

DSO strategy

Consultation

July 2020



electricity
north west

Bringing energy to your door

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The transition to distribution system operation (DSO) is an industry-wide initiative to drive the changes needed to achieve net zero carbon emissions in the UK. In this, our updated DSO strategy, we describe the progress we have made since publishing our first strategy document in 2018 and set out the steps we are taking as we continue on our DSO/net zero carbon journey.

This document forms part of a suite of current documents which explain how we are preparing our network for the net zero carbon future:

- Our Analysis of DSO functions document and our Grid digitalisation & data strategy. Consultation on these [DSO documents](#) runs from 6 July – 9 September 2020
- Inputs to our [Distribution future electricity scenarios](#) (DFES), which are used to create our forecasts for future capacity requirements. This consultation runs from 6 July – 7 August 2020
- Three '[decarbonisation pathways](#)' for Greater Manchester, Lancashire and Cumbria, energy blueprints developed with Cadent, the region's main gas network operator.

We are inviting our customers and wider stakeholders to review and comment on all of our plans, to ensure we have a good understanding of their expectations when planning for the future of our network. The consultation questions for this strategy are displayed in the relevant sections of the document.

In response to the climate emergency, the UK has become the first major economy in the world to pass laws to reduce and then ultimately end its contribution to global warming by bringing carbon emissions to net zero by 2050. While this is a national challenge, here in the North West, political leaders are responding to the desire of the population to go further and faster than the national target and deliver net zero by as early as 2038. To achieve this we need to emit 60% less carbon within the next eight years.

We all rely on electricity to power our lives. As we decarbonise we forecast that demand for electricity will double as customers adopt cleaner, greener forms of transport and heating. Many customers already generate some of their own electricity and sell it back to the grid, a trend we expect to continue. The increase in demand and the connection of large numbers of customer generation will have a dramatic effect on the existing electricity infrastructure which simply wasn't designed to cope with the complex and multi-directional power flows we expect to see.

Electricity network operators like Electricity North West will play a key role in this transformation. It's our responsibility to provide a smart and flexible electricity distribution system which will meet the evolving needs of customers and support the region's economic development. We will do this by adopting new technology, by sharing far more data than ever before and by working in partnership with stakeholders, customers and industry parties.

Engagement with our customers and wider stakeholders has highlighted that we need to do more than just operate a smarter and more flexible network; many are looking to us for support with their own carbon transition. They have told us they need us to help them better understand what they can do, how we can support them and explain how they can benefit from interacting with us as 'prosumers'.

They have told us that they see it as part of our role to stimulate the adoption of low carbon technologies (LCTs) such as electric vehicles (EVs), solar generation and battery storage, which is essential if we are to meet our net zero carbon targets. To do this, we will provide the knowhow and support that our customers and stakeholders need, helping them understand and address barriers to adopting LCTs at places of work and leisure, and, we will deliver the network to facilitate their installation.

The urgency of the need to decarbonise has created local, regional and national momentum and is driving new, innovative solutions to meet and exceed our targets. Our local authorities and business leaders are making real changes and our academic institutes are showing what can and needs to be done. It's our job to support this ground swell of activity.

We will ensure all of our customers are included, both those with active voices in the energy debate and those who are less well represented. It's clear that the net zero carbon challenge will affect us all and it's imperative that no one is left behind.

The scale of the challenge is clear, the urgency of making the transition is great, and the speed at which we need to see change is unprecedented.

Our aim is for customers to have the confidence to take part in that transition and adopt LCTs which improve their lives today and tomorrow.



Peter Emery
Chief Executive Officer

2 Executive summary

At Electricity North West, we have been preparing for the low carbon challenge for a number of years. In 2018 we published our ‘Powering the North West’s future’ document which detailed six guiding principles for our DSO transition, identified through dialogue with our customers and wider stakeholders. Led by these principles we have carried out research, implemented changes and developed action plans to prepare our business for net zero.

In February 2020 the validity of our plans was reaffirmed by our regulator Ofgem’s own decarbonisation action plan, which sets out the central role of network operators in enabling the UK’s carbon transition.

In collaboration with government and other industry participants, we have been active in the Smart Grid Forum. This forum recognised the opportunity for smart grids to deliver benefits to consumers through minimising costs, enabling participation and providing wider economic benefits with faster, cheaper connections and the provision of network capacity for economic growth.

We have developed a host of technologies and approaches guided at every step by our customers. Since 2010, we have invested over £80 million in research, exploring and trialling new technologies and commercial models with our stakeholders and academic partners. We have invested a further £50 million in operational technologies to make our network smarter.

These investments have driven a whole host of improvements in our service to customers, halving the number and duration of supply interruptions while delivering real reductions in bills. They are also guiding future planned changes to our operations and the new services we will offer. These investments in research and stakeholder engagement have enabled us to gain insights into what is needed to adapt our business. Customers will soon see new choices in how they interact with us and with how they connect to, and use, our network.

Producing the required amount of electricity in a sustainable way has seen huge growth in renewables like wind and solar, much of it connected to distribution networks. In the North West of England, we have developed new policies and low cost commercial arrangements to transform how we accommodate increasing volumes of clean energy and manage the dynamic power flows across the network.

We are already showing how we can help our customers save money through optimising the efficiency of their appliances as well as supporting the electricity system operator to balance the national grid. Our investment in research and development supported by our stakeholders has already brought about real benefits for our customers and together with commercial and technical changes will ensure we continue to deliver.

As our engagement has deepened over the past few years, expert groups of stakeholders, such as our sustainability panel, have helped us to understand that our customers need us to become a trusted, neutral party who can take a leading role in helping our communities achieve their aims. This role is new to our business but our stakeholders, including local government, have asked us to put in place the guidance, advice and support required to assist the region in its ambitions.

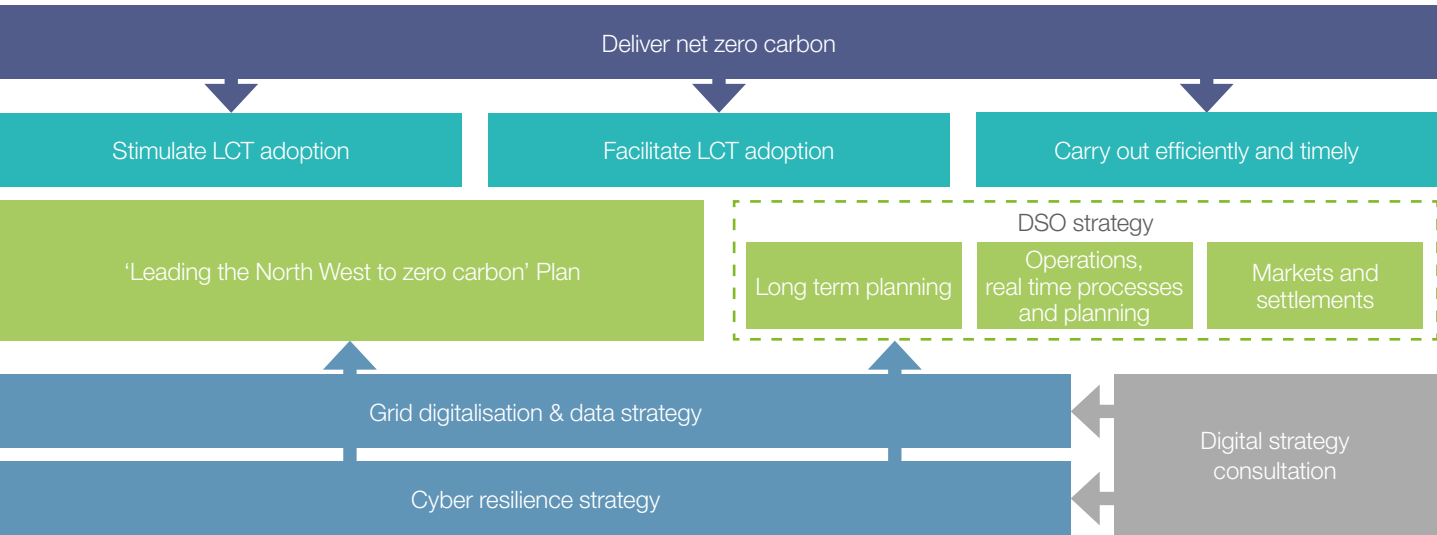
We have been told by stakeholders that ‘DSO’ is an industry-specific term and they would prefer to talk to us in terms of ‘decarbonisation’. Out of that was borne our ‘[Leading the North West to zero carbon plan](#)’ which sits alongside our DSO strategy and outlines our commitment to achieving net zero by demonstrating ways to decarbonise and providing leadership through actions across our own operations.

Concurrently, at industry level, the debate about DSO continues and network operators are looking at new processes and standardisation around DSO and whole system coordination.

We will also review Ofgem’s RIIO-ED2 Sector Specific Methodology consultation document due in summer 2020, and take into consideration any comments relating to DSO under the next price control period.

