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SP ENERGY NETWORKS

SP Energy Networks Digitalisation Strategy

9th December 2019

Contents

The world is changing and the urgency to deliver the UK's ambitious Net Zero carbon emissions targets is greater than ever before.

Our electricity networks are leading on that journey; delivering value for money, providing a secure and stable supply, and making sure that our most vulnerable customers won't be left behind.

Through digitalisation and harnessing the power of data, we will create the step change needed to deliver this cleaner future at the pace our customers need. That's why I'm delighted to share our Digitalisation Strategy, which maps out how we are transforming traditional network operations with digital innovation and moving to smarter, more agile network management. All to enable the low carbon future.

Improvements in control, automation, flexibility and demand-side management are helping us create a more dynamic and active network. We need to make significant investment to create the network that the future needs. That's going to mean more intelligent monitoring, smarter systems and more advanced technology to help drive the uptake of electric vehicles and new electric heating devices.

The change has already begun

The speed of change and the radical transformation required across the industry means we cannot stand still. We need a fair regulatory regime that reflects the investment required, the risk associated, and the incentives necessary to meet today's challenges.

We're committed to a tailored and locally focused approach that helps to prioritise the needs of our customers and stakeholders, while continuing to deliver a safe, reliable and sustainable network. For this reason, we've been clear on our ambition to become a Distribution System Operator (DSO), and in highlighting the critical role the DSO has in preparing our network for the low carbon future.

As the world changes, our organisation will adapt with it to build on our award-winning innovation portfolio and develop cutting-edge solutions. We are building a workforce for the future and developing the digital skills necessary to meet the needs of a changing energy landscape. Throughout all of this, we keep our customers, network users and stakeholders at the heart of every decision we make. Decarbonisation is such a major transformation; it can only be achieved in collaboration with all interested parties.

A strategy for the future

We are pleased to publish our Digitalisation Strategy, and are proud to play our part in the transformation to a decarbonised society. We will continually refresh this strategy, and welcome feedback and participation from all our stakeholders.

"We are pleased to publish our Digitalisation Strategy, and are proud to play our part in the transformation to a decarbonised society. "

Frank Mitchell
Chief Executive Officer,
SP Energy Networks

Section 1: A Message from our CEO

As a Distribution and Transmission network operator, we keep electricity flowing to homes and businesses throughout Central and Southern Scotland, North Wales, Merseyside, Cheshire and North Shropshire. We do this through three regulated electricity businesses:

- SP Transmission PLC (SPT)
- SP Distribution PLC (SPD)
- SP Manweb PLC (SPM)

We own and maintain the 40,000km of overhead lines, 65,000km of underground cables and 156 substations in these areas. This means that whoever you pay your bill to, we're the people to contact if you have a power cut, need a new or upgraded power connection, or if you spot an issue with our equipment.

However, our focus goes beyond keeping the lights on for our 3.5 million customers. We play a key role in delivering against Net Zero targets, and enabling our customers and communities to get the most out of the low carbon technologies now available to them.

Section 2: About us

What we do

We transmit, distribute and connect electricity to and from 3.5 million homes and businesses over our network, 24 hours a day, every day of the year. Our distribution network has:

30,000 Substations;

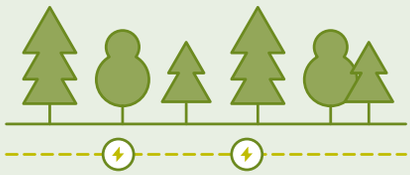
Supplying
3.52m Customers

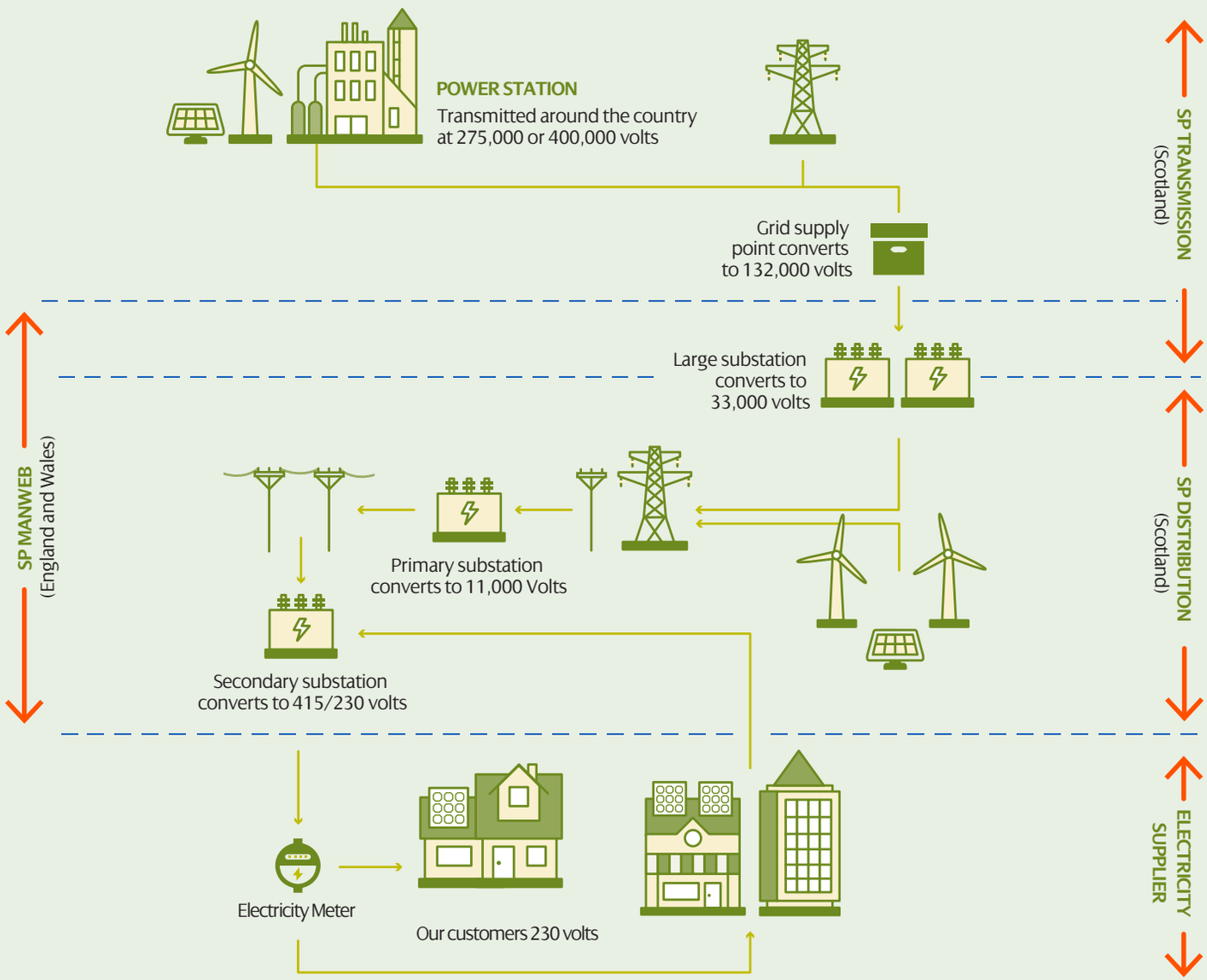
40,000km of overhead lines

That's enough to wrap once around the world.

and 65,000km of underground cables

All to keep your electricity flowing





Delivering value to customers

For a domestic customer the average cost is just 35p per day, much less than a 2nd Class postage stamp, a coffee shop latte, or a typical domestic broadband service.

We take electricity generated from wind farms, power stations, and other utilities, reduce it to the low voltage needed for homes and transport it through our vast network.

Power in numbers

Our networks have connected more than one third of Great Britain's renewable generation, despite only serving 14% of the GB population. We're also proud to be a part of ScottishPower Group – who now generate 100% clean, green energy from renewables. Furthermore, our place within the wider Iberdrola business allows us to call on international experience and innovative thinking from other markets.

Having one of the largest Ofgem Network Innovation Competition (NIC) portfolios in the UK, we are at the forefront of innovation in our industry, with projects that:

- Consider smarter, more agile ways to manage the network
- New approaches to customer interaction
- New technologies to maximise our network potential.

We are committed to innovating and updating our operations for the digital world. In fact, our industry-leading innovation projects were recognised by experts within the sector this year when we scooped two top spots – including E&T Innovation of the Year – at the prestigious Institute of Engineering and Technology Awards.

A view to the future

We work closely with the Government and the regulator to help shape the policy parameters we work within, and see ourselves as key to engagement with the education sector. This engagement is vital not only for recruiting our future workforce, but for educating new generations on the ever-changing energy landscape.

Customers and communities

Stakeholder engagement is central to how we shape our business. By talking to others about our processes and services, we can continually improve our approach and prioritise the needs and wants of the communities we serve.

Above all, our customers are at the heart of our business. We are proud to have been awarded the UK's Network of the Year 2019, benchmarked 1st in the UK for Customer Service, and recognised as the best DNO in the UK for Customer Satisfaction.

We focus on supporting consumers' modern lifestyles, while making sure the most vulnerable are never left behind. Ultimately, we are dedicated to playing our part in delivering the zero carbon communities of tomorrow.

Throughout Central and Southern Scotland, North Wales, Merseyside, Cheshire and North Shropshire we own and maintain overhead lines of

40,000KM

In the same areas we also own and maintain underground cables of

65,000KM

Awarded the UK's Network of the Year 2019, benchmarked 1st in the UK for Customer Service and Customer Satisfaction

1ST

With the declaration of a climate emergency and a legislative commitment to achieve Net Zero carbon by 2050, we must anticipate the shifting demands of the planet. Electricity networks and the wider energy system are in the midst of a fundamental change.

This section discusses the key factors that are working together to drive this transformation:

Decarbonisation: The growth in renewable generation has, and will continue to have, a considerable impact on electricity networks. The decarbonisation of the heat and transport sectors will drive change on an even bigger scale.

Decentralisation: The closure of large fossil fuel generating stations, a significant increase in smaller-scale renewable generation and an increased number of homes and businesses generating electricity means that over a quarter of overall generating capacity is now connected to the distribution networks[1]. New smart technologies, cost reductions and business models continue to push this decentralisation further.

Digitalisation: As technological advancements let us generate an increasing amount of data across our networks, there is a huge opportunity to do things differently and drive benefits for the consumer. If this data is fully utilised and managed, then the scope of potential change is significant. This means that change could be driven not only by network operators, but by any recipient of the data. As stated in an Energy Data Taskforce strategy report, "Digitalisation releases value, opportunity and resilience, enabling decarbonisation and decentralisation to be delivered at optimal cost for the benefit of consumers"[2]. We are happy to play an active role in supporting the transition towards modernising energy data access.

Section 3: The world is changing

[1]http://fes.nationalgrid.com/media/1409/fes-2019.pdf
[2]https://es.catapult.org.uk/news/energy-data-taskforce-report/

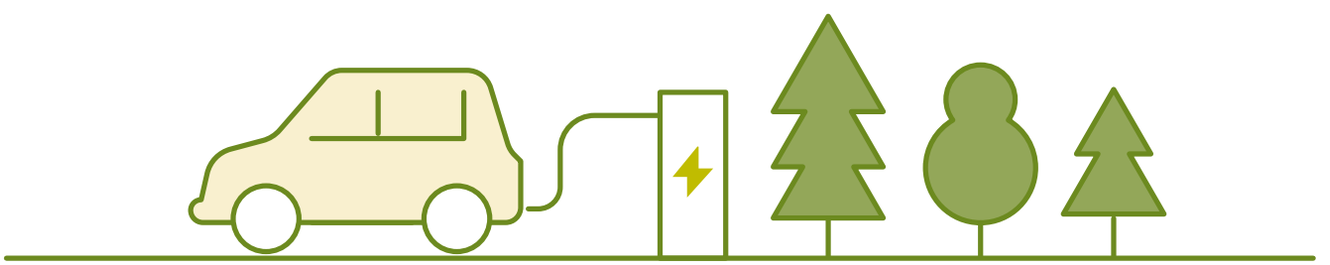
Decarbonisation

In 2019, the Climate Change Act was amended to a Net Zero carbon target by 2050. Scotland has gone further by setting a Net Zero target date of 2045, and individual cities and regions are committing to even more challenging targets.

The energy system is central to the UK's Net Zero transition. Renewable generation is one part, but that alone is not enough; the decarbonisation of heat and transport sectors also plays an essential role. Together, these two elements will have significant implications for electricity networks.

Number of electric vehicle charging points needed by 2050 - this is based on assumptions around how people will travel in 2050:

25 million



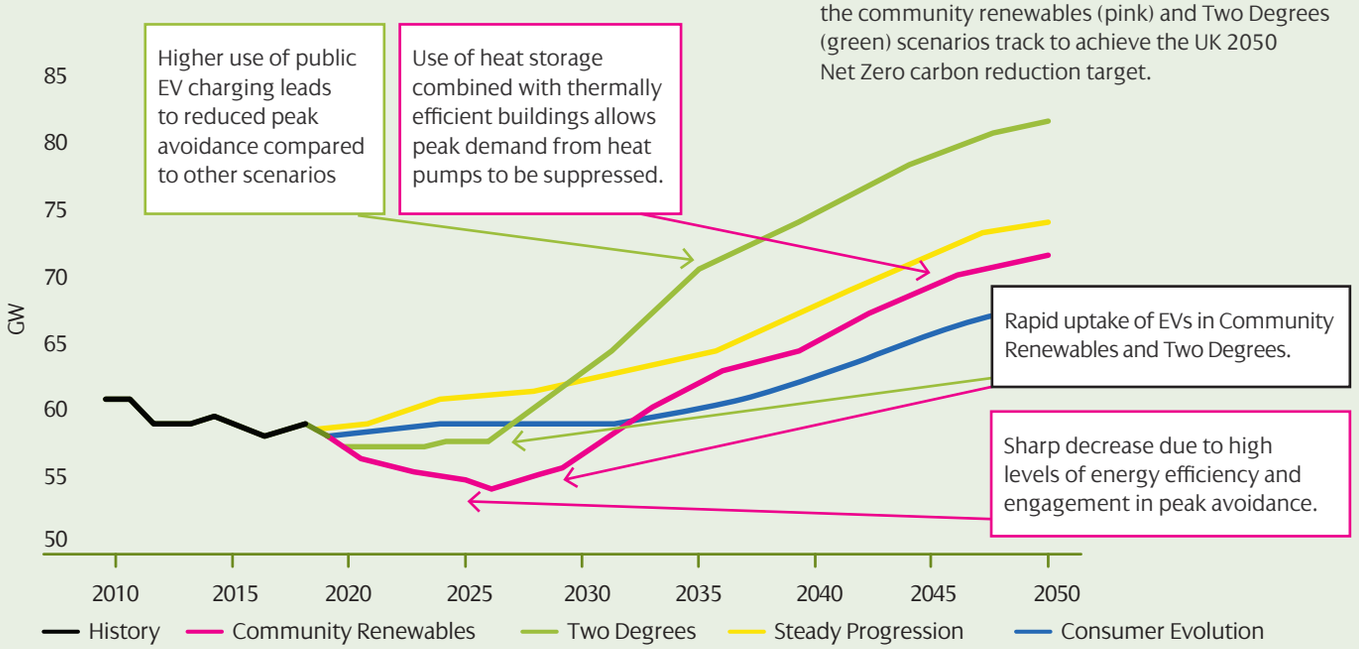
Number of homes that will install heat pumps by 2050:

23 million

https://www.scottishpower.com/userfiles/file/Zero_Carbon_Communities_Report.pdf

Electricity peak demand (including losses)

The 4 lines refer to different scenarios modelled by National Grid as part of the FES 2019. Note that only the community renewables (pink) and Two Degrees (green) scenarios track to achieve the UK 2050 Net Zero carbon reduction target.



Preparing for increased demand

Transport accounts for 27% of UK greenhouse gas emissions, and heat accounts for 37%[3]. Moving to electric vehicles (EVs) and low carbon heating will place huge demands on our electricity networks, which network operators must manage without compromising safety, reliability and resilience.

A significant amount of investment in network reinforcement will be needed for the electricity networks to successfully accommodate this growth in demand. A recent report has calculated that the amount required will be £48.5bn.[4]

A new opportunity

Traditional network reinforcement alone will not be able to deliver the scale of change required. We need to maximise the potential of our existing infrastructure and use flexible, smarter solutions to optimise the use of both network and non-network assets. This will help us deliver a system that maintains a high level of safety and quality.

While the growth in decentralisation and alternative business models introduces challenges to network management, it also provides us with an opportunity to actively manage the network and deliver Net Zero in the most cost effective way. Digitalisation plays a critical part in achieving this.

Transport contributes to UK greenhouse gas emissions by

27%

To support the anticipated growth in demand will require network reinforcement investment of

£48.5bn

The co-ordinated and strategic use of SMART planning and active management techniques has the potential to reduce overall network reinforcement costs by 30%-40%.

[3]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766109/decarbonising-heating.pdf
[4]https://www.scottishpower.com/pages/zero_carbon_communities.aspx

Decentralisation

The growth in renewable generation has already seen a huge shift away from transmission to distribution connected generation, and a growing number of consumers now acting as both energy producers and consumers (known as prosumers).

There are around 1 million[5] individual renewable generators in Great Britain, ranging from 1-2kW to 1.2GW. It's difficult to know exactly how things will evolve in the future, but one estimate is that by 2023[6]:

Prosumer electricity generation will double to 15% or more of the energy mix in G8 industrialised countries

One third of all investor-owned utilities will operate subsidiaries specifically focused on service provisioning for prosumers

Electricity storage will exceed 20% of total installed capacity

Adapted solutions

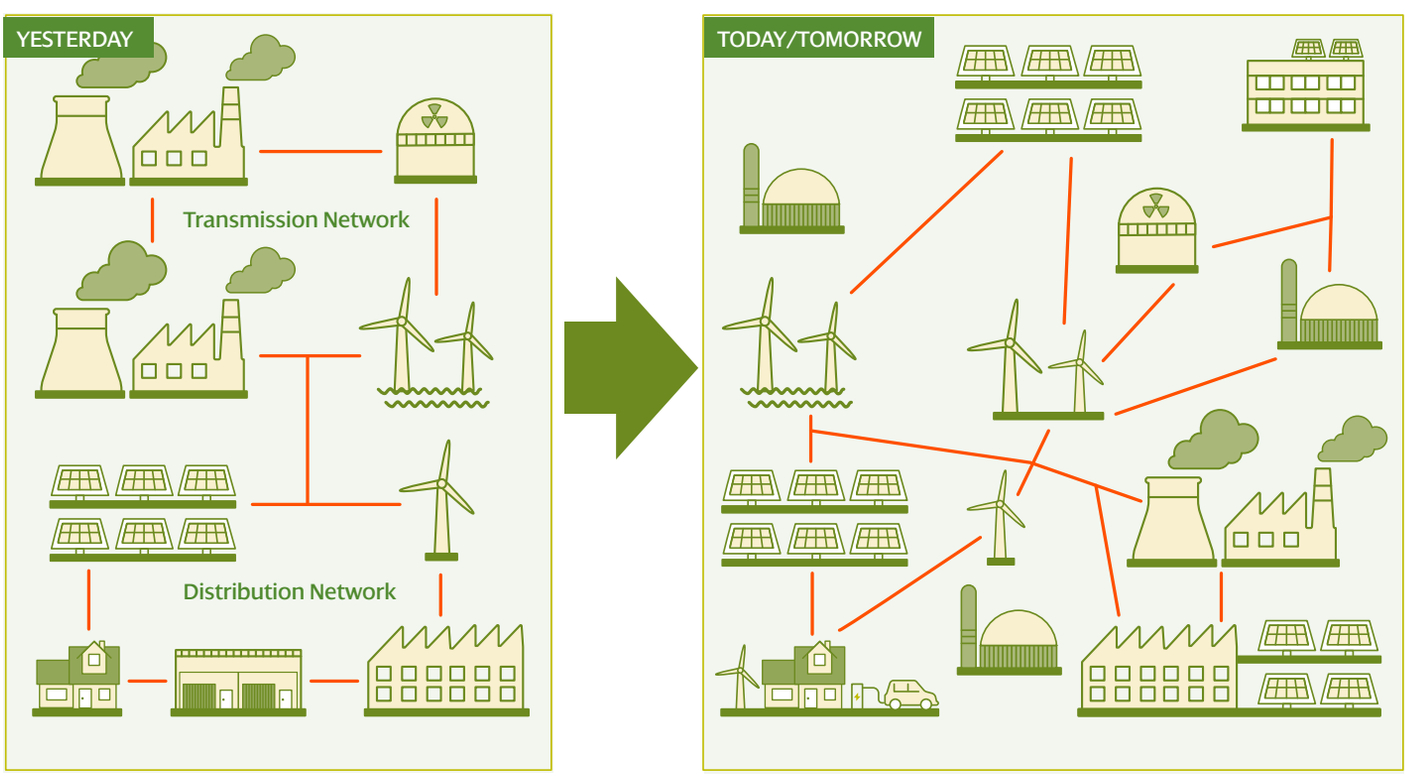
Electricity networks were designed for power flows in a singular direction from transmission, through distribution to the end consumer. While a more decentralised network creates a more complicated set of challenges and relationships, it also provides an opportunity to develop whole system solutions that benefit consumers.

