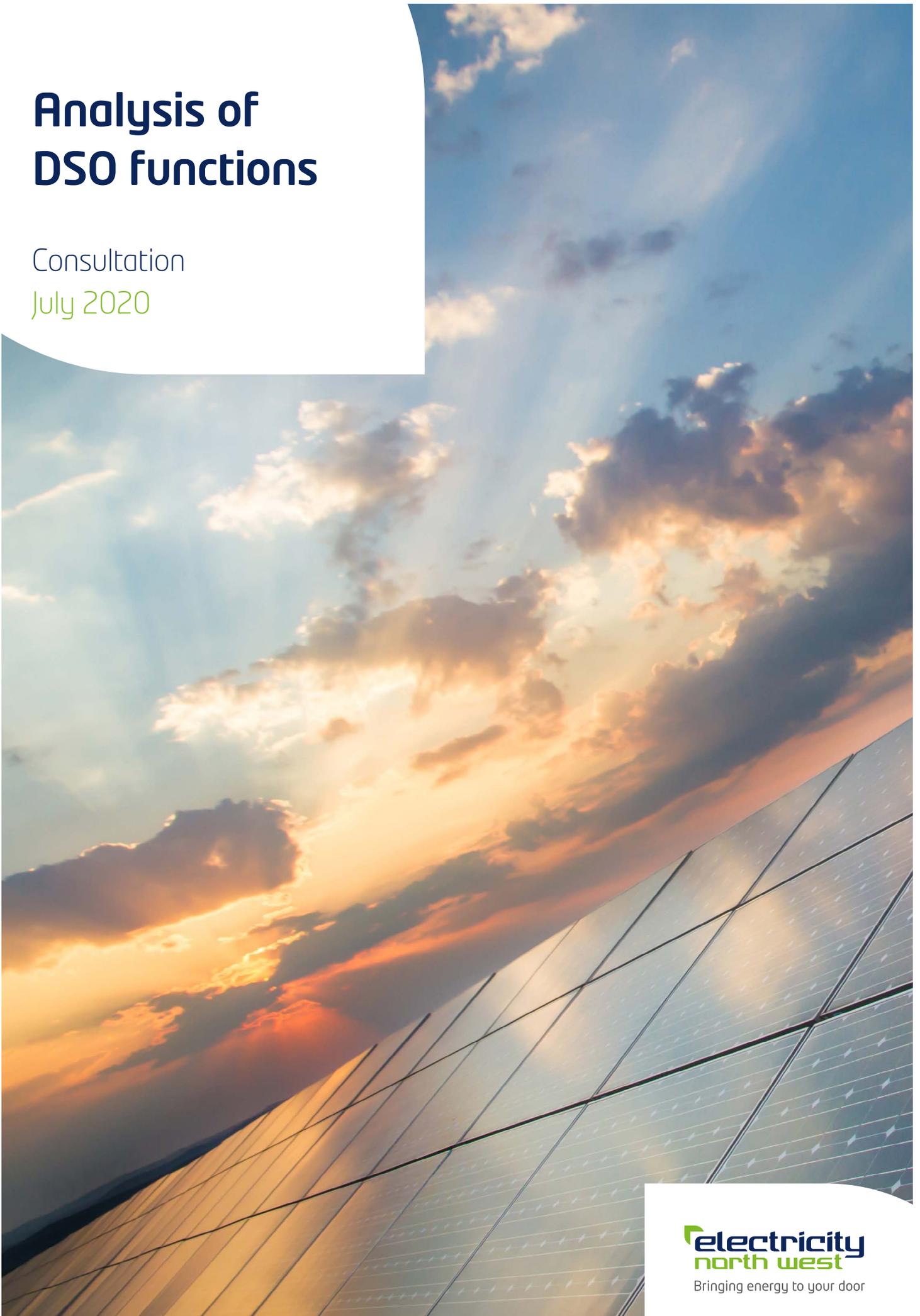


Analysis of DSO functions

Consultation

July 2020



electricity
north west

Bringing energy to your door

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Welcome to our 'Analysis of DSO functions' document.

In June 2019 the UK became the first major economy to legally commit to the target of net zero greenhouse gas emissions by 2050. The following February, our regulator Ofgem published its decarbonisation action plan which sets out the central role of network operators like Electricity North West in enabling the UK's carbon transition.

As the UK transitions to a net zero carbon future, the way customers connect to distribution networks will change dramatically. More customers will choose to generate their own electricity while others will rely on the network more than ever before to heat their homes and charge their electric vehicles. While all this is necessary to enable the UK's transition to net zero, these customers will be connected to networks which were not originally designed to accommodate these technologies and demand is expected to double as a result. Significant investment in our network would be required to enable the region's transition to net zero and the costs associated with this would ultimately be passed down to customers through their electricity bills.

The challenge for distribution network operators (DNOs), as key players in the UK's transition to net zero carbon, is to continue to provide and plan for a reliable and efficient network, while also encouraging and accommodating increases in low carbon technologies (LCTs), keeping costs low for our customers and enabling them to participate in new revenue streams. As a result, new and emerging functions are being identified, as well as a need for DNOs to evolve by undertaking distribution system operation (DSO) activities.

In December 2019 Ofgem published a consultation on the key enablers for the DSO programme of work and a long term development statement, in which they identified a set of DSO functions and activities that will make up the role of DSO. We have laid out our plan for fulfilling this role in our 'DSO strategy' document.

This document has been published alongside our DSO strategy, and seeks to more explicitly lay out the detail involved in fulfilling the role. Here we present the results from the analysis that informed our plan, which involved examining each of the DSO functions identified by Ofgem. We have detailed our current position in relation to each DSO function, along with our view of what the future of the function will look like and any requirements we believe are necessary to fulfil it.

At the end of the document we invite our customers, local businesses and other stakeholders to review and comment on our strategy and analysis, to ensure we have a good understanding of their expectations when planning for the future of our network.

We will also review Ofgem's ED2 Sector Specific Methodology consultation document due in summer 2020 and take into consideration any comments relating to distribution system operation under the next price control period.

This document forms part of a suite of current documents which explain how we are preparing our network for the net zero carbon future. We are also inviting feedback from stakeholders on:

- Our draft DSO strategy 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 gas network operator.

We hope you enjoy delving into the detail of our DSO strategy and associated analysis and look forward to hearing your views.