Underpinning all of our work are our Digital strategy and Grid digitalisation and data strategy.

How decarbonisation and DSO transition fit together



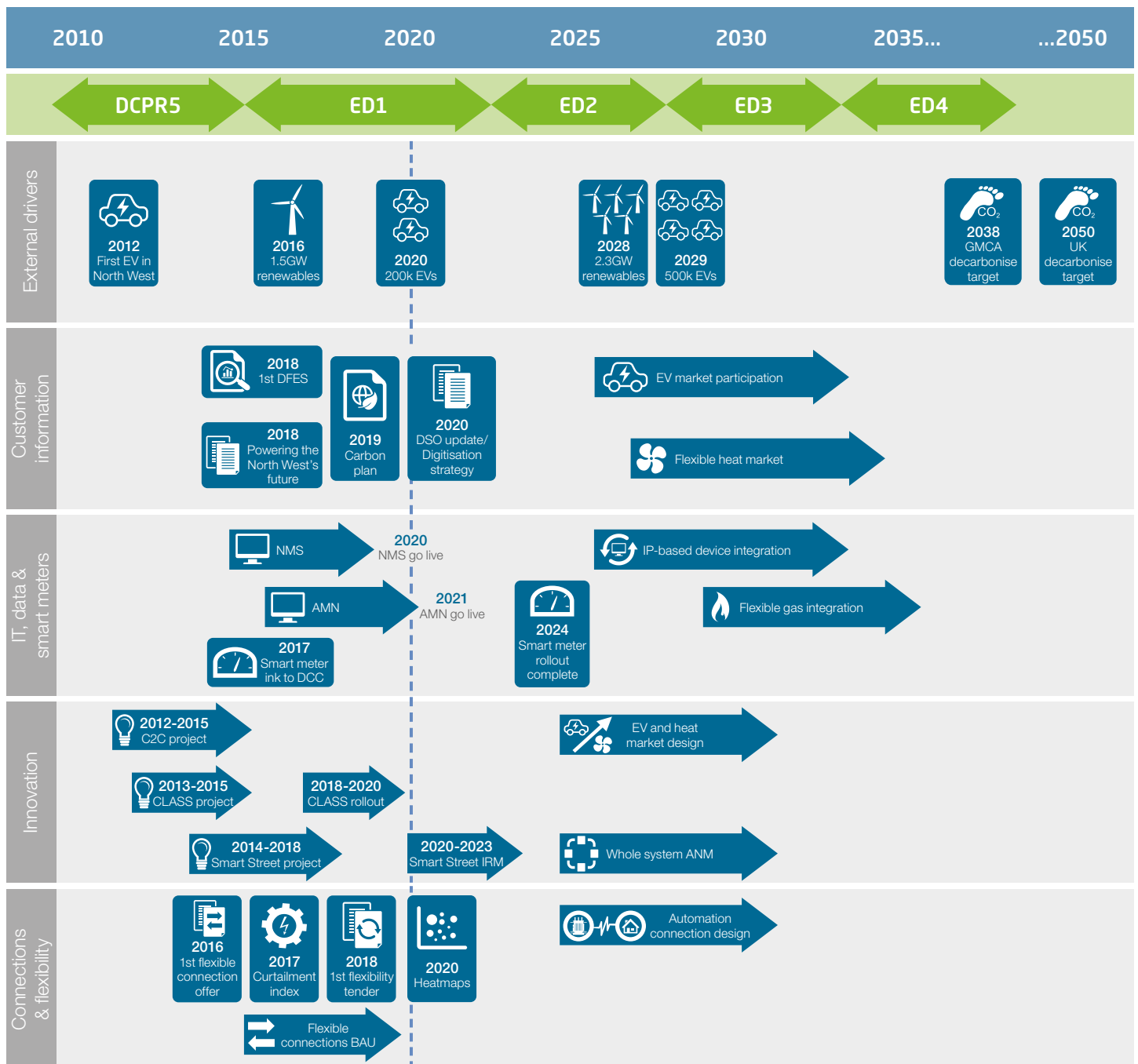
Q

1. Our overarching objective is to deliver a safe, reliable network for our customers and to support regional net zero targets in an efficient, coordinated way. Are you supportive of this as an overarching objective? If not, what would you consider to be the right objective?

Delivering DSO functions is a key enabler to making decarbonisation affordable. These functions are at the heart of a more active regional electricity network, fit for the changing ways customers produce and consume energy.

Electricity North West is uniquely placed to ensure that the changes deliver a net zero carbon electricity system for our region, attracting investment for regional economic growth, facilitating access to existing and new markets, while continuing to innovate and keep bills as low as possible for our customers.

Our DSO roadmap shows the external drivers for decarbonisation and sets out the key activities we are taking to achieve our net zero targets



3 The future

The way electricity is generated has changed significantly in recent years with many traditional, large coal power stations closing and new clean generation technologies taking their place. These new low carbon generators use renewable forms of energy instead of fossil fuels and a significant proportion are connected directly to local distribution networks or connected within commercial or domestic premises.

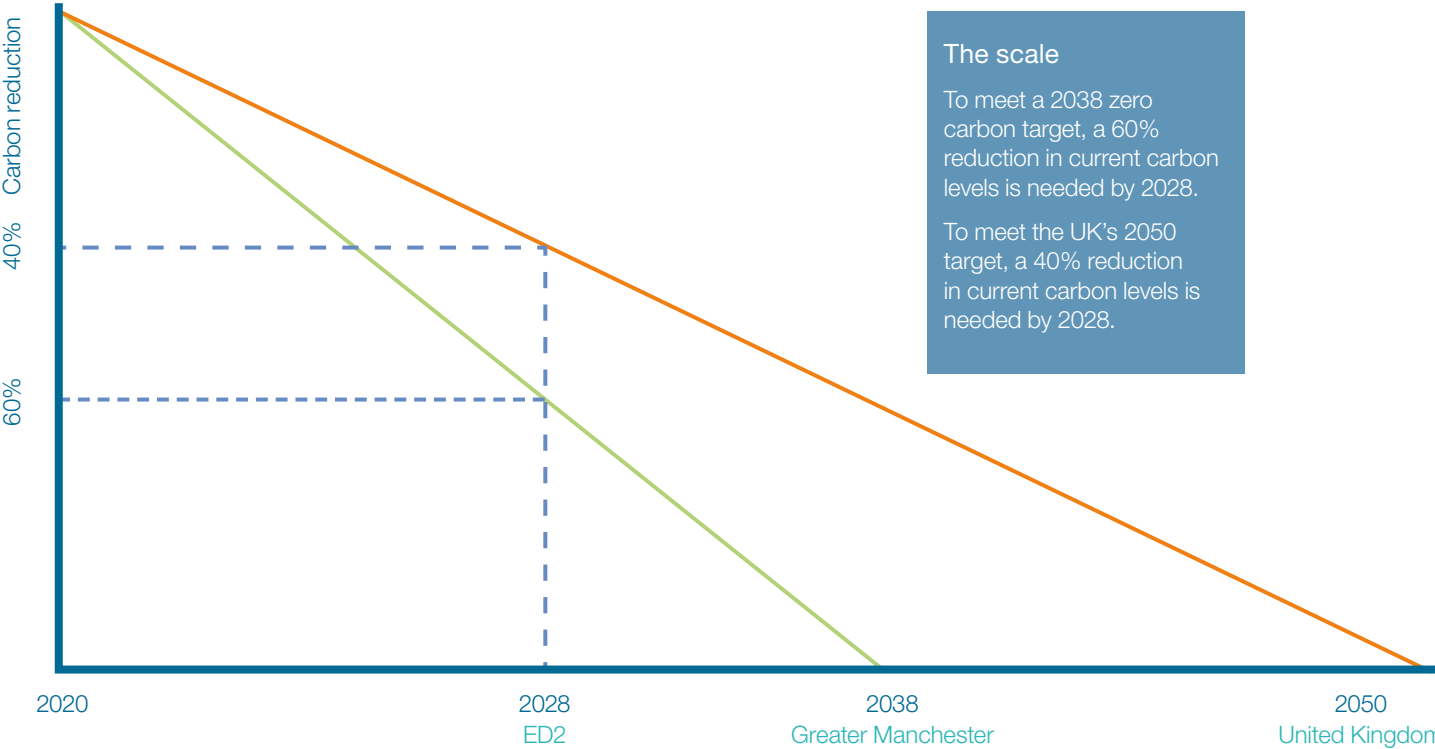
Decarbonisation targets supported by new incentives, the falling cost of technology and the desire of people to decarbonise their lives is driving wide adoption of LCTs for heating and transport with EVs rapidly increasing in popularity.

Delivering decarbonisation, improving reliability and ensuring affordability means that our role as a distribution network operator (DNO) must change. Central to this change is co-operation and co-ordination with our customers, our stakeholders and industry partners. This change is called 'whole system' and will play a major part in how we solve the challenges we face together.

