

# Powering the North West's future

Transitioning to a Distribution System Operator – a collaborative approach

Read more at [www.enwl.co.uk/dso](http://www.enwl.co.uk/dso)



Electricity North West Limited  
Registered number 02366949

**electricity**  
**north west**  
Bringing energy to your door

# Welcome

## A new energy landscape

The UK has already made great progress on its journey to de-carbonise its economy through a major change in the way electricity is generated, stored, transported and traded.

The traditional passive ‘top down’ model, where electricity flows from large power plants, via the national transmission system, to our distribution network and on to homes and businesses, is being redefined.

We are now seeing the emergence of an active decentralised model, in which energy is generated locally from renewable sources and supplied directly to communities. Last year, for the first time, more than half of all electricity consumed in the UK was generated from zero carbon sources, much of it being produced locally.

Whilst this is a tremendous start, to fulfill our climate change obligations, the UK is tasked with achieving an 80% reduction in carbon emissions by 2050.

Such a change presents major challenges and opportunities for distribution network operators (DNOs) such as Electricity North West. We need to not only meet this challenge but also ensure bills continue to remain affordable for our customers and that the transition ensures electricity supplies remain reliable.

Whilst our customers and community groups are becoming energy producers, renewable energy sources such as solar and wind are intermittent and they will need flexible grid top-up. This will require us to actively manage the network in new ways. At the same time, increasing demand for electricity for heat and transport will require us, as the network operator, to be even more innovative in our use of the existing network, to ensure capacity is available when customers need it.

This evolution from the role of passive network operator to proactive distribution systems operator (DSO) is an exciting proposition and will see us develop entirely new relationships with our customers and our partners in the energy supply chain.

We want to ensure everyone is involved in helping us shape this future. So to make sure we understand the needs and aspirations of the people, businesses and energy producers we serve, we are working closely with our stakeholders and customers at both a regional and national level.

Our region has always been at the centre of energy policy and with your help and guidance we will ensure Electricity North West continues to serve and to power the North West in the transformative decades to come.



**Peter Emery**  
Chief Executive Officer

## About this document

This document describes our vision of how Electricity North West can support North West people, businesses and energy producers in meeting the challenge of de-carbonising their energy.

It is informed by the views and expectation of our stakeholders and customers including community energy organisations, local authorities, other utility companies, businesses and academia and by national developments.

It is a companion piece to our document 'Delivering a smart, flexible, energy system' which we published in 2017, and is available on our website at [www.enwl.co.uk/dso](http://www.enwl.co.uk/dso).

It outlines what we see as the key roles and responsibilities of a DSO, and the technical and regulatory challenges our industry faces in transitioning to this new model.

While the nature and pace of change in the North West cannot be predicted with certainty, it is vital that we identify likely themes and priorities now, so that everyone in our region can face the future with confidence.

We hope this document will help to inform regional and national debate about the future role of DSOs.

## Get involved

You can contribute to the conversation about the future of energy in the North West by contacting Michelle Lewis, our Head of Communications and Stakeholder Engagement.

[michelle.lewis@enwl.co.uk](mailto:michelle.lewis@enwl.co.uk)

# A regional conversation

More than 70 delegates attended our North West stakeholder event to discuss the role of electricity distribution networks in a future, de-centralised energy landscape.

The event, co-hosted by Electricity North West and the Carbon Coop, resulted from discussions with our Stakeholder Sustainability Panel. This is one of four panels that have been established by the organisation to provide a vehicle for effective stakeholder engagement. Together with the Carbon Coop, we identified the need to meet national policy objectives through regional partnerships and approaches.

The Carbon Coop is a leading proponent of developing community-led energy solutions and a key supporter of Electricity North West's work.

The event enhanced our understanding of some of the regulatory and technical challenges our region faces as we move to more localised, renewable production, and helped us understand more about the way Electricity North West needs to evolve its services.

Delegates included community energy organisations, the Greater Manchester Combined Authority, industry bodies such as Regen and the Energy Networks Association, local authorities, universities and other utility companies.

Our thanks to everyone who participated



# A glimpse of the future

The way households and businesses use electricity, and the way it is generated, transported and traded, is changing rapidly.

These changes will have profound implications for electricity network operators, requiring a more proactive role in network management and the development of new types of relationships with our customers and participants in the energy markets.

For the first time all customers will be able to take an active part in this energy future through new devices such as smart meters, smart vehicle chargers and online services which control home appliances and heating.

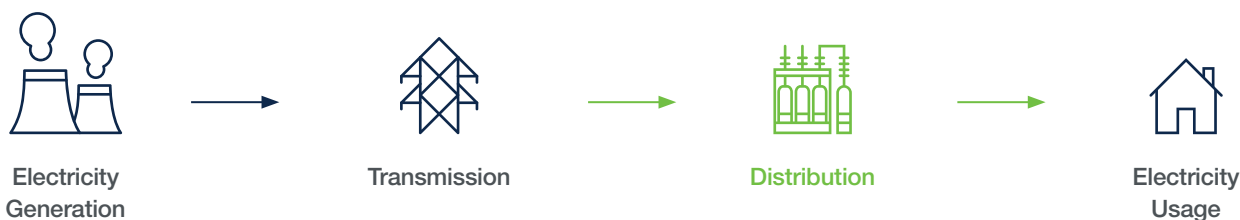
## The end of one-way travel

The traditional electricity distribution model is built around the one-way flow of energy to the consumer.