Additional flexible generation and demand at a local level can help meet increasing supply and demand. It also reduces the impact on the electrical network and the need for large scale installation of traditional assets.

To respond to these challenges while maintaining a low cost and reliable electricity network for customers, we and other Distribution Network Operators (DNOs) are increasingly moving towards a Distribution System Operator (DSO) model.

The DSO actively coordinates between all market participants, and facilitates the markets and services in a neutral and non-discriminatory manner. The DSO model relies upon the availability and exchange of data across digital systems that involve many participants.

Concept of decentralisation



[5]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/840014/Chapter_6.pdf

[6]https://www.gartner.com/en/documents/3899330/what-utility-cios-need-to-know-right-now-about-derms

Digitalisation

The scale of change required as a result of decarbonisation and decentralisation is unlike anything the electricity networks has experienced to date.

To manage this transition effectively, we will combine traditional thinking and ways of working with new approaches. One of the key tools to help with this is digitalisation.

A new paradigm

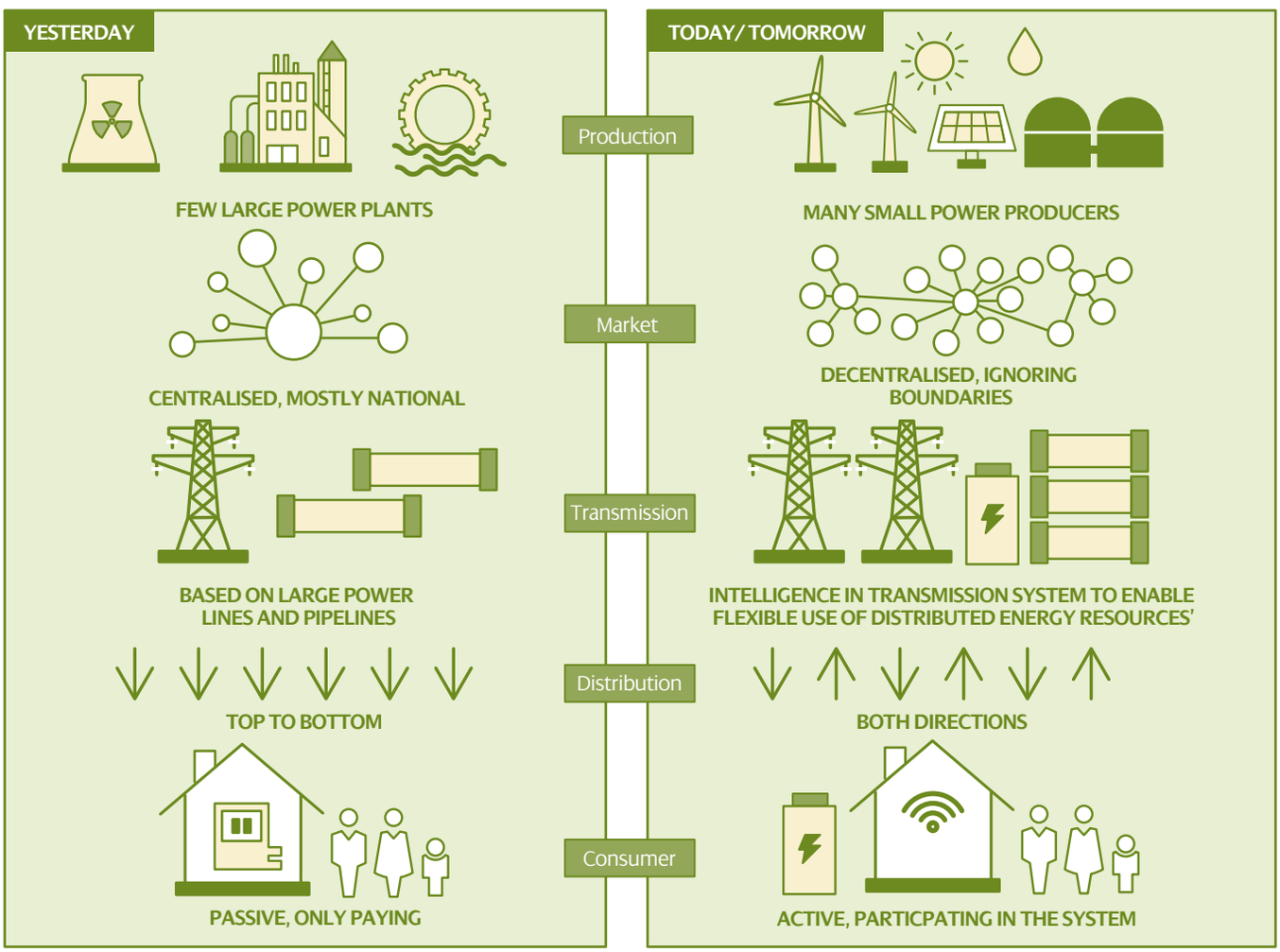
Digitalisation is 'the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business'[7].

The EDTF's report concludes that 'data and digitalisation, while not the sole enablers of energy system transition, are essential to unlock the decarbonisation and decentralisation dividends for the benefit of consumers'[8].

However, digitalisation is not just a tool to support the decarbonisation imperative and enable the safe and efficient management of decentralisation. It also presents us with the chance to improve customer experience and overall efficiency in many areas – and thus deliver more value for our stakeholders.

Transitioning to a low carbon energy system

Expected structural changes in the energy system made possible by the increased use of digital tools:



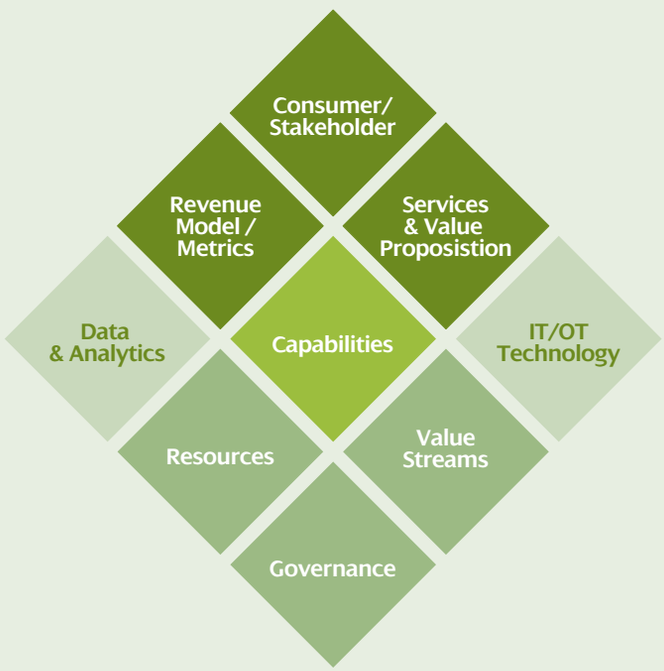
Significant structural changes are expected (Source: adapted from IEA Atlas of Energy)

[7]https://www.gartner.com/en/information-technology/glossary/digitalization.
[8]https://es.catapult.org.uk/news/energy-data-taskforce-report/

The scope of our digitalisation

The scope of our Digitalisation Strategy is represented in the diagram below. This provides a picture of how our digital initiatives cross all parts of our operation and organisation.

Scope of the Digitalisation Strategy: Adapted from Gartner Digital Business Strategy Framework



Consumer/stakeholder: The primary driver for digitalisation is to deliver benefits to current and future consumers. Wider stakeholders include those who do, or could, actively participate in management of the network.

Services and value proposition: As a network business, our primary focus is the effective operation of the network. The value proposition states that we should: operate the network without disruption to security of supply, safety or resilience; and facilitate the low carbon transition at the most efficient cost to consumers.

Revenue model/ metrics: Consumers pay for use of the network system through the Use of System (UoS) charge in their bill from electricity suppliers, and also directly for some services, such as connections. The revenue model for DSO related activities is still to be determined.

Data and analytics: The Digitalisation Strategy should consider better use of existing data, improving the quality of that data, the use of new sources, and ensuring that others can make effective use of our data.

Capabilities: Our digital capabilities are developed through a combination of all factors in the model.

IT/OT technology: The Digitalisation Strategy should address: the use of the Industrial Internet of Things (IIoT); such as telecoms; connected instrumentation; better integration of existing IT/OT systems; new IT/OT capabilities; and an integrated approach to information security.

Resources: The Digitalisation Strategy needs to identify the kinds of resources skills and partnerships required and the approaches taken to create a digital workforce.

Value streams: Digitalisation will have far-reaching effects. The table opposite illustrates some of the areas of impact.

Business activity	Impact of digitalisation
Design and construction	More efficient design, build and commissioning processes Minimised rework Seamless integration with operations and asset management Enabling whole system and whole lifecycle planning and management
Network operation	Better visibility of asset status Improved control and flexibility Real-time optimisation to avoid constraints and meet customer needs at minimum cost Fault prediction and faster fault fixing Improved network reliability and safety
Asset management	Improved data on asset health and loading More robust justification for asset replacement Network extension and reinforcement
Customer service	Improved data on systems and processes affecting customers Better customer interfaces, such as self-serve
Stakeholder engagement	Developing new channels of stakeholder engagement to inform business strategy and decision-making
Transparency and reporting	Streamlining of regulatory and statutory reporting including outputs, costs, performance, environmental and financial Making relevant data available to the outside world

Digitalisation in each of the opposite activity areas will benefit consumers in one or more of the areas below.

Value stream	Benefit to consumer
Reducing or delaying reinforcement needed	Reduced cost and time to connect Reduced environmental impact
Increasing operational efficiency	Increased customer satisfaction Reduced costs
Enabling and stimulating the DER/ flexibility markets	Avoided reinforcement
Supporting move to decarbonisation of transport and heat	Directly – benefits prosumer Indirectly – reduced cost and environmental impact
The introduction of new ideas and innovations from outside the network companies	Increased customer satisfaction Reduced environmental impact

The remainder of this Digitalisation Strategy outlines the steps we have already taken in our digitalisation journey, and explains our vision of moving towards a more digital business – ultimately, to better serve the needs of both current and future customers.

From the digitalisation of our substations to making preparations for the decarbonisation of transport, we have already taken several steps towards getting ready for our digital future.

This section provides four examples of digital initiatives that demonstrate our commitment to solving the challenges that decarbonisation, decentralisation and digitalisation will present. We will outline the work involved, and perhaps most importantly, the benefits for consumers.

Section 4: Taking steps towards a digital future

Efficient innovation

We set out on our digitalisation journey as part of our RIIO ED1 and T1 plans with an aim to work more efficiently, in support of the Net Zero economy. A key part of this involves seeking out new ways to operate and manage our networks. We have actively sought out innovative approaches, with projects funded through Ofgem's Network Innovation Competition (NIC) and Network Innovation Allowance (NIA).

Along with our own initiatives, we will continue to use NIC and NIA funding, and to support the growth of projects and products that will support our digitalisation strategy. This is currently underpinned by the launch of our iHUB platform – an SP Energy Networks Innovation Hub that allows our staff to contribute with pilot innovation ideas, which we then assess.

We have listed a series of projects that are part of our digital journey in our appendix 1 (Projects supporting decentralisation, decarbonisation, digitalisation and customer service). The following case studies also showcase some examples of our digital project initiatives.

1. FITNESS: *leading the digitisation of substations*

1

As a network operator, we have taken steps to move away from the traditional passive operation of substations that are currently on the network, and towards active substations that work intelligently. This involves the digitisation of our transmission substations, the first generation of which has already begun, under Project FITNESS.

How it works

Protection systems detect short-circuit faults and initiate the opening of circuit breakers to safely disconnect any faulted components. These systems are vital for the safe operation of the network, and must perform reliably to avoid any disruption to the network.

With recent developments in communications technology and advancements in software tools, new approaches to protection design can be applied, based on an international standard called IEC 61850. This will digitalise the interactions, making them faster, more reliable, and more robust.

This gives way to a more advanced communications system that will operate more intelligently and replace most of the electrical wiring in a substation, saving space, time, and money. We are pioneers in this field, installing our first systems of this type in 2008. We have since expanded our application of the technology and will have three completely digital substations by the end of RIIO-T1.

How we'll use it today, and beyond

The evolution of this type of digital design has now reached the interfaces of our high voltage equipment. We've also achieved the UK's first live installation of this technology using equipment from multiple vendors. We developed this as part of this innovation project, and it has proven to be highly successful, advancing the industry's knowledge and encouraging other vendors to develop their products. We will apply this new approach to all new and off-line build transmission substations in RIIO-T2.

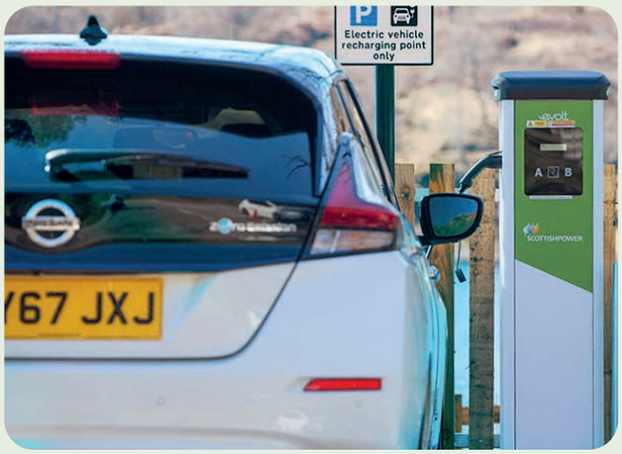
Digital technology that unlocks greater customer benefits

Through the linking up of the high voltage equipment, protection systems and our Supervisory Control and Data Acquisition (SCADA) system, with a double bus communication system instead of multiple copper wires, we will make sure that customers benefit from the reduced costs, reduced outages (for repairs if a copper cable is damaged), and shorter outage times. We will also leverage the environmental sustainability benefits that come from smaller substation footprints, and lower the use of materials such as concrete and copper cables.

2. EV-Up: *supporting the decarbonisation of transport*

2

To meet the Net Zero target by 2050, transportation will need to be decarbonised. Based on current trends and forecasts, this will be achieved by electrification rather than by hydrogen. We will need to facilitate this uptake of electric vehicles.



How it works

The transition to electrified transport – along with greater penetration of other low carbon technologies such as heat pumps – will increase pressure on low voltage networks as demand increases. To make sure that the network continues to provide the level of service required for customers, we must improve forecasting. This will help us make investment decisions at the lowest overall cost, while minimising network risk.

However, accurate forecasting is extremely challenging right now due to the current immature EV market conditions and rapid technology change. So there is a need to model a range of adoption scenarios over an extended timeframe – increasing the complexity and uncertainty of the forecasts.

Right now, we have limited ability to accurately forecast where and when customers will transition to EVs and how this will impact on the distribution networks. Improved forecasting is critical to ensure that our future networks can deliver on increased demand.

EV Uptake Modelling (EV-Up) is a £175k initiative funded via Ofgem's NIA innovation allowance. The project looks to better understand customers' ability to transition to electrified transport. It does so by combining each household's ability to park off-street with key demographic information such as age profile and economic activity.

Combining this information gives us a greater understanding on the probability of transition to EVs in specific areas – greatly improving future demand profiling for domestic customers and our understanding of appropriate network reinforcement solutions.

The project will investigate the following areas:

Probability of an EV owner being able to park and charge at home
Driver demographic, including income and behaviours
Make and model of the vehicles and corresponding battery size

The project will enhance forecasting accuracy and help with resilience planning. This will drive low voltage infrastructure upgrades and replacement programmes.

How we'll use it today, and beyond

Moving on to the ED2 price control, we believe that EV-Up will allow more sophisticated modelling. Namely in the identification of where and when interventions may be required – such as use of flexibility or reinforcements – and providing evidence for future price control submissions.

We also expect to leverage the learning from EV-Up to complement the Charge[1] project and provide greater accuracy for substation monitoring. We can also form a strategic partnership with the Scottish Government and Transport Scotland based on information exchange.

Digital technology that unlocks greater customer benefits

In terms of network modelling, data is crucial for the ongoing success of EV-Up. Better data means we can develop more realistic and comprehensive models, reducing risk and improving the efficiency of our solutions.

Currently the majority of EV impact modelling is top-down, looking at general adoption trends across geographical areas. EV-Up takes a different approach, delivering better understanding of individual households' ability and desire to transition to low carbon transport. It also indicates the potential increased demand and impact on local LV networks. This is very much a bottom-up assessment, leveraging data to provide a more granular and representative output. When incorporated into our corporate systems, that output data increases our understanding of the future of EVs.

EV Uptake Modelling (EV-Up) initiative is funded via Ofgem's NIA innovation allowance granting

£175K

[1]Charge Project Summary found in Index Table on SP Energy Networks Innovation Projects (Diagram)

3. Project FUSION : *enabling decentralised markets and customer participation*

3

Project FUSION is a live trial of a local demand-side flexibility market. It will trial the trading of decentralised flexibility through the creation of a competitive market, structured around the Universal Smart Energy Framework (USEF).

How it works

With Project FUSION, we've created a blueprint for a local flexibility market that allows DNOs to procure flexibility from customers. This will help to manage network congestion resulting from load growth.

The project will investigate the following areas:

- Harness local demand-side flexibility trading to alleviate localised network congestion and defer or avoid traditional network reinforcement
- Provide information on innovative commercial tools created to meet evolving customer needs associated with Low Carbon Technology (LCT) uptake and new connections
- Enable efficiencies from deferred or avoided network reinforcement and accelerated customer connections

We also aim to develop industry-wide standard procedures for DNOs procuring flexibility, within the existing GB regulatory and market framework. Because of FUSION, we now have evidence that:

- Developing a local flexibility market in the proposed study area could represent a saving of £19m by 2050 for the licensee area – mostly through deferral or avoidance of conventional reinforcement
- The learnings of the local trial can be rolled out across GB to provide numerous benefits to electricity consumers by 2050.

All the above will lead to crucial learnings for the DNO-DSO transition that we and other organisations are preparing to take.

How we'll use it today, and beyond

This project will provide valuable learning and toolsets that can be utilised for our transition from a DNO to a DSO.

By working collaboratively with the ENA, and the other NIC projects such as SSEN's Transition and WPD's EFFS, the project will also set industry standards for the rest of the GB network.