Regional ambition

While the UK has a net zero decarbonisation target set for 2050, some regions, including the North West, are planning to reach net zero sooner. This means that LCT adoption and behavioural changes will occur sooner and the investment in our network needs to match our region's adoption profile.

Reduction in emissions required to meet net zero targets



Forecasting what this means for our network

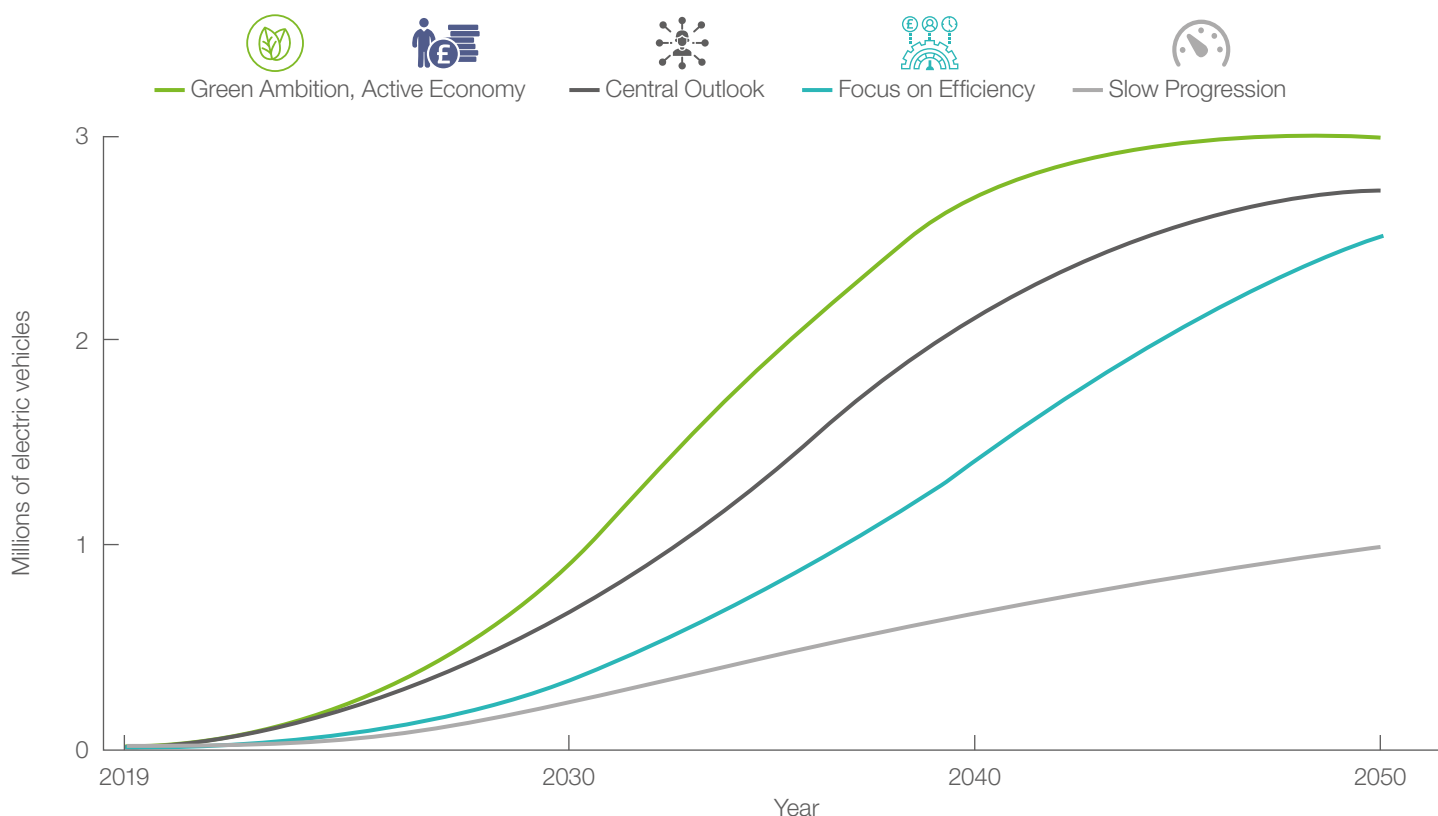
We have developed sophisticated ways of anticipating the range of changes likely to occur on our network in the future. The information we gather from our stakeholders and from our databases allows us to frame the assumptions that are used in our five distribution future electricity scenarios. These scenarios were developed as part of our innovation work under the [ATLAS](#) project, and represent different views of the future. This means we can explore future uncertainties driven by different levels of regional growth and decarbonisation.

Forecasting in this way allows us to consider many changing factors including customer numbers, demand types, economic activity, the pace of LCT adoption and new generation connections. This means we can see the impact of these factors on our network and forecast the network capacity we need to make available up to 2050 at an individual asset level. Through a detailed series of sub-regional stakeholder inputs, we can better understand how our network needs to change and identify where we may need to target investment to meet the challenge of our transition to net zero carbon.

EVs are expected to be the most significant contributor to the future rise in electrical energy consumption, although the electrification of heating and cooling (heat pumps and air-conditioning) also contributes significantly in this rise. In each scenario EV forecasts show increased uptake around the year 2035 reflecting the impact of the ban on petrol and diesel vehicle sales.

Our capacity forecasting and scenarios are published annually in our [Distribution future electricity scenarios](#) (DFES) document which shares our view of the North West's future electricity requirements and provides visibility to our stakeholders on where we may need flexible services to address capacity issues.

Future numbers of electric vehicles in the Electricity North West region, (DFES 2019)

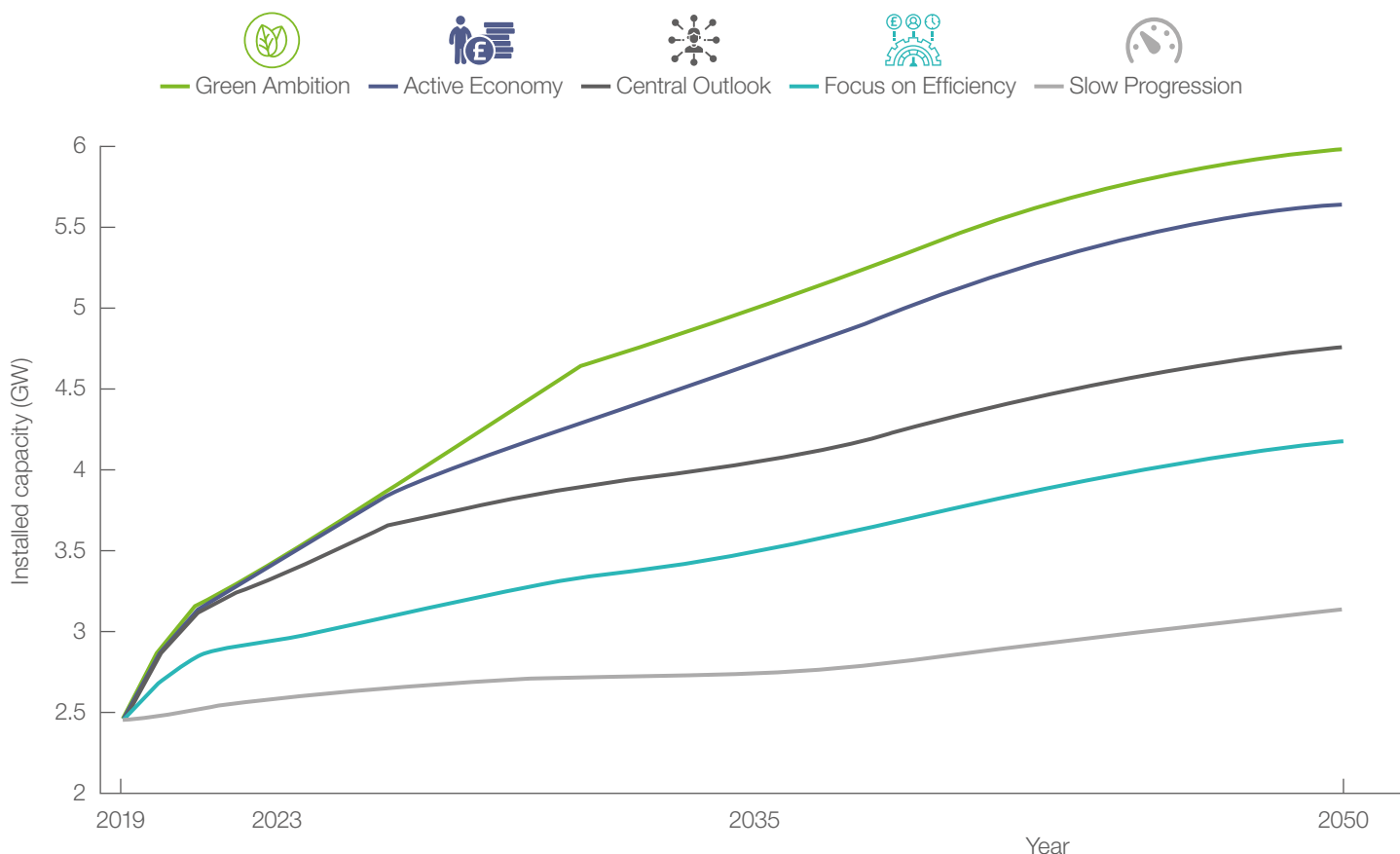


3 The future

We have seen a significant penetration of distributed generation (DG) in the UK in the last decade. Currently, solar/photovoltaic (PV) and wind farms are expected to continue growing as part of the transition to net zero. PV can be deployed on the roofs of domestic and large

commercial premises in urban areas, alongside larger solar and wind farm installations in more rural areas. Installed DG capacity is expected to increase by between 25% and 75% within the next decade and potentially more than double the current level by 2050.