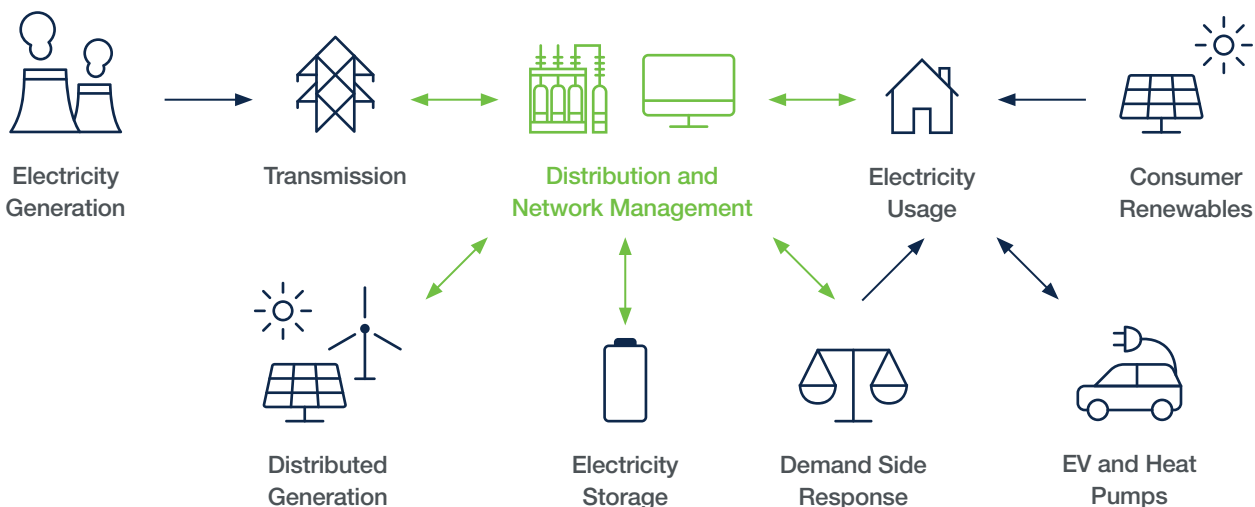
This model is already starting to be turned on its head, as local green energy producers emerge with the ability to power homes and businesses, and supply energy back to the grid.

Managing an electricity grid powered by multiple, local energy sources, is a complex and demanding task, requiring new technical and commercial solutions.

This has big implications for our role in the system - what used to be relatively simple...



...is becoming far more complex and multi-directional



## The road to electric vehicles (EV)

Using petrol and diesel to power our vehicles accounts for about a third of total carbon emissions. We have an opportunity and a responsibility to re-think the way we travel and the power sources we use to do so. We need to look at alternatives sources of power such as electricity but also new efficient transport systems such as Manchester’s Metrolink tram network.

It also means cleaning up our existing rail system through electrification and of course enabling more electric vehicles. We have already seen the widespread adoption of hybrid electric buses, with over 120,000 private motorists choosing EVs in the UK and now electric commercial vans becoming available.

Without careful management, this transport revolution could place regional power networks under strain, requiring reinforcement costs of between £200m and £350m by 2035. We will work closely with industry partners and customers to explore strategies (e.g. staggered charging times) to facilitate the roll out of electric vehicles without incurring such high costs.

If all vehicles in Greater Manchester were replaced with electric equivalents, electricity use would double

Four fast electric vehicle charging points require the same network capacity as a large supermarket

## Electricity for heat

Heating our homes and heat used by businesses currently accounts for one third of all UK energy use.

We expect to see electricity play an increasingly prominent role in heat provision, driven by affordable clean technologies, such as air source heat pumps. We also envisage a future where waste heat is appropriately valued and harvested; bringing additional challenges and opportunities for the electricity networks.

### Contribution of heat pumps to UK winter peak demand scenarios



As we come to rely more on electricity for our heat needs, this could put the regions power grid under strain. Attempting to meet predicted demand through network reinforcement alone (i.e. adding more cables and associated infrastructure) is unaffordable for our customers.

We have been working for several years to solve this problem and have developed several imaginative ways of increasing capacity while keeping bills affordable. These include new technical measures and new commercial solutions where customers can earn additional income for helping us solve grid issues.

## The growth of community energy organisations

There are currently more than 5,000 community energy organisations in the UK, and we expect numbers to grow significantly in the coming decade. In a number of European countries, community energy groups already supply clean renewable power to several hundred thousand customers.

These collectively-owned, or community-led charities, co-operatives and community benefit societies generate electricity, deliver heat and promote energy efficiency in their local communities.

Their business models are likely to become ever more ambitious, inspired by work in other countries, and we could ultimately see the emergence of community-owned energy villages, towns and cities.

Electricity network operators, like Electricity North West, will need to develop sophisticated technical and commercial relationships with these organisations, given their pivotal role in the UK's future energy landscape.

## Supporting economic growth

10% of Electricity North West's customers are businesses but they account for two-thirds of the electricity delivered by our network. Managing energy costs is vital to the competitiveness of our region's businesses and it is therefore essential our network not only keeps pace with their future requirements but does so at an affordable price.

Projects such as the Northern Powerhouse and High Speed Rail will attract further investment in the region, and we need sustainable energy strategies to power this growth.

Nationally, green energy is now recognised as an important part of the Government's industrial strategy, and is being supported by a significant increase in spending on public research and innovation.

## Adapting to renewable energy sources

More than half of all new power capacity installed globally is now renewable and renewables share of UK generation was around 30% in 2017.

Renewable energy sources, such as solar and wind, can be unpredictable, as they are subject to the vagaries of the British weather.

Balancing local electricity networks to avoid lulls in power or excessive voltages will become much more challenging as more of these sources come online.

To add to these complications, renewable sources such as wind farms can be geographically remote from large population centres.