The current use of this project and technology is:

- Technology readiness level at project start date: 6/10
- Anticipated technology readiness level at project completion date: 8/10

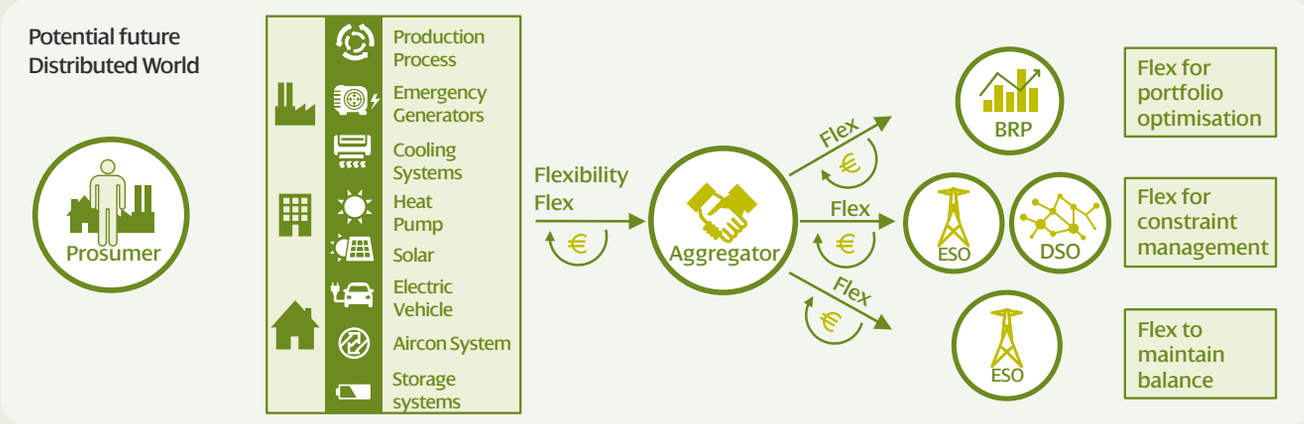
Digital technology that unlocks greater customer benefits

To effectively determine the network requirements, Project FUSION requires accurate data and system automation. We're currently collaborating across our different business functions to make sure that the necessary data and digital systems are put in place.

Once the necessary systems are in place to analyse the data and act upon it, our aims for the flexibility market can be achieved. And will ultimately improve the cost of electricity for our customers.

Glossary

- BRP- Balance Responsibility Parties
- ESO- Electricity System Operator
- DSO- Distribution System Operator



4. Case study : *Digitalising our asset systems with NAMS*

4

Our Network Asset Management System (NAMS) went live on the 8th January 2018 and is now fully operational across all parts of SP Energy Networks. It has helped improve the transparency and accuracy of our business information and empowered staff to make more informed day-to-day decisions through the digitalisation of our systems.

How it works

The principle of our Network Asset Management System (NAMS) is to bring multiple strands of asset management work together in one integrated Work Management System.

We previously had several business processes and data sets that were managed outside of core business systems using different applications and individual spreadsheets. Bringing these together within NAMS enables us to make better, more informed decisions, reduce manual processes and meet our responsibilities to customers, shareholders and Ofgem.

By reducing the time spent on paperwork and complex cross-system reporting, NAMS has allowed us to refocus our efforts on more value-adding business activities, such as robust forward planning.

Dimensions of NAMS:

1897 Business Requirements
80 Business Processes Designed
50 person-years of Coding Effort
100,000 Data Records Migrated
2715 Users Trained
383 Classroom Courses Delivered
22,935 Testing Steps Completed
63 Role Changes Evaluated

How we'll use it today, and beyond

NAMS is the primary suite of business systems used in the day-to-day operation of our business. The systems cover almost all of our business activities other than the real-time systems that control the physical network.

We're continuing to improve the functionality of NAMS and make regular small-scale investments to improve performance and user experience for our staff and principle contractors.

Digital technology that unlocks greater customer benefits

NAMS has laid the foundation for us to transition to a more digitally focused world. It gets us ready for the challenges of the low carbon energy systems of the future.

Already, we have:

Delivered a hugely complicated project on time and on budget
Set an Iberdrola global benchmark for large-scale IT implementation and change management
Maintained operational performance with no impact on customers or regulatory obligations
Assembled a wealth of knowledge on systems and processes
Developed our people, helping to grow talent while demonstrating resilience
Provided a platform to modernise our business and build our digital future

Much still to be done

Although we're heading in the right direction, we also recognise that there is much more we can do to establish the network of the future and deliver Net-Zero by 2050.

Without an overarching strategy to bring value to the initiatives detailed above, our approach risks becoming fragmented and inefficient. The magnitude of the challenge requires a considered strategic vision.

This is why we've developed our own Digitalisation Strategy. In the next section, we'll outline the broad aims of our strategy before providing detail on the steps we'll take to build a future-ready network.

"Digitalisation is key to transforming all aspects of our industry. We know decarbonisation of heat and transport will undoubtedly cause a massive increase in electricity consumption and additional demand on our electricity networks. Ultimately, we are best posistioned to meet these challenges ... and throughout all of this, we will keep our customers, network users and stakeholders at the heart of all our decisions Decarbonisation is such a major transformation, it should be done with collaboration from all interested parties"

Frank Mitchell, CEO SP Energy Networks

Where we are going:

Monitoring and Controlling the Network,
Autonomous Operation Instrumentation, Asset Lifecycle Management, Integrated Models, Analytics.

Develop Options to Manage Peak Loads,
Activate Network Managment, Flexibility Markets, Beyond the Meter.

Improving Mastery of our Data ,
Data Governance and Security, Master Data Management, Holistic Asset Register, Data Presumed Open.

Support the Development of new Business Models and Markets
Facilitate Transactive Flexibility Market, Publish Open Data, Support industry collaboration, Participate in markets.

Use Digital Technologies to Improve Customer Service and Experiences
Omni-channel type experience, Automated (to support increased scale), Integrated Customer Service Portal.

Investing in the Digital Skills of Our People
Building and sustaining a digital ready workforce, Digital Ability & Agility, IT Technical Expertise.

Section 5: Our digital vision

How we'll get there:

Key enablers
Our key enablers include: systems & systems integration, robust telecommunications, effective IT and OT (Operational Technology) cyber-security

Engagement
Active collaboration with other DNOs, cities and local authorities, education establishments and leading suppliers of digitally equipped assets to deliver decarbonisation, supported by decentralisation and digitalisation

Achieving our vision:

Running so many major streams of activity successfully demands a structured, focused approach – with several programmes of work.

To achieve our vision, we will:

- Increase our ability to monitor, manage and control our network
- Develop options to manage, communicate and work with generation and demand
- Invest in improving mastery of our data
- Develop new business models and markets
- Use digital technologies to improve customer service
- Invest in the skills of our people and in organisational design.

The following chapters discuss each of these areas in detail. These programmes will require the support of enabling activities, which we'll also detail.

The network is changing rapidly. We will require more sophisticated digital tools and autonomous systems to manage the transition to a low-carbon network. To ensure reliability and achieve our digitalisation aims, we need to develop multiple programmes addressing different streams of activity.

We have already deployed several industry-leading systems on our Transmission network, and have more planned for the RIIO-T2 period. We intend to apply similar digital approaches within our Distribution network.

This section outlines the steps we will take to increase our ability to monitor, manage, and control our network through digitalisation.

We are going to do this in four key ways:

- Learning from the progress made in digitalising our Transmission network
- Focusing on creating an active low voltage network
- Using data and analytics to optimise network planning and operation
- Increasing real-time visibility and autonomous operation of our Distribution network

Section 6: Monitoring and controlling the network

Monitoring and controlling the network

We've already taken big steps in digitalising our Transmission network

We monitor the Transmission network from a sophisticated real-time digital control room. A broad range of instrumentation and controls within the network are increasingly autonomous in operation. And our digital substations allow greater monitoring and control, while reducing the cost of build and operation.

The knowledge and expertise we've developed in digitalising the Transmission network puts us in an excellent position to do the same on our Distribution network.

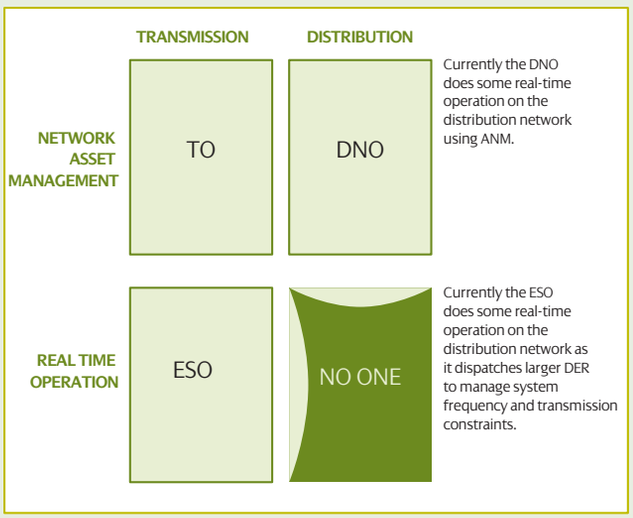
Improved visibility and control on the low voltage network

As we seek greater visibility of our Distribution network, our primary focus is on the Low Voltage (LV) network – an area with many challenges. We require new toolsets to gain visibility of changing power flows and greater control to maintain network operations.

While the High Voltage (HV) networks have been remotely controlled and monitored, this functionality has been limited on the LV network. Distribution Network Operators (DNOs) have not previously required a real-time view of the LV network or historical trends. This is no longer the case.

As greater volumes of low carbon technologies connect, the power flows in the LV network become more complex and the traditional approach of a passive LV network management is no longer appropriate.

Increasing the ability to manage and control the LV network is a crucial focus area in our broader drive to develop the management of the Distribution network. We will use increased visibility and control of the system to keep customers' vehicles charged, homes warm and lights on.



Changing patterns

As our network profiles continue to become more complex, we forecast a long-term trend of greater power flows on the LV network. This will be driven by higher demand from electric vehicles, heat pumps, batteries, and increased local generation from prosumers.

Understanding the power flows on LV circuits will be crucial. Greater knowledge of current and historical power flow patterns on the LV network through secondary substation monitoring and other sources of data such as Smart meters combined with real-time network modelling will help us achieve that.

Proactive intervention

Typically, circuits in need of reinforcement are highlighted after faults or during periodic manual assessments. Overloaded circuits are then targeted for reinforcement. Digital monitoring will provide early warning – so reinforcements or alternative methods can be deployed proactively to avoid failure or loss of supply for customers.

Traditional methods of dealing with high peaks in demand rely heavily on network overlay and reinforcement. This typically leads to very heavy investment, with electricity supply and environmental disruption to customers.

New digital tools will help us to understand the future requirements placed on the LV network. We can minimise the level of reinforcements needed, while maintaining high levels of service reliability, and avoiding restricting the rollout of low carbon technologies.

Helping us maximise reliability

These digital tools will allow us to do multiple things:

- Capture more data about the operation of the LV network
- Develop the capability to model network flows in detail
- Transform the network's operation to maximise our system capacity

This will transform our ability to capture data across our network and workforce, while bringing our IT and OT systems closer together. Combined, it all helps us to provide a more reliable network.

Using data and analytics to optimise network planning

To identify the constraints and weaknesses on the network, we'll focus on four key areas of improvement:

1. More data inputs
2. Improved network connectivity models
3. Better data analysis
4. Increased options for managing demand

Currently 100,000 SMETS2 meters across 3.5 million customers. By 2024 the forecast will increase to

3 million

1. More data inputs

To understand the changing usage of the LV network, we need to create more data sets to help inform our decision-making. Here are some of the ways we're doing that:

Smart meter data
The recent rollout of Smart meters will provide us with a wealth of data in the future, but right now there are limitations. Fewer meters than expected were installed, and most (approximately 1.4 million) of these are SMETS1 meters, which are not currently visible to the DNO. Eventually, these will provide load and voltage information.

Across 3.5 million customers, there are roughly 100,000 SMETS2 meters. These also have limitations, with issues in voltage information formats and loss of data when a large fault occurs.

Instrumentation and Industrial Internet of Things (IIOT)
Newer network devices such as transformers, switches, and circuit breakers have more sophisticated instrumentation and controls. These enable the measurement of connectivity and operation factors such as voltage, current and temperature. They also measure a variety of traces that support fault diagnostics.

Forecasting
Real-time information and historical data helps us to forecast and plan more effectively across multiple timeframes. Long-term forecasting gives us insight into overall trends, which informs capital planning, price control submissions and investment prioritisation.

Short-term forecasting over days and weeks can help predict the impact of events such as severe weather on the electrical network. This enables us to proactively deploy field staff and engineers to reduce impact on customers' electricity supplies. It can also help address specific short-term peaks caused by national events or local constraints on the network.

Minimising supply outages is going to become an even more fundamental requirement as the network is decarbonised and must serve additional needs. As this develops, accurate forecasting will become even more important.

Combining data sets
Putting together different data sets can bring new insights. Our EV-Up project demonstrated this by mapping the demographic of customers living in areas with off-street parking to identify likely areas for higher adoption of Electric Vehicles. We will build our capabilities in analytics in line with the expansion of data both from our internal monitoring and external sources as envisaged by the EDTF principal of 'presumed open' data.

2. Improved network connectivity models

We're moving towards an integrated operational Network Connectivity Model. The 11kV network and above are already accurately modelled, but the LV network has challenges due to its scale, age and historical construction. To achieve this model, we've established these priority areas:

Operational – improvements in areas with high historical fault rates. Our ongoing Evolve project will help identify fault locations on the LV network. Our Sinepost project will help identify fault locations on the 11kV network.

Load-related – areas where increasing demand, such as that caused by electric vehicles, is most likely to lead to load issues.

We will introduce a fully Integrated Network Model covering all voltage levels. This will create a consistent source of network information to drive analytics and data exchange both internally and externally. This consistency will aid in our overall mission to improve our mastery of data and digitalise our systems.

3. Better data analysis

Better data leads to better analysis. Our increased data inputs will mean we can deploy new analytical methods and systems. The result will be better planning, greater insight and more effective operation of our LV network.

Right now, we have limited insight into the performance of the LV network. A full scale retrofit of the instrumentation would be excessively expensive and highly disruptive. That's why we set out to assess what a mixture of Smart meter monitoring, predictive analytics and selective monitoring can achieve in predicting where additional load requests could create problem areas on our networks.

Our approach is to install sophisticated instrumentation and control in new developments, while selectively retrofitting in high-risk areas. Throughout this process, we will develop and improve our approach to risk assessment by:

More accurately identifying high-risk areas and hot spots on our networks

Driving assets to capacity limit by utilising spare capacity on the network during times of low demand

4. Increase our options for managing demand

The LV network has been designed to cater for After Diversity Maximum Demand (ADMD) with additional capacity for some high-load customer devices such as electric showers and selected electric heating units.

A host of new customer devices are now entering the network, for example, batteries, electric vehicles and heat pumps. These load profiles are not catered for. With new technology, we now have the capability to explore better use of our assets, rather than simply using reinforcement – which would have been the only option previously.

Selective reinforcement

Our improved data and analytics will allow us to take a risk-based approach to reinforcement. This could enable more economical solutions, which support the transition to Net Zero.

While new technology may provide alternative solutions, reinforcement of the networks may still be the only cost-effective or technically feasible option in some cases.

Drive assets to their capacity

The network is designed to cater for peak consumption at the point of connection request. This assessment is combined with engineering and local network knowledge, so that design solutions are optimised to reduce disruption and offer value for money to customers.

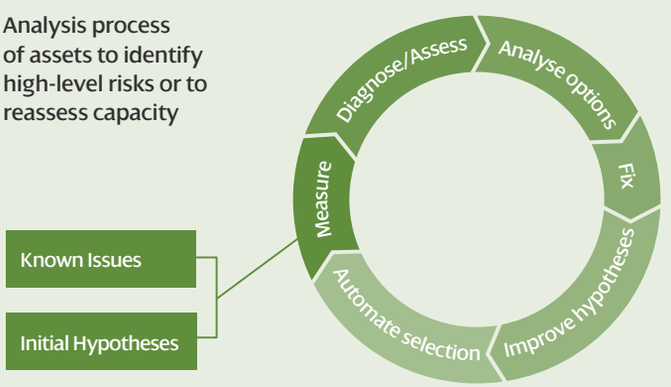
With more instrumentation and better analytics, we now have the potential to develop evidence-based risk assessments. These can determine in real-time which assets have spare capacity to be utilised, and reduce the volume of reinforcements.

Making use of flexibility

Making assets flexible to network requirements could help meet increased local demand, or cater for more generation connecting to our network. This flexibility could delay, defer or avoid the need to reinforce the network.

To help manage overloading during peak demand times, this would typically be done through an on-demand arrangement with network customers. However, we have also conducted a number of flexibility auctions and will use projects like FUSION and Visor to make greater use of local resources in meeting our network requirements.

Analysis process of assets to identify high-level risks or to reassess capacity



Increasing real-time visibility and autonomous operation

Ultimately, more data inputs and improved network models will provide better analysis and more options for controlling our network. This will help us to manage faults more effectively, providing quicker diagnoses and reducing the impact on our customers. Digitalisation drives a more reliable network.

Fewer faults

We're conducting several pilots where intelligent analysis of data from our monitoring equipment has predicted impending faults. The data from these pilots will enable us to verify accuracy and then increase our focus on prediction and prevention of faults.

Quicker diagnosis

Combining different data sets helps our existing and emerging analytical systems to improve our fault response times.

Active querying and last gasp signals from Smart meters can narrow down the nature of the fault, including numbers and locations of those affected. Data from monitoring equipment can also provide information on current and voltage levels at the time of a fault, which can be analysed to significantly improve the likelihood of finding the precise location of the fault.

Reduced impact

Improved monitoring and analytics create an opportunity to isolate substations that are directly affected by faults. This could allow for some reconfiguration at secondary substation level, meaning fewer customers are subjected to faults, and impact time is reduced.

Quicker fixes

Reconfiguration through network switching can be done in two ways. By remotely switching individual components such as LV auto-reclosing fuses, or by some switch functions being pre-programmed to act autonomously on our network.

What we're doing. And when.

We've already established a roadmap for achieving the ambitions outlined in this section. Here is the plan:

Project/Initiative	RIIO	Timescale
Digital substations	*T1/T2*	
Deployment		2021
Business as usual		2021
LV Network Model	*ED1*	
Deployment		2019
Business as usual		2020
Forecasting	*ED1*	
Deployment		2019/20
Business as usual -		2020
Flexibility	*ED1*	
Deployment		2019
Business as usual		2020

"We're conducting several pilots where intelligent analysis of data from our monitoring equipment has predicted impending faults."

We recognise that managing our network to accommodate power flows is only one part of an overall optimisation project. We must also manage the power flows to avoid causing network constraints. Managing power flows is nothing new, but advances in technology mean we now have more options to manage them in a more effective and economic manner.

This section outlines what we're doing to manage power flows across our distribution and transmission networks. It also introduces some of the issues we face around influencing and understanding behaviour beyond the meter.

To help manage capacity issues, we'll be focusing on seven key areas:

1. Active Network Management
2. Demand forecasting tool
3. Local Area Energy Plans
4. Generation export management system
5. Flexibility tendering
6. Influencing behaviour beyond the meter
7. Understanding the impact of low carbon technologies in homes

Section 7: Developing options to manage peaks in load

Key areas

1. Active Network Management

With increasing wind and Photo Voltaic (PV) generation, there is potential for generation loads to exceed the operating limits of the network. Active Network Management (ANM) is designed to autonomously throttle generation to reduce the risk of exceeding network limits.

This technology supersedes the conventional "on/off" generation we operated in the past – it can reduce or increase generation automatically in line with demand on the network. This can be used to limit the need for reinforcement.

In Dumfries and Galloway, we are delivering a large-scale deployment of ANM which will allow us to connect an additional 200MW of renewable generation capacity to the network. The project covers 11 Grid Supply Points (GSPs).

This is the first multi-GSP ANM scheme of this scale in the UK. It's the first designed to alleviate transmission constraints using distributed generation, and the first to interface with the Electricity System Operator (ESO). This makes it notably more advanced than ANM schemes being promoted by other Distribution Network Operators (DNOs) as business-as-usual solutions.

2. Demand forecasting tool

We are in the early stages of developing a demand forecasting tool which allows our Customer Service teams to forecast network demand and generation profiles across our distribution license areas.