Distributed generation forecasts for all Electricity North West scenarios (DFES 2019)



These changes present huge opportunities, bringing benefits to our customers and to the environment.

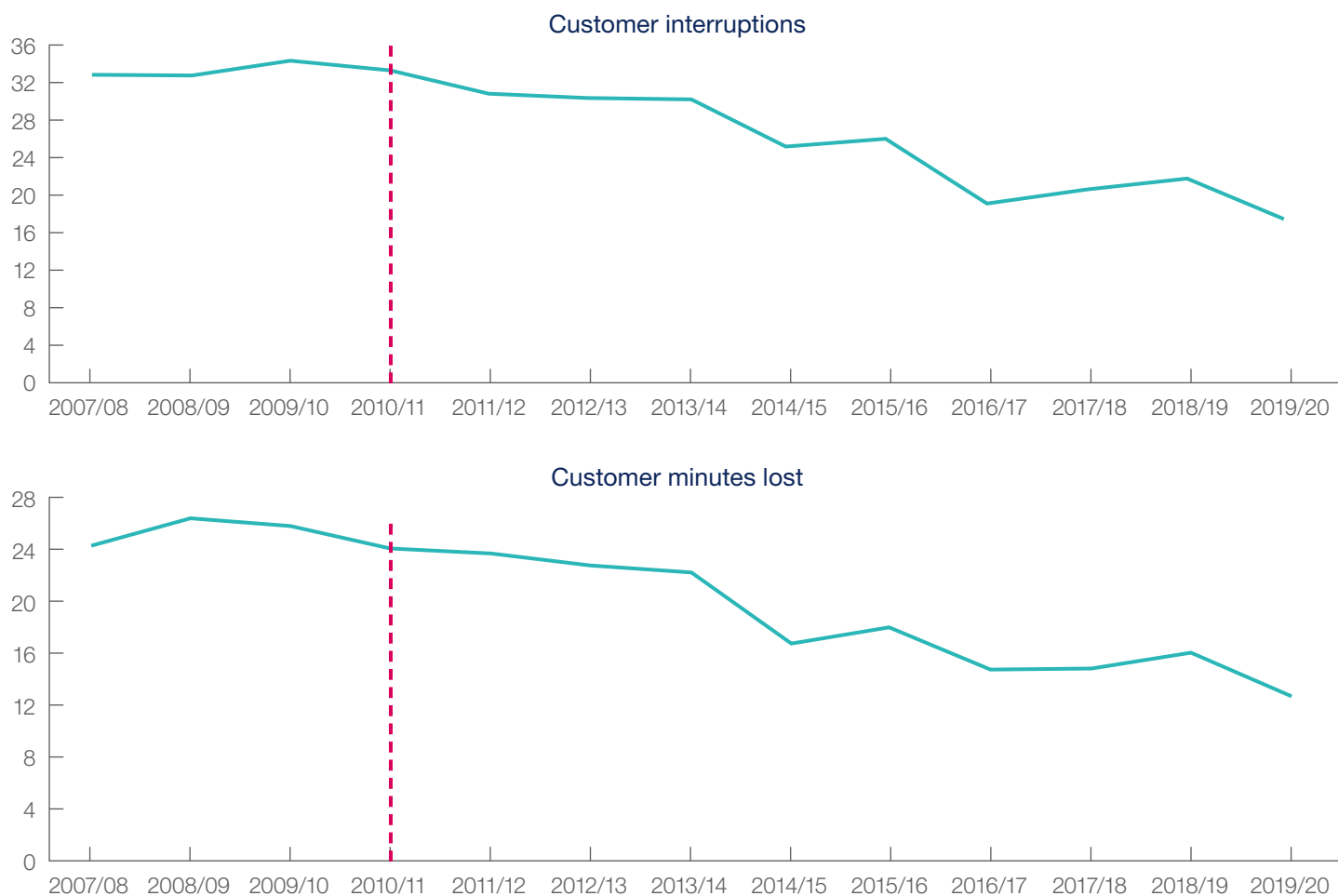
At Electricity North West, we are proud to support these changes, and have been working with our customers and the industry to understand our evolving role. This means improving what we already do and taking on new responsibilities to address new challenges and unlock the benefits for our region and the people we serve. We are investing in digital and technical enablers, as well as the skills of our people, to facilitate and stimulate the uptake of ever more LCTs to help the North West decarbonise swiftly. We are guided in this work through working closely with our customers, communities and stakeholders to ensure we understand their needs and help level the playing field for all to participate in the energy system of the future.

Reliable networks

Our stakeholders and customers consistently tell us that they expect Electricity North West to improve the reliability of our network. In response to this need we have invested an additional £18 million in network automation technology during the current price review

period (RIIO-ED1). This, together with similar investments in our previous price control DPCR5, has enabled us to halve the number of supply interruptions experienced by customers.

Since 2009/10, performance in high voltage customer interruptions (CIs) and customer minutes lost (CMLs) performance improved by around 50%



Our stakeholders have told us that certain vulnerable groups are particularly sensitive to loss of supply and hence we have invested in additional improvements in areas with significant numbers of vulnerable customers such as clusters of care homes. This, coupled with investments to improve supply reliability to the region's hospitals and care centres, has delivered real benefits for these groups.

Our stakeholders continue to tell us this need will increase and we are therefore investing a further £20 million in additional measures during RIIO-ED1. All of this additional investment is funded through efficiencies we have made in other areas of our business and has not affected customer bills.

We are using what we have learned from our customers to inform our investment plan for our next price control period which starts in 2023. We recognise that reliability is the number one priority for our customers; our business plans will therefore target investments that improve reliability. These measures will ensure our customers and wider stakeholders enjoy one of the most reliable networks in the world.

4 A national challenge

Open Networks Project

Stakeholders have been clear that the scale of the required change is significant and coordination across all network operators is necessary to ensure a UK-wide co-ordinated plan, incorporating the best available measures. The Open Networks Project was established to address this need, established by our industry body, the Energy Networks Association (ENA). The project is a key initiative which responds to the government's [Smart Systems and Flexibility Plan](#), [Industrial Strategy](#) and [Clean Growth Plan](#). The project has placed stakeholder engagement at the heart of its activities, establishing a stakeholder advisory group to inform and shape the project and its deliverables. Our own DSO functions and activities have in turn flowed from this national work and are aligned with the Open Networks stakeholder engagement programme.

As a member of the project we are working with the industry, our regulator and government on how new energy technologies, commercial models and emerging markets are facilitated by the network operators. This will define the future smart grid and ensure the energy system as a whole is properly equipped to deliver the energy we will all rely upon into the future.