We will need to continue to evolve technology and operational management approaches to ensure our networks deliver reliable energy, whatever the weather.

## The rise of the active consumer

As solar panels and battery storage technology become ever more affordable, households will be able to generate their own power, store the surplus and if they wish, sell it to the grid to reduce their bills.

Smart meters and smart appliances will allow customers to take control of their energy use like never before.

While this is an exciting proposition, as with any new technology, earlier adopters will be able to access these savings sooner. Wealthier, more engaged customers who can afford the new technology could end up saving money, whilst poorer members of society are less able to make these savings. Whilst this is to some extent predictable with any new technology, it has the potential to exacerbate social inequalities and will require careful management.

It will be up to policy makers, technology manufacturers and energy aggregators, working with the energy sector, to ensure the benefits of smart energy are made available to all, to avoid the emergence of a new form of fuel poverty.

## Flexible consumption

Meeting the future demand by network reinforcement won't be affordable. Helping customers save money by being flexible is part of the solution.

Consumers will need to become even more flexible in when and how they use energy, to make the most of the existing network, reduce bills and avoid unaffordable reinforcement costs.

Some large businesses in the North West already have demand side response (DSR) agreements in place to flex their demand in exchange for payments. We will see a growth in these commercial arrangements in the coming years.

As smart meters and smart appliances become the norm, we believe homeowners will also take advantage of the savings such flexible contracts can offer.

We expect smart meters to allow customers to see the real time price of their energy and hence where they are able to shift energy usage to lower costs periods. This can be waiting to start high energy appliances such as washing machines until later in the evening but will increasingly be done automatically for them as their appliances read the energy price in real time. Responding to these half hourly price signals is a cornerstone of both customer empowerment and smart grid technologies unlocking real savings for customers.

For example, variable tariffs might be used to encourage customers to use energy at different times of the day. Automation of electrical appliances – turning them up and down remotely – could also become common practice, through smart technologies in the home.

Energy aggregators are already starting to emerge to support the anticipated growth in domestic DSR, and we are working to help our customers understand these opportunities.

At the end of 2016, 900,000 UK homes have solar panels installed

Average lithium-ion battery energy prices have fallen by over 50% since 2012

## New energy markets

As renewable energy grows, new markets will emerge, and the policy and regulatory landscape will also need to evolve.

The Government has acknowledged that the current regulatory framework needs to adapt, especially in areas such as energy storage.

The way that new markets are allowed to develop, and the degree of central control that should be imposed, is currently an area of active debate.

Some policy makers/industry commentators advocate complete deregulation, while others wish to maintain a degree of central control to support long-term investment and social objectives such as tackling fuel poverty.

“A key role for the Government and Ofgem is to create the environment for new ideas to flourish by removing barriers to innovation. Our energy system needs technologies and infrastructure that are both cheap and clean, but it also needs innovation in processes, transactions and consumer offerings.”

Ofgem's Upgrading our Energy System Report, 2017

Business customers account for two thirds of North West electricity demand



# North West thought leaders

There are many organisations in the North West, of all shapes and sizes, which are taking a pioneering approach to green energy production and distribution.

## CASE STUDY

### Making energy while the sun shines

Greater Manchester Community Renewables is a volunteer run community energy organisation using solar power to reduce local energy bills.

The organisation has installed solar panels on three schools in Salford and a community building in Partington, paid for by a community share issue.

The electricity is sold back at a discounted rate to the building occupiers. Members who invested in the community share issue will receive interest on their investment and profits will fund further energy efficiency and environmental education projects.

The scheme is set to generate over 100,000 kWh of clean, green electricity each year, saving around 50 tonnes of carbon dioxide annually, and unlocking combined bill savings of £50,000 over the project's lifetime.

Working with schools has also enabled the group to deliver environmental education to pupils.



## CASE STUDY

### Turning homes green

Carbon Co-op is a group of environmentally motivated Greater Manchester residents who are converting their own homes to reduce carbon emissions and energy bills.

Each home undergoes a whole-house assessment to profile current energy use, leading to the creation of an improvement action plan.

Members can then employ expert contractors, or go down the DIY route, to retrofit their home, with the Carbon Co-op providing expert advice at every stage.

The group is owned and run by its 130 members, who share their experience and knowledge, and reduce costs through bulk purchase.

A recent Community Green Deal project with Greater Manchester Combined Authority enabled the group to unlock 0% loans and Government funding. The resulting home energy improvements reduced carbon emissions by 50% and unlocked a net energy saving of £1000 per household.



CASE STUDY

## A sustainable energy flow

Saddleworth Community Hydro is an award-winning project that generates enough sustainable electricity to power 75 homes, using a hydro turbine at the picturesque Dovestone Reservoir.

A continuous flow of water from the reservoir is used to drive the turbine.

The scheme is the first in the country to use an existing high dam to generate zero carbon electricity in a quiet and non-intrusive way.

The group is made up of local and national members with a passion for the environment, each of whom owns a share in the group.

The project was officially opened in 2014 and is generating funding for local environment and education projects, as well as providing a modest return to shareholders.



CASE STUDY

## The upside of flexible energy use

Upside Energy is a start-up company that uses a pioneering approach to demand side response to alleviate pressure on the grid during peak times.

A cloud based service aggregates the energy available in storage devices owned by homes and businesses (e.g. battery technology) and sells it back to the grid to balance supply and demand.

Revenue is shared with device owners and manufactures.

Using green, locally produced electricity reduces the need to turn on the UK's oldest, dirtiest and most expensive power stations during peak demand.

The company aims to scale hundreds of thousands of devices across the UK. By 2025, it aims to have 515 MW of capacity under management – enough to eliminate more than 300,000 tonnes of CO2 per year.

