manager



**Simon Brooke**  
Capacity  
Strategy  
Manager



**Christos  
Kaloudas**  
Forecasting  
Manager



**Gill Williamson**  
Strategic  
Planning



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