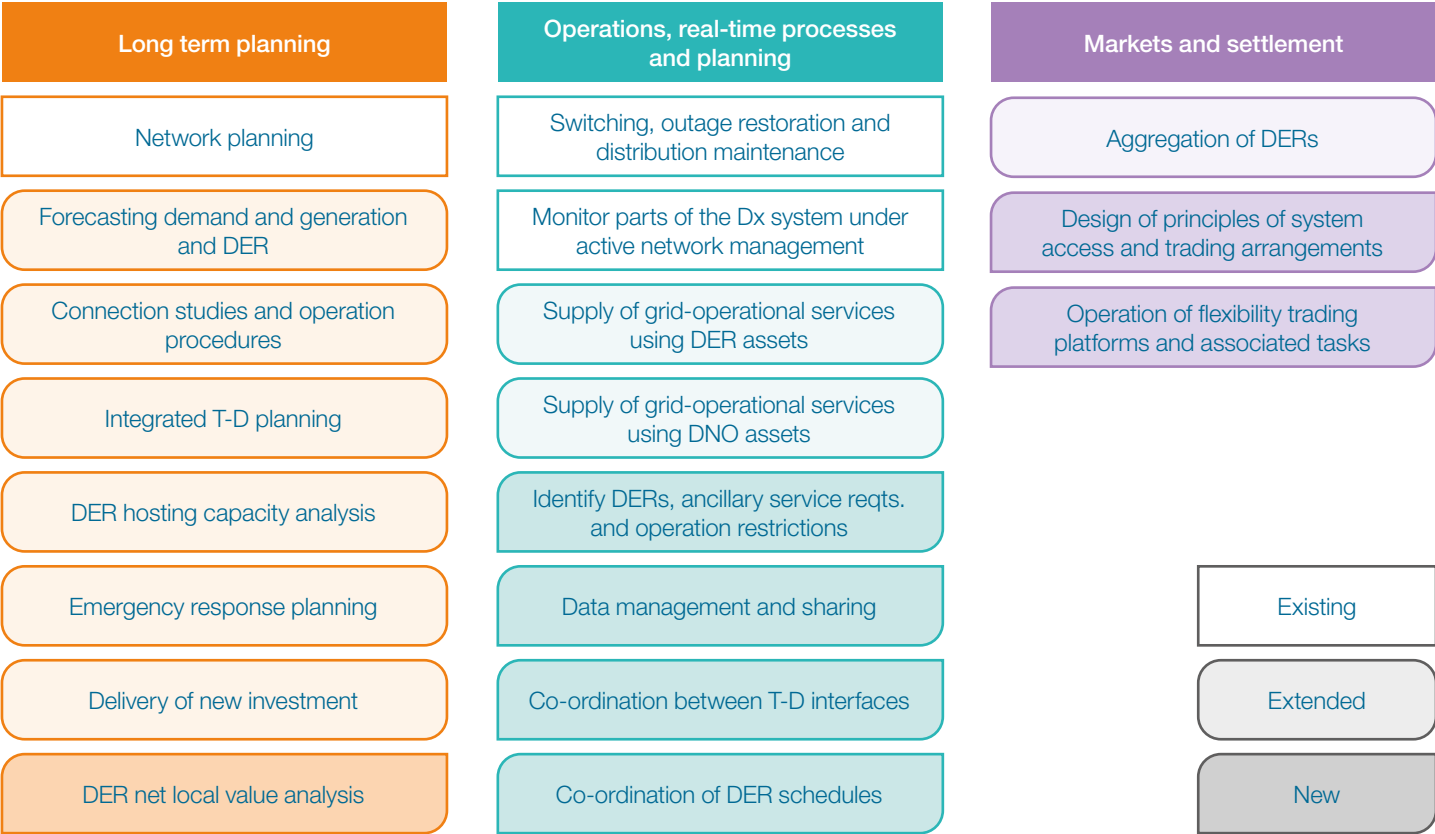
The key objectives of the overall Open Networks Project are to:

- Work collaboratively across network operators, with Ofgem, the Department for Business, Energy & Industrial Strategy (BEIS) and other stakeholders to progress the transition to DSO, bringing consistency in approaches across networks to improve outcomes for customers
- Ensure that the customer is kept at the centre of any development to ensure that their experience can be improved
- Bring consistency in approaches across networks through existing and new processes to support the transition to DSO, interactions with each other and interactions with customers
- Enable data visibility and better access to non-confidential data
- Ensure conflicts of interest are proactively identified and appropriate measures are put in place to address them appropriately and assure a whole system approach to system operation.

Government and regulatory enablement

Ofgem and BEIS are active participants in Open Networks, helping to ensure that all regions of the UK are aligned and implementing the necessary changes. In August 2019, Ofgem published a [position paper](#) on regulatory priorities and its approach to DSO. In the paper Ofgem outlined 19 DSO functions which are grouped into three themes: Long term planning, Operations and Markets.

Ofgem's 19 DSO functions



While recognising that these are not exhaustive or definitive and include interrelated functions, these are a useful way to help explain what we will do differently in the future and we have used them to provide an update on our activities, progress to date and our future plans. In our accompanying consultation document 'Analysis of DSO functions', we have highlighted our high level current view on the scope of work required to implement these functions, including key enablers such as IT systems and new processes.

Supporting contestability

It is anticipated that the characteristics of some functions mean that they could be undertaken via a market substitute and are therefore potentially 'contestable services'.

We support the position that as monopoly businesses DNOs should only implement DSO functions where there is a clear benefit in doing so. We are supportive of exploring contestability where alternative market solutions exist and look forward to continuing to facilitate new and emerging technologies and commercial models by increasing data sharing and visibility of network and system needs.

Electricity North West has a long history of supporting competition in many areas such as providing new connections. Competition has brought real benefits for customers in driving service improvements and value for money through customers' ability to choose. In the North West there has been extensive competition in connections for many years and our role in facilitating this outcome has been recognised by Ofgem.

As part of DPCR5 (our previous price control period, 2010-2015), Ofgem introduced 'competition tests' whereby DNOs could apply to Ofgem to have price regulation lifted altogether, if they could demonstrate that competition had developed sufficiently to effectively constrain prices. Electricity North West was the most successful DNO in demonstrating that there was effective competition in seven of the nine market segments identified by Ofgem. Ofgem's chart below shows our leadership in ensuring and supporting competition.

Competition test applications and results

	Electricity North West	Northern Powergrid		UK Power Networks			Western Power Distribution				Scottish & Southern Energy		SP Energy Networks	
RMS		Yorkshire	North East	EPN	SPN	LPN	East Mids	West Mids	South West	South Wales	SHEPD	SEPD	SDP	SPM
Metered demand LV	Pass	Did not apply	Did not apply	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Pass	Did not pass
Metered demand HV	Pass	Pass	Pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Pass	Did not pass
Metered demand HV & EV	Pass	Did not pass	Did not pass	Pass	Pass	Pass	Pass	Pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass
Metered demand EV & above	Pass	Did not pass	Did not pass	Pass	Pass	Pass	Pass	Pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass
Distributed generation LV	Did not pass	Did not apply	Did not apply	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass
Distributed generation HV & EV	Pass	Did not pass	Did not pass	Pass	Pass	Pass	Did not pass	Did not pass	Pass	Did not pass	Did not pass	Pass	Did not pass	Did not pass
Unmetered local authority	Pass	Did not pass	Did not pass	Pass	Pass	Did not pass	Pass	Pass	Pass	Pass	Did not pass	Did not pass	Did not pass	Pass
Unmetered PFI	Pass	Did not pass	Did not pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Did not pass	Pass	Did not pass	Pass
Unmetered other	Did not pass	Did not apply	Did not apply	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass	Did not pass

Pass Did not pass Did not apply

4 A national challenge

We believe that our long-term support of competition and the recognition from stakeholders of our best practice processes should give stakeholders confidence that we have both the track record and support for the principle of competition and that we will apply these equally to the different roles of DSO.

In the early phases of implementing the DSO functions, significant investment will be required and we believe we are in the strongest position to deliver for customers in the North West. As the DSO model develops and is rolled out at scale in RIIO-ED2 and RIIO-ED3, we expect to see contestability emerging and providing benefits across many areas and functions.

Key enablers

As well as the 19 functions, in their position paper Ofgem also described a range of key enablers to deliver those functions and their associated benefits to customers.

We have already made significant progress in developing and implementing the required key enablers. In our accompanying consultation document, Analysis of DSO functions, we have detailed our progress so far, our current activities and our future plans to put all the required enablers and functions in place.

Below we have summarised our action plans to put in place the key enablers that will unlock the value of the DSO functions for our customers and stakeholders. Data and transparency underpin all of the actions and ensure all participants, stakeholders and customers are included.

Q

2. We have sought to describe how we have aligned our activities around Ofgem's 19 DSO functions while keeping close to regional customer needs and addressing related network and whole system challenges in an efficient and timely way. Are there any omissions in the challenges or activities we are planning?
3. Do you believe that Electricity North West is best placed to deliver all 19 of Ofgem's DSO functions? If not, which functions would be better delivered by a third party and which types of parties may be better placed to deliver these? Please give your reasons for your answer.