The ultimate objective is to ensure security of supply to our customers by better understanding where congestion may arise. The forecasting tool will benefit customers through:

- Supporting the DNO to Distribution Service Operator (DSO) transition and offering greater flexibility
- Increased DSO network situational awareness
- Improved outage management
- Greater data and analytical insights

3. Local Area Energy Plans (LAEPs)

In the journey towards Net Zero, a national plan needs to be supported by local area plans. We understand that, for the communities we work with, one size does not fit all – we must respond to the individual needs of local communities.

We advised on Active Network Management to facilitate a community-led local scheme in Ettrick and Yarrow which explored how best to connect with the community at distribution level (the project would have been uneconomic at transmission level). This project was awarded funding through our Green Economy Fund and is another great example of how we're engaging with our stakeholders and customers on the journey towards Net Zero.

By partnering with local councils, businesses, residents and stakeholders, we aim to develop a unique roadmap for the regions we serve and support their Local Area Energy Plans (LAEPs). To reach Net Zero, every community will need to make changes, and each community will have a unique journey.

In each community we're engaging with local government bodies to help identify their unique needs for their electrical future. In particular, helping to identify what infrastructure they need for electric vehicles and heating. To make the journey to zero carbon, every community will need answers for questions such as:

- Exactly how many Electric Vehicle charging points will residents need?
- What type of chargers are required to ensure access and adoption?
- Where can they be installed most cost-efficiently, once current and future demands on the network are taken into account?
- How many homes in each local authority will need to switch from gas heating to electricity or heat pumps?

We're providing important data to help local communities answer these questions as we create smart networks that are flexible, resilient and available to all.

Additional renewable generation from ANM in Dumfries & Galloway

200MW

4. Generation export management system

During the RIIO-T2 period, we will deploy a smart control scheme to manage 2,750MW of generation in real-time, thereby minimising the cost and time to connect new generators in south west Scotland. This innovative scheme is a collaboration between SP Distribution and the ESO – and the largest of its type in Great Britain.

The ESO has confirmed that this approach is more economical than building new transmission network infrastructure to accommodate the growing amounts of generation. The system will ensure our network is compliant with relevant standards by controlling generation on the transmission and distribution network in accordance with the commercial arrangements in place.

This approach builds on the various ANM projects that SPD, UKPN and SSE have undertaken during RIIO-ED1.

5. Flexibility tendering

We're leading innovation in the field of flexibility tendering, having recently launched a second round of tenders for flexibility to help manage constraints on the distribution network.[1]

This tendering process is currently progressing on the Piclo flexibility market platform and will close in January 2020. As of November 2019, we've already had an initial 400MW of responses from the market – representing 81 individual providers.[2]

We attribute the success of this process to our strong pricing framework. To date, we remain the only DNO to tender for reactive power flexibility services.

Total of managed smart control schemes in real-time

2,750MW

Number of responses recieved from 81 individual suppliers through fleixbility tendering

400MW

6. Influencing behaviour beyond the meter

Spreading the load to manage user-demand at a domestic level is not a new concept. Radio tele-switching – the use of radio signals to control electricity at different times on systems such as electric storage heaters – has been used for decades. But this approach has severe limitations; it requires separate metering equipment in the house and only supports a limited number of controlled user groups.

We're committed to exploring the options for supporting customers in this area. That may include directing users to relevant providers, partnering, or even provision of services from SP Energy Networks.

This is an area yet to be fully developed in the industry so there are many unknowns. We do know that there are a number of important factors to consider, such as safety in the home, the duty to ensure continuity of supply, and make sure that customers are protected from adverse effects of the consumption by others[3].

There are significant challenges in how to get customers to engage in this activity, making it worth their while to participate in providing flexibility. Our energy is an enabler for the delivery of other services (heating and transport) and there may be opportunities to revise the way these services are offered to customers. The development of these markets will be enabled by our activities.

Ensuring continuity of supply, particularly for some Low Voltage (LV) circuits, may require control of some beyond-the-meter aspects of consumption. We're currently involved in industry discussions on the use of Smart meter data for load control under certain critical circumstances, where the network is at risk.

We're eager to collaborate with others in exploring solutions for influence and, under certain circumstances, potentially control. These solutions might include pricing signals, tariffs, home hubs, smart sockets and devices, collaborating with retailers and aggregators, or setting out strict obligations to register high-load devices.

[1] www.spenergynetworks.co.uk/pages/flexibility.aspx
[2] www.picloflex.com/
[3] http://www.legislation.gov.uk/uksi/2009/639/contents/made

7. Understanding the impact of low carbon technologies in homes

We've been collaborating with CALA Homes for the last 12 months on a project to better understand how Low Carbon Technologies (LCTs) installed in new-build housing will impact on the connection to the Distribution Network.

The project has several broad aims, including investigation of how After Diversity Maximum Demand (ADMD) is affected by LCTs such as photo voltaics, electric vehicle charging points and heat pumps.

As part of the project, we're undertaking a monitoring exercise on several CALA Homes developments across the central belt of Scotland – all of which have hybrid heat pumps installed. We intend to continue monitoring over the upcoming years, potentially over additional developments, to include locations with high penetration of Electric Vehicles (EVs). We're also working with academics to help analyse the data and draw conclusions.

What we're doing. And when.

We've already established a roadmap for achieving the ambitions outlined in this section. Here is the plan:

Project/Initiative	RIIO	Timescale
Active Network Management (ANM)	*T1/T2/ ED1*	
Deployment		2020
Business as usual		2020 +
Generation Export Management System (GEMS)	*T2*	
Deployment		2020
Business as usual		2020 +
Forecasting	*ED1*	
Deployment		2019/20
Business as usual		2020
Flexibility	*ED1*	
Deployment		2019
Business as usual		2020

An increased focus on data is necessary if we are to achieve our ambitions for a low carbon energy system. And managing this data effectively will require rigorous governance processes, better data architecture, stronger use policies, and commitment to delivering against a principle of presumption of Open Data – all in collaboration with the wider industry.

We've already made significant progress in our approaches to data, but we're committed to doing much more. This section outlines some of the work we've already done – such as our data strategy and our moves towards integrated models. And it outlines future steps we've planned to master our data and deliver a reliable future-ready network for customers.

Section 8: Improving mastery of our data

What we're doing already

We've taken control of our data. A number of initiatives across the business mean we're doing more than ever to manage the accuracy, efficiency and security of network data. Here are some of the steps we've taken.

For some time now, we've implemented a strict policy: critical network, customer and other important data is stored only on our core corporate IT systems, never on desktop applications or local databases. This means we have developed a comprehensive, but not yet fully complete, set of information about our networks.

We've invested significantly in GIS technology over many years to establish best-in-class digital representations of our electricity networks. Initial data sets had historical inaccuracies, but we have continuously improved the validity and veracity of the asset data model – partly through implementation of our Network Data Improvement Program. We also use centimetre accurate Lidar data to continually improve the asset data models for our overhead lines.

We've also made significant progress in data management as part of our end-to-end Enterprise Asset Management (EAM) System, NAMS, which went live in 2018. This integrates with our GIS system to provide a comprehensive data repository for all circuit assets. NAMS improves the production of regulatory reporting as part of our mandatory reporting process to Ofgem for RIIO T1 and ED1 price control contracts.

Right now, we are considering how best to implement the recommendations of the Energy Data Task Force report: Strategy for a Modern Digitalised Energy System. And we're taking a lead role in the Energy Network Association (ENA) Data Working Group. Our plans will be developed in conjunction with other industry participants as the working group is more fully established.

But we're not stopping there. We've developed a data strategy with an eye on continual improvement.

"We've invested significantly in GIS technology over many years to establish best-in-class digital representations of our electricity networks."

Our data strategy

We've already embedded six fundamental elements of our data strategy into our standard working practices:

Effective data governance

Data governance covers the ownership and integrity of network data by setting out clear roles and responsibilities. It's backed by a programme of assurance that continually tests the adequacy of the processes and controls surrounding data.

We do this in a few ways:

- Our Data Governance Forum (DGF) meets quarterly with senior managers and operational directors
- We established a Asset Data Decision Forum to act as an approver for change and feed through to DGF for formal sanction
- We have designated 'data champions' and 'data leads' at district level
- New systems allow for master data management between systems

A robust data model

For effective stewardship of network assets, we need a data model which clearly defines the key attributes of each asset. So that's what we're doing:

- A range of enhanced data models are being actively developed
- We established a process to define and agree new models as part of business-as-usual activities

By establishing a model which aligns asset information with its geospatial location and network connectivity, we can use data in context and generate detailed analyses of network operation.

Accurate data capture

We have robust processes and controls in place around issuing work to the field and timely return of field information on our assets – because we know that quick entry to corporate systems is essential.

As we currently use a Data Management Bureau to manually update our corporate systems, controls over accuracy and completeness of data entry is key. Here's how we manage data capture:

- Rejection processes are in place for when data returns don't meet our strict quality standards
- We produce monthly KPIs detailing missing data records, and discuss these with key directors at a steering group
- We have created a number of additional reports to help limit opportunities for manual process errors to be reflected in our asset registers. Where found these are corrected at source.

Improved data quality

The accuracy and completeness of data is pivotal to effective data stewardship. It's critical that our data is protected from corruption as it flows through the end-to-end business processes.
How do we do it?

- We're continually making improvements to overall process flows and controls, building them into our standard processes
- Updated our OHL and cable contract data management returns processes and embedded these into new contracts and business process documentation
- Established systems to continuously verify accuracy of data and suggest corrections
- Established automatic processes to backfill incomplete information

"It's crucial that we have trusted and consistent methods of extracting data from systems as this feeds into our methods of reporting internal business performance and also external statutory and regulatory reporting."

Trusted and repeatable reports

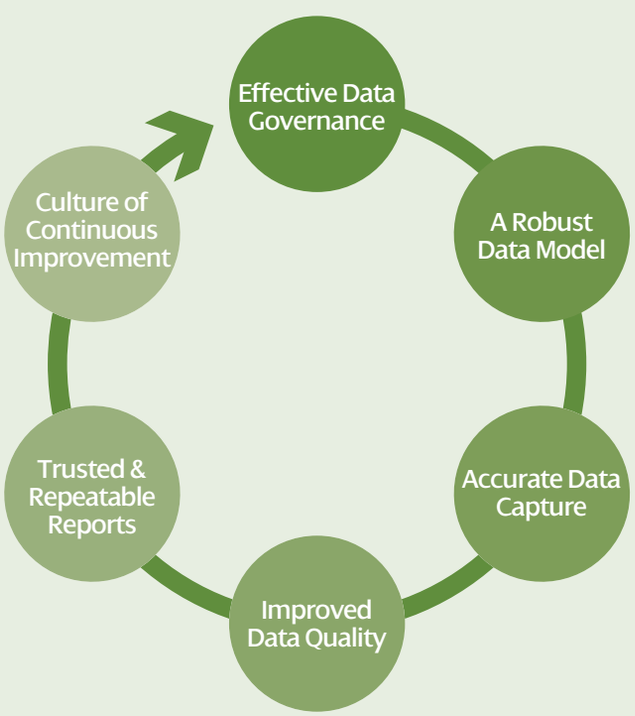
It's crucial that we have trusted and consistent methods of extracting data from systems as this feeds into our methods of reporting internal business performance and also external statutory and regulatory reporting. Here's how we make sure we have the right information:

- We have a suite of monthly synchronisation reports to ensure our network assets are reflected correctly into our core IT systems
- Our internal reporting documentation is reviewed annually and assessed for risk before we apply any updates
- We continually establish common data models that provide a "single source of truth" so we can run complex reports across multiple systems

Culture of continuous improvement

We want everyone in our business to take ownership over the importance of network data. And we are seeking to enhance individual responsibility for data through culture change. Here are a few of the ways we're making that happen:

- Data return requirements have been built into performance management processes
- We run education and communication programmes to promote data ownership through toolbox talks, team briefs, and poster campaigns
- We've assigned responsibility for data stored on our systems



Next steps

We're planning to build on our strategy with a number of initiatives that will improve our data processes. These include:

- Moving to integrated models and data sets
- Establishing a data analytics platform
- Improving data management processes
- Improving data capture techniques

We've outlined out approaches for these below.

We're moving to integrated models and data sets

We use many devices to monitor and record asset condition and system behaviour. This lets us pinpoint live network issues and conduct detailed post-fault analysis. By integrating measurements from across our network, we can provide control engineers with enhanced visibility of network operations. This is becoming increasingly important as new sources of generation connect and energy transfers across our network increase.

During the RIIO-T2 period, we will work on our transmission network to integrate data from all our system monitoring equipment into a single platform – which we call a System Health Map. This platform will aggregate distributed monitoring data from our transmission system – presenting data from all our transmission assets and comparing the values against predefined limits such as harmonics.

We'll then be able to take informed actions on system status and health. There will also be a defined architecture and methodology for integrating future applications into the platform in the future.

For more information on System Health Map refer to the Smart Control and Monitoring section of our RIIO-T2 Business Plan.

Still more to come

We have invested in several initiatives to collect data about our assets. Each of these has delivered value, but we're doing more to integrate all sources of network data into a comprehensive network model which displays information at all voltage levels.

We expect an increase in data from various sources:

- Smart meter data
- Instrumentation in the field
- Forecasting and analytics
- Customers
- Field devices such as toughbooks
- Data sets from 3rd parties like DVLA records of electric vehicle registrations

In each case, we expect there will be a greater volume of data from more individual devices or sources. We will have more data available than ever before.

Developing a Smart Data Integration Fabric

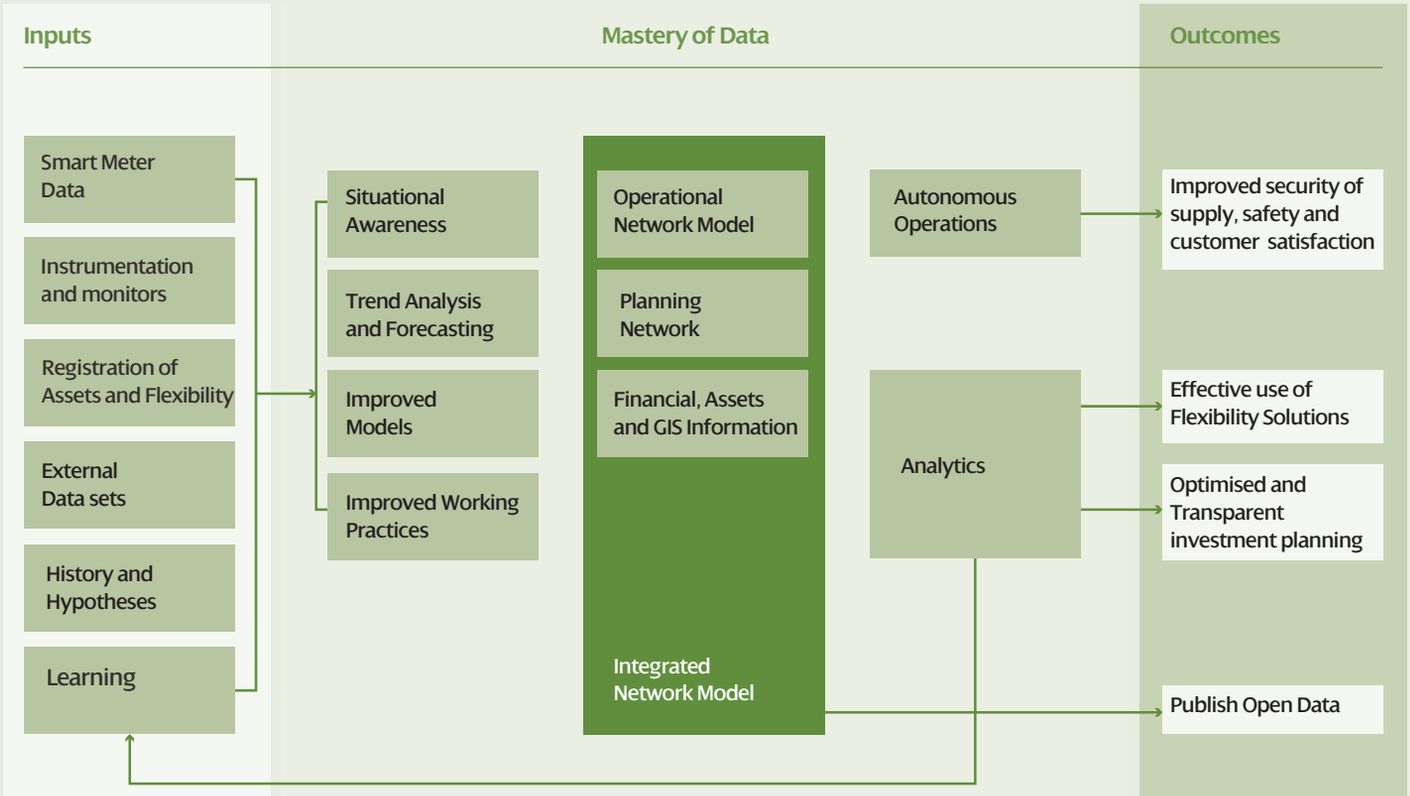
As part of our ED1 plan, we have also embarked on a data integration project, Smart Data Integration Fabric (SDIF). For this, we will put infrastructure in place for data to be collected, analysed and shared in a consistent manner.

SDIF will include creation of a fully integrated network model which will provide consistency of understanding for data sets across the business – including geospatial, connectivity, asset and telemetry. This will provide a strategic platform, alongside NAMS, on which we can build a digital future.

We also recognise the need to integrate new and historic land agreements data into our asset management models. Equally, we aim to integrate land agreements management into our planning and operational processes.

These initiatives build towards the ability to have a completely accurate digital model of the behaviour of our network – typically referred to as a Digital Twin. We already benefit from our Digital Twin approach and will progress our adoption to drive a broader range of planning and optimisation activities, including scenario replay.

High level view of SPEN use of data



Establishing a data analytics platform

Common use cases for analytics are expected to increase. Some of these will be supported by third party analytics solutions. However, we expect that problems and opportunities will arise where it will be more effective to use a general-purpose platform that can quickly deploy analytics applications. So we're developing our own.

By investing in understanding our underlying data models, we can deploy both types of solution based on a common data set and maximise efficiency. We will also seek efficiencies by sharing knowledge and experiences from across the Iberdrola group's global operations.

Using a platform approach, such as NAMS or SDIF, provides the capability to move towards complex business analysis being available on demand. This allows us to develop capability and retain flexibility to adapt to the realities of a digital future

Improving data management processes

Our data management approach has served us well historically, but we know that it must be improved. The changing energy landscape will place additional demands on data management. The general increase in automation, the developing DSO role, and the need to support the implications of a presumption of Open Data all need more rigorous data management.

Our approach to integrated data models is called master data management, and it will help us achieve various things. It will help verify the accuracy of information. And it will provide the capability to evolve towards self-correcting systems, where data anomalies can be automatically identified and rectified. For example, it could identify an asset which was added to geospatial systems but not to the control system or asset management, then correct the oversight This is currently done manually.

We're also improving data management with new capabilities for catagorising data against risk criteria (eg. GDPR, cyber-security or critical national infrastructure) – this ensures controlled and safe management and distribution of data. This builds on our commitment to ensure the privacy of consumers' Smart meter information.

We will also continue to review and update the six data strategy elements that we outlined above through the processes of continuous improvement.

Improving data capture

Traditionally, administration such as record keeping and paperwork has been kept separate from the work of planning and doing. Our Digitalisation Strategy integrates these activities for more efficient and accurate digital records. We do this with three approaches – digital engineering, automatic data capture from the field and self-documenting assets.

Digital engineering

Increasingly, work is planned and managed in an entirely digital environment. During RIIO-T2, we plan to improve our data framework by implementing Building Information Model (BIM) Level 2, including full 3D modelling of our transmission assets. With this we can establish a Common Data Environment where our data comes together for collaboration. If this proves successful, we will consider expanding this to major distribution projects such as 132kV.

This allows us to update our asset systems efficiently, without the need for complicated and costly administration. Future evolutions of BIM should ensure seamless integration of 3D and 4D datasets from design and construction into Asset Lifecycle Maintenance.