Consulting stakeholders on our plans

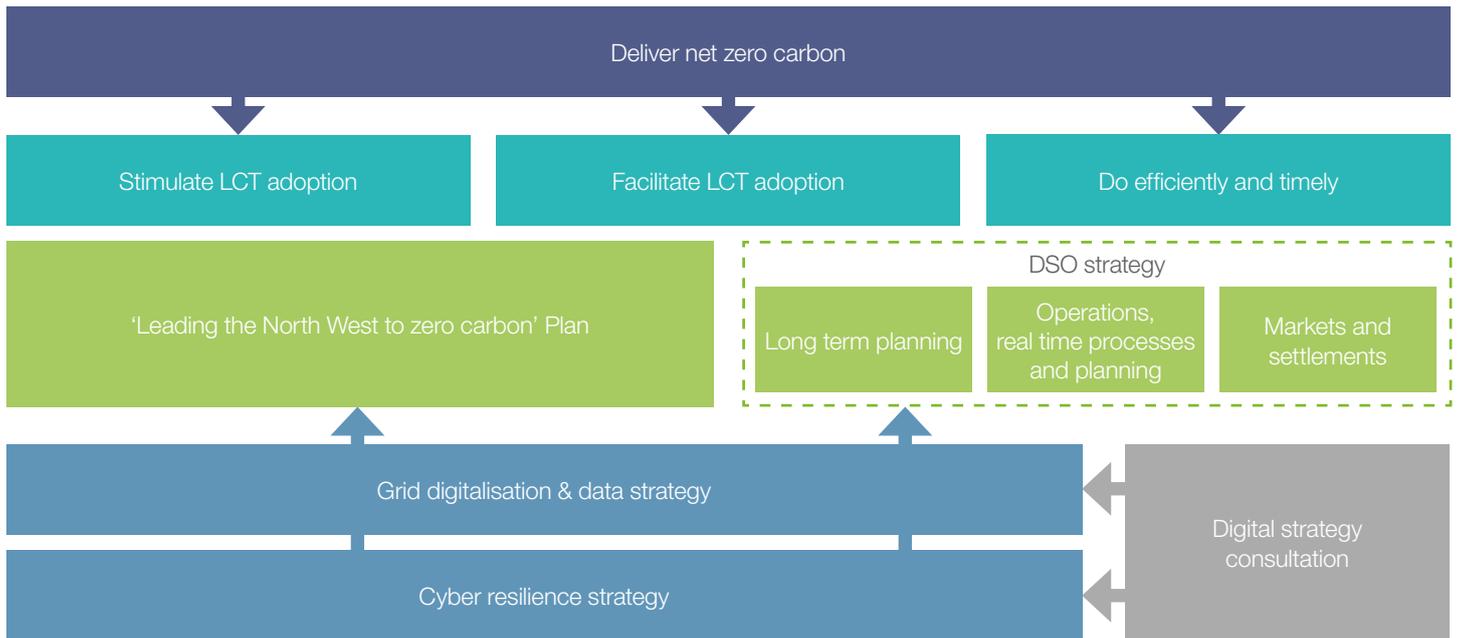


2 Introduction

This document forms part of a suite of consultation documents that support Electricity North West's business objectives to help deliver net zero and enable the transition to a DSO. It supports and should be read in conjunction with our draft 'DSO strategy' and 'Grid digitalisation & data strategy'.

We are inviting our customers and wider stakeholders to review and comment on our strategy and analysis, to ensure we have a good understanding of their expectations when planning for the future of our network.

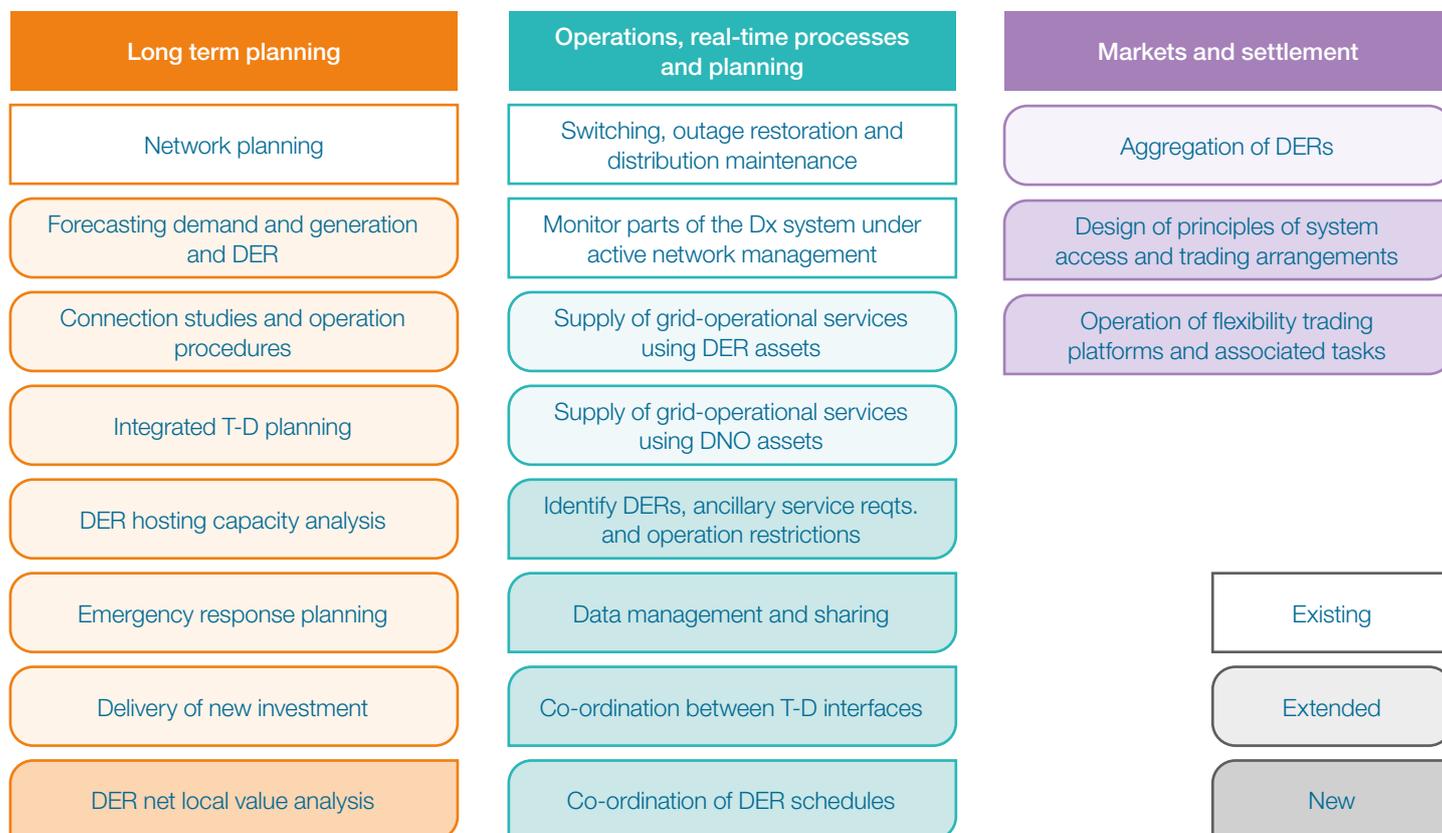
How decarbonisation and DSO transition fit together



As outlined in our executive summary, in December 2019 Ofgem published a consultation on the key enablers for the DSO programme of work and long term development statement in which they identified a set of DSO functions and activities commonly referenced in operation and/or academia.

Below is an extract from the consultation that shows the 19 different DSO functions identified grouped under three themes, with the shading indicating the current and proposed scope of each of the functions.