Enablers	What we have done/are doing	What benefits this delivers
Forecasting and planning enablers ["provide the information needed to inform coordinated actions by the system and network operators, investment decisions of stakeholders and facilitate the development of efficient flexibility markets."]	<p>Through our engagement work we have developed our decarbonisation pathways to show how the region could decarbonise</p> <p>We have developed our Distribution future electricity scenarios (DFES) and the supporting future energy scenarios identify where and when new capacity will be needed</p> <p>We have embedded our ATLAS and real options cost benefit analysis (ROCBA) decision support tools to ensure we provide capacity in the most efficient way</p>	<p>Our stakeholders will have greater clarity on when new technology will be available</p> <p>Our stakeholders can see where they can provide services to the grid and find lower cost connection opportunities</p> <p>ROCBA allows us to assess the best solution to today's network issues while recognising the potential future requirements of the network – informing a least regrets investment decision and keeping bills as low as possible</p>
Network monitoring and visibility enablers ["decentralisation of the energy networks now demands greater network visibility, particularly on the 11kV and LV network to drive efficient operational decisions on network management across voltage levels, and allow and inform the activation of flexible services."]	<p>We have implemented a state of the art modern network management system (NMS) incorporating over 30,000 network monitoring points spanning our network from 132,000 volts to 240 volts</p> <p>We are integrating smart meters into these systems as they are installed by suppliers</p>	<p>Investment in network monitoring will enable network optimisation in real-time, increasing utilisation while minimising network losses and, support the development of renewable generation and flexibility markets by highlighting areas of capacity and constraint</p>
Flexibility trading enablers ["operational data is core to well-functioning flexibility markets, and provide value to flexibility providers, aggregators and platforms ...that informs market positions, the value of flexibility for near-term competitions, and the ability to stack value across markets... and will inform network and system operators about operations that may benefit from co-optimisation and conflict avoidance."]	<p>We have implemented risk control measures for flexibility providers such as our curtailment index to underpin the viability of flexible resources</p> <p>We are supportive of the development of flexibility and local capacity trading platforms to supplement our flexibility tendering processes</p> <p>We are developing ANM interface arrangements so that we can communicate with platforms</p>	<p>Assurance to network users that over time they will not experience more curtailment than a value understood at the time of connection</p> <p>Platforms will allow flexible resource operators to search for opportunities and to stack revenues by providing services to multiple users</p>
Flexibility dispatch and control enablers ["open access arrangements for the management of a flexibility asset's energy consumption or generation, including the sending of a signal and the enactment of a modulation of energy use to avoid path dependent institutional lock-in and the potential for conflicts of interest."]	<p>We are implementing a whole system active network management suite to allow dispatch of flexible resources such as demand side response and generation, and help manage the flow of energy to EVs, storage; connected at any level to solve network constraints efficiently</p>	<p>Whole system benefits through coordination between transmission and distribution requirements delivering efficient network solutions and striking the right balance between new build and flexible solutions</p> <p>Development of sophisticated control algorithms will ensure coordination of T&D flexibility and prevent any unintended consequences</p>
Data exchange enablers ["Open and transparent electricity system data collection and sharing by breaking down potential data silos by standardising datasets and simplifying data exchange between parties to bring efficiencies to the unbundled electricity system."]	<p>We are working through the ENA to put in place standard open source data flows to ensure all parties have access to the data they need</p> <p>We are a supporter of the Flexr project</p> <p>We have raised both Grid Code and Distribution Code modification proposals to mandate the provision of an enhanced level of network planning data</p>	<p>Data sharing will revolutionise the operation of the network bringing innovation and greater participation in the energy system</p> <p>Increased data capture and sharing will enable network companies to more efficiently plan their networks in a smart future; it will provide new customers with an insight into connection and flexibility opportunities and also provide general stakeholders (local authorities, community energy projects etc) with a resource to help them with their planning commitments</p>
Our business As our role evolves, so will our skills and competencies requirements. A culture for continuous improvement in our people and business processes will ensure we are successful in distribution system operation for the benefit of our customers.	<p>We have already formed a separate DSO team with appropriate governance and segregation from our other DNO functions such as asset management</p> <p>We are including our colleagues in these changes, revising our training and development policies and recruitment and retention strategies</p>	<p>Our DSO team already take decisions on the most efficient way to provide capacity and operate an open and transparent procurement process for flexibility</p> <p>We publish the outcome of our calls for flexible services to ensure transparency for market participants</p> <p>New ways of working will bring new opportunities for skilled resources across a wider range of disciplines</p>

5 A regional opportunity

In our conversations with stakeholders, they have told us that to ensure the carbon transition takes place they need us to become a trusted, neutral party who can take a leading role in helping our communities achieve their aims. Our Leading the North West to zero carbon plan, launched in 2019, sits alongside our DSO strategy. Supported by independent research and engagement it is focused on stimulating the adoption of LCTs across the region through a three part process:

1. An initial engagement campaign focused on industrial and commercial customers, who consume over 60% of the region's electricity, as a priority set of energy users. This will be followed by a wider engagement plan encompassing all customer groups
2. Understand barriers to adopting LCTs
3. Help industry and local authorities to overcome barriers to adoption.

As part of this debate, we will maintain our dialogue with our customers and stakeholders to understand their views on our role in stimulating the transition to a low carbon economy.

Our DSO strategy, as outlined in this document, covers how we will facilitate and deliver this economically.

Q

4. Do you agree that we have the right set of key enablers? Are there any others we should include?



In our first publication ‘Powering the North West’s future, transitioning to a distribution system operator – a collaborative approach’, working with our stakeholders and customers, we identified six principles for guiding our approach to implementing DSO.

Electricity North West DSO guiding principles



This document demonstrates how we have kept the guiding principles at the heart of delivering the data, IT systems and capabilities that will facilitate a range of services and technologies to deliver smart, flexible and zero carbon electricity systems. In this document, we will seek to identify how the energy system transition will drive the development of new capabilities and what skills and partnerships will be required to deliver the desired outcomes.

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 stakeholders while remaining commercially neutral.

Neutral not silent means transparent in processes, and technology agnostic.

Curtailment index

One of the early changes delivered by our DSO programme was the introduction of flexible connections which allow both generation and demand to be connected at much lower cost. These connections have become extremely popular with generation, industrial and commercial customers and are now the normal form of connection in many instances.

The flexibility inherent in these types of connections offers significant potential for helping meet the challenges of decarbonisation. These stakeholders have told us that the main barrier to investing in additional assets that can provide the flexibility services needed is the uncapped risk of curtailment ie, them not being able to operate their generation/ storage/ demand normally.

In response to this we introduced a curtailment index cap in all of our flexible connections contracts to ensure they have complete transparency around this risk and that it is managed to an agreed level. We are the only DNO to put such measures in place in response to stakeholder feedback.

Q

5. We have outlined six guiding principles; do you agree that these still provide the right foundation to guide our transformation toward the right decisions, practices and processes to deliver for our customers and to support Ofgem in achieving their strategic outcomes? If not, why do you disagree?

Q

6. We are planning to use the curtailment index to share use of the network between flexible connections on an equitable basis. Do you agree with this approach versus 'last in, first off' (LIFO) or capacity sharing?

6 Our DSO principles

Capacity trading

Our stakeholders have also told us that at certain times they may be willing to release the network capacity they normally use for use by others. This 'capacity trading' will become much more prevalent as the number of flexible demand devices increases – for example EV charge points. To allow customers to directly benefit from such capacity trading on local networks we will put in place a market mechanism whereby customers can bilaterally trade their capacity. While we will facilitate and technically enable the market, our neutrality principle means that we will not partake in it.

Flexible services

As part of our drive to find smarter solutions to meet future demand for electricity we promote the provision of **flexible services** and invite customers to increase or reduce demand, generation or storage at certain times and receive payment in return, to help us manage constraints on our network.

We run local markets for flexibility and encourage active participation in the energy system from a broad range of participants so that they can get the maximum value out of their ability to flex their use of the network and increase revenue streams for electricity assets such as batteries and EVs.

Procuring flexibility will minimise the need for investing in more cable or transformers, reducing the cost of DSO as the use of the electricity network increases.

We see procuring flexibility services as a key DSO function and a vehicle for change as part of the transition to net zero carbon. We think in the future it is inappropriate to purchase carbon-emitting flexibility.

We secured our first flexibility contract in 2009 and have been running regular tenders to purchase flexibility. Since 2018 we have issued six tenders for over 65MW of flexibility, the details and outcomes of which are available on our website.

Although there has been limited interest in these tenders to date, at the end of 2019 we had a total of 578 MW of flexibility connected distributed generation (DG) on our network, which is projected to reach over 800 MW by the end of 2020.

We are a leading voice in the development of common definition and contracts for flexibility services most notably during 2019-20; we have led national work in the Open Networks Project towards the standardisation of active power flexibility services and contractual agreements. Electricity North West is proud to be the first DNO to implement these standardised deliverables in its spring 2020 flexibility tender. The use of industry agreed terminology for flexibility services is important to help facilitate participation through the transparency and simplification of information available. This early adoption shows our commitment to remove barriers to entry and to encourage participation as much as possible.

We recognise that this is a nascent market and we continuously seek feedback directly from stakeholders who participate in our tenders, and more widely through the Open Networks platform. Feedback from participants has already identified that the greatest barrier to entry to this market is the specific geographical location in which we require flexible services. Our DFES document has changed as a result of this feedback and will help stakeholders see where and when future capacity needs will emerge. This will ensure continued successful engagement with our stakeholders and encourage participation at a later date as opportunities arise across our region.

We expect the number of potential flexible solution providers to grow, enabled by further decentralisation of generation and the connection of LCTs. New, innovative market entrants will participate in emerging opportunities and our ongoing investment in the key enablers of our people, technology, data and business capabilities will help these markets to mature by providing greater visibility of network needs and simplifying coordination between all parties.