Founded in 2013, Upside Energy has quickly grown to a team of 17 people based in Salford and London, and has won a number of prestigious industry awards.

It closed its Series A funding round, led by SYSTEMIQ and Legal & General Capital, in December 2017.



# From Distribution Network Operator to Distribution System Operator

As UK energy production moves to a more flexible and localised model, electricity distributors will need to play a more sophisticated role in managing networks and supporting producers and consumers.

This move, from a traditional Distribution Network Operator (DNO) to a Distribution System Operator (DSO), offers customers many exciting opportunities.

“By harnessing the potential of energy storage, demand-side response and smarter business models, we have an opportunity to upgrade to one of the most efficient, productive energy systems in the world.”

Ofgem’s Upgrading our Energy System Report, 2017

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## Old Distribution Network Operator model

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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

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## New Distribution System Operator model

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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 stakeholders and customers see Electricity North West as a trusted source of information

We'll continue to focus on value for money and on making efficient investment decisions

## Making the transition: our guiding principles

Through our consultation process with our stakeholders and customer, we've identified the following guiding principles which are shaping our approach.

- **Neutral, but not silent:** our stakeholders and customers see Electricity North West as a trusted source of information, helping to demystify the new, complex energy market for participants, while remaining commercially neutral.
- **Network automation:** our stakeholders and customers expect Electricity North West to invest to secure their energy needs and improve the reliability of their electricity supply. We are providing sophisticated, automated network services that can meet these needs while keeping costs affordable.
- **Regional and national collaboration:** we'll continue working with North West stakeholders, and collaborate with them to develop local and regional solutions to deliver against devolved and national policy objectives.
- **Planning for 'least regret':** future demands on the network cannot be predicted with complete certainty so we'll work with our stakeholders and customers to plan in a sensible, informed way which will facilitate the development of flexibility markets in our region.
- **Everyone's included:** we are committed to ensuring that the poorest in society are not disadvantaged by developments in the energy sector and have opportunities to secure the benefits.
- **Affordable and efficient:** our stakeholders and customers expect Electricity North West to continue to focus on value for money and on making efficient investment decisions.

# Making the transition: our stakeholder informed approach

## A whole system approach

When we face such a complex future it is no good just thinking about the energy supply chain in pieces. We need to consider the whole system to ensure we find the best solutions. This means considering energy in the round and considering electricity and gas.

There could be significant benefits to taking a whole system approach to developing energy networks. Benefits can include more efficient processes, lower costs for customers, and more strategic no regrets investments.

**Our stakeholders told us that a whole systems approach is of value, they said:**

**“Gas and electricity networks face many of the same issues, and working together could help solve issues across the entire energy sector.”**

**“Perceived successes and failures in one area of energy policy can inform the Government’s or regulator’s view of future energy policy and regulatory changes in another.”**

There is potential for strong benefits from thinking across the whole energy system and from networks working closely together, speaking with a common voice and learning lessons from each other’s experiences.

It is no longer sufficient to think about the energy supply chain in segregated blocks such as transmission or distribution or indeed gas and electricity. To serve our customers better we will look at gas and electricity integration, how to better integrate the separate elements of the electricity supply chain and reach beyond the meter to also integrate appliances.

This is one of the most challenging regulatory discussions. Stakeholder involvement which includes customer representatives, are essential to ensuring customers are at the heart of whole system thinking.

There is no whole system planner for both electricity and gas. In the future, we envisage all inclusive energy services. For example, new generations may trust Google enough for Google to offer a service that is inclusive of everything, so that it is easy and effortless.

Could Distribution System Operators offer an all-inclusive energy service? Google might find that gap.

We need to look at energy solutions – not just electricity or gas.

We need the ability to forecast and load balance across electricity and gas better and at less cost due to a shared forecasting system and more involvement at the planning stage with commercial and industrial customers.

Therefore, through our trade body the Energy Networks Association, we are considering how data can be shared between the networks and what improvements can be made to planning for both gas and electricity networks.

In December 2016, network operators gave their commitment to the Open Networks Project at the Energy Networks Association (ENA), a major collaboration that will transform the way that both local Distribution Networks and national Transmission Networks will operate and work for customers.

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.

This collaborative project will agree the way electricity networks evolve to best serve customers. It will also look beyond the sector to seek collaboration with other energy networks.

## System co-ordination

Closely coordinating with National Grid and other DSOs on a daily basis to run the networks in a coordinated way will help ensure continued high levels of safety and reliability. We believe this is key to planning the development of both transmission and distribution networks to meet the North West's needs.

### One stakeholder said:

**“Distribution and transmission need to stop standing on each other's feet. You need visibility and close working with National Grid.”**

As explained in the previous section, we agree that as we move towards a DSO that this close working will expand so we take a “whole system approach”. This will ensure our development as the North West's DSO works to our customers maximum benefit.

We are also learning from current initiatives through industry pilots where system coordination is being trialled. During 2017 these included regional Development Programmes closely co-ordinated across Distribution and Transmission network and Innovation project-based trials for ways of coordination.

## Network operation

The fundamental role of the DNO will remain unchanged, providing affordable, sustainable and reliable electricity. The means of achieving this will change significantly in the coming decade, however, hence the move to DSO.

The expected increase in local energy producers, with variable, weather-dependent energy output, will require a more proactive approach. DSOs will be required to actively balance capacity, on a minute-by-minute basis, using real time data and automated technology on the network.

