

# The vital role for Distribution Network Operators

Delivering a smart, flexible  
energy system

**January 2017**



## Introduction

The UK is committed to delivering ambitious targets for reductions in carbon emissions and the importance of these targets has created local, regional, national and international momentum and innovation to meet and exceed these targets.

New technology is changing the way that companies, communities and customers generate, distribute and consumer energy. The application of information and communication technology to existing electricity networks is transforming them into increasingly smart energy systems.

Customer adoption of electric vehicles, solar generation and battery storage isn't just advantageous but essential. As well as significantly contributing to achieving low carbon targets, these smart energy systems allow customers to participate in energy markets in new ways and to share the rewards of this transformation.

Throughout this transition period and into the future, customers will rightly also continue to expect their electricity network to continue to be reliable, resilient and affordable.

A smart energy system isn't just about technology; to really empower our region's customers and communities we need smart energy policies and smart regulation.

Our stakeholders need for clean, secure and affordable electricity is therefore clear but there are a number of ways that this future need can be developed and delivered. Electricity North West is at the forefront of developing both the new smart electricity systems and in leading the national debate on this matter by chairing a number of influential working groups and committees.

It's essential that the policy environment is positive and enables all participants to bring their skills and talents together to enable the UK to meet its low carbon targets in an innovative, inclusive and efficient way. Distribution Network Operators, like Electricity North West, have a unique role to play as both enablers and participants in creating open markets which enable early adoption and implementation of new technologies and commercial opportunities.

Enabling these changes will require policy agreement around the purpose and role of Distribution Systems Operators. This paper sets out our view of this role and makes the case for the evolution of the role of Distribution Network Operators to deliver the Distribution System Operator services. Such an evolution is essential if the UK is to meet its low carbon targets in a timely, inclusive, cost efficient and secure way.

This paper is intended to help our stakeholders engage in this important debate. I hope you find it useful. I would be delighted to hear your views and suggestions on our plans for the future.



**Peter Emery**  
**Chief Executive**  
**January 2017**



## Understanding our stakeholders' needs and expectations

### Government's need to achieve low carbon targets

The UK Government is committed to achieving challenging carbon emissions targets which have been set, with cross-Party agreement through the Climate Change Act.

A key element of the Government's plan to achieve these targets is through the development of a smart, flexible energy system. Government and Ofgem (the energy regulator) are committed to ensuring the energy system works for people and businesses. A smarter more flexible system offers significant benefits for consumers and the economy.

### Customer and community expectation to be able to adopt and implement new technologies

With the development of new technologies, how our customers want to connect to and then use our network is changing. Generation of electricity is no longer limited to big power stations and we're increasingly seeing customers from local authorities to businesses to householders generating electricity for their own use.

Usage of electricity is also changing. The drive to reduce carbon emission to the environment has improved the energy efficiency of household appliance and customers now use electricity to keep more of our homes and businesses warm. This coupled with the move to hybrid and all electric vehicles is transforming our reliance on electricity.

As customer and business reliance on electricity increases, expectations about customer service will also increase. Our customers want and expect a more responsive service that meets their changing needs and understands their priorities.

For many customers, this continues to be focussed on how we 'keep the lights on' and how we communicate when we need to work on our network. For those wanting to use our network, it's increasingly about how they can connect to the network, and particularly how quickly they can connect to enable them to make the most of opportunities they've identified. They are also concerned about pricing arrangements which make the adoption of new technologies affordable.

Customers in the North West are already changing; in the past three years we've seen a rapid rise in the number of Community Energy groups who collectively buy energy and often generate their own energy. The needs of these groups are very different and we need to adapt the services we provide to better support their needs.

### DNO responsibility to provide an affordable, responsive, reliable and resilient network

Enabling customers to be flexible in their energy usage will help us reduce traditional investments in expensive assets and thereby keep energy bills low for us all. Allowing DNOs to actively balance capacity between customers and to provide demand management and generation facilities will mitigate the need for costly new network investment.

DNOs are also uniquely placed to advise customers on the adoption of new technologies which may drive energy efficiency or deliver low carbon outcomes. The DNO can be a trusted source of information as its incentives are aligned to these consumer needs.



## Evolving to meet our stakeholders' needs and expectations

Our role historically has been to convey electricity from the transmission (very high voltage) networks to our customers' homes and businesses. Our network is very reliable and many of our customers only have need to contact us if something goes wrong, like a power cut or traffic disruption when we need to dig up a street to repair or replace one of our cables.

Ensuring that enough electricity is produced for us to transport to customers has been the responsibility of National Grid. This electricity has been traditionally produced at large power stations to match to the demands of customers.