Q

7. We have outlined our approach to neutral market facilitation for flexibility markets in terms of signposting, advertising and evaluating flexibility tenders. How can we further improve access and visibility of these opportunities and transparency of decision-making?
8. DSO is an enabler for decarbonisation. Should we look to purchase low carbon flexibility in preference to any technology that does not conform to low carbon definitions?

Management of contracted capacity

A key function of DSO is to ensure the efficient use of the network at all times. Our stakeholder engagement consistently shows that customers value reductions in their bills. To help meet these requirements we introduced a process for the management of contracted capacity which proactively helps customers understand and manage their capacity on a continuous basis to ensure that

they only pay for capacity they use. On a monthly basis, we contact those customers who are exceeding their contracted maximum import capacity (MIC) and help them avoid excess capacity charges by changing to the correct MIC. We also contact those customers who are underutilising their MIC, who are therefore paying to reserve capacity that they are not using.

			
58MW	£108k p/a	31MW	£396k p/a
additional capacity reserved by our customers in line with consumption	avoided excess charges for customers that were exceeding their MICs	underutilised capacity released onto the network	avoided charges for customers under-utilising their MICs

Costs are estimated based on last 12 months maximum demand data of customers and 2020/2021 DUoS charges; and assumes MICs were changed as a direct result of notifications sent.

This activity helps to free up capacity on the network for use by others. This benefits new customers connecting to our network who are able to use this capacity and avoid any reinforcement charges they would otherwise face. The regular review process has also helped us streamline our network planning processes and provide customers and wider stakeholders with a more accurate view of where capacity already exists through our DFES.

We are the only DNO to proactively contact customers in this way, as we recognise the changing nature of our customers' requirements and endeavour to move away from a 'connect and forget' approach.

6 Our DSO principles

Network automation

Network management system

Our new £35 million advanced network management system (NMS) is the first end-to-end NMS in the UK. It allows our network model to individually represent all 2.4m customers including their low voltage (LV) service connections, LV network and high voltage network connected assets, and will make the vision of whole system management a reality.

Active network management

The NMS will pave the way for the first active network management solution to be deployed at full network scale. This will ensure that our network is optimised for the lowest cost operation at all times and crucially, at all voltages. This investment will also provide the foundations for bilateral trading of capacity and flexibility between customers, without the need for network operator participation – truly neutral market facilitation.

Network automation for energy efficiency

By installing intelligent software and innovative voltage control technology, the **Smart Street** system stabilises supply voltage to customers which makes their appliances and our low voltage network run more efficiently. This brings a number of benefits to customers. It can deliver real savings through a reduction in energy used by domestic appliances, reduce carbon emissions and provide more flexible solutions to help us connect LCTs to the network – all without impacting power quality.

Q

9. Active network management (ANM) maximises the use of the distribution network for all parties at minimum cost. How should our ANM system be configured to take into account the potentially aligned or conflicting requirements of the provision of flexibility to multiple industry parties? Should it be through market mechanism, networks coordination, via contractual or other means?

Regional and national collaboration

We will continue working with North West stakeholders, and collaborate with them to develop local and regional solutions to deliver against devolved and national policy objectives.

As part of our stakeholder engagement we have established independently chaired groups to guide our thinking and improvement plans with focus on our key priorities – affordability, sustainability and consumer vulnerability. We believe that stakeholder engagement with a wide range of stakeholders is fundamental to informing our strategy. In future our local knowledge and relationships with customers will help us to coordinate demand and supply and support all customers to effectively engage with the future smart grid.

Our stakeholders have told us that they expect whole system outcomes; as an industry it is important that there is close collaboration to deliver this. As a result of such feedback we have been working more closely with Cadent, the main regional gas network operator, to develop our local 'decarbonisation pathways'. As we all decarbonise our lives we need to work ever closer with other sectors such as gas, transport, telecoms and water. This whole system thinking will bring significant benefits and savings for customers.

Our local decarbonisation pathways are there to provide certainty to stakeholders to embark on their carbon transition over the next two price control periods to 2033. For example, they give clarity on how private motor vehicles, vans and heavy goods vehicles will decarbonise, allowing customers and stakeholders to make their decisions with confidence. They also span heat, electricity generation and the emerging role of hydrogen as a source of energy.

Our local decarbonisation pathways are complemented by our DFES document that sets out in detail what those changes mean for our network and ultimately inform our RIIO-ED2 price control submission.

Our joint work with Cadent has already highlighted the important role EVs will play in decarbonising road transport and delivering the region's clean air strategy. To enable these EVs to recharge we have identified the need for additional network capacity at major transport hubs such as Manchester Airport, key city centre locations and regional leisure and retail hubs. Our strategic projects programme was put in place to deliver this capacity which will enable our region to adopt EVs at scale.

Planning for 'least regret'

Our forecasting work includes the views of our stakeholders and utilises the best available techniques but we recognise that future demands on the network cannot be predicted with complete certainty.

When we invest to increase network capacity through either new assets or through flexibility markets we are spending our customers' money and we must ensure we only do so where justified.

ROCBA

The real options cost benefit analysis (ROCBA) tool was developed in 2016 as part of our research work. It compares the cost of different network investment solutions such as the cost of reinforcement against the cost of flexibility and includes an assessment of the risks and benefits under the five DFES scenarios.

We now use this tool for all reinforcement and asset replacement investment proposals to inform our decision-making and to ensure we make the most efficient use of our customers' money. The tool has been used since 2017, and we have demonstrated savings of over £5 million on network investment solutions within RIIO-ED1.

The tool compares the demand forecast for each site, using our DFES scenarios, against the cost of investment, while accounting for the depreciation of assets and the value of network losses incurred.

By incorporating our DFES scenarios into this tool, we can take a much longer-term view of our network investment programme, thereby avoiding the requirement for subsequent disruptive investment solutions while maintaining security of supply and cost efficiencies for our customers.

We were the first DNO to adopt such a holistic approach to network investment analysis and this ensures we take much more efficient decisions on behalf of our customers. This approach has been recognised by the Open Networks Project and Workstream 1A, Product 1 is developing a common evaluation methodology for flexibility services, which will be used by all DNOs from April 2021.

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.

The principles outlined above combine to ensure that we are delivering on this obligation. Our use of ROCBA, our regional decarbonisation pathways and our DFES give us certainty in decision-making and underpin our actions and investments.

We recognise the importance of close collaboration in our industry to deliver whole system outcomes. With the increase in the provision of flexibility we believe there is great potential for distribution networks to offer solutions to the transmission network. Likewise there may be limited potential for the transmission network to provide solutions to distribution networks. Working closely with other sectors will be key for the electricity industry to deliver whole system benefits and maximise value for customers.

Stakeholder engagement and feedback from the Open Networks Project has provided us with valuable insights in how whole system thinking can be incorporated in our DSO strategy.

Whole system planning

The National Grid electricity system operator (NGESO) had, at periods of low demand, experienced difficulty maintaining transmission system voltage within statutory limits. Its Pennine Pathfinder Project considers all possible solutions to this issue and will conduct a cost benefit analysis to decide the most efficient solution to progress. Through the Open Networks Project, we have developed distribution network 'build' solutions to address the voltage problems. This consists of installing 132kV reactors at grid supply points on our network. The 'build' solution was compared to solutions submitted by Northern Power Grid and National Grid Electricity Transmission. NGESO are currently testing the flexibility market for an alternative. The result of their analysis may be a build solution, a flexible solution or a combination of the two.

6 Our DSO principles

Everyone's included

We have a comprehensive stakeholder engagement process which aims to engage with as many different consumer voices as we can. These include our consumer vulnerability advisory panel which makes sure the voices of our hard-to-reach customers are heard; and our sustainability panel which links us with the community energy sector. These panels help us to develop our understanding of specific issues and give us the mechanisms to consult on the development of our support for vulnerable customers and the fuel poor.

One of the ways we are already providing direct support to vulnerable customers and making sure we engage a diverse segment of our customer base is through our support for community energy and vulnerable customers and our Empowering our Communities Fund.

Vulnerable customers

We are committed to ensuring that the most vulnerable in our region are not disadvantaged or excluded from the benefits of developments in the energy sector. We want to include those people who may be in vulnerable circumstances or find it particularly difficult to be without power so that we can put the right support in place and ensure that the benefits of DSO are understood and shared equitably.

It is important that such customers are pro-actively included in initiatives such as Smart Street which delivers material savings on customers' energy bills through reduced energy consumption.

Value of Lost Load

Understanding the impact of power cuts on different groups of customers and the [Value of Lost Load](#) (VoLL) is important as it is used by the electricity industry to determine investment strategies and network planning, which is one of the functions of DSO.