### Our stakeholders have told us that:

**“Technology ‘bolt ons’ are usually imperfect. Need to make sure that the technology works, even if retrospectively fitted.”**

**“The challenge is to connect disparate generation sources and to do this requires flexibility and intelligence within the network.”**

**“Electricity North West has a very resilient network at present, and the risk is that it may be compromised if the wrong choice of model is made.”**

To adapt our network and to ensure that we meet these stakeholder concerns, Electricity North West has already begun the transition to a smart, controllable network. A range of innovation projects, such as our UK-leading CLASS initiative, is allowing us to manage variable power flows and avoid traditional network reinforcement.

New technology will also help us to monitor network usage at a granular, street level; this will enable us to make more informed network decisions.

During the remainder of the current regulatory period, we will be developing a state-of-the-art Network Management System, which will provide central co-ordination and automation of proven technology on the network.

**Our investment in delivering on our stakeholders' needs is substantial:**

- We have invested over £50m in research and development to identify real practical smart solutions to the challenges ahead
- We have invested £20m in a state of the art network management system to make the outputs of this research come alive for customers
- We are commissioning an additional £5m of smart grid functions on top of the existing systems already advanced capabilities
- We have invested £5m in cleaning up our data
- We are investing £18m in improving our ability to remotely control the grid
- Our DSO investments in the period will require a further £10m of investments to be made

CASE STUDY

## NEDO

Residents in Wigan Borough, Bury and Manchester are helping to reduce carbon emissions while saving money on their fuel bills by taking part in the pilot project that will see a total of 600 homes have their old inefficient heating systems replaced with air source heat pumps.

This collaborative £20m project involved Greater Manchester's Combined Authority (GMCA) and Japan's New Energy Development Organisation (NEDO), Wigan and Leigh Homes, Northwards Housing, Six Town Housing, Hitachi, Daikin, Mizuho Bank and Electricity North West with the Department for Energy and Climate Change (DECC) and Department for Business, Innovation and Skills (BIS).

Over a year since the launch of the NEDO Smart Heat project, 300 social housing properties have been fitted with state-of-the-art smart energy.

The pumps are connected to a "smart grid" system which can manage the energy produced in people's homes and help reduce demand on the National Grid, which is currently close to capacity. This uses less energy and can therefore lead to cheaper fuel bills. It is the first time the technology has been used in homes anywhere in the world.

Residents are being given a tablet computer which enables them to take part in the trial, while giving them free access to the internet – enabling more tenants the opportunity to get online. Special equipment is being installed in each home known as a "home gateway", which is used to monitor and control the heat pumps. This will be used to reduce energy consumption at peak times – thus reducing demand on the national grid.

Greater Manchester has a target to reduce CO2 emissions by 48 per cent by 2020 (compared to 1990 levels). Currently domestic fuel demand accounts for around 12 per cent of Greater Manchester's carbon footprint.

CASE STUDY

## Developing a smart network

Over the past four years, Electricity North West has invested £40 million to transition to a smart network, by taking advantage of Ofgem's innovation funding.

### Our second tier LCN Fund projects

#### C2C

£10 million project combines proven technology and new commercial contracts to release network capacity

Technical innovation



New commercial contracts



#### CLASS - Customer Load Active System Services

£9 million project seeks to demonstrate that electricity demand can be managed by controlling voltage without any discernible impacts on customers



Lower network costs  
Faster connections



Lower balancing costs  
Reduced carbon



Lower energy costs

#### SMART STREET

£11.5 million project combines innovative technology with existing assets to make networks and appliances perform more efficiently



New controllable switching devices stabilise voltage



Allows us to lower voltage levels



Networks and appliances work in harmony

#### RESPOND

£5.5 million project. The first UK demonstration of an active fault level management solution that avoids traditional network reinforcement



Faster Low Carbon Technology adoption



Less disruption



Lower bills

#### CELSIUS

£5.5 million project which provides a co-ordinated approach to managing the temperature of electrical assets in distribution substations



Improved knowledge of distribution assets



Avoids early asset replacement



Releases additional capacity

## Connecting customers

As customers generate and store electricity locally, the manner in which DNOs will have to connect customers to the network will change. These different types of connections will benefit customers and will also benefit the companies as it provides flexibility.

Having accessible information about the capacity available at any point on the network and the flexible options offered by Electricity North West are a priority for customers and stakeholders.

### They told us:

**“There is no visibility in when and where the network is constrained. It’s crucial to make the network digital to meet these requirements.”**

**“We need real time data – actual load at the substation to target and inform behaviour changes at the domestic level.”**

**“Perhaps we need a postcode identification system similar to broadband.”**

**“Connections take a long time. Is the process as lean as it can be?”**

**“Information needs to be more transparent so that customers can make informed decisions. Customers need to be able to see areas of capacity.”**

**“We need better visibility of the state of local networks. Community energy groups want to know how secure their supply is and how much there is left.”**

**“Australia has a ‘street scale’ heat map in a more granular view as it goes right down to the street view. This is something Electricity North West could do going forward but the data would have to be up to date and possibly at postcode level.”**

We’re committed to improving the service we provide to our Connections customers and outline our approach in our annual Incentive on Connections Engagement report. Our improvement plan is informed by regular discussions with expert panels of stakeholders.

Customers can access our Long-Term development statement on our website and can access information about the capacity that is available. We understand that stakeholders would like more granular information and we’ll work with them to define this in 2018.

Our discussions with Connections’ customers now focus on the provision of flexible connections. These provide network benefits and also significant customer benefits and are delivered in partnership between Electricity North West and the customer. They can reduce the need for network reinforcement which reduces the costs to customers. Some of the detail of these discussions is provided in the section ‘Our role in future capacity markets’.



## Our role in future capacity markets

In January 2017, we stated that DNOs could “operate local markets to access flexible capacity either directly or indirectly through aggregators.”