Automatic Data capture from the field

Information is currently gathered from a range of devices in the field, which is then populated into the Asset registers. Projects are already underway to make this process more efficient by looking at how the information can be gathered, and how this can be at least partially automated using process tools such as Robotic Process Automation (RPA). It is anticipated that SPEN will have a working model for some assets early in 2020.

Self-documenting assets

Network assets are becoming increasingly sophisticated. With basic processing capability and connectivity, there is potential to add all manner of sensors. With the development of an integrated network model, equipment could know what it is, where it is, what it's connected to and how it's performing. That means records are updated automatically, without the need for a separate administration process.

What we're doing. And when.

We've already established a roadmap for achieving the ambitions outlined above. Here is the plan:

Project/Initiative	T2/ED1	Timescale
System health map	*T2*	2021+
Smart data integration fabric	*ED1*	20/22
Integrated network model		
Operational data governance	*ED1*	2020
Robotic Process automation	*ED1*	2020
Field workforce solutions	*ED1*	2020

This section focuses on how data and digitalisation can support new and emerging products, business models and markets. We categorise these opportunities into two broad types:

1. How data and digitalisation supports new business models and markets. In the short-term, this focuses mainly on electricity flexibility service markets for distribution and whole system, but in time would expand to include cross-vector markets.

2. How open data can stimulate innovative ideas and products from non-network parties. This mainly focuses on products which might be developed for a range of electricity system participants. These might include smart enabled transformers, new analytical software, and smart enabled domestic appliances.

We will engage as an enabler and as a buyer for new products and services in this area. Depending on the DSO structure, we may also be a neutral market platform operator.

We hope that the ecosystem of new products, markets and services that our Digitalisation Strategy promotes won't just be limited to delivering for us though; we would like it to promote a new range of products, markets and services which benefit consumers and the wider energy system.

While we are excited about the possibilities presented by ongoing digitalisation and open data, we also recognise the potential risks to security. And we're committed to finding a responsible balance that benefits the network and consumers.

This section details how we plan to support these changes.

Section 9: Supporting the development of new business models and markets

Flexibility service markets

The distribution network is set to experience unprecedented decentralisation and decarbonisation in the coming years. As a responsible network operator, we must evolve the way we design, build and operate our networks to manage this change without compromising reliability.

One approach to consider: traditionally, we have reinforced network capacity to accommodate network power flows. But we could take the opposite approach and start managing power flows to stay within existing network capacity.

DNOs already manage network power flows through Active Network Management (ANM) schemes. However, advances in technology have made it possible for us to do this in a more efficient and economical manner. That means flexibility services – where we pay a third-party asset to operate in ways that benefit the network – will be a major new way for DNOs to manage power flows on the network.

Data and digitalisation delivers a range of benefits that will be critical in promoting the use of flexibility services. In the short-term these include:

- Making network data accessible internally – means we can better identify network areas where flexibility services would be beneficial. We can better specify the requirements for flexibility services, which will result in more targeted and efficient deployment.
- Making network data more accessible externally – makes it easier for potential service providers to understand our requirements and develop solutions.
- Making network data more visible externally – supports DNO transparency and neutrality so we can 'show our working' and clearly explain decisions.
- Interoperability with external systems – our systems can communicate with service providers for more efficient notice of availability, dispatch, and settlement.
- Better coordination of flexibility markets – interoperability means the likes of BM, weekly ESO auctions, distribution flexibility markets and more can be better coordinated. This whole electricity system coordination can help identify overall least cost solutions.

In the longer-term, open data and digitalisation will help promote cross-vector markets which can address whole energy system challenges.

Our commitments

Our Digitalisation Strategy is geared towards delivering these short and long-term benefits, and we commit to:

- Making network data visible and accessible to external parties
- Developing flexibility service systems that are interoperable and free for service providers to use
- Complying with all industry obligations to make data available to the ESO
- Looking to use external providers rather than developing market platforms internally

These commitments will require significant investment and will take time. As outlined in section 4, we are already taking steps to achieve these aims and will continue taking an evolutionary approach.

Stimulating market innovation with open data

Open data brings many benefits. Beyond those for service markets, the information and insight generated can help non-network parties to develop innovative new products and services. These could be new physical consumer products like smart-enabled domestic appliances that rely on data streams. Or it could be new services for us, such as operational analytics that help operate our network more efficiently, or a site energy management tool that predicts Use of System (UoS) charges.

By making our data available, we significantly increase the possibilities for these new products and services which can bring efficiencies to us and other energy system users.

Beyond this, we're working with industry participants as part of the Energy Networks Association Data Working Group to develop an ongoing approach for how we will facilitate market innovation in the future. We look forward to sharing our plans in updates to our Digitalisation Strategy.

Section 13 provides more information on our plans to engage with a broader range of stakeholders in this area.

Risks we'll consider in data and digitalisation

Digitalisation and data sharing is a fundamental enabler in revolutionising the energy sector.

The goal: *a modern, transparent digitalised energy system.*

How do we get there?

Fundamentally, we achieve this by giving third parties access to data about the networks we operate and by integrating external data sources into our datasets. However, this comes with associated risks. In our commitments to data openness and digitalisation, we must first consider three risks:

1. GDPR and personal data – we have a legal obligation to protect certain data.

2. Cyber security – interoperability can bring increased cyber risk. Ensuring the security of our systems and third-party connected systems is critical.

3. Infrastructure security – electricity networks are nationally significant infrastructure. The UK threat level is currently 'Substantial'. Cyber attacks on infrastructure, from both state and non-state actors, are on the rise. Publishing all data about networks increases our vulnerability to such attacks. We must balance the advantages an open data policy brings without opening the electricity networks to materially increased risk.

In addition to these risks, there are three important factors we will consider:

1. Data quality and governance – we recognise that we can still make significant improvements in areas such as data quality and governance. We will only make data public once we understand its quality, and we will ensure that meaningful meta data is published and there is a governance system in place to ensure it stays up to date. We will develop a triage process to determine any areas where open data is not suitable – in accordance with the EDTF recommendation 2.1, and in support of EDTF recommendation 3.1.

2. Commercial or contractual confidentiality – we will not make third-party data available where we are bound by contract.

3. Unintended consequences – in some cases, making data available may increase the risk of gaming by third parties. This is likely to be the case where there are very shallow markets with few participants. If the effect may be to ultimately increase costs for our customers, we will not make data available.

Data that is available now

We already publish data on a regular basis. We also respond to ad-hoc requests for data to be provided to third-party organisations.

Here is some of the data we currently make available:

Title	Description	Link
Distribution Long Term Development Statements	We have provided an overview of the design and operation of the network. This helps existing and future users of our network identify and assess opportunities for making new or additional use of our distribution systems.	https://www.spenergynetworks.co.uk/pages/long_term_development_statement.aspx
Distributed Generation Constraint Data	For customers who want to connect generation to our network, we publish a series of heatmaps that provide an indication of the network's capability. This provides a better understanding of potential opportunities to connect.	https://www.spenergynetworks.co.uk/pages/connection_opportunities.aspx
Investment Plan Data	This application gives our customers and stakeholders an indication of the investment work we have planned on our network.	https://www.spenergynetworks.co.uk/pages/interactive_investment_map_gis.aspx
Distribution Performance Reports	This document updates our stakeholders, as part of our overall stakeholder engagement strategy, on the progress we are making in meeting our outputs and delivering our distribution business plan commitments.	https://www.spenergynetworks.co.uk/pages/distribution_annual_performance_report.aspx
Transmission Performance Report	This document updates our stakeholders, as part of our overall stakeholder engagement strategy, on the progress we are making in meeting our outputs and delivering our transmission business plan commitments.	https://www.spenergynetworks.co.uk/pages/transmission_annual_performance_reports.aspx

In addition to the above:

For our transmission network, we publish information on connected assets in the TEC Register and other National Grid publications.

For our distribution network, from January 2020 we will publish a System Wide Resource Register, showing all assets greater than 1 MW connected to our networks.

Traditionally we have performed strongly in customer service feedback. We were ranked as the top network operator in 2019 and were benchmarked ahead of the number 1 service organisation in the UK by the Institute of Customer Service.

But we also recognise that we can do more. In the future, we will need far more scalable response for our customers, whose requirements will become wider and more nuanced.

Work we commissioned with Delta EE has shown that, due to the uptake of low carbon technologies, customer interactions are expected to increase significantly as we approach the RIIO-ED2 period. We must be ready to manage this greater volume of interaction.

Section 10: Using digital technologies to improve customer service

We are committed to processes that make customers feel valued in their interactions with us in many ways – that might be through highlighting faults, establishing new connections, handling general enquiries or proactively reaching out to support our vulnerable customers.

This desire to do the best for our customers will not change in the future. But the way we interact with our customers is going to change, for the following reasons:

- Transactive flexibility markets and demand management will alter customer requirements for "good customer service"
- These changes are likely to create more situations in which we'll need to proactively contact customers
- The number of customers we interact with will increase significantly, requiring stronger infrastructure to react to real-time requests
- Electrical vehicles and other new electrical items connected to the home will mean we have greater responsibility to customers as their demands for electrical supply increase
- We must support customers to access new markets and technologies, to ensure the electrification of the network does not cause customers to fall into poverty

Moving towards integrated omnichannel experience

With these changes approaching, we're committed to digitalising our systems and processes. With smarter, more efficient ways of working we can deliver even better customer experiences across multiple channels.

How do we plan to do it? Our vision will be underpinned by:

Omnichannel experiences – based on customer behaviours and preferences, we'll extend great service beyond telephone interactions to incorporate website, social media, and real-time messaging services like Facebook Messenger or WhatsApp.

Customer relationship management architecture – this provides us with a single view of customer interactions. It's a fuller picture of our relationships, and links network performance and technology so that we can better understand how our customers truly experience our service.

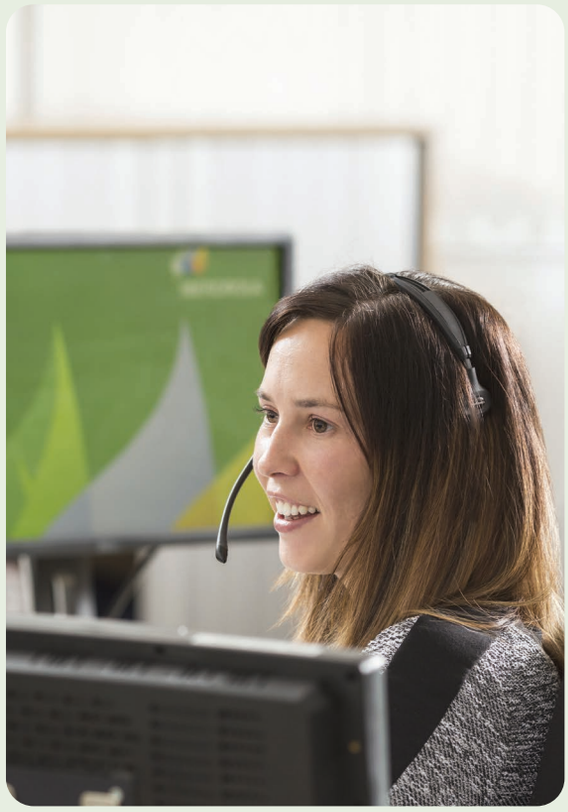
Expanding our online offerings – our planned customer facing omnichannel platform deals with fault-inquiry. We're expanding that to accommodate new connection requests, proactive conversations and, eventually, transactive flexibility contracts and demand management.

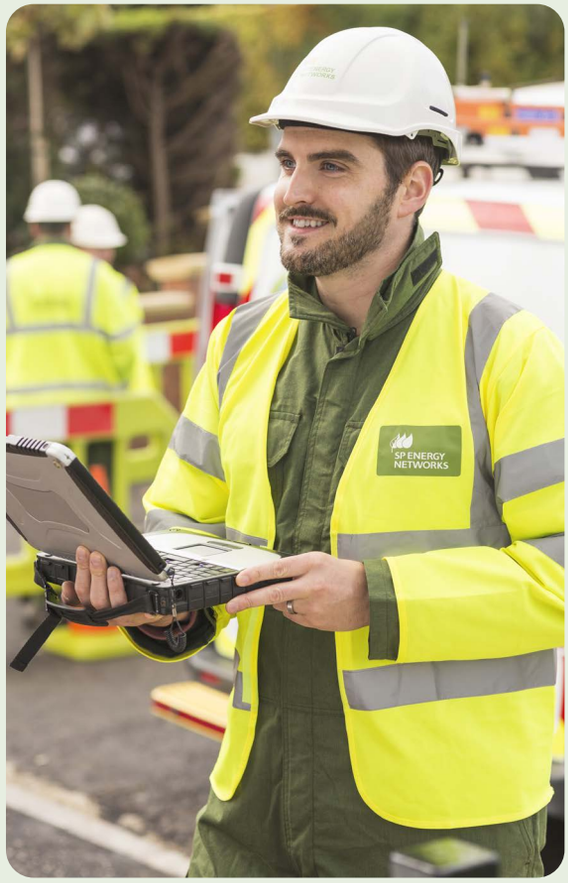
More AI and chatbots – these provide real-time responses for well understood questions, based on a detailed data catalogue. This functionality could be embedded into any area of the omnichannel experience.

Customer analytics – with details on request behaviour and patterns. This will better equip us for proactive conversation. It will also include social media tracking and analysis.

Understanding local challenges – by understanding issues raised by customers, press, politicians and stakeholders we can link this to reputation and plans.

More nuanced customer service scoring – a shift to detailed feedback which is part of a continuous process. We're already using our Rant and Rave feedback mechanism, which allows customers to provide feedback and suggestions in a more dynamic way. This channel has a 35% response rate from our customers.





We want to do more

As an ultimate ambition, we're aiming to move at least 50% of customer interactions to digital platforms beyond 2019.

Where possible, we'll also adopt these key principles regarding all engagement types:

All of our contact strategies will be customer-led, using new technologies to automate communication and keep customers informed in ways that work for them.

We'll share information across our workforce, developing a culture of best practice and making sure our team can react to customers' changing needs.

We will actively seek out partnerships and develop new programmes to deliver on customer needs – including flexibility services which keep costs down and deliver on low carbon targets.

Technology will help us to be more efficient and reduce interactions – fixing faults before they occur, proactively resolving issues and using sensor data to build a more holistic approach.

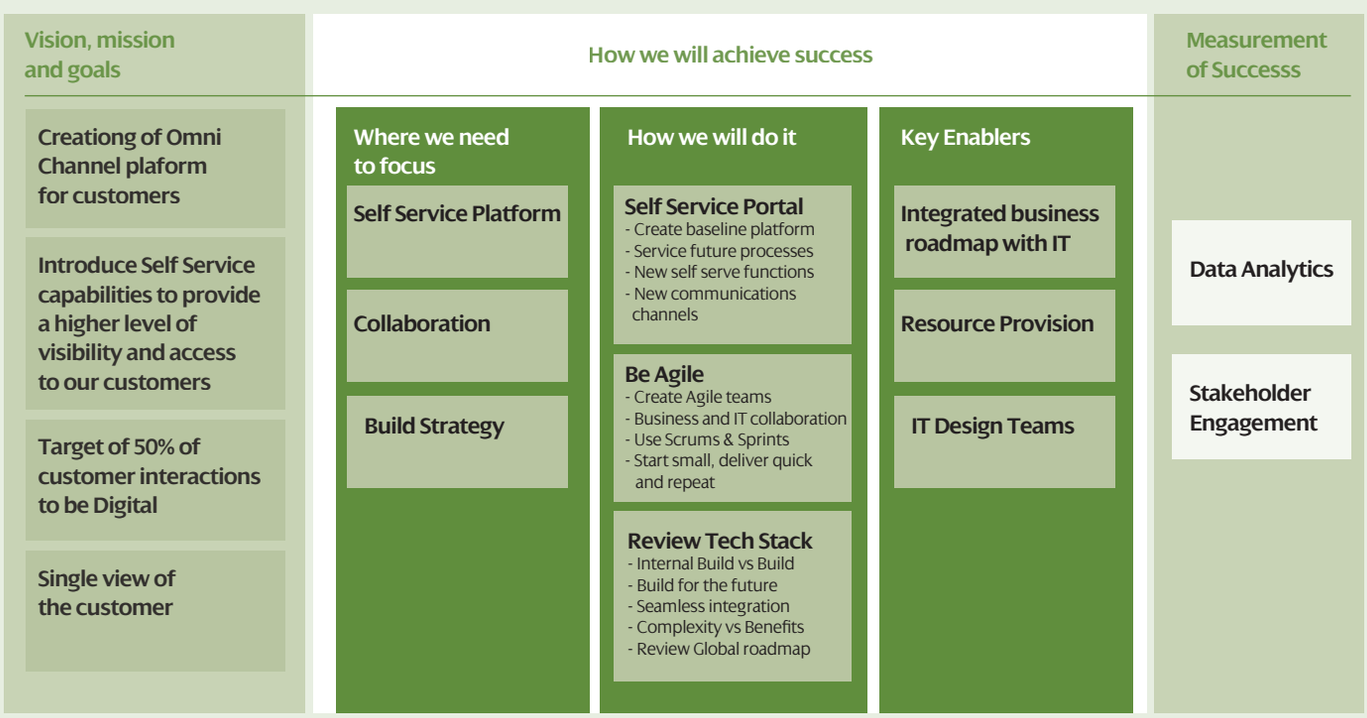
We'll segment our customer base so we can tailor communications and effectively encourage uptake of low carbon technology.

We're focused on community and will seek to develop initiatives that bring services together in a socially responsible way, while making sure the financial impacts of electrification do not result in customer poverty.

Our contact process will be AI-driven and, where appropriate, we'll use AI to contact customers through a channel of their choice.

While we want to make the move to digital communications, we appreciate this might not suit all customers. If a customer tells us they would rather continue to receive phone calls or SMS messages, we'll do that – making sure we retain human interaction, provide quick information and give general assurance of their safety.

Customer service vison, mission and goals



Using Smart meter data during customer interactions

We already use data from SMETS2 Smart meters in handling initial calls about service interruption. In this way, the call agent can identify if the customer has a suitable Smart meter then message the meter to check supply status.

If the meter responds "energised" then the agent can advise the customer that the network is operational. This saves on an unnecessary maintenance call-out and helps us direct the customer to the potential source of the issue.

Flexibility and demand control contracts at consumer level

As we introduce flexibility and demand control contracts with consumers, this will open up new customer service requirements.

Our current platform for improved customer experience covers services such as request for connections and reporting of faults. This will need to expand to cater for agreement of contracts, resolution of issues, and payments. We are reaching out further to our stakeholder base, for example to deliver engagement solutions for land owners and contractors (to determine the location of underground assets).

External registration portals

As well as creating a customer facing platform, we have identified the need for an external portal – which could be integrated with the customer facing platform. We'll need this to manage future requirements for registration of customer or prosumer assets such as heat pumps, electric vehicles, and smaller generators of energy. We recognise this will need access to a much more detailed level of data on flexibility assets and their consumption to support the supply and demand of the future market.

While we require the cooperation of regulatory bodies to wholly access such data, we also have a responsibility to store this information in a simple and effective way for the customer. We commit to creating a registration portal or platform for customers to do this.

We are happy to explore any solutions which create one national portal for the registration of the assets – provided it acknowledges that the registration portal is a key element of future engagement with the customer and their satisfaction, in line with EDTF Recommendation 4.

What we're doing. And when.

We've already established a roadmap for achieving the ambitions outlined in this section. Here is the plan:

Project/Initiative	RIIO	Timescale
Contact Centre Platform	*ED1*	
Contact Centre Platform Strategy		2019
Contact Centre Platform development		2020
Platform change and integration with web		2021
Website/Digital Platform	*ED1*	
Tactical Web improvements		2019
Web intelligance (AI) and Customer Self Serve		2020
Platform change and integration with web		2021
Customer view	*ED1*	
customer data strategy		2019/20
CRM decision point		2020
Fuse all our data together, including customer and asset data		2021
Data driven	*ED1*	
PowerOn Upgrade/Smart metering Integration		2019
Customer data strategy		2019/20
Enterprise Service bus		2020
Fuse all our data together, including customer and asset data		2021

Decarbonisation is a societal imperative. One that will require significant changes to the network. The decentralisation involved will alter the engineering, economics and ecosystem of our industry considerably.