As our customers produce more and more of their own power and as new renewable sources connect to our local networks, local networks become much more important in meeting customer needs. Customers will sell energy to each other locally as Community Energy Groups and at a larger scale in smart cities. This change will need us to play a much more active role than we currently do, reflecting the new needs and priorities of our customers.

For new customers wanting to connect to our network, we continue to strive to respond to their specific needs and requests. We've been at the forefront of introducing competition in this important area and are able to welcome other parties working on more connection types in our area than anywhere else in the country.

Key to improving how our customers connect to our network is moving to a service model which provides flexible capacity rather than just traditional fixed assets. Whilst some new assets will be needed it's vital that we are also able to deliver efficient capacity via new commercial solutions. Stakeholders want us to adapt to meet each and every customer's specific needs.

To do this, we need to revolutionise our forecasting abilities to ensure we can predict how every part of our network will be used and then ensure we have sufficient capacity available when and where it's required.

## Realising the potential of Distribution System Operators

Whilst our primary role as a Distribution System Operator will focus on the effective and efficient provision and balancing of network capacity, developing the role will provide a number of other significant opportunities and benefits.

### Network Capacity Provision

Going forward, DSOs will need to focus much more on localised and regional balancing of capacity to ensure that customers are able to operate with the maximum efficient freedom that optimises but does not unduly stress the network.

When network capacity starts to unacceptably limit our customers' freedom, we will identify where additional capacity is required.

Our role as a DSO will therefore rightly be on the technical capabilities of the network using a number of new service indicators. Once a capacity need is identified our role will be to provide the additional capacity needed in good time in the most efficient manner. This will be via a variety of means including requiring new assets to be created, deploying efficient smart grids technologies or by using commercial contracts with customers to release capacity.

### Capacity Market Management

The provision of capacity for customers by other customers is one of the most efficient means of meeting collective requirements. To enable customers to participate we will operate local markets to access such flexible capacity either directly or through third parties such as aggregators.

Our role will centre on needs identification and securing the most efficient means of capacity provision for customers.

We already see customers in our network contracting with a variety of other parties such as the National Grid for demand / generation turn up or down services. These are efficient and effective means of meeting their needs. As the proportion of customers participating in such markets increases, we will need to have a role in ensuring that our network is not overstressed by these actions and ensure security of supplies to all of our customers.



## Network access

Managing local networks will be a 24 x 7 function utilising commercial and traditional means. This will require us to manage network access for construction and maintenance outages. Our role as a DSO will be to protect flexible customers from inappropriate outage requests and to set out efficient network outage plans, balancing security for customers, cost and the impact on flexible customers.

Without proper consideration of the appropriate balance between these factors there is a risk that flexible customers are inappropriately disadvantaged leading to a reduction in the volumes of flexible demand and generation. We have undertaken work to develop service metrics and mechanisms to do this in a systematic manner and expect to introduce these during 2017.

## Connections

Our work also shows that DSOs will interact in both the new connections service chain, particularly in determining the point of connection, and in associated ongoing operating terms.

The regional DSO is therefore likely to need to interact with and manage capacity within embedded Independent Network Operators (IDNO) areas. We have been at the forefront of enabling both Independent Connection Provider (ICP) operation and IDNO growth and welcome the choice that these models offer customers across our region. To ensure all customers benefit from the development of SO roles, these two important developments will require some level of DSO involvement and we're looking at how this might work. We will develop and share our plans on this role over the coming year.

## Security of supply and investment plans

Our work shows that security of supply for customers and capacity provision are intrinsically linked once commercial capacity solutions are adopted. The future role of the DSO must include determining efficient levels of supply security for customers.

This has historically been regulated by Ofgem on an incremental glide path basis but our recent work on developing much more sophisticated approaches to determining and using metrics such as the Value of Lost Load (VoLL) shows that efficient levels of security can be calculated and hence provided via commercial or technical means.

DSOs should assume responsibility for determining both capacity and security issues within an appropriate regulatory framework.

VoLL underpins all network asset risk investments such as asset replacement and hence the role of the DSO would include commissioning works across the investment spectrum to adequately manage resilience risks for customers. These would include High Impact Low Probability (HILP) events, quality of supply improvements and targeted asset replacement plans.

## Losses

All Investments (including asset based and commercial solutions) related to capacity should appropriately consider electrical losses to ensure the electricity generated is used as efficiently as possible. Losses are a material issue in any Cost Benefit Analysis and, as DSOs will be ensuring the provision of capacity and resilience, they will inevitably be at the centre of decisions related to losses management. DSOs must have a central role in determining losses-related investments including incremental investments ('upsizing') and targeted losses reduction programmes.