### Our stakeholders agree and told us:

**“We need more active management of contracts. For example, unused capacity could go to auction.”**

**“There’s a need to challenge the capacity that large customers are asking for. They may be asking for too much, which doesn’t get used.”**

To respond to this feedback, we have expanded our thinking and believe that the DSOs will be responsible for the provision of network capacity and that this will, in part, be achieved by establishing local markets where providers of services can sell this flexibility.

The DSO will create this market and buy flexibility services to manage the distribution network. The DSO could also participate in this market.

The learning from our innovation work is that we will be actively managing customers’ demand and generation in the future in real time and this will require a change in the way we manage our contractual arrangements. We have started this work with the following actions.

- 1 We have recently refreshed our standard contract templates and introduced a curtailment index that describes the maximum number of days in a year that a customer could be constrained.
- 2 In this financial year, we will issue an Expression of Interest (EoI) for the provision of flexibility services in six areas of our network that have capacity constraints. The aim of the EoI is to prime the market and to obtain a market price for the provision of flexibility services with the plan to purchase flexibility services for the forthcoming and future winter periods in those six areas.
- 3 We have also started visiting large customers to discuss their future capacity requirements and see whether it’s appropriate to release unused capacity.
- 4 We are in the process of writing to those customers that have exceeded their maximum import capacity in the last year; to inform them of a change in the value of the excess capacity charge and to consider whether to reduce their capacity going forward or apply for an increase.

We will be actively managing customers’ demand and generation in the future

We have also started visiting large customers to discuss their future capacity requirements

## A trusted facilitator

Community energy organisations, households and businesses will need help in accessing opportunities in what will become an increasingly complex energy market.

Some of our stakeholder feedback includes:

**“We want to be able to have more open, collaborative conversations rather than ‘the computer says no’ scenario.”**

**“There is a gap for a trusted service. Someone needs to provide education and awareness raising services to help people and businesses understand the changing energy landscape, energy efficiency options, and connection options. This will all be predicated on the ability to create trusted relationship, and this may require a lot of effort.”**

**“There is a need for partnerships between community energy groups, DNOs, suppliers/contractors, SMEs and larger companies to develop technology and ideas. The DNO/Distribution System Operator should facilitate this and have a match-making role.”**

**“The Distribution System Operator should have the ability to support all commercial and industrial customers to consider how demand side response could benefit them.”**

**“Distribution System Operators are uniquely placed to act as neutral and trusted sources of information – demystifying these markets for anyone who wishes to participate.”**

We can also help to grow new markets, such as demand side response, by raising awareness of the benefits among different customer groups.

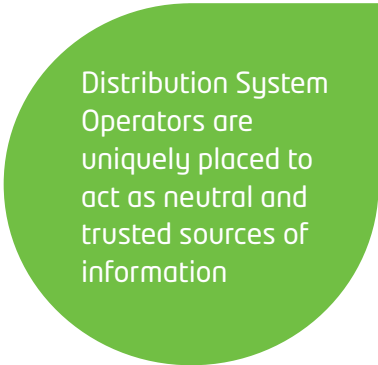
This will see a further shift in the traditional role of the DNO, from a largely silent infrastructure provider to a trusted, public-facing facilitator and advisor.

Our Community and Local Energy Strategy will be published later this year. This will set out how we plan to continue to engage with community and local energy groups and develop opportunities to work together.

We are working through the Open Networks Project to ensure DSOs are charged with delivering this stakeholder requirement.



There is a need for partnerships between community energy groups, DNOs, suppliers/contractors, SMEs and larger companies



Distribution System Operators are uniquely placed to act as neutral and trusted sources of information

## Promoting energy efficiency

Investment in new network capacity can be deferred, or avoided entirely, by helping communities to use less electricity in the first place.

This was an area of particular interest to our stakeholders and they told us:

**“There are businesses that have no awareness of how to make themselves more energy efficient. How are the Distribution System Operators going to help these businesses?”**

**“Businesses know they should be energy efficient but they don’t do it.”**

**“Marketing using the ‘green, energy saving’ approach doesn’t work. Increasing financial gain is better received and a bigger buy in from consumers.”**

**“Housing developers are not building energy efficient homes. The Government and the Distribution System Operators need to get a grip of the situation and offer ways to enable people to use energy smarter.”**

Our Power Saver Challenge project (see case study) has shown that investing in simple, low cost energy saving measures, combined with public education and incentives, can have a significant impact on household energy consumption.

We believe DSOs can play a more proactive role to help customers change their consumption behaviour – something that has traditionally been the role of energy providers.

### CASE STUDY

## Changing consumer behaviour

Electricity North West’s Power Saver Challenge saw 1,000 households in Stockport encouraged to reduce their electricity usage, to alleviate pressure on the network.

The project took place in an area of the town where the local substation was approaching maximum capacity. Could network reinforcement be deferred, by encouraging local people to reduce their electricity consumption?

Participants were given free energy saving and monitoring devices to help them reduce daily consumption, along with continued support through drop-in events, home energy visits, a dedicated website and the recruitment of community energy champions.

Using monitoring equipment at the local substation, a 5.8% reduction in peak energy consumption was recorded across the lifespan of the project.

Crucially, 79% of participants said they would continue to reduce energy consumption following the conclusion of the project.

The project demonstrated that low-cost intervention from a DNO or a DSO can lead to long-term behaviour change and alleviate pressure on local networks.

5.8% reduction in peak energy consumption was recorded

79% of participants said they would continue to reduce energy

## Setting prices

Charging arrangements will need to evolve to reflect the new types of services customers require from the networks.

