

Distribution System Operator Strategy Summary

June 2020



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Foreword

The energy landscape is changing fast as the way our customers generate, distribute, and use energy evolves. This document summarises our strategy to respond to these changes, so that we continue to serve our customers and communities.



To tackle the climate emergency and deliver Net Zero carbon targets, a significant proportion of customer transport and building heating will be electrified. We are also going to see a further leap in renewable generation capacity as fossil fuel power stations close, and experience more dynamic and complex power flows as customers become increasingly active participants in the energy system. If we do not continue to adapt to meet our customers' evolving needs, these changes will push the distribution network and wider system beyond what it is currently designed for – this would lead to higher costs and a poorer service for all customers.

The magnitude of these changes means there is a clear need for a set of functions and activities **to meet our customers' evolving needs, deliver Net Zero, and ensure the continued safe, reliable, and efficient operation of the distribution network and wider energy system for all customers.** Most of these functions and activities are evolutions of existing business-as-usual activities, whilst others are new. These functions and activities in turn require new enabling tools, processes, and capabilities.

This is what Distribution System Operation (DSO) is to us: the set of functions, activities, and enablers that we plan to deliver, so that we can continue to serve our customers and communities. They include delivering smarter and more agile network infrastructure, making extensive use of services delivered by our customers, being a neutral facilitator of an open and accessible distribution energy resources (DER) services market, and coordinating DER services to deliver a safe, efficient, and reliable whole system. These must be delivered at a pace that meets our customers' needs.

We have already started delivering these DSO functions and activities, but there remains much to do on this journey. I am therefore pleased to present our SP Energy Networks DSO Strategy, which sets out how we plan to deliver this vital development for the GB electricity system and what it means for our customers.

We consider that we are best placed to continue leading this delivery of DSO. We have the capability, knowledge, and experience to deliver on time and in a cost-effective way. Our strong links with our customers and communities mean we can quickly understand and respond to their needs. We will build on our industry-leading customer service position to deliver an effective and fair transition that ensures a safe and reliable supply for all customers.

We look forward to engaging with you and hearing your thoughts over the coming weeks. Please do not hesitate to share your feedback and insights with us, so we can ensure our network continues to meet your needs.



Scott Mathieson
Network Planning &
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Impact of Covid-19

Covid-19 has impacted every part of our society and the UK economy. Our ways of working, socialising, and living have all changed. It is important to highlight that, during this challenging time, we are focussed on continuing to provide a safe, secure, and reliable supply for all our customers.



At a system level, Covid-19 has affected GB electricity consumption: electricity demand is materially lower compared to usual, and the transmission network has experienced record low levels of demand. In response, help from ever smaller distributed generation is required to maintain system stability. Looking forward to this summer, National Grid forecasts that GB demand could be up to 20% lower compared to the “pre Covid-19” forecasts¹. This has exposed the need for more whole system coordination and resilience.

On a human scale, Covid-19 has impacted our customers and caused great hardship. The need to serve our customers well, and at least cost, has never been greater.

To address this individual economic hardship, and to manage our journey to recovery so that emissions do not return to previous levels, advisors to government² are already recommending green economic recovery investment in major infrastructure projects, such as the electrification of heat and transport.

We fully support this – we believe that investing to deliver Net Zero targets presents a critical opportunity to restart our economy, deliver much needed jobs, and inject sufficient pace into the Net Zero transition to safeguard the environment for future generations. The DSO functions, activities, and enablers set out in this document will ensure that this investment delivers maximum value.

¹ Source: <https://www.nationalgrideso.com/document/167541/download>

² For example, Sir John Armitt, Chair of the National Infrastructure Commission. His letter to the Chancellor, dated 12 May 2020, is available at: <https://www.nic.org.uk/wp-content/uploads/C0160-Sir-John-Armitt-Chancellor-HM-Treasury-12052020.pdf>

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Introduction

We are SP Energy Networks. We own and operate the electricity distribution network in Central and Southern Scotland (our SP Distribution network), and in North Wales, Merseyside, Cheshire, and North Shropshire (our SP Manweb network).



It is through these two networks of underground cables, overhead lines, and substations that we provide 3.5 million homes, businesses, and public services with a safe, reliable, and efficient supply of electricity.

Our customers' needs are forecast to significantly evolve over the coming decades. This creates a number of challenges for the distribution network and wider system. We need to start responding to these customer needs and system challenges now to ensure the continued safe, reliable, and efficient operation of the distribution network and wider energy system for all customers, and to deliver Net Zero.