Ofgem's identified DSO functions



As part of the refresh of our DSO strategy we have reviewed the scope of the 19 DSO functions and activities and highlighted our high level current view on the requirements to fulfil the function, including IT systems and processes. In addition, we discuss whether the DNO or a third party is best placed to fulfil the requirements and consider the contestability of the described function.

As many of these activities and functions will form part of our business plan for RIIO-ED2, we intend to provide a view of what the associated costs will be in RIIO-ED1 and RIIO-ED2; this cost will be identified as our plans develop. We have also linked each function to our RIIO-ED2 output areas below, to show the associated benefits:

-  Enabling competition and innovation
-  Protecting customers
-  Decarbonising at lowest cost

Our views on each function are grouped by the three themes in the order shown in the figure above, utilising one page per function/activity.

At the bottom of each page we have cross-referenced each of the 19 functions with the eight ENA Open Networks DSO functions and identified the relevant products to enable research into what the Open Networks Project is doing in this area.

3 Long term planning

Long term planning: Network planning			
Function description	Carrying out well planned, co-ordinated and suitable network planning is a core DNO function to deliver network capacity to fulfil customers' needs in a safe, secure, reliable, and efficient manner. This function includes activities relating to: identifying and resolving network constraints, improving the quality of supply to customers, improving network efficiency, reducing environmental impacts, improving network safety, and ensuring that the network is designed to the required industry standards. Working with other network owners and developers (TOs, DNOs, ICPs, and IDNOs) to maintain and develop network infrastructure; co-ordinating with them to ensure that network planning standards are maintained across the region.		
Current activities	<p>We have been working to develop solutions to new challenges in the way networks are planned, relating to the move towards: increasing levels of distributed generation, increasing energy efficiency and a growth in low carbon technologies connecting onto the network e.g. electric vehicles, and heat pumps. We have addressed these by developing improved modelling tools, policies, procedures and working practices. We work alongside other key stakeholder groups to develop and enhance industry standards, allowing these changes to occur in a safe and co-ordinated manner.</p> <p>A range of connections options have been developed to allow customers more flexibility in the way they connect to the network. In offering these connections we have reviewed the way that security of supply is treated, as well as developing more options for network rearrangement to drive efficiency and network reliability.</p> <p>We produce a series of heat mapping tools which provide information relating to the level of available capacity for future connections to the network.</p> <p>We have been testing the market to compare reinforcement and flexible services solutions for all new projects of significant value.</p>		
Future position	<ul style="list-style-type: none"> • Applying the principles of flexibility first i.e. all new network planning should consider if there is a flexible solution to resolve a network issue which otherwise would have resulted in the requirement for a physical change to the network • Modelling to produce a more granular demand profile forecast e.g. utilising time series modelling • Enhanced network planning tools, including the capability for open data sharing of network planning activities 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Digitisation of new and existing connection agreements in a format which can be easily filtered • Automated production of network models from GIS data • Develop planning tools to model flexible services options 		
New or enhanced data required	<ul style="list-style-type: none"> • Enhanced asset health information • Smart meter data • Increased granularity of asset technical details • New and enhanced distributed energy resource data • Improved accuracy of geospatial data • Forecasting of how demand and generation profiles will change over time 	Date(s) ED1	
Business process change required	<ul style="list-style-type: none"> • Develop the capability to carry out enhanced data exchanges with stakeholders • Upgrade network modelling tools to provide enhanced functionality for new planning activities • Employ the flexibility first methodology when carrying out solution optioneering 	ED1 and ED2	
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Investment Planning, System Co-ordination

Related to Open Networks products: 2018 WS1 P1 – Investment Planning, 2019 WS1B P1 – Investment Planning, 2020 WS1B P1 – Investment Planning

Long term planning: Forecasting demand and generation and DER

Function description	The forecasting of all demand, generation in and out of the network. This information is used to inform business plans, stakeholders, investment decisions, connections activities and system operations.	
Current activities	Since 2018 we have published an annual Distribution Future Electricity Scenarios (DFES) document. This provides regional insights into the potential changes in demand and generation across the distribution network based upon stakeholder engagement. We have implemented advanced forecasting tools developed through our innovation work on the ATLAS project, to produce highly accurate forecasts.	
Future position	<ul style="list-style-type: none"> Utilising enhanced planning capabilities to improve modelling and forecasting capabilities. These enhanced capabilities will take into account: flexible connections, increasing variability in demand and generation profiles, utilisation of flexible services to provide network services and increasingly variable weather patterns Systems we are developing will be capable of providing short-term (<48hr) demand forecasts which will anticipate network constraints. This knowledge can then be used to procure flexible services, manage network flows and prevent network overloads Improvements in the ATLAS forecasting methodology to include reactive power forecasting and increased automation of long- and short-term forecasting processes. The forecasting system will also be fed with greater quantities of quality data to improve forecasts 	
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> Enhanced network monitoring to provide greater data quality for analysis Integration of smart meter data into corporate systems Implementation of common data exchange protocols to share forecast data openly with stakeholders 	
New or enhanced data required	<ul style="list-style-type: none"> Smart meter data Weather data Forecasts of changes in: uptake of LCT connections activities, regional development plans, policy changes (regional, national and international) and long-term weather patterns 	Date(s) ED1
Business process change required	<ul style="list-style-type: none"> Carry out improvements in ATLAS forecasting methodology to include reactive power (Q) forecasting Publish more detailed forecasts of power requirements for anticipated future flexible services requirements Implement a common platform to allow customers to access forecast data in industry agreed standard formats Automated integration of business and third party data sets into forecasting algorithms 	ED1 and ED2

Estimated costs		RIIO-ED2 output areas		
ED1	ED2			
tbc	tbc			

Open Networks Project related DSO functions: Network Operation, Investment Planning, Connections and Connection Rights

Related to Open Networks Project products: 2018 WB1 P5 – Whole System FES, 2020 WS1B P5 – Whole Systems FES (Signposting of Potential Network Capacity Requirements), 2019 WS1B P2 – Whole Electricity System FES, 2020 WS1B P2 – Whole Systems FES (co-ordination of national and regional FES)

3 Long term planning

Long term planning: Connection studies and operational procedures			
Function description	Carrying out studies to establish both the non-contestable and contestable elements of connections requests to the network. Determining operating procedures for customers connected to the DNO network and defining these within connection agreements.		
Current activities	<p>We have introduced a range of flexible connections offers to our service offering. These allow customers to refine how they would like to utilise the network which can result in significant cost and time savings relating to delivery of connections; in addition, this allows us to operate the network more efficiently.</p> <p>Our teams have been engaging with customers where their existing connection agreements do not reflect their observed usage patterns. This process has been aimed around reducing charges these consumers pay for redundant capacity they are not utilising and returning this capacity to the network so that it can be offered to other customers who wish to connect to the network. The process also identifies customers who are exceeding their agreed supply capacity, offering advice about energy saving measures and carrying out updates to their connection arrangements where required.</p>		
Future position	<ul style="list-style-type: none"> • As we develop to be able to operate the network closer to maximum network efficiency the likelihood of periods of network constraint will increase. Connection studies will be required to determine likely periods of constraint and inform customers to allow them to incorporate this into their business planning • We are implementing an active network management system which will optimise the availability of the network for all connected customers • We will increase the range of flexible connections options available to customers which will allow them to further tailor connections to their individual needs 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Standardise internal network models and make those models available to third parties. We will allow customers to access data within our Network Management System (NMS) through a standard portal for use in their planning tools • We will introduce online tools to allow customers to receive an immediate answer to their connection enquiry using automated planning tools 		
New or enhanced data required	<ul style="list-style-type: none"> • GIS data • Historical network demand data (FLA) • Network model extracted from NMS for to be shared via data portal in CIM format 		Date(s) ED2
Business process change required	<ul style="list-style-type: none"> • Further development of flexible connections options and processes • Upgrading of network modelling tools, including the ability to carry out time-series modelling • The development of Active Network Management (ANM) and the merit order management system • Integration of flexible connections into ANM 		ED1
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Connections and Connection Rights