## Making most of network assets

In order to ensure that the transition to a smart and flexible energy system is delivered as efficiently and effectively as possible, we believe it is vital to consider all options to make the most of network assets. Developments such as our Respond, C<sub>2</sub>C and CLASS projects demonstrate the potential to release capacity that already exists within the network. It is important that such options continue to be explored and developed to minimise bills for customers.





## Charging for the services used

The DSO will have an important role to play in determining the charges that network customers pay. The structure of charging currently used in the UK needs fundamental review; driven both by changing customer needs, innovation and the range of commercial solutions for network balancing.

In order to ensure that customers are treated fairly, it's critical that the charging arrangements for electricity networks evolve to reflect the services customers require from the networks.

It's important to move away from the status quo to a framework that is truly cost reflective by capturing the likes of voltage stability, power quality and fault level. This, combined with a capacity based charging structure, would start to tackle many of the concerns being expressed by emerging and existing parties.

## Service provision

We also see the DSO as being a participant in markets facilitated by others, eg providing services to National Grid to balance the national system and also to network users who may require additional, value adding but non-essential services. We are concerned that some of the mainland European DSO models do not allow such functions within the DSO and adoption of an overly constrained role risks value loss for customers. This is an important area of national influencing where UK risks loss of value, given its relatively more advanced energy market structure.

## Management of local Transmission capacity

The DSO has an important role to play in the decisions around regional transmission capacity management. For example at grid supply point (GSP) sites, the DSO would be balancing transmission operator (TO) capacity against DNO/IDNO transfer capacity, customer demand, customer generation, storage operation and a host of commercial options. TO investment at relevant boundaries is a relevant issue for DSOs who are best placed to manage customers' interests.

## Innovation

All DNOs will continue to develop new solutions to ensure networks deliver the level of service that our customers expect. The DSO will have a central role in determining where innovation is required. We're developing new and quicker ways of seeing potential faults on our network before they become issues so our customers don't face disruption.

There are a lot of technical parameters, such as voltage, that we have to consider when operating our network and we're looking at how we can 'flex' these in new ways to increase the efficiency or effectiveness of our operations without causing disruption or inconvenience to our customers.

We're also looking at how technologies like smart meters and energy storage may be able to do to improve our understanding and operation of the network.



## Why does this matter to customers of the North West?

We are funded solely by the customers that we serve in the North West. In carrying out our work, we act as stewards of the network, ensuring that we balance the interests of today's and tomorrow's customers so we don't invest too early and cause an unnecessary increase in our costs or too late and preclude our customers using the network how they want to. As such, everything we do matters to our customers because it has an impact on the element of their electricity bill that covers network costs.

But there's more to it than just that. We believe how our customers want to connect to and use our network will fundamentally challenge how we see and interact with our customers. We also know that our customers are busy people and that they want to be able to rely on being able to use electricity when and how they want to so they can achieve their own goals.

All of this takes us from being a largely silent service provider to our customers in the North West to being much more actively involved and aware of our customers' needs and challenges. This means working with our customers to offer the services they need, increasing our understanding of their requirements and ensuring that we have an electricity network and model of operation that allows us to respond to the aspirations of the North West.

Looking at how we charge our customers for how they connect and use our network is an important element of this. Distribution charging assumes a small number of groups of customers (from householders to large businesses) who, within each group, have similar patterns of how they use the network.

As the usage of our network changes, these patterns cease to be as broadly representative as they once were. This will require a fundamental rethink of how we charge for the services we offer is to ensure that customers pay for what they use and that unfair burdens don't end up falling on any particular group of customers.

We are particularly concerned about protecting those customers who are less able to pay more and who are less able to invest in these new technologies.

Getting the policy and regulatory framework right will mean that we will be able to offer our customers increased flexibility to connect to and use our network in a way that reflects their needs, as well as potentially creating new income streams for them as they are able to provide services to help us, without significantly increasing the cost to other customers.

## So what happens next?

There is a lot that needs to happen to deliver a smart, flexible energy system which delivers society's needs and expectations. Strong engagement and the support of our key stakeholders is key and we're putting a strong foundation in place.

Our funding arrangements work in cycles, called price controls. We expect to use our current price control period to develop, test and establish many of the components that we expect to be required for a DSO with full implementation coming in the next price control period.

We are setting out our initial thinking on the timeline for these changes and will consult on this and develop it with our stakeholders shortly. In the meantime, if you'd like to know more about our thinking or to discuss any of the points raised in this summary document, please do get in touch.