We have created this DSO Strategy to share with our stakeholders what these customer changes and system challenges are, and how we plan to respond to them from now through to the end of RIIO-ED2 (2028). We welcome and encourage your views and feedback so that we can ensure our network continues to meet your needs.

This document is a summary of our main DSO Strategy document. For more detail on any of the issues covered in this summary, please refer to the main document³.

3.1 The changing landscape

The energy landscape is changing fast as the way our customers generate, use, and interact with energy evolves. Four key trends are driving this:

Decarbonisation – in response to the climate emergency, we need to achieve Net Zero greenhouse gas emissions by 2045 in Scotland and 2050 in England and Wales. To achieve this, a significant proportion of

transport and building heating will need to be electrified. For example, we forecast⁴ that the number of customer electric vehicles (EVs) we will serve on our two distribution networks will increase from approximately 10,000 now to up to 1.2m within just ten years. We also need to complete the transition of our generation mix from fossil fuel to zero carbon generation. These changes will significantly increase the levels of demand and generation that we need to connect to the distribution network for our customers.

Decentralisation – the proportion of the generation mix which is smaller-scale and sited close to demand is increasing. This means that we will connect to our distribution networks a significant proportion of the new generation capacity needed to supply decarbonisation. For example, over the next ten years the volume of customer generation we connect to our SP Manweb network could double; it could triple on our SP Distribution network. Decentralisation has two effects: we must find ways to accommodate more customer generation than the distribution network is currently designed for, and the vital service providers which the electricity system operator (ESO) needs to maintain system stability will increasingly be distribution connected.

³Our main DSO Strategy document is available at: www.spenergynetworks.co.uk/DSO

⁴Our Distribution Future Energy Scenarios (DFES) forecasts are detailed forecasts for a range of demand and generation metrics (e.g. electric vehicles, heat pumps, different generation technologies) out to 2050. They are available at: https://www.spenergynetworks.co.uk/pages/zero_carbon_communities.aspx

Democratisation – means the rise of the active domestic consumer (aka prosumer). Smart meters, home energy management systems, intelligent domestic and EV storage, specialist aggregators and suppliers – these are all reducing the barriers for consumer participation in the energy system. Democratisation has two effects: consumer consumption profiles are becoming less predictable and more dynamic; and we can increasingly work with many individual consumers and communities, rather than just large generation or industrial customers, to source vital network and system services.

Digitalisation – means that we can better understand and coordinate the above three trends through improved transparency and coordination of data and IT systems between industry parties. Digitalisation significantly enhances our ability to measure, forecast, understand, and address the decarbonisation challenge by utilising a whole new range of data sources and solutions, driving a more efficient outcome for customers.

3.2 The impact of these changes

Together, these four drivers create two core challenges for the electricity network:

1. Distribution network capacity: how we accommodate increased customer demand and generation on the distribution network whilst maintaining a safe, reliable, and efficient distribution network for all

customers. This issue is especially relevant for the low voltage (LV) network. If we do not address this, the network will be overloaded, leading to customer supply interruptions, delays in delivering customer requirements, higher overall costs, and possible safety issues.

2. Whole system coordination: decentralisation means that the ESO increasingly needs to utilise services from controllable customer assets connected to the distribution network (known as DER). This service use affects power flows on the distribution network, and so overlaps with our responsibility to operate a safe, reliable, and efficient distribution network. We must therefore deliver greater planning and operational whole system coordination to avoid risking system resilience and unnecessary costs for all customers.

However these four drivers also shape the solutions we have. Democratisation and decentralisation mean that there may be a far greater pool of service providers than we currently have available, which could increase system resilience whilst keeping distribution operating costs efficient for all. Digitalisation means we can share information and our network requirements more easily, encouraging new solutions and better coordination with other parties.

In response to these changes, we need to evolve the way we plan and operate our distribution networks and the wider energy system.



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Responding to the challenge – DSO

We have a clear responsibility to meet our customers' evolving needs, deliver Net Zero, and ensure the continued safe, reliable, and efficient operation of the distribution network and wider energy system for all customers.



So that we can continue to meet this responsibility to our customers, the magnitude of the changes means we need to deliver an updated set of functions and activities - there are summarised in [Section 4.1](#). To enable these activities, we require an increasing number of tools, processes, and capabilities – these are summarised in [Section 4.2](#).

This is what DSO is to us: the set of functions, activities, and enablers that we plan to deliver, so that we can continue to serve our customers and communities.