Related to Open Networks products: 2018 WS1 P10 &11 – Facilitating Connections, 2018 WS2 P2 – Management of Capacity, 2018 WS2 P7 – Provision of Constraint Information, 2018 WS2 P1 – Good Practice ahead of Connection Applications, 2018 WS2 P6 – Guidance on Post Connection Changes, 2020 WS2 P4 – Connection Agreements Review

Long term planning: Integrated T-D planning

Function description	Carrying out joint planning activities with the transmission network operators in order to develop a co-ordinated and efficient electricity network.		
Current activities	<p>DNOs produce a week 24 data transfer which is sent to National Grid Electricity System Operator (ESO). In return the ESO sends a week 42 planning data submission which is then intergraded into the DNO planning models. These data transfers allow both parties to share in-depth planning data required to carry out co-ordinated network management and investment. Regular face-to-face joint technical planning meetings are carried out with the ESO to discuss current and future activities which would impact the network including: reinforcement, data transfers, reporting, commercial connection agreements, new connection activities and demand pattern analysis.</p> <p>Through the work of the ENA Open Networks Project, the UK DNOs and ESO have developed modifications to the Statement of Works process. The Statement of Works process is the method in which DNOs signal a potential requirement to modify the connection agreement, and arrangements at the boundary to the transmission network. This process has been updated to incorporate a new process called Appendix G. The Appendix G process requires more frequent data transfers between the DNOs and the ESO but also provides DNOs with the knowledge of available headroom within the transmission network before an intervention is required e.g. reinforcement.</p> <p>We have begun work on developing a Regional Development Plan (RDP) with the ESO for one of the grid supply points currently experiencing high connections activity. The RDP process stimulates a closer working relationship between DNO and transmission planning teams for a dedicated geographic area to resolve specific localised issues. The RDP process has been widely adopted within other DNO licence areas where wide-scale constraints have occurred.</p>		
Future position	<ul style="list-style-type: none"> • Further development and implementation of RDPs with the ESO. These will become more important as boundary flows at grid supply points (GSPs) become more constrained or variable • Work with ESO to ensure that transmission problems are jointly examined to see if a distribution solution would be more efficient for customers • Enhancement of data sharing activities between Electricity North West, other network and system operators 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Data exchange in open data formats, such as Common Interface Model (CIM) • Enhanced week 24 and 42 data transfers facilitated by advancements in digitisation of data sharing 		
New or enhanced data required	<ul style="list-style-type: none"> • Standardisation in data exchange format e.g. CIM • ESO network models and historical demand data 	Date(s)	ED2
Business process change required	<ul style="list-style-type: none"> • Joint planning with other network and system operators considering the best solutions from a whole system perspective • Development of processes for the integration of DNO solutions to resolve transmission level constraints • Development and integration of enhanced data sharing capabilities 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: System Co-ordination

Related to Open Networks products: 2018 WS1 P1 – Investment Planning, 2019 WS1B P1 – Investment Planning, 2020 WS1B P1 – Investment Planning, 2019 WS1B P4 – Data Exchange in Planning Timescales, 2020 WS1B P4 – Data Exchange in Planning Timescales

3 Long term planning

Long term planning: DER hosting capacity analysis		
Function description	Carrying out analysis on the network to determine and inform stakeholders where Distributed Energy Resource (DER) can and cannot be easily connected to the network. This information will help to focus customers to connect where capacity is available and inform our investment plans to reinforce the network where DER hosting is not easily available.	
Current activities	<p>We produce an annual Long-Term Development Statement (LTDS) which is made publicly available. The LTDS provides detailed network planning data to stakeholders, as well as valuable insights around future development plans.</p> <p>We offer network capacity availability visualisations in both a geospatial format and tabular form of heat mapping tools. Together with the annual DFES and LTDS documents, the heat maps provide stakeholders with data to help them make better informed investment decisions. We carry out connection studies for anybody requesting a connection to the network. We regularly update our load and generation-related forecasting, thus ensuring investment is based upon up to-date, quality data.</p>	
Future position	<ul style="list-style-type: none"> • Carry out updates to the LTDS template and content in line with Ofgem's upcoming recommendations • Refine and improve DFES assumptions, uncertainties and format to meet the requirements of our stakeholders • Increase the granularity of heat mapping and functionality to meet the requirements of our stakeholders • Allow self-assessment of capacity by providing online tools, allowing customers to carry out their own network assessments • Enhance the whole electricity system working with relation to FES production • LTDS data to be shared in an open format to a wider stakeholder base, through a data sharing portal 	
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Enhanced automation of network modelling and forecasting • Adopt an interactive visualisation tool to illustrate DFES scenarios to stakeholders • Publish network hosting capacity at each network node online • Enhanced LTDS content to be shared via digital channels 	
New or enhanced data required	<ul style="list-style-type: none"> • Local, national and international Government policy insights • Historical demand data (FLA) • Weather data • Business insights • Planning data • LCT uptake figures 	Date(s) ED1
Business process change required	<ul style="list-style-type: none"> • Further development of flexible connections options and processes • Development of capacity assessment processes to provide capacity hosting analysis at increased granularity 	ED1 and ED2
Estimated costs		RIIO-ED2 output areas
ED1	ED2	
tbc	tbc	

Open Networks Project related DSO functions: System Co-ordination, Connections & Connection Rights, Service/Market Facilitation, Investment Planning

Related to Open Networks products: 2018 WB1 P5 – Whole System FES, 2018 WS2 P7 – Provision of Constraint Information, 2019 WS1B P2 – Whole Electricity System FES, 2020 WS1B P2 – Whole Systems FES Co-ordination of National & Regional FES, 2020 WS1B P5 – Whole Systems FES (Signposting of Potential Network Capacity Requirements)