The only effective way to manage this change is through digitalisation. Technology provides us with the means to monitor and control use of the network, connect low carbon technologies and introduce a wider range of market participants.

To do this properly, we need a coordinated approach across all aspects of our business activity – including engineering, technology and collaboration with a range of industry parties.

This is a fundamental shift in the way our industry works. Our people will need to adapt and we're ready to help them meet these challenges.

We have a strong record in organisational change and innovation. We're confident this gives us the platform to capitalise on the exciting new opportunities afforded by digitalisation and build a workforce ready for the low-carbon future.

Here's how we plan to do it.

Section 11: Investing in the digital skills of our people

Making changes for the long-term

Our people's passion for innovation lies at the heart of our success. We will harness this passion by investing in digital skills across our workforce, both in RIIO-T2 and with more radical changes as we approach RIIO-ED2.

In our RIIO-T2 business plan we identify the need to invest in our people; both our existing staff and our new trainees. We also recognise the need to attract new talent to replace an ageing workforce and make sure they're appropriately skilled to maintain the safe and reliable operation of our network.

As technology continues to disrupt our industry, it's crucial that our people can adapt. We'll focus on four key areas to deliver this investment in our people's digital skills:

1. Building and sustaining a digital-ready workforce
2. Sustainable change management
3. Ensuring consistency in the workplace
4. IT transformation

"We apply our competency framework to help develop our people throughout their careers – whether that's building new talent or developing long-serving staff."

1. Building and sustaining a digital- ready workforce

Our competency framework was developed in partnership with our parent company Iberdrola and is built around our core values of Sustainable, Dynamic and Collaborative. The framework includes several behavioural competencies which are critical for building and sustaining our business in a digital marketplace.

With a more diverse and skilled workforce comes the potential for greater innovation. This is something we already foster through our Innovation Hub (iHUB), an internal initiative to encourage new ideas and develop them into real-world solutions. One such example would be our implementation of the Response Eye solution for video and image dialogue with customers.

We apply our competency framework to help develop our people throughout their careers – whether that's building new talent or developing long-serving staff.

We continually refresh our framework over time to make sure it's relevant to our current and future needs. We recognise that individuals learn in different ways, so we ensure that learning activities are tailored to their ability, and using smart digital methods such as e-learning and augmented or virtual reality.

We're currently working with external partners such as EU Skills, SDS and Strathclyde University to explore new mechanisms and industry best practice for recruiting and developing the talent. As part of this collaboration, we have broadened the range of skills we recruit to include cyber security and data analytics as well as trialling new graduate and higher skills apprenticeships.

Management support

To maintain this strategy, we will identify and support "management allies" who will act as advocates for the digitalisation strategy and lead their teams by example. We will also introduce "peer advocates" – voluntary non-managerial workplace advocates. As respected and engaged individuals they will help spread digital workplace messaging while providing support and coaching to colleagues.

We will also seek to use "culture hacks" – small interventions that exploit a single area where our culture is vulnerable to change. These changes are small but can have big immediate impact.

A centre of excellence

Following the successful implementation of our NAMS project in 2018, we established a Centre of Excellence (CoE) for process and systems. This helps to build internal expertise in supporting and developing full utilisation of our suite of IT systems.

Focuses include system integrity, the management of future functional changes and the implementation of new technology and innovation. The CoE works very closely with the ScottishPower IT Team and is pivotal in making sure we maximise the benefits of technology investments across all aspects of our business. The CoE also plays a key role in our Process and Data Governance framework outlined in Section 8.

2. Sustainable change management

We use principles outlined by PROSCI, a global leader in change management, to identify interventions and follow a rigorous methodology that ensures sustainable management of change while supporting individuals and teams throughout the process.

We have used this approach on previous large-scale change programmes, like our NAMS project, to great effect and it has since been adopted as an Iberdrola Network Business global best practice.

3. Ensuring consistency in the workplace

As part of our "Better Balance" programme we're embracing more flexible and effective ways of working.

A better balance is driven by a change in culture enabled by more progressive HR policies. Following on from this we will encourage the use of smart workspaces, cloud offices, voice-over-IP and video conferencing – all with the aim of helping people work effectively and securely, wherever they are.

We expect this to generate further benefits, including a reduction in carbon emissions from reduced travel, plus the ability to attract and retain people from more diverse backgrounds who may require a more flexible and progressive workplace.

The programme has already resulted in an increase in the well-being and satisfaction of our people and driven an improvement in overall business performance. We piloted the programme on two floors of our headquarters in Glasgow, and we're now planning to extend the programme across more of the Glasgow HQ and other office locations.

4. IT transformation

ScottishPower IT has a significant role to play in the realisation of our digitalisation strategy. With significant change on the network, our IT organisation must become more agile and responsive to our business' demands while continuing to deliver value. To achieve this IT have launched a two-year transformation programme with the following key pillars of change:

Develop Internal Capability	We are investing in new digital capabilities through an extensive training programme for existing resources, increasing internal resourcing by 70%, and transforming our delivery methodology to agile-first.
Transform Sourcing Model	We are transforming our sourcing model by establishing strategic partnerships, reducing the number of vendors, and creating new alliances to ensure better value to ScottishPower.
Greater Local Freedom to Execute	As a trusted part of the global IT organisation, the freedom to execute locally at pace while upholding global IT strategic direction is key.

Through this programme, ScottishPower IT will be transformed into a DevSecOps organisation capable of providing high quality, business-ready solutions, quickly and seamlessly.

better balance

UK IT TRANSFORMATION

We can't achieve our goal of digitalisation without a solid foundation of technical infrastructure. That's why infrastructure has been such a key part of the delivery of our RIIO-ED1 plans and remains central to our investment plans for Transmission in RIIO-T2. Our distribution planning process for RIIO-ED2 is still to be completed but we expect to continue our investment into digitalisation of our energy networks.

This chapter details the key areas of investment we believe will help us realise our digital vision. These include:

1. Systems and systems integration
2. Telecommunications
3. Cyber security

We expect further details to be included in subsequent versions of our Strategy as our plans develop.

Section 12: Enabling digital transformation

1. Systems and systems integration

Supporting the digitalisation of the network will require significant changes in the world of IT (business systems) and OT (systems to monitor and control the electrical network). As the network changes, digitalisation will need to be integrated across the entire system between both worlds. Information will be collected in the OT world, analysed in the IT world, and then enacted in the OT systems.

The degree of integration between these traditionally separate domains will require strong architectural principles, disciplines in managing the data architecture, and well defined layering and interfaces between systems. Traditional approaches no longer apply: how these systems operate and the skills needed to manage them will change radically.

Sensors, edge computing (distributed processing that brings computing power closer to where it's being used) and integration platforms will facilitate the collection, transfer and analysis of data and information flows. Our work on the Enterprise Service Bus provides a platform to facilitate the flow of data between the IT and OT worlds, and the Integrated Network Model of the low voltage network creates a platform for data to be hosted and analysed. This can then be used in our central real-time systems and mobile platforms to make sure we deliver high class customer service.

Agile development techniques will be required at scale, whether conducted by ourselves or by third parties. This will require mature processes to deal with DevOps (and in a combined IT / OT environment). Section 11 provides more detail on the organisational changes being undertaken to deliver this.

We are playing an active part in delivering the recommendations from the recent Energy Data Taskforce report. We have attended the Energy Systems Catapult working groups, feeding in our thoughts around best practices for opening up access to energy data. We chair the ENA's Data Working Group (DWG), coordinating with other network companies to deliver the best open data platform for our data.

A core enabler for open data is to have platforms that serve as the systems of record for key data items. Our investment in the NAMS solution described elsewhere has created this platform, and we will build data sharing platforms on top of this foundation.

We recognise the need for data to be visible, accessible and interoperable. We agree that this is key for efficient markets and transparent decision-making. However, it's important to note that electricity networks are nationally significant infrastructure, and with the current threat level to the UK listed as 'Substantial', it's widely believed that a cyber-attack is highly likely. For this reason, we expect to proceed cautiously to make sure we can maintain the security of the network, and security of data while allowing the correct level of access to data from third parties.

2. Telecommunications

The operation of our network depends on telecommunications for voice, protection, control and monitoring. This dependency on the telecommunications network will increase as digitalisation expands, so we must ensure that the services we use are reliable and secure.

For Transmission, we plan to invest over £40m during the RIIO-T2 period to improve resilience, upgrade obsolete and unsupported equipment, and enable new services for smart applications which will run through the RIIO-T2 period.

The programme will achieve a more robust network by diversifying communication channels, through additional fibre routes and increasing the redundancy and resilience of the active communications equipment. The programme will also enhance cyber resilience on our telecoms network, which is a key requirement under the NIS Regulations.

Changing requirements

As the electrical network changes, this will result in different telecommunication requirements. There is a need for more coverage, more resilience and greater security – while making sure we meet this challenge in a cost-efficient way.

We are developing and implementing a hierarchy of technology approaches to meet the needs of the data sets being gathered. For example, routine data monitoring and collection from a substation has different requirements to that of a safety critical control operation.

With such varied requirements, the solutions we need cannot be met by a single technology stack. The speed of deployment across technologies will be different and will require careful planning to make sure we can meet ever-changing demands. Importantly, the technologies all have a different regulatory regime and this must factor in our planning.

We believe that a technology mix is the correct approach, as this will allow us to meet individual challenges with tailored solutions. We expect the following technologies will be implemented:

- Growth of the Fibre Optic Network
- Further utilisation of the copper pilot cable network
- Public Operator 4G Wireless Network
- Private Secure Wireless Network
- Unsecured Wireless Network
- Satellite Network

We will also review new technologies, such as 5G, as they emerge to consider how they may change our approach. Any new technology provided will be assessed to meet the criteria of secure, resilient and affordable technology

3. Cyber security

Digitalisation of our network operations will inevitably result in greater exposure to cyber risks. Increasing reliance on automated solutions, and greater data volumes required for active management of the network, will result in a complex system and data architecture.

This complexity, coupled with a wider and more sophisticated threat landscape, requires proportionate measures to protect and monitor the security of our data, applications and technology infrastructure.

We are an Operator of Essential Services (OES) as defined in the Security of Network and Information Systems (NIS) Regulations. The guidance from these regulations have created a Cyber Assessment Framework (CAF) with requirements and a timeline to meet specific improvements which we must make.

We have reviewed our maturity in this area and created a detailed plan to make sure we are meeting those required improvements. These are largely focused on the OT network, given the critical systems that are present.

Our plan focuses on these critical systems. However, it also factors in that we need to make sure our employees and contractors are aware of the cyber security threat we face, and the precautions we need to follow.

For transmission, we are proposing 20 cyber security projects for OT[1], together with a programme of continual investment in IT cyber-security in response to these challenges. We expect that cyber security investment requirements for distribution will emerge during the RIIO-ED2 planning process.

The focus of the current IT cyber security plan is:

1. **Increased visibility.** Increased visibility of security events to detect potential security incidents
2. **Improved response.** Provide a 24/7 security incident response service to quickly identify and manage incidents
3. **Reduced vulnerabilities.** Identify and manage vulnerabilities in applications and infrastructure
4. **Protect against malware.** Protect endpoints from advanced malware variants
5. **Increased testing of defences.** Enhanced penetration testing to identify high risk vulnerabilities
6. **Data protection.** Discover, tag, and protect our key data assets
7. **Cloud services protection.** Gain visibility of cloud service usage and apply protection policies to safeguard data
8. **Improved access management.** Improve the way systems access is managed and governed on our critical systems

A programme of work is planned through until the end of 2026 to deliver these. More detail can be found in our RIIO-T2 business plan[2] and the corresponding CAF responses.

"We are an Operator of Essential Services (OES) as defined in the Security of Network and Information Systems Regulations."

[1]See Annex 32 SP Energy Networks RIIO-T2 Business Plan
[2]See Annex 24 SP Energy Networks RIIO-T2 Business Plan

Our digital strategy needs to be active, evolving and agile. This section will detail how we will develop and implement our strategy. We recognise the importance of engaging with our stakeholders and other interested parties to fully understand their changing needs, expectations and the evolving nature of the energy sector. It's vital that we give them the opportunity to provide us with their views, and that we respond to their feedback accordingly.

Section 13: Making it happen

Our overall approach to stakeholder engagement

Our Stakeholder Engagement Strategy[1] applies to all of the activities we undertake, including our approach to digitalisation

At its core, this strategy embeds the four principles of the AA1000 stakeholder engagement standard:

Inclusivity

Materiality

Responsiveness

Impact

To test our commitment to this standard, an annual audit of the strategy governance, activities, communications, and maturity of stakeholder engagement approach is conducted.

The audit involves a series of sequential steps that detail how we plan, review and close all our engagement activities. This allows us to identify consumer, network user and wider stakeholder wants and needs, and make sure that everything we do delivers value for money.

The Key Steps of Our Strategy

[1]See Annex 28, SP Energy Networks, RIIO-T2 Business Plan

The engagement process in action

We intend to continually improve our Digitalisation Strategy, and it is likely that many of these improvements will originate from stakeholders.

Stakeholder engagement will be a key feature in the development of any future version of the strategy. Here's how the process works:

1. Define the purpose: The purpose of the engagement is to inform and improve our Digitalisation Strategy and vision.

2. Identify and map our stakeholders: With a clear purpose defined, we will identify the stakeholders best-placed for providing the kind of insight required (including current and future users of Energy Systems Data)[2]. This will include the RIIO Transmission and Distribution customer engagement groups.

3. Tailor the engagement: To ensure maximum value from every activity, we will tailor three distinct aspects of the engagement:

a. Tailored content before, during and after the event: this will prevent stakeholders from becoming bored or tuning out.
b. Tailored methods to reach a wide and varied stakeholder and customer base: this will cater for different levels of stakeholder knowledge.
c. Tailored communication, including invitations, briefings, outputs and next steps.

4. Engage: Once the planning phase is complete, we will undertake the engagement event(s) best suited to obtaining feedback on the Digitalisation Strategy.

5. Capture feedback: We will use our Stakeholder Management System, Tractivity, to input stakeholder feedback and allow tracking of the outcomes.

6. Determine wants and needs: We will translate the feedback we receive into stakeholder wants and needs. This will allow us to measure the effectiveness of the actions, outputs and outcomes of the Digitalisation Strategy.

7. Develop and prioritise action: It's important to prioritise feedback, wants and needs, so we can be certain that resources are allocated and changes are planned accordingly.

8. Act: While feedback is the output of the planning phase, actions are the output of the reviewing phase. We make sure that each of the actions from capturing feedback, determining wants and needs, and developing and prioritising actions leads to a list of activities which are recorded and monitored. This will provide visibility of the full end to end engagement on the Digitalisation Strategy.

9. Close the feedback loop: When the engagement is complete, feedback collected, and actions taken, the final step will be to close the feedback loop. This will involve:
a. Measuring the value and impact. b. Identifying how and where we can improve our approach. c.Reporting the engagement activities to our CEO and executive team.

Outwith the structured approach to engagement, we are happy to take comments from interested parties at any time. Please send an email to: spencoequeries@spenergynetworks.co.uk

Collaboration with other network operators

We are committed to collaborating with other network operators on our digitalisation approach, and are demonstrating this by chairing the ENA's Data Working Group (DWG).

Although the terms of reference for this group have not yet been finalised, we see it as being a key forum for sharing best practice, developing a whole systems approach to digitalisation and progressing the Energy Data Taskforce (EDTF) recommendations.

A new strategy

The group is expected to facilitate activities which will enable a consistent approach to digitalise the networks and modernise network-related energy data across the electricity and gas networks. As a result of this work, we expect our Digitalisation Strategy to evolve into a mix of 'standard' (activities common across all network companies) and 'bespoke' (areas where we have our own approach) content.

In addition to facilitating the common activities in support of network companies' Digitalisation Strategies, the group will work with BEIS, Ofgem and other relevant stakeholders to help progress the other key recommendations of the EDTF. We expect this to include:
a. Identification and agreement of data sharing requirements. b. Development of a common index of network data, including meta data. c. Identification of common platforms for sharing data. d. Development of a common digital systems map.

An invitation to collaborate

In response to Ofgem's call for a collaborative industry event to be held in Spring 2020, the DWG is arranging to hold an event in March 2020. The agenda and format is currently under development in consultation with stakeholders. Details, including information on how stakeholders can participate, will be issued soon.

What is clear at this stage is that the event will be inclusive and highly participative. The purpose will be to showcase digitalisation strategies and initiatives undertaken and in progress, with a view to gathering energy system data and digital user feedback.

The DWG hope to make this the first of many events, as a means of continuing engagement. Details are available at: energynetworks.org/info/modernising-energy-data.html

Benchmarking

We intend to benchmark and implement learnings from beyond the energy sector. Digitalisation has already made a positive contribution across telecoms, transport and media sectors. We see this as an exciting opportunity to learn and benefit from the insights of others. We will build this learning approach into future versions of our strategy and use it to improve our plans.

[2]https://es.catapult.org.uk/news/energy-data-taskforce-report

Governance and next steps

Our Process & Systems Centre of Excellence (CoE) will be responsible for reviewing and updating this strategy while tracking progress of the projects that will deliver the strategic vision.

Projects will be subject to clear and robust governance and assurance. This will be discussed during our CoE Governance Forum using a balanced scorecard approach.

Our current digital projects are:

		Implementation		
Project	Section(s)	2020	2021	Onwards
Digital Substations	*4 & 6*		*X*	*X*
Customer Service Solutions	*10*	*X*	*X*	*X*
Systems Health Map	*8*		*X*	*X*
Generation Export Management	*7*	*X*	*X*	*X*
Visor	*4*	*X*		
Active Network Management	*7*	*X*	*X*	*X*
Forecasting	*6*	*X*		
Flexibility Platform	*9*	*X*		
Fusion	*4*		*X*	*X*
Network Constraint Early Warning System	*6*	*X*		
Smart meter Information Analytics	*8*	*X*		
Integrated Network Modelling	*8*	*X*		
Smart Data Integration Fabric	*6*	*X*	*X*	*X*
Robotic Process Automation	*8*	*X*		
Asset Digitisation	*8*	*X*	*X*	
Data Analytics Platforms	*6*		*X*	*X*
Open data sharing platform	*9*	*X*	*X*	*X*
Building Information Management	*8*		*X*	*X*

Adopting the change

A network of change ambassadors with practical local knowledge and expertise will help embed the digital transformation and drive change to make sure digitalisation is embraced throughout our organisation. At least once a year, there will be a full refresh of the Digitalisation Strategy. In the early stages, as we gather feedback from stakeholders and collaborate with other network operators, it's likely that we will decide to refresh sooner.

Section 14: Glossary of digital technologies

Our Digitalisation strategy contains numerous digital enablers for tomorrow's complex ecosystem and value chain.

These enablers can arise from inside the industry, but there are also opportunities to harness them from the outside. The digital technologies available range from mainstream uptake to more leading-edge enablers, which are still some way off general adoption.

Unless stated otherwise, all definitions in this glossary have been taken from the Gartner glossary.