In all cases, the need for these functions, activities and enablers is driven by the need to meet system challenges and deliver the safe, efficient, reliable, and decarbonised operation of the distribution network and wider energy system at least cost to customers. Before funding is sought to deliver any function, activity or enabler, cost benefit analysis will be undertaken to ensure that it delivers quantifiable net benefits for customers.

4.1 DSO functions and activities

The activities can be categorised into four functions. Functions 1, 2 and 4 are predominantly existing or evolved activities; function 3 predominantly consists of newer activities. Please see our main DSO Strategy document for a full list of activities.

DSO Function	Customer benefits
1. Smart networks Activities where we coordinate DSO and network actions to optimise the capacity, security, and reliability of the network.	These activities enable us to get the best out of the existing network capacity, and so defer the need for new network capacity; this helps keep bills low for customers.
2. Flexibility contracted from our customers Activities where we work with our customers' ability to operate flexibly.	These activities help us keep distribution power flows within existing network capacity, and so defer the need for new network capacity. These activities provide our customers with additional revenue opportunities and/or quicker and lower cost connections.

DSO Function	Customer benefits
3. Neutral market facilitator and DER services coordinator Activities to neutrally facilitate an open and accessible DER services market, enabling DER to access markets whilst coordinating the optimal use of DER services for distribution and transmission needs to deliver a safe, efficient, and reliable whole system.	These activities enable: DER to participate in a range of markets; us and the ESO to access DER services in a coordinated manner; and the distribution network and whole system to be planned and operated efficiently and safely. These activities allow DER to earn services revenue whilst ensuring the reliability of the whole system at least cost to all customers.
4. DSO value added services Activities where we offer additional value to our customers through bespoke services or being a provider where the market fails to deliver.	These activities allow us to support specific customers in targeted ways, and provide a safety net where the market fails to deliver. As small groups of customers typically benefit from these activities, these costs will be recovered directly from customers who wish to use them. This protects wider customers from funding activities from which they do not benefit.

These activities deliver benefits to all customers by maintaining system safety and reliability, whilst enabling decarbonisation at least cost.

In addition to these planning and operational functions, we have an important responsibility to inform and educate customers and stakeholders. This will enable them to make more informed decisions, maximise their engagement with the energy system, realise local and national benefits, and keep energy costs as cost-effective as possible.

4.2 DSO enablers

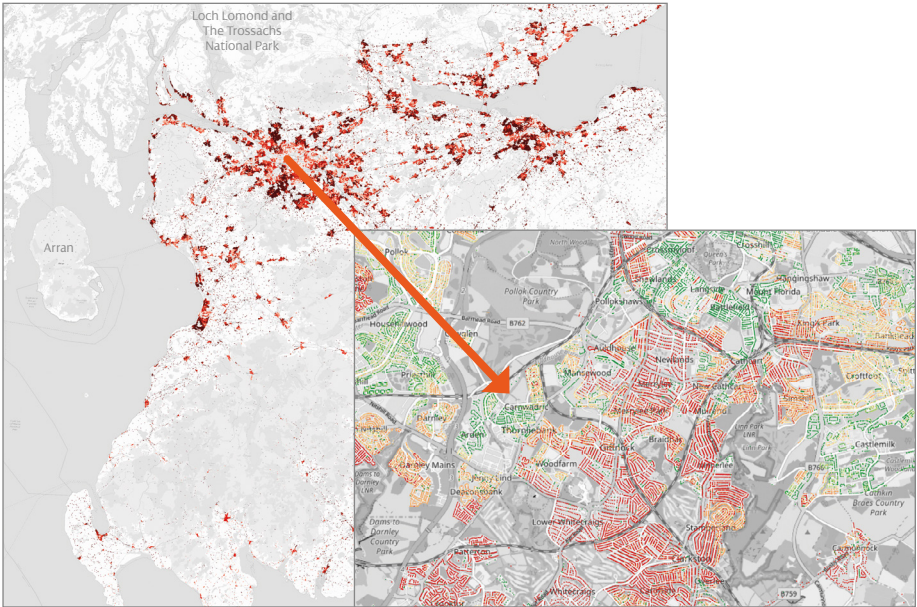
Six key enablers underpin the DSO functions and activities. Given their importance, we have already started to deliver these.