Long term planning: Emergency response planning			
Function description	This is a core DNO activity which requires the development of plans for unplanned network events. These events will range from day-to-day activities through to theoretically predicted emergency events. This function covers a wide range of activities both electrical and non-electrical including: storms, faults, weather-related events, terrorist attacks, fires, floods, loss of network supplies, load overloads, third party damage to assets, etc.		
Current activities	<p>Activities include planning where resources are deployed and provision of welfare facilities for colleagues and customers. We carry out response planning for both the day-to-day emergencies, as well as the low probability high impact events. To prepare for these events we carry out planning which includes: provision of backup generation, welfare provisions for colleagues and customers, the evacuation and relocation of the control room and co-ordination with: emergency services, Government, TNOs, ESO, MOD, local authorities etc.</p> <p>We have installed and utilise more network tele-control and automation in order to speed up restoration times following network faults. Within targeted areas of the low voltage network we have partnered with an external consultant who carries out network monitoring and control. This company has sophisticated software which can help locate faulty sections of network, isolate the fault and restore supplies within very short timescales.</p> <p>Focus has been given to developing collaborative partnerships and closer working with key external parties who contribute to supporting our emergency response plans, and likewise we support theirs, e.g. other utilities, Environment Agency, mobile food vendors.</p>		
Future position	<ul style="list-style-type: none"> Increasing the use of flexible services to assist in maintaining and restoring supplies following unplanned network events Consideration of how advanced network automation will be utilised during emergency situations e.g. ANM 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> Increasing the level of system automation and monitoring Manual and automated messaging systems to keep stakeholders informed utilising a range of digital communications channels Development of real-time digital data links with other network and system operators to facilitate whole system co-ordinated restoration and data sharing 		
New or enhanced data required	<ul style="list-style-type: none"> Network status updates from other network and system operators Smart meter data Data from third party sources e.g. regional disaster planning agencies, Environment Agency, weather data, emergency services, MOD etc 		Date(s) ED1 and ED2
Business process change required	<ul style="list-style-type: none"> Development of emergency plans incorporating a world with more LCT connections, e.g. providing backup generation for EV charging Develop processes to utilise network monitoring data more efficiently to inform restoration plans Utilise more automation to help with restoration Utilise predictive functionalities to anticipate network issues before they fully develop e.g. real-time partial discharge monitoring 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: System Defence & restoration

Related to Open Networks products: 2018 WS1 P4 Reliability Standards & Emergency Requirements, 2019 WS1A P5 DSO Services: Conflict Management & Co-optimisation, 2020 WS1B P3 – Real Time Data Exchange & Forecasting

3 Long term planning

Long term planning: Delivery of new investment			
Function description	This function covers delivery activities where the network needs to be developed through reinforcement, smart technology rollout or flexible services. This function also includes the Investment in new business capabilities e.g. new IT equipment, people, operational equipment etc.		
Current activities	<p>Where we have identified that reinforcement of the network is required (for load, generation growth) we carry out or subcontract the delivery of this work. We facilitate the delivery of new connections and upgrades to existing supplies.</p> <p>In place of conventional asset build solutions we have looked to procure flexible services where this represents good value. These services defer or avoid the need for a build solution to resolve network constraints.</p> <p>Following the proof of concept of a new technology or working practice this is then rolled out into business as usual e.g. CLASS and Smart Street.</p> <p>Many of the activities associated with new investment are open for competitive tender in order deliver the best value for money to the end customer.</p>		
Future position	<ul style="list-style-type: none"> • We will continue to seek flexible services and novel solutions for new load and generation related investment and consider flexible or managed contracts when planning new connections. 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Improvements in digital planning tools which help to improve the efficiency of delivery capabilities • Developments of automated procurement systems • Combine ANM and procurement functionality to procure flexible services near to real-time • Integration of automated stock re-ordering systems • Digitisation of delivery records via data links e.g. commissioning paperwork completed on computer devices in the field • Data link between colleagues in the field and control room to facilitate digitised switching schedules and field control 		
New or enhanced data required	<ul style="list-style-type: none"> • Accurate network records • Monitoring data required to power the ANM system • Accurate stock recording 		Date(s) ED1
Business process change required	<ul style="list-style-type: none"> • Develop processes to allow for all design colleagues to consider flexible services first, ahead of conventional reinforcement options • Building tools to allow designers to understand the current and future network limits in a greater granularity which will allow for faster, more efficient decision-making 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Investment planning, Connections & Connection Rights, Network Operation

Related to Open Networks products: 2018 WS1 P1 – Investment Planning, 2019 WS1B P1 – Investment Planning, 2020 WS1B P1 – Investment Planning, 2019 & 2020 WS1A All products, 2020 WS4 P1 Whole systems CBA

Long term planning: DER net value analysis

Function description	Providing information to potential DER providers to show them potential value of providing DER services. This will include encouraging the uptake in LCTs.	
Current activities	<p>The work we have been doing in relation to our 'Leading the North West to Zero Carbon' plan is designed to encourage stakeholders to take up LCTs, as well as decarbonising their current usage of energy. This work involves working with individual customers, local businesses and authorities to provide advice on LCT technologies and utilising energy more efficiently. We work closely with community and local energy groups to help with projects to adopt LCTs and to provide DER services to their community.</p> <p>We regularly update the information which is made available to our entire stakeholder audience to highlight areas of the network where we are looking to procure flexible services from DER providers. Information is available via: our website, through stakeholder workshops, webinars, newsletters, mailing lists and 1-2-1 meetings. We have recently updated our flexible services agreements and product naming to standardise with the other UK DNOs. This provides consistency for service providers wherever they are within the UK distribution network.</p>	
Future position	<ul style="list-style-type: none"> • Help to mature the DER services market • Provide information to DER service providers highlighting the value of providing flexible services 	
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Automation of network modelling to allow for near real-time updating of information made available to stakeholders relating to the availability of capacity and requirements for service provision • Integration of a flexible services platform to advertise service requirements and to facilitate peer-to-peer trading 	
New or enhanced data required	<ul style="list-style-type: none"> • Enhanced network modelling data • Details of flexible services requirements 	Date(s) ED1
Business process change required	<ul style="list-style-type: none"> • Development/procurement of a flexible services platform • Development of automated capacity modelling capabilities • Enhanced stakeholder engagement surrounding DER uptake 	ED1 and ED2

Estimated costs		RIIO-ED2 output areas		
ED1	ED2			
tbc	tbc			

Open Networks Project related DSO functions: Connections & Connection Rights, Service/Market Facilitation

Related to Open Networks products: 2018 WS2 P4 Good Practice for Information Provision on Flexibility Services, 2018 WS2 Provision of Constraint Information, 2020 WS1B P5 Whole System FES (Signposting of Potential Network Capacity Requirements)