### One stakeholder told us:

**“Charging will need to facilitate complex arrangements, such as peer-to- peer charging. Currently, the structure assumes you only have one supplier. In the future, we may have a number of suppliers for different things.”**

To address these concerns, Electricity North West is contributing to the debate around future charging structures through our participation in Ofgem’s comprehensive review of network charging. Ofgem has established the Charging Futures Forum which includes two task forces, the Access Task Force and the Forward Looking Charges Task Force.

We would like to see a charging framework that is fair and is truly cost reflective of the service customers receive. In particular, we want to ensure that customers who may use the network infrequently for import and export are charged appropriately and not subsidised by other users.


We are also championing arrangements to encourage local demand and generation which balance demand. This could reduce the need to reinforce the network even though demand is rising. We believe this is likely to become more important as electric vehicle charging increases.

We also want to ensure there is a whole- system approach to charging so that, where appropriate, transmission costs which are driven by users connected to our networks are properly reflected into charges.

The Access Task Force is reviewing how capacity is best allocated and used. We need a framework which is more flexible and allows capacity to be used more effectively.

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6,000 domestic customers provided a much better understanding of the impact a power cut can have

## CASE STUDY

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### Value of Lost Load

Electricity North West is completing a detailed programme of research with 6,000 domestic customers and small businesses to better understand the value they place on losing their electricity supply.

Our survey which included 3,000 customers from the North West and 3,000 from across the rest of Great Britain has provided a much better understanding of the impact a power cut can have on a diverse range of domestic and business customers.

The research shows a huge difference in the way customers value their electricity supply. Working couples are among the least affected by a power cut whereas the customer groups most affected include those with electric vehicles or electric heat pumps, young families, the elderly and the fuel poor.

Understanding this impact or 'value of lost load' is important as it is used across the electricity industry to guide investment decisions and the way customers are compensated after a power cut. At present, one customer's power cut is valued the same as another. For example, the impact of a power cut affecting the home of a working couple is valued the same as a nursing home with 100 residents.

The findings from our research will help ensure that future investments are targeted at areas of the network which will benefit our customers the most. It's also likely to influence how we support vulnerable customers and address fuel poverty.

The results of our customer research and recommendations for the application of the Value of Lost Load will be made available in two separate reports which will be published on our website in Spring 2018.

## Winning hearts and minds

There is currently low public understanding of the challenges and opportunities facing the UK energy sector, as we transition to a low carbon economy.

Customers will need to be ‘bought in’ to the new world of local energy production and active household participation, if it is to be successful. The approach must also be inclusive, contributing to the alleviation of fuel poverty.

As an industry, we need to bring this vision of the future to life, to build excitement and encourage participation. Our stakeholders understood this challenge and supported Electricity North West fulfilling this role.

### They said:

**“We need to change the mindset of consumers. The Distribution System Operator should have the role of education.”**

**“‘Gamification’ of houses would show customers their contribution and their impact.”**

**“One of the unintended consequences could be fuel poverty.”**

**“Customers should all benefit – not a postcode lottery.”**

**“We need to change the mindset of consumers. There needs to be constant engagement regarding energy efficiency and the options available.”**

DSOs have an opportunity to use their pivotal role to show customers how they can save money, help the environment, and improve quality of life, by embracing the new technologies and opportunities that are just around the corner.

### CASE STUDY

## Switched on Energy Test

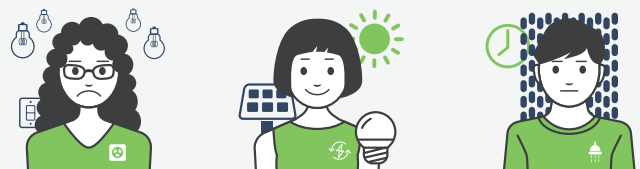
More than 1,500 people across the North West took a test, which asked participants a series of multiple choice questions linked to their energy usage to uncover the North West’s attitudes to energy efficiency, now and in the future.

The results of the test, which we launched during the Big Energy Saving Week, revealed that more than 50 percent of people were implementing lots of energy saving measures at home.

### In addition to the main findings we discovered that:

- Blackpool and Preston were shown to be the most energy efficient towns.
- Stockport was the only town which didn’t have Energy Busting Beths as their majority persona, instead 47 per cent were categorised as Energy Steady Eddies.
- Lancaster and Stockport had the least amount of Energy Busting Beths, with 46 per cent each.
- Lancaster had the highest percentage of Energy Drain Janes, at 12 per cent.

The energy test, which has received support from MPs including by Cat Smith MP (Lancaster), Ann Coffey MP (Stockport) and Paul Maynard MP (Blackpool North and Cleveleys), was vital as it allows us to delve into people’s attitudes towards energy saving and really get them thinking about ways they can improve their efficiency.



#SwitchedOn

## Establishing a national framework

The Open Networks Project is an industry-wide initiative to identify shared, national priorities as the UK transitions to a more diverse, low carbon energy landscape.

Led by the Energy Networks Association, participants include nine UK electricity grid operators, academics, NGOs, Government departments and the energy regulator, Ofgem.

Key areas of focus include the relationships between transmission and distribution operators; the transition from Distribution Network Operator to Distribution System Operator and what this means for distributors; future charging requirements and meeting customer expectations.

Electricity North West is playing a leading role in the project and is represented on all of the working streams that have been established to deliver the required changes.

# Distribution System Operation – delivering the transition

## What we've already delivered

### Improved data quality and network connectivity

We've been cleansing all of our network data to ensure that it accurately reflects our network. Having a robust and reliable network model is a key foundation for the development of new DSO services.