Enabler	Benefits delivered
1. Expanded network monitoring, telecommunications, and control <ul style="list-style-type: none"> Monitoring gives greater real-time visibility of the network. Control means we can quickly and remotely make changes to the network. A reliable, secure, and low latency communication network enables this monitoring and control. These are especially needed on the LV network, to accommodate decarbonisation and more active prosumers.	These allow us to accurately establish spare capacity and so safely get higher utilisation out of the existing network; they provide more insight as to where and when interventions are required; and they underpin our more targeted and effective use of flexibility services from third parties. These all help us more efficiently operate our network for our customers and enhance competition.
2. Enhanced forecasting and modelling Detailed forecasting means we can understand how our customers' demand and generation requirements will change in different areas of the network. Enhanced modelling means we can understand the network impact of those customer changes and assess possible network interventions.	These enablers, combined with data from network monitoring and other sources, help us to make the right interventions at the right time, so we can meet our customers' needs cost-effectively and on time. They support greater use of competitively procured flexibility services by allowing us to give more notice and details of network requirements to the market.
3. Data and digitalisation Data is the key to fully unlocking the value of the network for our customers. So that data delivers this value, we are undergoing a digitalisation ⁵ transformation to make the data visible, accessible, and interoperable. Together, data and digitalisation underpin all network activities, from allowing us to make more informed operational decisions to helping markets better understand network opportunities.	These enable benefits from the micro (predicting a cable fault and repairing it before the customer loses supply) to the macro (supporting greater whole system planning and operational coordination). They enable the use of the platforms which allow us to coordinate with our customers in an open and cyber-secure manner.

⁵Please see our Digitalisation Strategy for more information about our data and digitalisation plan. Available at: https://www.spenergynetworks.co.uk/pages/our_digitalisation_strategy.aspx

Enabler	Benefits delivered
<p>4. Increased whole system coordination</p> <p>Network planning coordination across distribution, transmission, and other energy vectors. This is needed as customers change their energy consumption vectors (e.g. increasingly using electricity rather than petrol/ diesel for their car) with the move to Net Zero.</p> <p>Operational coordination, especially the use of DER services, between distribution and the ESO. This is needed given the growing dependency on DER services by us and the ESO, and the resulting distribution to transmission operational interactivity.</p>	<p>Greater planning coordination will enable more efficient whole electricity system and whole energy system network interventions, and reduce the risk of unnecessary investment.</p> <p>Greater operational coordination will protect against increasing risks to system stability and safety, inefficient system operation, and poor use of customer money.</p>
<p>5. Holistic conflict management regime</p> <p>Given the magnitude and breadth of the changes on the distribution network, we are evolving existing activities and plan to undertake new activities. A number of these involve interacting more closely with our customers, other network parties and other markets. This could give rise to real or perceived conflicts of interest – these must be addressed.</p>	<p>An effective holistic conflict management regime will give our customers and service providers confidence in us and the markets we interact with. This is vital as their involvement is essential to cost-effectively maintaining network and system stability, and promoting competition.</p>
<p>6. Organisational change</p> <p>The extent of activities and enablers that need to be delivered to ensure the continued safe, reliable, and economical service is significant. We are working to have the right organisational structure and the right people to successfully deliver these.</p>	<p>Having the right structure and the right people means that we can effectively meet our customers' evolving needs and respond to system challenges for the benefit of all customers.</p>

Figure 1 | Our EV-Up project, an example of our detailed forecasting work



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Delivering the change

3.5 million homes, businesses, and public services depend on our two distribution networks for a safe, reliable, and efficient supply of electricity.



We recognise the critical role that our distribution networks will play for our customers long into the future, regardless of the decarbonisation pathway that our customers end up treading.

To ensure we continue to meet our customers' needs and deliver Net Zero, we are evolving the way we plan and operate our networks, implementing innovative solutions, and embracing new technologies. We are already developing or starting to deliver most of the DSO activities, we are leading numerous innovative projects to better understand how we can efficiently deliver the enablers, and we have a clear strategy and roadmap.

Looking to the future, we consider that we are best placed to continue leading the delivery of DSO. We have the capability, knowledge, and experience to deliver the functions, activities, and enablers in a cost-effective way and at a pace that meets our customer's needs. We have the existing relationships with our customers so we can quickly understand and respond to their needs. Our use of flexibility tenders, independent contractors, and multiple

equipment vendors means that competition will be embedded in DSO. Our regulatory framework and economies of scale mean we are a low-cost provider that can deliver where the market might not, leaving no customer behind.

We have just 30 years to achieve Net Zero. In network terms, this is not a remote horizon: the majority of the assets we install today will still be operational in 2050. This means that our journey to deliver Net Zero has already started.

We welcome and encourage your feedback so that we can ensure our network continues to meet your needs.

Responses to the stakeholder questions in the main DSO strategy document, and other feedback, would be welcomed by **10th July 2020** and can be emailed to RIIO_ED2@spenergynetworks.co.uk

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