4 Operations, real-time processes and planning

Operations, real-time processes and planning: Switching, outage restoration and distribution maintenance			
Function description	Carrying out management of the distribution networks day-to-day running arrangements, a core DNO function.		
Current activities	<p>On a day-to-day basis we carry out planned switching operations, restore supplies following faults, respond to network emergencies and carry out network maintenance. These are the core activities which keep the network operation within design limits and maintain security of supply for the North West.</p> <p>We have increased the level of tele-control and automation on the network. This helps reduce the time taken to carry out switching activities for both planned and unplanned network rearrangement and control. The increased levels of tele-control and automation mean that staffing resources can be more efficiently utilised driving financial savings, as well as improving network safety and reliability. The improved tele-control functionality includes tele-control to sites with flexible connections which allows control room colleagues to signal to sites to change their input/output during periods of abnormal network running arrangements. The inclusion of this capability allows the network to be operated closer to maximum efficiency as well as requiring lower levels of reinforcement to facilitate new DER connections.</p> <p>We have introduced a real-time view of network outages as well as a view which shows upcoming planned network outages on our website.</p>		
Future position	<ul style="list-style-type: none"> • The increasing numbers of flexible connections will lead to additional commercial implications when switching, restoring faults and carrying out network maintenance • Utilising flexible services to assist in fault restoration and maintenance activities to restore supplies earlier or to extend maintenance windows • Balancing the different parameters of multiple systems such as ANM and CLASS on: switching, outage restoration and maintenance activities 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Digitised switching schedules and field control • Increased automation of switching and fault restoration devices • Increased tele-control of network assets • Improved data provision of outages for stakeholders 		
New or enhanced data required	<ul style="list-style-type: none"> • Enhanced network monitoring data • Greater granularity and clarity of planned outage data • Improved data provision of outages for stakeholders 		Date(s) ED1 and ED2
Business process change required	<ul style="list-style-type: none"> • Improved co-ordination of planned activities requiring outages to minimise disruption and resources requirements • Enhanced utilisation of flexible services and flexible connections to manage outages • Utilisation of low carbon sources of backup generation e.g. hydrogen, batteries • Improved data provision of outages for stakeholders 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: System Co-ordination, Network Operation, System Defence & Restoration

Related to Open Networks products: 2018 WS1 P4 Reliability Standards & Emergency Requirements, 2019 WS1A Product 2 – DSO Services, Procurement Processes, 2020 WS1B P3 Real-Time Data Exchange & Priority of Actions

Operations, real-time processes and planning: Monitor parts of the distribution system under active network management		
Function description	Monitoring any sections of network under the control of an ANM system to ensure that the ANM system is taking appropriate actions and taking control to override the ANM system should it take inappropriate actions or cannot maintain network stability without human intervention e.g. storm conditions.	
Current activities	We do not currently have any areas of the network under ANM control. We have entered into contract with a vendor to produce an ANM system which will be integrated with our NMS. The process so far has been to identify the requirements for the ANM system taking into account learning from other DNOs who have already integrated ANM into business as usual processes, working with our software developer to create a customised system that should future proof its network capabilities well into RIIO-ED2.	
Future position	<ul style="list-style-type: none"> • Deploy ANM • Carry out regular monitoring of ANM system performance • Maintain ANM system including updating the details of: DER providers, flexible connections, flexible services and flexible assets • Maintain communication links for ANM functionality to be effective 	
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • New telemetry monitoring points will require fitting retrospectively at various points on the network, as the network becomes constrained. These points will require inclusion in the NMS data model and as such can form part of the network model extracted for planning purposes and wider sharing • ANM will require appropriate measurements in constrained network locations prior to implementation • Digitisation of connection agreement records required so that the ANM system has a full DER management system (DERMS) list and knows the merit order of flexible switching actions 	
New or enhanced data required	<ul style="list-style-type: none"> • ANM status • DER connection agreements 	Date(s) ED1
Business process change required	<ul style="list-style-type: none"> • Delivery of the ANM system and embedding into corporate systems • Developing and integrating new DSO control room functionality. This is likely to require new staffing and training to enable control engineers to monitoring the ANM systems actions and performance • Develop a hierarchy of switching actions which considers the actions of ANM • The future design of the network needs to be cognisant of potential ANM actions • Improvement in telemetry fault restoration capabilities (if the ANM system is fed bad information it will make bad decisions) • Watchdog of communications links within the network and to DER sites, where tele-control and/or monitoring is required 	ED1 and ED2
Estimated costs		RIIO-ED2 output areas
ED1	ED2	
tbc	tbc	  

Open Networks Project related DSO functions: System Co-ordination, Network Operation, Service Optimisation

Related to Open Networks products: 2018 WS1 P7 ANM Information, 2019 WS1B P3 Real Time Data Exchange & Priority of Actions

4 Operations, real-time processes and planning

Operations, real-time processes and planning: Supply of grid-operational services using DER assets			
Function description	This function relates to DER owners providing services to support grid operations to the ESO. This activity is predominantly focused around DER providers therefore DNOs have limited input into this function other than facilitating the distribution of electricity.		
Current activities	We facilitate providers of grid balancing services to get connected or modify their connection arrangements to the distribution network to allow them to offer services to the ESO e.g. STOR, FFR and EFR		
Future position	<ul style="list-style-type: none"> Balancing grid operational DER services such as STOR, FFR and EFR with DNO flexible services and systems such as ANM This will require new algorithms and rules agreeing that maximum value can be delivered through DER connections on the distribution network without impacting network security Integrating the learning which is being developed and shared through the Open Networks Project in this area, through several ongoing RDPs involving other DNOs 		
Digitalisation required/IT systems and support	Real-time data exchanges via real-time digital links to other network and system operators. These data flows will be utilised for conflict resolution and co-optimisation and headroom and foot room management		
New or enhanced data required	DER contractual data may be required where conflict management services are required	Date(s)	ED1
Business process change required	<ul style="list-style-type: none"> The connections business will need to be cognisant of potential service contracts in which DER connectees may wish to participate to provide adequately suitable connections Outage planning teams may need to consider if a connected customer has a contract to provide services especially where these are network critical (currently not applicable) 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Network Operation, Service/Market Facilitation, Service Optimisation

Related to Open Networks products: 2019 DSO Services – Conflict Management & Co-optimisation, 2020 WS1A P6 Markets Facilitation – Non-DSO Services

4 Operations, real-time processes and planning

Operations, real-time processes and planning: Supply of grid-operational services using DNO assets			
Function description	Using DNO assets or assets under the DNO's control to provide services to the grid.		
Current activities	We have developed the CLASS functionality to provide frequency balancing services to the ESO. This functionality utilises the inherent flexibility within the distribution network to provide a market competitive alternative to balancing services. The revenue generated from these services is then utilised to further upgrade the network as well as providing savings to electricity customers.		
Future position	<ul style="list-style-type: none"> Enhancing the benefits of the CLASS functionality to generate more efficiency savings and improve network performance If permitted, utilising controllable home appliances e.g. EV smart charging functionality, to provide grid-operational services Utilising the ANM system to provide load control and network balancing actions Carrying out reinforcement to provide reactive power services e.g. those being trialled under the Pathfinder project 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> Upgrading of tap changer units to be able to provide CLASS functionality Installation of enhanced ANM functionality to carry out grid balancing services Integration with home energy management systems and EV smart charging interfaces 		
New or enhanced data required	<ul style="list-style-type: none"> CLASS monitoring data Comms links with EV smart charging and home energy management interfaces Comms links with ESO trading systems 		Date(s) ED1 and ED2
Business process change required	<ul style="list-style-type: none"> Enhanced network modelling for reactive power service capabilities 		ED1
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Network Operation, Investment Planning, Service/Market Facilitation, Service Optimisation