### Better use of network analysis tools

We've created a better understanding of load flow and fault levels and the impact these have on the service our network provides through the development and use of system analysis tools. We're putting these to work to offer our customers better service.

### Flexible connections

We've worked closely with developers to provide new connections to the network which give us flexibility with regard to service from the network. Developers benefit by being able to connect to our network quickly and affordably.

### Enabled Respond

We've enabled new Respond technology which is an active fault level management solution that avoids traditional network reinforcement.

### Control room data integrated with customer system

We've created an interface between our control room fault management system (which we call Troublecall) and our Customer Relationship Management (CRM) system. This will ensure that we're better able to manage the impact of network events on our customers.

### Improved network automation

We've implemented Automatic Restoration Systems (ARS) to our high voltage network. This restores the network where faults occur promptly and has significantly improved the customer impact of such faults.

### Implementing CLASS

We're implementing the Customer Load Active System Services (CLASS). This low cost solution uses voltage to manage energy consumption and allows Electricity North West to offer capacity services to the Transmission Service Operator, National Grid.

### Smart Meter Integration

The implementation of smart metering will give network companies better visibility of the performance of the whole system. This will enhance the decision-making capacity of network operators.



What's clear is that our stakeholders and customers expect us to respond promptly to their changing needs and expectations and DNOs have already invested in developing some of the new capabilities required to deliver Distribution System Operator services.

This section describes the changes that have already been implemented by Electricity North West and outlines our next steps to deliver the transition that our stakeholders want.

## What we're currently working on

### Active Network Management (ANM)

We're developing a new Network Management System which will allow us to actively manage the network in real time. This capability is the essential first step to being able to offer the full range of DSO services.

### Transmission Operator (TO) Interface balancing

We're working with National Grid to understand how we can balance capacity across the distribution and transmission networks.

### Look ahead capability

We're developing models which will help us predict what will happen to the network in the very short term, for example in the next our hour, 12 hours and 24 hours. This will enable us to act promptly to secure network stability.

### Forecasting

We're enhancing our forecasting models so that we're better able to plan for longer-term changes in energy usage patterns.

### Contract management and curtailment index

We're working with customers to understand the opportunities for them to provide flexibility services, develop a market prices for these services and plan to purchase them for the forthcoming and future winter periods.

### Distributed Energy Resource Management (DER)

Using ANM, we'll be able to call on the generation, storage and other capacity connected the network and contract with asset owners to deliver services that provide overall network benefits. Over time this service will be automated.

### Industry data-flows

Through the Open Networks Projects, we're working with others in the sector to ensure that we have the appropriate agreements, systems and processes in place to ensure the whole system operates effectively.

### Capacity mapping

We're developing heat maps which will provide customers with real time information about the capacity available on our network.

### Automated Point of Connection

We'll develop an on-service which will provide developers with a portal to complete connections applications. This will be supported by the capacity mapping mentioned earlier in this section.

### Sentinel integration

Sentinel is fault location technology which operates on the high voltage (HV) network. We'll implement it to help us identify the likelihood and location of a fault so that we can improve our network performance, improving our reliability to our customers.

## Get involved

These are exciting times for energy generation and distribution, and the changes will affect everyone.

We are keen to ensure our plans for the future match the aspirations and priorities of the North West homes and businesses that we serve.

You can contribute to the regional conversation by contacting Michelle Lewis, our Communications and Stakeholder Engagement Manager.

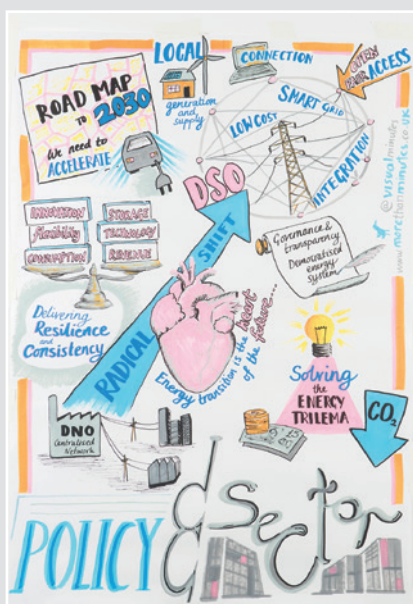
[michelle.lewis@enwl.co.uk](mailto:michelle.lewis@enwl.co.uk)



## List of organisations who attended the 1 December event

|                           |                             |  |
|---------------------------|-----------------------------|--|
| Acra Style                | Energy Networks Association | Salford City Council                           |
| Aecom                     | GMCA                        | Schneider                                      |
| Arup                      | GMCR                        | Siemens  |
| Bristol Bluegreen         | GMPCS Ltd                   | Smarter Grid Solutions                         |
| Bruntwood                 | Hamilton March              | The Co-operative Group/Energy Enterprise Co-op |
| Business Wise Solutions   | Jones Lighting              | Transition Wilmslow                            |
| CAB                       | Kast Energy                 | Turner and Townsend                            |
| Calvin Capital            | More Renewables             | UKPN   |
| Carbon Co-op              | My green investment         | United Utilities                               |
| Centrica                  | Cadent                      | University of Keele                            |
| CGI                       | National Grid               | University of Lancaster                        |
| Depsys                    | Oldham City Council         | University of Manchester                       |
| Derbyshire County Council | Oldham Community Power      | Upside Energy                                  |
| EA Technology             | PA Consulting               | WPD  |
| Growth Company            | Regen                       |  |
| Endeco Technologies       | Saddleworth Hydro           |  |

Visual note takers captured the discussion at our North West stakeholder event. This provided an engaging focal point for delegates and articulated the key themes of the day. Their summaries are shown below.





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