The transition from DNO to DSO – what could it mean for community and local energy?

#CEconf18
Transition to a Distribution System Operator – a collaborative approach

Cara Blockley,
Central services manager
From DNO to DSO

Old Distribution Network Operator model

- Low numbers of connections
- Relatively easy to connect more demand
- Limited customer engagement
- Reactive management
- Network sized to cope with peak winter demand
- Very little renewable generation

New Distribution System Operator model

- Energy flows in multiple directions
- Huge increase in number of renewable connections
- Increasingly complex to manage supply and demand
- Need to build relationships, and facilitate competition and innovation
- Much higher use of electricity for electric vehicles and heat

Electricity distributors will need to play a more sophisticated role
### Our guiding principles

<table>
<thead>
<tr>
<th>Neutral, but not silent</th>
<th>Network automation</th>
<th>Collaboration</th>
<th>No regrets</th>
<th>Everyone’s included</th>
<th>Affordable and efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>We want to be a trusted source of information, helping to demystify the new, complex energy market, while remaining commercially neutral</td>
<td>We will provide sophisticated, automated network services that can meet the needs while keeping costs affordable</td>
<td>We will work with North West stakeholders and collaborate with them to develop local and regional solutions to deliver against devolved and national policy</td>
<td>We will work with stakeholders and customers to plan in a sensible, informed way which will facilitate the development of flexible markets in our region</td>
<td>We are committed to ensuring that the poorest in society are not disadvantaged by energy sector developments and have opportunities to secure benefits</td>
<td>We will continue to focus on value for money and on making efficient investment decisions</td>
</tr>
</tbody>
</table>
DSO transition

- Flexible connections
- Flexibility services
- ANM

Current

2019 – 2020

- Wider ANM rollout
- TSO-DSO interface
- Regional needs/heat maps

2020 – 2023

- Further investment in DSO
- Full ANM & DER services
- Network visibility/online PoC

2024 - 2030

- DSO commercial operations are core business capability
- Active system management
### What we’ve already delivered

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Improved data quality and network connectivity</td>
<td>Cleansed network data – reliable network model is key foundation for DSO services</td>
</tr>
<tr>
<td>Better use of network analysis tools</td>
<td>Better understanding of load flow and fault levels</td>
</tr>
<tr>
<td>Implementing CLASS</td>
<td>Uses voltage to manage energy consumption and allow us to offer capacity services to the National Grid</td>
</tr>
<tr>
<td>Flexible connections</td>
<td>Choice of connection type</td>
</tr>
<tr>
<td>Control room data integration</td>
<td>New interface ensures that we’re better able to manage impact of network events on customers</td>
</tr>
<tr>
<td>Improved network automation</td>
<td>Automatic Restoration System has significantly improved customer impact of faults on high voltage network</td>
</tr>
<tr>
<td>Enabled Respond</td>
<td>Active fault level management that avoids traditional network reinforcement</td>
</tr>
<tr>
<td>Smart meter integration</td>
<td>Will give better visibility of the performance of the whole system and enhance the decision-making capacity of network operators.</td>
</tr>
<tr>
<td>What we are currently working on</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Active network management (ANM)</td>
<td>Transmission operator interface balancing</td>
</tr>
<tr>
<td>Looking ahead capability</td>
<td>Forecasting</td>
</tr>
<tr>
<td>Contract management and curtailment index</td>
<td></td>
</tr>
<tr>
<td>Distributed energy resource management</td>
<td></td>
</tr>
<tr>
<td>Capacity mapping</td>
<td>Industry data flows</td>
</tr>
<tr>
<td>Automated point of connection</td>
<td>Sentinel integration</td>
</tr>
</tbody>
</table>
Transition to DSO – community and local energy
Delivering value for our stakeholders

‘Our vision for the north of England is that by 2050 we will be the leading low-carbon energy region in the UK, with an energy economy worth £15 billion per annum and 100,000 green jobs providing affordable, clean energy for people and businesses across the North.’