Related to Open Networks products: 2019 WS1A P5 DSO services – Conflict Management & Co-optimisation, 2019 WS1A P1 – Flexibility Market Principles, 2019 WS1B P1 – Investment Planning, 2020 WS1B P1 – Investment Planning

4 Operations, real-time processes and planning

Operations, real-time processes and planning: Identify DERs, ancillary service requirements and operation restrictions			
Function description	Identify DER providers connected to the distribution network, when and where there may be a requirement for services to be provided to the distribution system and any operational restrictions to a service being provided.		
Current activities	<p>We have published a resource register (SWRR), in line with other DNOs, which identifies where distributed energy resources are connected to the network. Initially this data has been limited to generation ≥ 1MW and some of the data has been redacted to protect commercial sensitivities, GDPR, and to comply with the Utilities Act.</p> <p>We regularly update the information which is made available to our entire stakeholder audience to highlight areas of the network where we are looking to procure flexible services from DER providers. Information is available via: our website, through stakeholder workshops, webinars, newsletters, mailing lists and 1-2-1 meetings. We have recently updated our flexible services agreements and product naming to standardise these with the other DNOs. This provides consistency for service providers wherever they are within the UK distribution network.</p>		
Future position	<ul style="list-style-type: none"> Carrying out monthly refresh of SWRR and inclusion of a planned expansion to include: 1) load related reinforcement plans, 2) ESO ancillary service requirements for distribution connected DER, 3) network restrictions placed on DER by distribution network Implementation of Embedded Capacity Register (ECR), proposed by DCP 350, and ongoing maintenance Publish any operational restrictions to a service being provided by a connected DER 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> Production of the SWRR via an automated process Digitisation of connection agreements to provide a single filtered data source Develop data collection and publish processes for NMS and ANM systems on operational restrictions for service provision 		
New or enhanced data required	<ul style="list-style-type: none"> DER connection agreement data Data on network constraints Data on reinforcement/flexible service requirements Network topology data 		Date(s) ED1
Business process change required	<ul style="list-style-type: none"> Considering the use of flexibility in every action we take Production of the SWRR and ECR Linking multiple data sources together to form filterable digital records of DER connections Automated network studying and publication to identify network constraints, and areas of opportunity for DER providers 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: System Co-ordination, Network Operation, Service/Market Facilitation

Related to Open Networks products: 2018 WS2 P4 – Good Practice for Information Provision on Flexibility, 2018 WS2 – Provision of Constraint Information, 2019 WS1B P2 – Whole System FES, 2020 WS1B P2 – Whole System FES (Co-ordination of National & Regional FES), 2020 WS1B P5 – Whole System FES (Signposting of Potential Network Capacity Requirements)

4 Operations, real-time processes and planning

Operations, real-time processes and planning: Data management and sharing			
Function description	To fulfil the Energy Data Task Force's (EDTF) recommendations to make all data open unless triaged to a more restrictive category.		
Current activities	<p>We produce an annual Long-Term Development Statement (LTDS) which is made publicly available. The LTDS provides detailed network planning data to stakeholders, as well as valuable insights around future development plans.</p> <p>We produce and publish heat maps, fault data, HSE reporting data, GIS data (line search before you dig), financial reporting data and other licence regulatory reporting data.</p> <p>We have published a resource register (SWRR), in line with other DNOs, which identifies where distributed energy resources are connected to the network. Initially this data has been limited to generation ≥ 1MW and some of the data has been redacted to protect commercial sensitivities, GDPR, and to comply with the Utilities Act.</p> <p>We have dramatically improved the functionality and presentation of our heat mapping tools. All information is downloadable including tabular data and associated geographical maps showing the locations of our substations. In addition, we offer a tool which enables customers to identify the closest primary or bulk supply point (BSP) substation to the location of their site, along with the capacity there for their particular type of connection (demand/generation types and required security). Distances from the customer's site to each of the substations are provided along with a specific red/amber/green indication of the ability to connect.</p>		
Future position	<ul style="list-style-type: none"> Open sharing of all data, unless it has been triaged as having a closed audience 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> Consolidation and cleansing of all digital and non-digital company data sources Triaging of data to assess data sharing categorisation Publication of data in accessible formats: PDF, XML, CIM etc 		
New or enhanced data required	<ul style="list-style-type: none"> All company data 		Date(s) ED1
Business process change required	<ul style="list-style-type: none"> Triage to retain sensitivity level Requirement to ensure all data entered into corporate systems is accurate, quality data Requirement to maintain/enhance data protection governance Requirement to ensure cyber security protocols are in place and kept up-to-date Requirement to maintain records of the source of data so it can be cross-checked and, where this comes from a third party, source to ensure that data protection rules have not been breached by storing data, processing data and open data sharing 		ED1
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: System Co-ordination, System Defence and Restoration, Connections & Connection Rights, Network Operation, Investment Planning, Charging, Service/Market Facilitation, Service Optimisation

Related to Open Networks products: 2019 WS2 P1 – System Wide Resources Register

4 Operations, real-time processes and planning

Operations, real-time processes and planning: Co-ordination between T & D interfaces			
Function description	The co-ordination activity between licensees to ensure that 1) neither party has a negative impact on each other with their activities and 2) the most efficient solutions are being developed together to provide the best value and service to customers.		
Current activities	<p>Licensees hold regular face-to-face joint technical planning meetings (JTPMs) to discuss current and future activities which would impact at the network boundary points including: reinforcement, data transfers, reporting, commercial connection agreements, new connection activities and demand pattern analysis.</p> <p>Other current activities include the joint procurement and dispatch of flexible services, where there are system-wide network benefits and efficiency savings.</p> <p>We carry out conflict management of separately purchased flexible services contracts.</p> <p>Electronic data transfer provides real time data sharing of 1) network data, 2) ANM status and key data about boundary flows, 3) boundary headroom/foot room levels for more efficient network operation.</p>		
Future position			
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> Development of ICCP links between licensees for data exchange from ESO/TO fed back into NMS and into planning tools 		
New or enhanced data required	<ul style="list-style-type: none"> Network SCADA data ANM status data and key data Data from ESO/TO Real time boundary headroom/foot room levels 		Date(s) ED1
Business process change required	<ul style="list-style-type: none"> Develop conflict management protocols Develop joint procurement and dispatch protocols Deployment of ANM system Development of ICCP links between licensees' system Establishment of real time boundary headroom/foot room levels 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: System Co-ordination, Network Operation, System Defence and Restoration, Investment Planning, Connections & Connection Rights, Service/Market Facilitation, Service Optimisation, Charging

Related to Open Networks products: 2018 WS1 P4 – Reliability Standards & Emergency Requirements, 2019 WS1A P5 – DSO Services (Conflict Management & Co-optimisation, 2019 WS1B P4 & 2020 WS1B P4 – Data Exchange in Planning Timescales, 2019 WS1B P3 – Real Time Data Exchange & Priority of Actions, 2019 WS1B P1 & 2020 WS1B P1 – Investment Planning, 2020 WS1B P2 & P5 – Whole System FES

