NORTHERN POWERGRID

Roadmap for Digitalisation

December 2019

Contents

Foreword

The urgency of accelerating the transition to a low-carbon economy is well understood. The UK has committed to achieve net-zero carbon emissions by 2050 and three quarters of local authorities in our region have now declared climate emergencies. Responding to the immense challenge of climate change requires a radical transformation to deliver a clean, safe and sustainable society for future generations. Dramatically decarbonising the electricity system while also electrifying everything from transport to heating is an essential part of the solution.

The development and deployment of new technologies will be a key part of how we make the transition to zero carbon electricity. In the next decade, we will see millions of homes and businesses embrace electric vehicles, adopt heat pumps and use battery storage in combination with renewable sources of generation.

New digital technologies, including automation, data analytics and artificial intelligence, will enable consumers to become active participants in the energy system and transform how it operates. These changes will place new stresses on energy networks while simultaneously creating new opportunities to innovate and transform how we manage our systems and how we enable the transition to net-zero.

Energy networks have a vital role in enabling the overall energy system to evolve and support rapid decarbonisation. As a Distribution Network Operator (DNO), we have had a central role facilitating a low-carbon energy system, connecting people to renewable power across our region. Our vision is to enable a smart, flexible and clean energy system that benefits all our customers. This is why we begun to expand our capabilities, recast our role to become a platform for the optimisation of the region's energy system. We have become a Distribution System Operator (DSO). As we set out in our DSO Plan published in October, our vision is to develop our role as our regions' DSO for our network to be a trusted and neutral platform, able to optimise our whole energy system and underpin the transition to carbon free electricity, transport and heat for all our customers.

Our Digitalisation Roadmap forms part of our approach to meeting the challenge of the new zero carbon landscape. It sets out our vision to become a digital energy network, utilising all available digital tools and technologies to transform the capabilities of our infrastructure and our business to support a flexible, reliable and resilient energy network for the 3.9 million homes and businesses we serve. The Roadmap is integral to the future of our business and forms part of our next long-term business plan, which we are developing for the next regulatory price control period from 2023-28.

Continued investment in new digital technology and innovation will drive the delivery of a more efficient, optimised network that reduces costs and improves our service for customers. It will transform our customer experience, enabling more tailored services and support – areas we are already making great strides in. By embracing these new technologies and moving to a fully digital workplace, we will also increase our efficiency as a business, improve transparency over how we operate and enable more effective collaboration with our colleagues and other organisations.

We are already implementing industry-leading digital innovation projects on our network. Our Activating Community Engagement project ran the world's first trial of a mobile game to incentivise households to reduce their electricity consumption at times of peak demand. Our Foresight project is using ground-breaking data analysis to enable fault prediction and proactively deploy network technology to automate the restoration of power supplies to customers. Looking to the future, our Customer-Led Distribution System programme is exploring the potential for our network to operate a more flexible energy system and avoid unnecessary investment in infrastructure or new generation.

As we continue to develop our business plan and develop our role as our regions' distribution system operator, it is critical we do so openly and transparently in dialogue with our customers and wider stakeholders. This document outlines our guiding principles for digitalisation, sets out our strategy, the outcomes we want to deliver and our vision for the digital future of our network and business.

Our Digitalisation Roadmap is a snapshot of where we are today. We want it to stimulate conversations with our customers and stakeholders and we are looking forward to working with all of our stakeholders and the communities we serve to refine and develop our plans. This work will sit within a suite of documents to support our business plan for the next price control period (ED2) running from 2023 to 2028, which we are developing ahead of formal submission in 2021.

Thank you for your continued interest, engagement and feedback.

Patrick Erwin
Policy & Markets Director

Tom Fielden
Finance Director

About this document

About this document

Why we have created this publication and how we set about the task.

At Northern Powergrid we recognise that digitalisation will underpin significant elements of the changes happening within the UK energy system, allowing for the transition from Distributed Network Operator (DNO) to Distributed System Operator (DSO). We are keen to share our Digitalisation Roadmap with stakeholders as early as possible. This supports the themes that OFGEM has brought forward in its planning guidance and represents the beginning of our collaboration with the wider energy sector to determine the right future path.

We have published this version of our Roadmap for Digitalisation early in our business planning process as we recognise that collaboration across the sector will be required to achieve some of the outcomes, particularly around open data. This document provides a high level view of our intention and direction but we envisage this being an iterative publication that will be revisited several times throughout our business planning process both to allow for stakeholder engagement and collaborative discussion with others in the sector to develop principles and standards.