Northern Energy Taskforce
# Listening to our customers’ priorities

<table>
<thead>
<tr>
<th>KEY DSO THEMES</th>
<th>% OF BUDGET CUSTOMERS ALLOCATED TO THEIR PRIORITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability and availability</td>
<td>27.2</td>
</tr>
<tr>
<td>Affordability</td>
<td>10.3</td>
</tr>
<tr>
<td>Innovation and the future</td>
<td>9.6</td>
</tr>
<tr>
<td>Safety for both customers and staff</td>
<td>7.7</td>
</tr>
<tr>
<td>Looking after vulnerable customers</td>
<td>7.1</td>
</tr>
<tr>
<td>Better emergency resilience</td>
<td>6.7</td>
</tr>
<tr>
<td>Employability, workforce renewal and STEM</td>
<td>6.2</td>
</tr>
<tr>
<td>Cutting carbon footprint and other environmental impacts</td>
<td>5.9</td>
</tr>
<tr>
<td>Working closely with communities</td>
<td>5.2</td>
</tr>
<tr>
<td>Helping customers to be more aware of Northern Powergrid</td>
<td>4.0</td>
</tr>
<tr>
<td>Making it easier for customers to get in touch</td>
<td>3.4</td>
</tr>
<tr>
<td>Gaining more customer data</td>
<td>3.3</td>
</tr>
</tbody>
</table>
DSO brings a new service

**TODAY**
- Keeping the lights on
- Hooking people up

Customers pay us

**FUTURE**
- Local balancing

We pay customers

‘Fit and forget’

Active customers and network
DSO – Developing our thinking

Scoping the future

- Solving the big open questions of market design and industry architecture

Building new capability

- Innovating with new services
- Providing new infrastructure and processes

Getting on with it

- Low regrets steps to demonstrate and learn
Societal changes: vehicles as a source of value for the energy system

Collaboration between motor manufacturers, vehicle users and energy companies

Vehicle-to-grid technology trials informing future network scenarios
Scoping the future: community energy solar and storage

- Batteries installed in 40 council owned homes in Oxspring village outside Barnsley
- Aims to reduce customer electricity bills
- Using batteries to manage peak solar output
- Reduce reinforcement works – cost and disruption
- 2030: 70-80% of rooftop PV installed with storage
- Ensuring that everyone benefits from the transition to a smarter more flexible energy system
Customer activity one day in August...

- Strong consumption and a low battery capacity in the morning
- Charging battery through day and supplying house evening load
...with voltage at the substation within limits
Scoping the future: using microgrids to boost resilience

TODAY

LV to Customers

FUTURE

LV to Customers

Loss of 11kV – Sensing & Synchronizing

Load Support & Balancing
Opportunities for community energy

- Facilitate our customers’ transition to a low carbon future at lowest cost
- Enable new local markets for peer-to-peer local trading
- Provide more value for customers by contracting for local grid balancing flexibility services
- Provide the physical trading platform for other parties in the energy market
- Keep the network stable and power supplies reliable
Community Energy Conference 2018:
Introduction to the Open Networks Project and the DSO Transition

Jim Cardwell, Head of Trading and Innovation, Northern Powergrid
Introduction to ENA

- 29 million electricity customers
- 21.5 million gas customers

- 180,000 miles of gas network
- 519,304 miles of electricity network
Open Networks – Delivering a Smart Grid

ENA’s Open Networks Project is a major energy industry initiative that will transform the way that both local Distribution Networks and national Transmission Networks will operate and work for customers. This is being driven by the 3D’s; digitisation, decentralisation and decarbonisation.

The Open Networks Project will help customers connect and realise value; as well as reducing cost for consumers through more cost effective planning.

The Open Networks Project is a key initiative to deliver Government policy set out in the Ofgem and BEIS Smart Systems and Flexibility Plan, the Government’s Industrial Strategy and the Clean Growth Plan.

Short Animation that can be found at: https://www.youtube.com/watch?v=8GxeWsppmB1
Definition of a DSO

A Distribution Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources (DER).

As a neutral facilitator of an open and accessible market, it will enable competitive access to markets and the optimal use of DER on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation.

