Distribution Future Electricity Scenarios and Regional Insights

Webinar
28th March 2019
Welcome to our webinar

Victoria Turnham
Strategic Planning Manager
Webinar format

30 minutes presentation

20 – 30 minutes questions & answers

Submit written questions online during the webinar
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

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

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
coordination 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**

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<td>Solar</td>
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<td>Battery energy storage</td>
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DFES and regional insights – scenarios and forecasts

Scenarios

Prosperity

Green future

Active Economy

Green Ambition

Central Outlook

Slow Progression

Focus on Efficiency

Forecasts
DFES and regional insights – scenarios and forecasts

- Active Economy
- Green Ambition
- Central Outlook
- Slow Progression
- Focus on Efficiency

Forecasts:
- Electrical demand
- Distributed generation
- Reactive power
- Energy storage
DFES and regional insights – scenarios and forecasts

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

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

**Forecasts**
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

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
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% 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

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)

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

Planning strategy
- Flexibility services
- Network reinforcement
- Whole system solutions

Electricity demand
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- Battery storage
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Network impacts
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Planning strategy
- Flexibility services
- Network reinforcement
- Whole system solutions

Electricity North West LTD
CONTROL BOUNDARIES
- LAKES AREA
- LANCASTER AREA
- MANCHESTER AREA
- PEAK AREA
### DFES and regional insights – Cumbria region

- **286,000 customers**
- **Area 7,400km²**
- **Future demand**
  - **Peak** 720 MW
  - **Existing demand**
  - **Future distributed generation**
    - **Existing distributed generation** 480 MW
    - **2023** x 110% on average up to x 150%
    - **2050** x 140% on average up to x 190%
    - **2023** x 170% up to x 255%

- **Very low customer density**
- **Nature of the region makes it attractive to DG developers**
- **Cumbrian Local Energy Plan seeks more DG**
Overall, sufficient capacity to accommodate 2023 forecast demands and generation is likely to be a bigger influence on network developments.

Moorside nuclear power station introduces uncertainty into our expectations for how the Cumbrian network will cope with forecast demand and generation.
Primary capacity is expected to be mainly sufficient for our long-term forecast demand and network enhancements will be required to accommodate generation. 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

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

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Existing distributed generation 370 MW

Future distributed generation

2023 x 260%

2050 x 400%
Primary capacity is sufficient to meet the predicted short-term growth in demand, however localised overloads may occur.

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

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

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<th>Peak</th>
<th>Future demand</th>
<th>Future distributed generation</th>
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<tr>
<td>581,000 customers</td>
<td>910 MW</td>
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<td>Area 430km²</td>
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### Existing distributed generation
- 140 MW

### Future demand
- **2023**
  - x 140% on average
  - up to x 280%
- **2050**
  - x 170% on average
  - up to x 280%

### Future distributed generation
- **2023**
  - x 300%
- **2050**
  - x 390%
We are strategically investing to provide additional primary capacity so the region can realise its development ambitions.

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

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

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<th>Future distributed generation</th>
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<td><strong>Existing demand</strong></td>
<td><strong>120 MW</strong></td>
<td><strong>2023</strong></td>
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<td><strong>Existing distributed generation</strong></td>
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<td><strong>2023</strong></td>
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#### Existing demand

- **456,000 customers**
- **Area 1,150km²**

#### Future demand

- **2023**
  - x 115% on average
  - up to x 135%
- **2050**
  - x 140% on average
  - up to x 210%

#### Future distributed generation

- **2023**
  - x 270%
- **2050**
  - x 370%
Primary capacity is sufficient to meet forecast demand growth until at least 2023.

There is sufficient BSP capacity in the short-term.
Long-term forecasts predict overloading of primary capacity in the south and on the border with central Manchester.

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
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.
Submit written questions online
Please complete the post-webinar poll after the Q&A session
For more information

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