We have conducted an extensive piece of research which has led to a better understanding of the unique impact of power cuts on a diverse range of domestic and business customers.

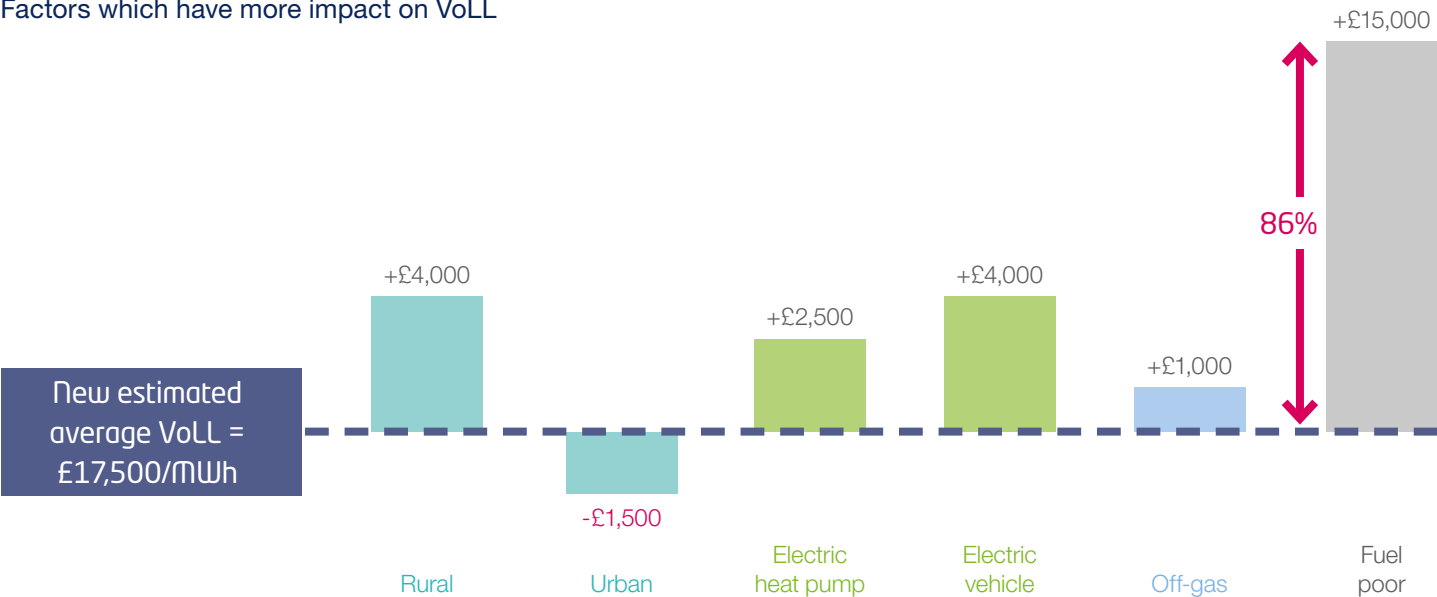
The research shows a huge difference in the way customers value their electricity supply. The under 30s are among the least affected by a power cut whereas the groups most affected include those in vulnerable circumstances, particularly those struggling with fuel poverty. Other highly impacted groups include young families and early adopters of LCTs.

Our research has demonstrated that the value electricity consumers place on the security of their supply has increased significantly to an overall weighted average of £17,500/MWh, since Ofgem set the single value for our current regulatory period (RIIO-ED1) at £16,000/MWh, reflecting customers' greater dependence on electricity and their evolving needs.

The findings from the VoLL project are expected to inform our investment decisions in the next regulatory period (RIIO-ED2) and deliver more efficient decisions. Moving from a single model, to a more nuanced segmented VoLL, will enable DNOs to more effectively calculate the risk and benefits of prioritising particular investment decisions to deliver security of supply. This understanding will also inform restoration strategies following a supply interruption, and the provision of temporary support to mitigate the impact on those most impacted.

The following table illustrates the significant variation in the impact of an unplanned supply interruption on key customer groups. When adjusted to reflect income, the VoLL of vulnerable customers and households in fuel poverty is significantly higher than average, demonstrating that these customers are more likely to suffer detriment than typical customers as a result of an interruption.

Factors which have more impact on VoLL



Community energy

Community energy refers to a whole range of community-led projects and initiatives to reduce, manage, generate or purchase energy. Community energy projects focus on community engagement and delivery of benefits directly to the local area and communities. These are aligned to our DSO/decarbonisation ambitions as the projects are largely focused on the development of renewable energy and the promotion of energy efficiency advice.

In 2018 we developed our [Community and local energy strategy](#) which sets out our approach to forging links with community and local energy groups and organisations to support the growth of the sector.

The strategy demonstrates a clear commitment to our customers in this exciting and rapidly changing area. It was developed in consultation with our stakeholders to ensure it addresses the issues they are facing and to make sure our response is well informed.

Consultation with our stakeholders led to the development of a range of initiatives including the launch of a community and local energy newsletter to help us keep our stakeholders up-to-date with our activities and the launch of a series of 'community connects' workshops, aimed at increasing capacity and skills within the community and local energy sector.

Q

10. How can we ensure that vulnerable customers are not disadvantaged by the transition to zero carbon? Are you interested in working with us to meet these aims?



7 Our DSO strategy consultation process

We are inviting our customers and wider stakeholders to review and comment on this draft DSO strategy, together with our Analysis of DSO functions document and Grid digitalisation & data strategy, to understand your expectations and gain your feedback on our approach.

Input from our stakeholders will help ensure we are prioritising your needs and will be fed into a revised version of the documents for further review later in the year.

In particular, we are interested in knowing whether our DSO strategy is worthwhile and beneficial to our customers, whether there is anything missing and whether we are communicating our plans and progress in a way that's easy to understand.

The consultation opens on 6 July and closes on 9 September 2020.

Please provide your response to the consultation by completing our [online survey](#). If you have any other comments or questions, please contact Simon Brooke at development.plans@enwl.co.uk.

Q

11. Do you have any other feedback on how we could improve the content or transparency of our plans for delivering DSO?



Term	Description
ANM	Active network management
ATLAS	Architecture of Tools for Load Scenarios project which developed methodologies, prototype tools and specifications to develop detailed loading scenarios
BEIS	Department for Business, Energy & Industrial Strategy
Curtailment index	A cap which provides a safeguard against excessive outages or faults (on the number of hours without access to the network)
CIs	Customer interruptions – the number of customers whose supplies have been interrupted per 100 customers per year over all incidents, where an interruption of supply lasts for three minutes or longer
CMLs	Customer minutes lost – the average customer minutes lost per customer per year, where an interruption of supply lasts for three minutes or longer
DCPR5	Electricity distribution price control period, 2010-2015
DFES	Distribution future electricity scenarios – forecasting plans for a range of scenarios for how low carbon technologies will be taken up and how the network could respond. The scenarios inform our investment plans and provide visibility of flexibility opportunities
DNO	Distribution network operator - company licensed to distribute electricity in Great Britain by the Office of Gas and Electricity Markets (Ofgem)
DSO	Distribution system operation
ENA	Energy Networks Association – industry body which represents transmission and distribution network operators for gas and electricity in the UK and Ireland
EV	Electric vehicle
Flexible services	The term used for paying a customer to reduce their electricity consumption or increase generation on request, due to a network constraint
Flexr project	A project led by ElectraLink and GB distribution network operators to provide a data sharing service and standardise data to enable a smarter, more flexible energy system
HP	Electric heat pump
HV	High voltage
Key enablers	The technology, data and engineering competencies and capabilities needed to deliver DSO functions
LCT	Low carbon technology such as electric vehicles, electric heat pumps, solar and wind generation
LV	Low voltage
Net zero carbon	The achievement of balancing carbon dioxide emissions with carbon removal or eliminating carbon dioxide emissions altogether
NMS	Network management system
Ofgem	Office of Gas and Electricity Markets – the government regulator for gas and electricity markets in Great Britain
Ofgem DSO functions	A list of 19 key distribution system operation functions published by Ofgem designed to describe the activities performed by a DNO in distribution system operation
Open Networks Project	A key industry initiative to deliver government policy that will transform the way our energy networks work and help deliver the ‘smart grid’
Prosumer	A person who both consumes and produces a product, in this case electricity
PV	Photovoltaic (solar panel)
RIIO-ED1	Current electricity industry price control period, 2015-2023
RIIO-ED2	Next electricity industry price control period, 2023-2028
ROCBA	Real options cost benefit analysis tool
Smart grid	An electricity network which allows devices to communicate between suppliers to consumers, allowing them to manage demand, protect the distribution network, save energy and reduce costs
Smart Grid Forum	Industry platform which engages on the significant challenges and opportunities posed by GB’s move to a low carbon energy system
VoLL	Value of Lost Load project – extensive piece of research which has led to a better understanding of the impact of power cuts on a diverse range of customers



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