A DSO enable customers to be both producers and consumers, enabling customer access, customer choice and great customer service.
What does the DSO look like?

In 2018, modelling potential DSO future worlds and impact assessment to feed Ofgem and BEIS policy direction:

- **DSO co-ordinates**
- **National system operator co-ordinates**
- **Joint Procurement**
- **Price Signal driven**
- **Flexibility Co-ordinators**
Stakeholder Input is Critical

Thus far, we have undertaken with the Advisory Group:

4 Advisory Group Meetings
3 Advisory Group Modelling Workshops
40 With over 40 different stakeholder attendees at these sessions

To the wider stakeholder community, we have:

Published a newsletter to 100s of stakeholder contacts.
Published our material on ENA website updates.
Conducted a stakeholder webinar with 45 attendees followed by 30 responses to commercial principle consultation.
How to get involved?

• Join our mailing list!
  • opennetworks@energynetworks.org

• All outputs and consultations posted online:
  • www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-overview/

• 2017 End of Year Report can be found here:

• We welcome your feedback and input
The energy system is going through a fundamental change.
The distributed energy world in 2030 – a view...

Distribution networks acting as a facilitator for a wide range of energy resources and market models

Enabled by:
- Smart meters
- Distributed Generation
- Storage
- Micro Grids
- Community Energy and peer-to-peer
- Electric Vehicles
- Smart appliances
- Market and regulatory reform
- Demand flexibility

The UKPN world in 2030

~13 GW of solar

~4 GW of storage

~1.2-1.9m Electric Vehicles

UK Power Networks Distribution System Operator (DSO)

Other Electricity DSO

CHP
Combined Heat and Power

I+C
Industrial and Commercial

DSO
Distribution System Operator

Peer to Peer

Large scale Renewable generation

Gas DSO

Connected Living

Transmission network

Interconnectors

Community Energy Scheme

Base Load Generation

Peer to Peer

Local wind farm

Solar farms

Utility Scale Storage

Connected living

Smart meters

Smart appliances

Micro storage
Transitioning to a **Distribution System Operator**

**Emergent DSO**

- Keeping the lights on
- Providing great customer service
- Lowering our costs

- Secure and reliable supplies taking into account two way flows and greater intermittency
- Facilitating cheaper and quicker connections using proven innovation
- Optimising network investment decisions using alternative flexible solutions

**Full DSO**

- Support whole system optimisation
- Enabling markets

- Collaborating with the GB SO to deliver ‘whole system’ outcomes that are best for customers
- Enabling market solutions for DER to provide flexibility to local and wider system
Customers shaping our transition to DSO

- Accelerate the roll out of Active Network Management
- Continue to run flexibility tenders for Distributed Energy Resource (DER)
- Support local energy growth
- Consider potential new areas of vulnerability
- Educate and inform different customer groups
- Improve network visibility and monitoring
- Clarify the DSO’s roles and responsibilities
- Strengthen the collaboration between different energy sectors

Visit FutureSmart.ukpownetworks.co.uk
Our Distribution System Operator Strategy

Delivering ‘a smart grid for all’

Five key areas for 2018 - 2019

1. Facilitate cheaper and quicker connections using proven innovation
   Continue rollout of Flexible DG that uses Active Network Management

2. Use customer flexibility as an alternative to network upgrades
   Run market tenders for flexibility services such as Demand Side Response

3. Develop enhanced System Operator capabilities
   Develop TSO – DSO Commercial Framework, DER Dispatch capability and
   readiness for smart meters

4. Collaborate with industry and others to enable GB wide benefits
   Actively participate in industry forums and engage with others to make this
   transition a reality

5. Prepare and facilitate the uptake of Electric Vehicles
   Enable connections using smart solutions and ensure business readiness
Facilitating your ‘A Day in the life’ Stories

Energy Sector Employee

Community Energy Manager

Domestic Prosumer

Commercial Operator

Visit FutureSmart.ukpowernetworks.co.uk
Community and Local Energy have an important role in facilitating a smarter, cleaner energy system

Visit FutureSmart.ukpowernetworks.co.uk