Name	What it is	What it means for us
IoT/IIoT:	The Internet of Things (IoT) is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment. The Industrial Internet of Things (IIoT) is the term used for the sets of hardware that work together through IoT connectivity, in order to strengthen manufacturing and industrial processes[1].	The market potential of IIoT solutions is vast, with predictions of 1.7 billion new devices per year[2]. Within the context of SP Energy Networks, these smart devices could be connected to a local area-based network and are already part of the operational technology (remote sensing), or even machine to machine communication. This technology would provide us with a far greater understanding of the performance of our assets, which would ultimately lead to greater optimisation.
Data and analytics	Data and analytics is the management of data for all uses (operational and analytical) and the analysis of data to drive business processes and improve business outcomes through more effective decision making and enhanced customer experiences.	We must optimise the future digital business environments and prepare for future transformation by addressing the need for a clear data storage and analytics procedure. This will allow us to interpret the increasing swathes of customer and operational information.
Artificial intelligence	Artificial intelligence (AI) applies advanced analysis and logic-based techniques – including machine learning – to interpret events, support and automate decisions, and take actions.	AI offers us opportunities to achieve formerly impossible efficiencies and innovations by "delivering value that previously required too many people or too much time." Streamlining routine and non-routine tasks frees employees to work on other problems and parts of the business.
Models/digital twins	A digital twin is a digital representation of a real-world entity or system. The implementation of a digital twin is an encapsulated software object or model that mirrors a unique physical object, process, organisation, person or other abstraction. Data from multiple digital twins can be aggregated for a composite view across a number of real-world entities, such as a power plant or a city, and their related processes.	Digital twins of processes and objects create a new reality where our world is "the computer," with storage and sensors throughout our network. We have already committed to network models.
Robotic/drone vehicles	Robotic / drone vehicles are robots that can be remotely controlled, or fly autonomously.	Drones can be deployed to sense and manipulate data in remote areas that are hard for our staff to reach. They can provide us with improved safety, superior proficiency and lower costs.

[1] Industrial Internet of Things definition, Techopedia: https://www.techopedia.com/definition/33015/industrial-internet-of-things-iiot

[2] Top 10 Strategic Trends, Gartner: https://www.gartner.com/document/3903969?ref=solrAll&refval=232073812&qid=ef87f7d05a7ba58e1997bf44

Name	What it is	What it means for us
AR/VR/MR:	Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects. It is this "real world" element that differentiates AR from virtual reality. AR integrates and adds value to the user's interaction with the real world, versus a simulation. Virtual reality (VR) provides a computer-generated 3D environment (including both computer graphics and 360-degree video) that surrounds a user and responds to an individual's actions in a natural way, usually through immersive head-mounted displays. Gesture recognition or handheld controllers provide hand and body tracking, and haptic (or touch-sensitive) feedback may be incorporated. Room-based systems provide a 3D experience while moving around large areas, or they can be used with multiple participants. Mixed reality (MR) is a blend of the real and virtual worlds. This merging allows new environments to be created, where both physical and digital objects can interact with one another in real time.	Immersive technologies, such as augmented reality (AR), virtual reality (VR) and mixed reality (MR), provide natural and ambient experiences within the digital world. We could utilise these technologies for immersive training experiences, or to simulate field work for staff.
5G	5G is the next-generation cellular standard after 4G. It has been defined across several global standards bodies, including the International Telecommunication Union (ITU), 3GPP and ETSI. The official ITU specification, International Mobile Telecommunications-2020, targets maximum downlink and uplink throughputs of 20 Gbps and 10 Gbps, respectively; latency below 5 ms endpoint to RAN; and massive scalability, although initial deployments may be less ambitious. New system architecture includes core network slicing and edge computing.	5G cellular is intended to provide significant improvements over 4G in three main areas: these are high-speed broadband, low-latency critical communications and high-density connections offering long battery life for Internet of Things (IoT) applications. All of these will be of great use when implementing our Digitalisation Strategy.
Blockchain	A blockchain is an expanding list of cryptographically signed, irrevocable transactional records shared by all participants in a network. Each record contains a time stamp and reference links to previous transactions. With this information, anyone with access rights can trace back a transactional event, at any point in its history, belonging to any participant.	From our perspective, it could have a huge impact on the brokerless asset flexibility trading in the future distributed world, though there is no solid scalable case yet.

Appendix 1: Projects supporting decarbonisation, decentralisation, digitalisation and customer service

Name of project	Description	Connection to digitalisation strategy	T, D, SPEN[1]
Decarbonisation			
Electric Vehicle uptake modelling (EV -Up)	EV-Up will contribute to the development of data sets to improve our understanding of customers' ability to transition to Electric Vehicles (EVs), based on off-street parking opportunity and customer demographics.	This new data set will enable improved understanding on the likely network areas which will see increased domestic demand and better inform future investment programmes. In addition, the data set will complement existing work being carried out in other innovation projects, such as NCEWS (Network Constraint Early Warning System) and the NIC Charge project.	D
CHARGE	The Charge project combines transport planning and electricity network planning, trialling innovative solutions to maximise and accelerate the connection of EV charge points. It will develop interactive tools to identify the most cost-effective location and methods to connect to the network.	Charge will use data analytics to accelerate the deployment of public charging infrastructure by bringing together expertise from transport planning, the electricity network and charging solutions. The project will provide insight into where EV charge points may be needed, and how their use will impact the electricity network.	D
PHOENIX	£18.9m NIC in collaboration with NG ESO, ABB, University of Strathclyde and Denmark Technical University. We are on track to successfully deliver GB's first hybrid synchronous compensator for fast declining essential grid services such as inertia, short-circuit level and reactive power compensation.	The Phoenix project's hybrid system, with an advanced digital system at its core, will support the operation of our network and also enable us to participate in the marketplace for ESO flexibility and ancillary services.	T
Decentralisation			
NCEWS	This LV (Low Voltage) connectivity model provides a model of the nodes and lines of the LV network that can be imported into a variety of analysis tools (rather than having to build the model in each tool). Neural networks, pattern matching, and other AI techniques have already been applied to the model to predict network behaviour. In some tasks, it has reduced design time by two thirds. Navi provides the basis for modelling in Charge, LV Engine, EV-Up and Evolve.	By providing this LV connectivity model annotated with multiple datasets, we can reduce the network modelling/design time by two thirds. Working closely with other innovation projects means that all these projects are using the same consistent data sets for analysis and modelling. The automatic tracing of the network also means much larger geographical areas can be analysed. The platform provides improved understanding of the LV network which will, as a result, allow for more informed decisions to be made regarding reinforcement.	D

[1] T=Transmission, D=Distribution, SPEN=both

Name of project	Description	Connection to digitalisation strategy	T, D, SPEN
FUSION	Project FUSION is a live trial of a local demand-side flexibility market. It will trial the trading of flexibility through the creation of a competitive market, structured around the Universal Smart Energy Framework (USEF).	Project FUSION will allow DNOs to make use of the inherent flexibility that is available within their networks. This will be developed within a fixed frame of network parameters, supported by new datasets and analytical tools. FUSION will demonstrate how flexibility can be optimised as part of a services market to mitigate network constraints, provide a valid alternative to conventional network reinforcement, and enable an agile market.	D
LV Engine	Project LV Engine aims to add flexibility to LV networks. It will achieve this objective by carrying out a live network trial of two innovative technologies; 1. Solid State Transformers (SSTs) as a direct replacement and; 2. Vacuum Tap Changers as a retrofit option to the conventional secondary transformer (11kV/415V).	The deployment of this innovative technology will bring several valuable functionalities (that are supported by automation, modelling and network visibility) to the distribution network for the first time, facilitating the growth of Low Carbon Technologies (LCTs) by releasing additional capacity within our existing network infrastructure without the need for costly network reinforcement.	D
Digitalisation			
Network Asset Management Systems (NAMS)[2]	The Network Asset Management System (NAMS) is a collection of solutions delivered in 2018 to capture key asset information, manage planning and work delivery and facilitate regulatory reporting. It is constantly evolving to meet the dynamic needs of the business and to enable it to remain as the authoritative source of truth for asset data.	NAMS paves the way for automated asset information data capture and reporting, leading to both improved efficiencies and the opportunity for more sophisticated data analysis.	SPEN
BIM – 3D Modelling for Transmission Major Projects[3]	Building Information Modelling for SP Transmission during the RIIO T2 period. We plan to achieve Level 2 and implement a Common Data Exchange (CDE).	BIM captures digital data during design and construction. It opens the possibility of seamlessly integrating this data into end-to-end asset lifecycle management. This supports the intent of making data capture part of how work is planned and executed. This allows us to plan new assets more effectively, build at lower cost and operate and maintain assets more efficiently.	T
Sinepost	Collates information from multiple systems and new monitors to identify a more precise location of 11kV faults	This is an example of development of a specific solution using the investment in the our integration platform (SDIF) and our LV network model (INM). We expect these underpinning solutions to support a number of use cases.	D

[2]Refer to NAMS case study in section 4

[3] Refer to RIIO T2 Main Business Plan – Section Digitalisation and Big Data Platforms Page 120

Name of project	Description	Connection to digitalisation strategy	T, D, SPEN
Condition Based Risk Management (CBRM)	Our CBRM platform is used for deploying the Common Network Asset Indices Methodology and designing intervention strategies.	We calculate the Risk Points of an Asset Intervention using CBRM. We currently track and report all risk point movements for all assets manually, but we are developing a flight path reporting tool (dashboard) for visibility of performance at a license, district and individual asset level.	**SPEN**
Response Eye	Pilot project tool which allows a customer to share their site conditions and work requirements with SP Energy Networks staff through a smart phone camera in real-time, reducing the need for site visits.	Digitisation of the process between customer and SP Energy Networks will enhance the ease with which customers can interact with SP Energy Networks services in real-time. As well as customer service benefits, there is a potential positive environmental impact of lower carbon emissions due to reduced travel for site visits.	**SPEN**
Network Modelling	Strategic review of the network modelling solutions across the business. Potential for 3D and network models in ESRI. Potential convergence of Integrated Network Model with other network models.	A far more calibrated and detailed understanding of the network. This sort of modelling will be the linchpin for a successful transition into the DSO world, where more data points and accurate depictions of the network will facilitate the calculation of supply and demand.	**SPEN**
Fitness	FITNESS will deliver the pilot GB live multi-vendor digital substation instrumentation system to protect, monitor and control the transmission network using digital communication over fibre to replace copper hardwiring.	The goal of FITNESS is to enable GB Transmission Owners (TOs) and Distribution Network Operators (DNOs) to apply a digital substation design approach to future load and non-load related investment. Digital substations are based on concepts of standardisation and interoperability, enabling the replacement of many kilometers of copper wiring with digital measurements over a cost-effective fibre communications network. FITNESS will result in reducing cost, risk and environmental impact, and increasing flexibility, controllability and availability.	**T**

Name of project	Description	Connection to digitalisation strategy	T, D, SPEN
VISOR	£8.3m NIC in collaboration with NGET TO, SSEN, NG ESO & GE. This project successfully delivered Great Britain's first wide-area monitoring system, providing dynamic visibility of the GB network to the ESO and TOs across GB.	This is an example of increased instrumentation and situational awareness and was done in collaboration with ecosystem partners as part of a move to digitalise our monitoring systems.	**T**
Circut-Rating Management System[4]	Assets have a capacity rating which is based on a number of assumptions, including the temperature at which they operate. We plan to create a new system which will use analytics and enhanced data processing to provide real-time assessment of asset ratings.	This is an example of using thermal instrumentation and analytics as input to optimised planning.	**SPEN**
Transmission Connection Portal[5]	Replacement of a slow manual process with a digitalised process supported through a portal. Supports the process of getting connected at transmission level. Includes providing information about demand, costs and timescales (to support customer planning), automated processing and initial budgetary estimates.	This is an example of making data available to customers to improve decision making, improvement of process efficiency, and effective capture of data from the customer interaction.	**T**

[4] Described in T2 submission

[5] Described in T2 Customer Value Proposition annex

Customer service			
Improving Storm Resilience & Readiness through Data Analytics	The analytics application will take outage and GIS data, and combine with historical and current weather datasets for the SPD region to provide a predictive model for whether a postcode area is forecast to have an outage, and what the severity of this outage will be. This will then be displayed graphically using the GIS data.	Connected to the use of data and analytics which will ultimately allow us to predict patterns with greater accuracy and make more efficient and cost-beneficial decisions on faults and re-engineering of the network.	**D**
EvoLVe	EvoLVe is a program to install monitoring capability in the LV network, and to use this capability for multiple purposes. Outcomes will include: • Faster fault fixes (react) • Predicting faults (prevent) • Informing investment choices (optimise) • Support DSO activities (transform) This program is currently being piloted.	This program represents many aspects of the digitalisation strategy. It is based on collecting, analysing and interpreting information, to lead to informed and evidenced optimised conclusions.	**T**
WANDA	The project uses historic SCADA, generation and discretised weather data (1km squares) at a primary substation level. This data will be used to build and evaluate models which disaggregate electrical demand into 'load driven by weather conditions' and 'load driven by other customer behaviour'. Analysis of the underlying trends will be undertaken.	WANDA ultimately creates a trend model which will vastly improve our predictive and proactive maintenance work, allowing us to envisage much more sophisticated planning scenarios as part of our Asset Management Strategy.	**SPEN**

Appendix 2: Ofgem business plan digitalisation strategy guidance – reference table

We have used Gartner to help guide the development of our Digitalisation Strategy. Gartner is the world's leading research and advisory company covering digital business and IT. Gartner undertook a structured knowledge elicitation exercise to make sure they fully understood the individual digitalisation initiatives that were planned or already happening within our organisation, then helped us to formulate this into a cohesive strategy to help us plan for the future.

In doing so, Gartner conducted an extensive research process to ensure that best practice and initiatives from across the energy sector – and more broadly on an industry agnostic basis – could be captured and evaluated for inclusion in the development of the strategy. Gartner's knowledge and understanding of the potential impact of digitalisation, and the implications for optimisation of our business, and innovations in business models, organisation and technology have enabled us to develop a practical, rounded and more comprehensive digitalisation strategy.

The strategy has specific sections which relate to some of the themes from the UK government's 'Digital Strategy' which highlights building connectivity infrastructure, harnessing the digital skills of the workforce and creating a safe cyber security space in the UK.[1] (sections on 'people' (section 11) and 'enablers' (section 12).

A key component of our digitalisation vision is our mastery of our data (section 8), which includes creating data openness, clear governance, a framework for sophisticated data analysis, and finally, clear data ownership. This concept is referenced in the 'Data for the public good[2]' report from the National Infrastructure Committee, as well as the UK government's 'Digital Strategy' chapter on 'Unlocking the power of data'.

The strategy embeds the 'Gemini principles' of the Centre for Digital Built Britain which commits to openness and also sets the digital transformation focus on providing public good, creating value and insight, maintaining security and trust, while still being of high quality.[3] The Gemini principles also commit to "openness" which we explore when it comes to the presumption of open data, and we are committed to the evolution of this document which agrees with one of the principles.[1] We firmly believe that our commitment to a clear, open data strategy aligns with the National Data Strategy's goal of 'driving the collective vision that will support the UK to build a world-leading data economy'[4]. We're confident that this will ultimately lead to a future 'data economy' where 'all citizens and organisations trust the data ecosystem, are sufficiently skilled to operate effectively within it, and can get access to high-quality data when they need it'.

[1] https://www.gov.uk/government/publications/uk-digital-strategy
[2] https://www.nic.org.uk/wp-content/uploads/Data-for-the-Public-Good-NIC-Report.pdf
[3] https://www.cdbb.cam.ac.uk/system/files/documents/TheGeminiPrinciples.pdf, 4.
[4] https://www.gov.uk/government/publications/national-data-strategy-open-call-for-evidence/national-data-strategy-open-call-for-evidence

Ofgem BP Guidance Ref	Ofgem Guidance	Our comments
2.36	We expect that, as part of ongoing network stewardship network companies are already doing their part to modernise energy data and network operation through digitalising the energy system and have considered: • How digitalisation is already bringing about cost savings • Its ongoing potential for efficiency improvements • Its potential to aid other markets, the wider economy and consumers – including those participants that might be currently unrelated to energy network investment and operation. Digitalisation should already form part of network companies' regular business planning. We anticipate they have been updating their digitalisation strategies, catalysed both by the need to drive cost reductions for consumers, the RIIO-2 process and the recently published Energy Data Taskforce (EDTF) report.	Section 4 provides an overview of existing or past projects with a digitalisation focus – including a selection of more detailed case studies.
2.36	We expect that, as part of ongoing network stewardship network companies are already doing their part to modernise energy data and network operation through digitalising the energy system and have considered: • How digitalisation is already bringing about cost savings • Its ongoing potential for efficiency improvements • Its potential to aid other markets, the wider economy and consumers – including those participants that might be currently unrelated to energy network investment and operation. Digitalisation should already form part of network companies' regular business planning. We anticipate they have been updating their digitalisation strategies, catalysed both by the need to drive cost reductions for consumers, the RIIO-2 process and the recently published Energy Data Taskforce (EDTF) report.	Section 4 provides an overview of existing or past projects with a digitalisation focus – including a selection of more detailed case studies.
2.37 - 2.38	The EDTF shared a collective market-wide vision for how the sector – including network companies – can maximise the value of data and digitalise the energy system in support of the energy transition. Ofgem has welcomed the report and supports its recommendations. We view the EDTF report as a fantastic focal point to drive cultural change in the energy sector. We encourage network companies to treat the publication of their business plans as an opportunity to showcase to energy consumers, the wider economy and international counterparts how they are leading change and delivering a progressive modernisation of Britain's national infrastructure. Through this, network companies can better enable the country to overcome important societal challenges such as the industrial strategy's grand challenge for clean growth and net zero carbon emissions by 2050 (2045 in Scotland).	We welcome the EDTF report and are chairing the ENA's Data Working Group (DWG) and attending the Energy Systems Catapult data best practice working groups to help progress the EDTF's recommendations in the most effective and efficient way.
2.39	We particularly echo the EDTF report's principle of continuous improvement. We urge network companies to deliver benefits to their customers early, and to frequently iterate small improvements to their services and plans. We would expect this to be captured and demonstrated in their business plans.	We recognise the need for our Digitilisation Strategy to be active, continually evolving projects to deliver early improvements where possible. Section 13 describes our process for delivering early and evolving our plans.
2.40	It is important that digitalisation strategies provide current and future users of energy system with access to data so they can understand and challenge the digitalisation strategies. Strategies will need to be iterated in a timely fashion and to reflect ongoing learnings and user feedback, assuring that any digitalisation work delivered best meets users' needs.	Our approach to stakeholder engagement is outlined in section 13.

Ofgem BP Guidance Ref	Ofgem Guidance	Our comments
2.41	In recognition of the relevance of a whole system approach to delivering digitalisation, we encourage network companies to collaborate on the development of their strategies and to include this collaborative work in their published strategies.	We are chairing the ENA's Data Working Group (DWG). We have provided more details of our collab-orative approach in section 13.
2.42	The following are themes Ofgem considers will be valuable content for network companies to include in their digitalisation strategies: • Actions being taken to align with the recommendations made by the EDTF • Consideration of making available metadata (which is data that describes and gives information about other data) · • How network digitalisation is being coordinated between network companies • Preferred corporate ways of working when delivering digital and data services • Preferred corporate digital and data best practices, such as to realise user needs-driven data visibility, data interoperability and implementation of the EDTF recommendation that energy system data is presumed open	We are chairing the ENA's Data Working Group (DWG) and have attended the Energy Systems Catapult energy data best practice working groups to help progress the EDTF's recommendations in this area in a consistent manner. Further detail is contained in section 9.
2.42	Demonstrating a credible workforce planning path with respect to digital, data and technology capabilities. Outlining plans to meet the needs of the digitalisation strategy now and in the future.	Our approach to workforce planning is outlined in section 11.
2.42	Approaches to user engagement and feedback on the digitalisation strategy · Approaches to continuously improving the digitalisation strategy	Our approach to stakeholder engagement and continuous improvements is outlined in section 13.
2.42	Reporting the current understanding of user needs (e.g. new data needs; existing data improvement needs). Delivery plans to meet users' needs: cost, benefit, options, validation, prioritisation	Details within past and proposed digitalisation initiatives in sections 4. Further detail on plans will be provided in subsequent versions of the strategy.
2.42	How digitalisation strategies are contributing to and aligning with wider initiatives, such as, but not limited to: • The Centre for Digital Built Britain (including the Gemini Principles, the Digital Framework Task group Roadmap, digital twins and the Information Management Framework) https://www.cdbb.cam.ac.uk/ RIIO-2 Business Plans – Updated Guidance • The wider National Infrastructure Commission agenda • The National Data Strategy and UK Digitalisation strategy	See Page 61 Appendix 2 on strategy development.
2.42	Energy system digital architecture needs and associated delivery plans.	Details of technology enablers are provided in section 12
2.43	Ofgem recognises that the timing of the publication of the EDTF report is relatively late on in this RIIO-2 business plan development process and that the EDTF has implications for network companies' digitalisation strategies. We expect it will take several iterations of continuous improvements before digitalisation strategies mature, we are therefore not including each company's digitalisation strategy in our assessment of whether the business plan meets the Stage 1 minimum requirements for the purposes of the BPI. It may, however, be possible for the content of the digitalisation strategy to be included in companies' CVPs	We agree with this approach.