4 Operations, real-time processes and planning

Operations, real-time processes and planning: Co-ordination of DER schedules			
Function description	This is the review of DER schedules and determining the optimisation of the schedules. This would include carrying out conflict management within the distribution network where services will negatively overlap.		
Current activities	Currently Electricity North West does not perform this activity.		
Future position	<ul style="list-style-type: none"> Deciding when services are triggered to make the optimal network choices; this involves looking at predicted and real-time network flows and choosing the optimal mix of flexible resources to maintain network stability This may entail matching flexible connections with flexible services to enable cheaper and faster connections activity We may also be able to help facilitate trading activities where two parties wish to trade via the DNO network and need assistance to align operating schedules 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> Holding schedules of all flexible services capabilities in the ANM system, plus potential publication of schedules as part of open data sharing Advertising where a flexible service provider is able/prepared to provide services to another customer (i.e. P2P trading) 		
New or enhanced data required	<ul style="list-style-type: none"> DER technical parameters DER availability data List of connections which may be suitable for pairing 		Date(s) ED2
Business process change required	<ul style="list-style-type: none"> Open data sharing with electronic platforms for facilitating a neutral market for trading Undertaking technical check for matching of DER i.e. does power flow from one customer to another without causing network constraints Deployment of the ANM system 		ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Network Operation, Connections & Connection Rights and Service Optimisation

Related to Open Networks products: 2018 WS1 P10 & 11 – Facilitating Connections, 2019 WS1A P5 – DSO Services (Conflict Management & Co-optimisation), 2020 WS1A P4 – Commercial Arrangements

5 Markets and settlements

Markets and settlements: Aggregation of DERs			
Function description	Where DERs are aggregated and traded as a block, as an individual DER may not be sufficient to trade in competitive markets or may not be interested/able to carry out market competition.		
Current activities	<p>Electricity North West does not currently perform this activity.</p> <p>In our flexibility tenders we have reduced the size of the portfolio of DER from 200kW to 100kW and we are planning as part of the standardisation work under the Open Networks project to move to 50kW, to encourage aggregation of DER.</p>		
Future position	<ul style="list-style-type: none"> • Implementing open data sharing recommendations to enable others to aggregate DER providers eg Embedded Capacity Register in DCUSA and System Wide Register in Open Networks etc • Electricity North West has no plans to aggregate DER to produce a service response; however if the flexibility market fails to develop then we may develop an aggregated response provision for our own purposes, under a flexibility first approach 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Collecting and collating DER information into usable aggregated clusters • Develop data provision platform or procure data provision service 		
New or enhanced data required	<ul style="list-style-type: none"> • DER technical information • Network topology data • Power flow analysis • ANM constraint data • ANM zone • Purchased service provision • DER register 		Date(s) ED1 and ED2
Business process change required	<ul style="list-style-type: none"> • Data sharing between industry participants to facilitate aggregation by others, to understand the impact of aggregated services on the planning and operation of the distribution network and to avoid conflicting actions 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Service/Market Facilitation and Service Optimisation

Related to Open Networks products: 2019 WS2 P1 – System Wide Resources Register, 2020 WS1A P6 – Market Facilitation (Non-DSO Services)

Markets and settlements: Design of principles of system access and trading arrangements			
Function description	Clearly defined principles of system access are required to ensure that network users know who is entitled to utilise the network and when. Trading rules need to be established to ensure that a fair and neutral marketplace can be operated.		
Current activities	<p>We are supporting the Ofgem-led Access & Forward-Looking Charges (A&FLC) Significant Code Review (SCR) and Targeted Charging Review (TCR) SCR working groups to develop access and trading arrangements and the associated rules.</p> <p>We are supporting the work of ElectraLink to develop a common data sharing platform in the Flexr project.</p>		
Future position	<ul style="list-style-type: none"> • Implement the A&FLC and TCR SCR proposals • Test and utilise the common data sharing platform, Flexr, for the sharing of energy data to fulfil ETDF recommendations • Understand how to facilitate non-DSO services to enable the market to develop 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Adapt NMS/ANM systems for new access and trading arrangements • Develop and collate data to fulfil obligations for neutral market facilitation 		
New or enhanced data required	<ul style="list-style-type: none"> • Asset data • Real time data • DER data 		Date(s) ED1
Business process change required	<ul style="list-style-type: none"> • Collection and publication of new data requirements for neutral market facilitation 		ED1
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Service/Market Facilitation and Charging

Related to Open Networks products: 2018 WS4 – Charging, 2020 WS1A P6 – Market Facilitation (Non-DSO Services)

5 Markets and settlements

Markets and settlements: Operation of trading flexibility platforms and associated tasks			
Function description	To facilitate the trading (ie buying and selling) of flexible services via an electronic marketplace.		
Current activities	<p>Electricity North West does not own or operate a flexibility trading platform; we have uploaded flexible services requirements onto third party marketplace platforms as part of trials to procure flexible services.</p> <p>Electricity North West is part of the Transition project, which will help DSO transition by developing and demonstrating a 'neutral market facilitator' (NMF) platform. We have also participated in the Local Energy Oxfordshire (LEO) trials.</p>		
Future position	<ul style="list-style-type: none"> • Use of an electronic flexibility trading platform, operated by a third party, to procure flexibility from the marketplace • Evaluation, dispatch and settlement of procured flexible services through a third-party platform. We are supporting the development of the Flexr project for the publication of flexibility requirements 		
Digitalisation required/IT systems and support	<ul style="list-style-type: none"> • Linking NMS and ANM systems for the procurement, dispatch and settlement of flexible services via a trading platform 		
New or enhanced data required	<ul style="list-style-type: none"> • Procurement rules and price data • Flexible services requirements • Network topology data • DER technical data 		Date(s) ED1 and ED2
Business process change required	<ul style="list-style-type: none"> • Undertaking technical checks on trades • Enforcing market trading rules • Preventing gaming practises/fraudulent activities • Maintaining data protection and commercial sensitivity data privacy 		ED1 and ED2
Estimated costs		RIIO-ED2 output areas	
ED1	ED2		
tbc	tbc		

Open Networks Project related DSO functions: Service/Market Facilitation

Related to Open Networks products: 2019 WS1A – All products, 2020 WS1A P2 – Procurement Processes, 2020 WS1A P4 – Commercial Arrangements, 2020 WS1A P6 – Market facilitation (Non-DSO Services)

We are inviting our customers and wider stakeholders to review and comment on this Analysis of DSO functions document, together with our draft DSO strategy 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 document for further review later in the year.

The consultation questions relating to this document are listed below. In particular, we are interested in knowing whether our analysis on DSO transition 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.

1. Does our Analysis of DSO functions document help to provide a greater understanding of each of the 19 DSO functions identified by Ofgem?
2. Does this level of detailed analysis help to provide a greater understanding of how we have developed our approach?
3. After reading our analysis, is it clear what our future position is in regards to each of the functions?
4. In regards to each function, is there anything else you think we should be taking into consideration?
5. 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.
6. If third parties are better placed to deliver some of these functions, who should have responsibility for their overall coordination?
7. Is there any more information you would be interested in seeing in addition to what has been provided in our analysis? If yes, what information would you like to see?
8. Do you have any other comments on this document?



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