Ofgem BP Guidance Ref	Ofgem Guidance	Our comments
2.44	Although companies will not face a penalty under the BPI, we believe it is reasonable for them to be making meaningful progress now, and throughout the remainder of the RIIO-1 period. We therefore expect that alongside the December submission of their business plan: · Network companies will each make a "Digitalisation Strategy" publicly available, including on their websites. This iteration (and future iterations) of the Digitalisation Strategy should include a plan for how the company will continue to improve its Digitalisation Strategy, with focus on getting and acting on feedback from current and future users of Energy System Data. Network companies will provide Ofgem with a single hyperlink to the homepage where that published strategy is hosted. That hyperlink is to be emailed to ofgemdataservices@ofgem.gov.uk. Ofgem will then collate all the hyperlinks and publish them together on its website.	This document is available on our website and we have provided Ofgem with a single hyperlink. Our approach to stakeholder engagement and continuous improvements is outlined in section 13.
2.45	We also see merit in network companies arranging a collaborative event to take place in early 2020. This should be an inclusive event for energy system digital and data user engagement and should provide a forum for engaging with the Digitalisation Strategies and showcasing key steps and projects they have already taken on data and digitalisation. Network companies would be encouraged to showcase the latest iteration of their Digitalisation Strategies at the event and listen to the opinions of their stakeholders. The expectation is that network companies may use this and all other user feedback they collect, to improve the content of their Digitalisation Strategy and to improve their ongoing approach to user engagement with respect to the Digitalisation Strategy itself. For the purposes of the business plan submission schedule: we expect the Digitalisation Strategies to include either directly or via hyperlink the plan for and date of for the collaborative network company hosted event, describing how stakeholders can participate in it. Though this guidance document does not apply to DNOs or the ESO, we recognise that these companies will also be keen to participate in making their Digitalisation Strategies publicly available and to share them at the network company event. We therefore encourage DNOs and the ESO to participate at the event. If DNOs and the ESO send Ofgem a hyperlink to their own public digitisation strategies, Ofgem will also host these on its website along with the hyperlinks to the other network companies' Digitalisation Strategies	We are chairing the ENA's Data Working Group (DWG) and have provided more details of our collaborative approach in section 13.
2.47	We will work closely with industry and other stakeholders in supporting this work. During this process, it may become apparent that the delivery of high quality digitalisation strategies is dependent on changes to the RIIO-2 framework of funding and incentives, and we will consider what opportunities there may be in the remainder of the process of setting the price control (and during the period itself) to enable these changes. For RIIO-ED2, we have more time to consider from the outset if and how this will affect the price control for this sector.	The SPEN RIIO-T2 Business Plan is published alongside this Digitalisation Strategy and investment proposal details are contained within the relevant sections (e.g. on cyber security). We expect more proposals on distribution funding and incentives to emerge during the RIIO-ED2 planning process and to be referenced within subsequent versions of the strategy.

Appendix 3: Energy data task force recommendations – modernising energy data access – reference table

Below is an overview of the Energy Data Task Force's Appendix 1 recommendations along with our response. Where appropriate, we have identified the cross reference to our Digitalisation Strategy. Generally, we are supportive of the intent of most of the recommendations from the EDTF, however we also believe there needs to be a dialogue around the manifestation of some of the recommendations, as they could imply explicit support for specific solutions where alternatives may be more appropriate. For example, while we are supportive of the notion of a metadata standard in principle, we are aware of multiple metadata standards in addition to the Dublin "Core Elements". We're content to recognise such suggestions as worthy of investigation, but we wish to be clear that support of the principle does not imply that the suggested solution is supported as the best approach.

As described in section 13, we are actively engaging with the ENA's Data Working Group and the Energy Systems Catapult data best practice working groups to help drive the adoption of the EDTF recommendations.

Index Number of requirements	Requirement/Recommendation	Response	Section of Response
Recommended 1	Digitalisation of the Energy System: Government and Ofgem should direct adoption of the principle of Digitalisation of the Energy System in the consumers' interest, using their range of existing legislative and regulatory measures as appropriate, in line with the supporting principles of 'New Data Needs' 'Continuous Improvement' and 'Digitalisation Strategies'. Many of these are supported by specific Enabling Recommendations	We are supportive of the need for the regulatory adoption of the principle of digitalisation of the energy system and are keen to participate with Ofgem and government to create principles which have the consumer's health, financial needs and convenience in mind.	Throughout
1.1	The Taskforce recommends that energy infrastruc-ture and assets should be digitally enabled and have data which enables them to be operated efficiently, and their impact evidenced.	We agree on the digital enablement of assets. We have invested heavily to create a digital repository of asset data for regulatory reporting purposes (i.e. NAMS) and see this as a platform for further data capture. Reference to the above can be found in sections 7 and 8.	Section 8
1.2	The Taskforce recommends new data needs should be proactively identified and addressed through a variety of approaches, from installation of new monitoring equipment to the use of data analysis on existing data.	We have developed a strategy that enables us to build on our existing platforms and develop our workforce to support a new digital world. We have outlined our approaches to facilitating new data needs and supporting the EDTF recommendations around openness.	Sections 6 - 11.
1.3	The Taskforce recommends that the government and regulator provide clear leadership through initiatives such as the 'DSO - regulatory principles, priorities and key enablers' workstream	This is noted and we are supportive of a regulator providing leadership and guidance on the opening up of energy data. This is fundamental to the whole system view and hence an enabler for achieving net zero.	N/A

1.4	The Taskforce recommends that regulation should be used to incentivise continuous improvement where appropriate but recognise that improving data and skills are part of running a modern business and can create organisational benefits.	Noted and we are supportive of this. We would also note that openness of energy data spans across regulatory boundaries (e.g. Transport for electric vehicle data) and we hope that the UK Government will take a joined-up approach to ensuring data is opened across the whole system.	We are already undertaking a continuous programme of data improvement. Our strategy outlines the approach we will take to ensure mastery of our data (section 8).
1.5	The Taskforce recommends that baseline expectations of digitalisation strategies are set through measures such as the RIIO2 business planning process, the Whole System Licence, the Long-Term Development Statements (LTDS) and the Ten-Year Statement.	We acknowledge the attempts to baseline expectations and would be keen to engage in conversation about how that would manifest.	N/A
Index Number of requirements	**Requirement/Recommendation**	**Response**	**Section of Response**
Recommended 2	Maximising the Value of Data: Government and Ofgem should direct adoption of the principle that Energy System Data should be Presumed Open, using their range of existing legislative and regulatory measures as appropriate, supported by requirements that data is 'Discoverable, Searchable, Understandable', with common 'Structures, Interfaces and Standards' and is 'Secure and Resilient'.	While we are supportive of the nature of Presumed Open, we have concerns that this request may put our energy system at risk if sensitive data is released inadvertently. We raised this concern in Ofgem's August ED2 consultation and welcome continuing dialogue. This is a feature that will need to be incorporated into the risk assessment and mitigation approaches that are developed to support open data sharing. However, we see the benefit of having a whole system view and anticipate being both a provider and a consumer of energy data in the future.	For Open Data See section 9
2.1	The Taskforce recommends that as part of embedding the principle of Presumed Open, organisations adopt an Openness Triage process which considers a range of risk factors and develops an appropriate range of mitigation mechanisms.	We agree with the development of an Openness triage process taking account of risk factors and applying appropriate mitigation techniques to push data towards the most open access that can be achieved, balanced against these risk factors	Section 9
2.2	The Taskforce recommends that the sector should consider if there is value in a standardized procedure for openness triage, PAS 185 details a triage process for smart city applications.	We are engaging through the ENA taskforce on issues of standardised procedure. PAS 185 is expected to be a candidate.	N/A
2.3	The Taskforce recommends that open data risk mitigation techniques (including but not limited to those described in the main report) be applied in all matters of open data as assessed by the Data Owner	We are engaging with the ENA (Electricity Networks Association) taskforce and the ESC (Energy Systems Catapult) data best practice working groups on issues around open data risk mitigation.	N/A
2.4	The Taskforce recommends that support for Presumed Open should leverage existing mechanisms of organisational responsibility and enforcement instruments combined with a layer of transparency which enables continuous challenge.	We are investing in the digital skills of our workforce. As part of this, we will be utilising our existing organisational structures to facilitate data openness processes.	Section 11
2.5	The Taskforce recommends that a cross sector public good and data ethics oversight is identified and developed through the Centre for Data Ethics and Innovation.	We are supportive of this intent and are engaging with the ENA taskforce to define what a public good and data ethics oversight should include.	N/A

Index Number of requirements	Requirement/Recommendation	Response	Section of Response
2.6	The Taskforce recommends that data standards are adopted or developed to enable data across organisations to be aggregated and utilised more easily. Recommended approaches are summarised in the body of the report and Appendix 6.	We are supportive of this intent and are engaging with the ENA data working group and ESC energy data best practice work groups to define this. We are working on our internal data catalogue to en-sure this is ready to support the requirements of an open data process.	N/A
2.7	The Taskforce recommends that the sector progressively manages risk by: maintaining current security practice, utilising security advisors and deploying openness triage.	We are supportive of this intent and are engaging with the ENA taskforce to define the remit of a security advisor and have already signaled intent of deploying openness triage.	Section 8
2.8	The Taskforce recommends that the sector uses mitigation techniques to retain the value of data when security issues with data are identified by the Data Owner, including those described in the main body of the report.	We are supportive of this intent and are engaging with the ENA and the ESC to define this. We are working on our internal processes to capture the triage and mitigation steps undertaken when presenting data for external consumption.	N/A
Recommended 3	Visibility of Data A Data Catalogue should be established to provide visibility through standardised metadata of Energy System Datasets across Government, the regulator and industry. Government and Ofgem should mandate industry participation though regulatory and policy frameworks.	We are supportive of this intent and are engaging with the ENA and the ESC to define standardised metadata processes through a data catalogue. We also agree with the mandating of industry participation through a regulatory framework.	N/A
3.1	The Taskforce recommends that a 'Data Catalogue' be established to provide visibility of the data that exists across the sector through a common metadata standard.	We support this intent and are engaging with the ENA and ESC to define this and determining the best solution for a data catalogue.	N/A
3.2	The Taskforce recommends that the Data Catalogue is based on the Dublin Core 'Core Elements' metadata standard.	We are supportive of this intent and are working with the ENA and ESC to determine whether the Dublin Core Elements standard is the most appropriate standard as there are alternatives. We are working on our internal data catalogue, including the facility to map to an external standard to facilitate this.	N/A
3.3	The Taskforce recommends that the Data Catalogue should be developed and managed by an independent, trusted party with a strong track record in data management. The Taskforce's review and analysis has led to consideration of the Office for National Statistics (ONS) as a partner.	We are supportive of this intent and as part of our work with the ESC and the ENA taskforce will assess suitability of the ONS alongside other partners.	N/A
Recommended 4	Coordination of Asset Registration an Asset Regis-tration Strategy should be established to coordinate registration of energy assets, simplifying the experience for consumers through a user-friendly interface in order to increase registration compliance, improve the reliability of data and improve the efficiency of data collection	We agree with the principle of an asset registration strategy which simplifies the experience for the customer / consumer in registering their asset. We view this as a point of great importance.	N/A

Index Number of requirements	Requirement/Recommendation	Response	Section of Response
4.1	The Taskforce recommends that a sector wide Asset Registration Strategy should be developed and adopted to curtail the proliferation of standalone registration platforms.	We believe there is an imperative on regulator and Operators to provide an asset registration strategy that provides convenience and clarity to the consumer / customer.	N/A
4.2	The Taskforce recommends that the Asset Registration Strategy should be driven by an organisation that is open, independent, empowered and experienced. Consideration should be given to a regulator led approach.	We believe there is an imperative on regulator and Operators to provide an asset registration strategy that provides convenience and clarity to the consumer / customer.	N/A
4.3	The Taskforce recommends that a programme be established to consider the strategic options including that of a single Asset Registration Portal.	We recognise the need for consistency of consumer / customer experience and for collaboration and standardisation in the process to register assets. For some use cases we consider that the benefits of integrated consumer / customer experience at a local level may outweigh the benefits of a common approach to asset registration, and that DNO integrated consumer / customer portals provide the best solution in this situation. There may therefore be a need to provide solutions which integrate with an asset registration system electronically.	See section 10 for details of our customer service portal developments.
Recommended 5	Visibility of Infrastructure and Assets A unified Digital System Map of the Energy System should be established to increase visibility of the Energy System infrastructure and assets, enable optimisation of investment and inform the creation of new markets.	We utilise a digital systems map on our ESRI GIS system and facilitate controlled external access to this. While we agree with the principle of greater visibility, we recognise the importance of security with regards to exposure of a unified digital map and would encourage discussion around how this would progress.	N/A
5.1	The Taskforce recommends the development of a Digital System Map that will help unlock the opportunities of a Modern Digitalised Energy System.	We recognise the value of Digital System Map and are expecting to actively collaborate in the development of one. Our assets are already digitally mapped using the ESRI GIS product set.	We will continue to work with the ENA data taskforce on the provision of a digital system map.
5.2	The Taskforce recommends that the Government and Ofgem commission an open and interoperable Digital System Map of the Energy System. Utilising learning and resources from existing projects described in the main report.	We are supportive of this intent and are engaging with the ENA taskforce to define this and determine the value of an open digital system map. We see the need to coordinate across a range of stakeholders and other initiatives such as the Geospatial commissioner's register of underground assets.	N/A
5.3	The Taskforce recommends that Energy System actors use existing data sets to build a map of current energy infrastructure and that third parties share other data to further inform its enhancement and evolution towards a digital twin.	We are supportive of this intent and are engaging with the ENA taskforce to define this and determine the value of an open digital system map. Our assets are already digitally mapped using the ESRI GIS product set.	N/A

Index Number of requirements	Requirement/Recommendation	Response	Section of Response
5.4	The Taskforce recommends that the digital system map should be a public good project to enable greater competition and drive investment into the sector. It therefore should be owned by an organisation with no commercial interest in the energy sector such as a university, not for profit organisation or independent IT consultancy	We are supportive of this intent and are engaging with the ENA taskforce to define this and determine the value of an open digital system map. We intend to sign up to www.linesearchbeforeudig.org as a platform to provide digital system maps in the interim.	N/A
E.1	Government and Ofgem Leadership: The Taskforce recommends that Government and Ofgem explicitly endorse the principles and recommendations and be clear on their expectations of the sector through stating clear policy and regulatory intent.	We are in approval with the notion of government and Ofgem endorsing the principles and recommendations, under the proviso that there is a consultative process around the appropriate route or the repercussion of agreeing to a specific regulation. We note that a cross department approach will be required to cover the whole energy system (energy, transport, water, etc).	N/A
E.2	Environmental Information Regulation: The Taskforce recommends that the sector considers utilising EIR to facilitate the release of Energy System Data, both proactive dissemination (Regulation 4) and on request (Regulation 5).	We are supportive of the intent to encourage the release of Energy System Data across different network operators and would be keen to discuss what specifically that would cover.	N/A
E.3	Electricity Act 1989 - Section 9: The Taskforce rec-ommends that organisations consider Digitalisation of the Energy System and Presumed Open as part of existing obligations to "develop and maintain an efficient, coordinated and economical system of electricity" distribution / transmission and "facilitate competition in the supply and generation of electricity".	We approve the recommendations of Digitalisation and Presumed Open being obligatory positions for Distributed Network Operators in the future but would appreciate some clarity on the specific reasons the EDTF recommend it being attributed to the Electricity Act of 1989.	N/A
E.4	Whole System Licence Modifications: Ofgem are currently considering licence changes for electricity networks and have just concluded a consultation to which the Taskforce responded. The Taskforce recommends that Ofgem consider taking this opportunity to embed the Taskforce principles into the licence at this point.	We welcome the publishing of the results of the consultation between the Taskforce and Ofgem and would be keen to engage in the discussion around implementation of principles.	N/A
E.5	Liability Waver: The Taskforce recommends developing a set of standard waivers to help give organisations comfort regarding the release of data in circumstances where there is concern about liabilities that could arise due to data quality or completeness.	We are supportive of this intent and are engaging with the ENA taskforce to define what would be included in the aforementioned standard waivers.	N/A
E.6	Code Administrator Code of Practice: The Taskforce recommends that industry consider adopting the principles or Building Block projects into the CACoP in order to encourage adoption of the recommendations.	We support the principle of an overarching code of practice to enforce good governance around data management. The CACoP approach may be an appropriate delivery vehicle.	N/A

Index Number of requirements	Requirement/Recommendation	Response	Section of Response
E.7	Long Term Development Statement Review: The Taskforce recommends that principles proposed to be embedded within the LTDS	We acknowledge the attempts to baseline expectations and would be keen to engage in conversation about how that would manifest.	N/A
E.8	Review of Terms and Conditions: The Taskforce recommends that all owners of public datasets should aim to clarify the terms and conditions that apply to that information and aim to make it as discoverable as possible via metadata and discoverability mechanisms.	We are supportive of the intent to make metadata as discoverable as possible as part of a presumption of open data and would be keen to discuss if clarifying terms and conditions that apply to the information is a beneficial recommendation in achieving this aim.	For Open Data See section 9
E.9	The Retail Energy Code: The Taskforce recommends that the Retail Energy Code should be an early adopter of the principles.	N/A for SPEN	N/A
E.10	Licence Conditions: The Taskforce recommends that Government and Ofgem consider using licence conditions to ensure licensed actors are compelled to register their metadata with the Data Catalogue	We are supportive of the intent to make metadata as discoverable as possible and would welcome the chance to discuss the most effective way to achieve this aim.	For Open Data see section 9
E.11	RIIO2: The RIIO2 price control be treated as an opportunity to embed the core principle of Digitalising the Energy System. The Taskforce recommends that Ofgem consider a full set of mechanisms (as noted in the body of the report).	We agree and our Digitalisation Strategy is a response to the embedding of digital in the price control.	N/A
E.12	Codes Modifications: The Taskforce recommends that code modifications be considered and if appropriate, implemented to increase the number and range of actors required to participate with the Data Catalogue.	If industry parties are to be required to do something new, then we agree that it makes sense for this to be included in the codes that already govern the passing of information between participants.	For information on our suggestions opening up access to our energy data please refer to section 8.
E.13	Code Review: The Taskforce recommends that Government and Ofgem use the Energy Code review as opportunity to embed the principles	We recognise that the Energy Code review attempts to improve the governance of all the industry codes and streamline processes and give Code administrators more authority which we are supportive of, as code processes are very complex and not easy to follow for new participants. It makes sense to consider the taskforce recommendations as part of the Energy Code review.	N/A
E.14	Policy Change: The Taskforce recommends that Government and Ofgem consider acting to address several legislative barriers to data release which could be reduced and overarching obligations which could be created.	We have mentioned in our strategy that we have concerns that open data by nature may render our energy system at risk if sensitive data is released inadvertently. We have responded to Ofgem's August ED2 Consultation with this point and welcome continued dialogue.	N/A
E.15	Export Tariffs and Market Access: The Taskforce recommends that Government and Ofgem consider that in order to access an export tariff or participate in an energy market there should be a requirement for the asset to be registered via the Asset Registration Strategy.	We are supportive of this intent and would welcome a regulatory mandate on assets to be registered in an open fashion when entering the energy market (irrespective of where the portal resides).	Section 8 describes our process for providing open data access.

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