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Stakeholder engagement

How you can help shape our digital vision and why we need your help.

This is the first version of our Roadmap for Digitalisation, dated December 2019. Stakeholder expectations, technology and commercial development keep moving fast within and outside Northern Powergrid. An ongoing dialogue about Digitalisation with customers, policy makers, regional stakeholders and colleagues will help us to refine this strategy. That ongoing dialogue will contribute to the production of a strongly evidenced plan for the RIIO-ED2 price control that provides our customers with what they need.

To produce this iteration of the Roadmap for Digitalisation, we plan to engage widely and utilise the newly formed Customer Engagement Group, which is an independent panel of experts brought together to challenge and shape Northern Powergrid's future plans, to scrutinise this area of our business plan.

Have your say

Please tell us what you think about our Roadmap for Digitalisation, how you feel about some of the key themes of this publication and our ambition to underpin our 2023–2028 business plan with technology and open data.

We would welcome your views on the goals, objectives and principles and our direction of travel we are setting out in this publication. We expect to have a specific set of engagements emerging in 2020 but any views on our plans are welcomed at any time. Send your comments to: yourpowergrid@northernpowergrid.com

Executive summary

Executive summary

The need for change is clear and we are responding

The Government's commitment to achieve net-zero emissions by 2050 and the climate emergency declarations from three quarters of our regions' local authorities are clear action-statements for a radical transformation in our collective efforts to tackle climate change. The pace of transformation in the UK energy system must now accelerate dramatically to meet this challenge.

This means enabling a system that provides carbon-free, safe and sustainable energy for homes and businesses. Delivering this will also require a profound increase in electricity demand to decarbonise transport and heating – an unprecedented scale of transformation in a short timescale. The way businesses, energy companies and networks operate must rapidly evolve to underpin this transition.

Electricity networks are critical enablers of decarbonisation. As a Distribution Network Operator (DNO) we are already responding. We are adapting our business to enable a smart, flexible and carbon-free energy system while continuing to deliver a safe, reliable and affordable service to the eight million people in our region. This is why we begun to expand our capabilities recast our role to become a platform for the optimisation of the region's energy system: our region's Distribution System Operator (DSO). Our vision is for the network to evolve into a trusted and neutral platform able to facilitate the optimisation of our region's energy system, minimise the need for new infrastructure, make the best use of low-carbon generation and minimise the need for expensive dedicated storage and high-carbon generation. By doing this we think the network can underpin a net-zero energy system and help use resources sustainably. At the same time, we want the network to continue to deliver what it does today, providing universal services for customers, suppliers and other providers that benefit everyone.

We want to implement, operate and participate in a digital energy network, while using technology to continuously innovate and evolve as a digital business.

Digital technology is a key enabler of our transition

Utilising digital technologies and capabilities is a key part of being a DSO. The digital technology revolution is transforming every area of society and energy networks are no different. New digital technologies, including automation, big data analysis and artificial intelligence, present enormous opportunities for us to innovate and transform how we operate our network. They are also driving profound changes in what our customers, partners, suppliers and employees expect from us as a business.

We want to implement, operate and participate in a digital energy network, while using technology to continuously innovate and evolve as a digital business. We are already implementing industry-leading digital innovation projects on our network and in our business practices to deliver new and better services that benefit our customers. In the near future that means embedding the digital transformation across everything that we do, deploying next generation digital capabilities to deliver an even more efficient, optimised network that reduces costs and provides new and improved services.

The digital transformation is providing the opportunity to:

- Deliver innovations that improve the effectiveness and reduce the overall cost of running the network; both capital costs such as new network infrastructure and the costs of operating the system.
- Empower consumers to become active participants in the energy system and adapt how it operates as it decarbonises.
- Transform our customer experience to provide more tailored services and support and drive higher standards of customer service.
- Better coordinate network operations and energy market operations, delivering greater efficiency and unlocking new opportunities that benefit our customers and support net-zero.
- Create a digital workplace, increasing our efficiency as a business, enabling more effective communication and collaboration and supporting greater employee satisfaction.
- Further improve the reliability, resilience and safety of our network.

Executive summary

Our plan to deliver a digital transformation

Our Digitalisation Roadmap sets out our vision to become a digital energy network, utilising all available digital tools and technologies to transform the capabilities of our infrastructure and business to support the 3.9 million homes and businesses we supply every day. It is an articulation of our ambition and forms the basis for consultation with our customers and stakeholders to confirm our approach is the right one: that it focuses on the right areas and meets expectations.

The Strategy sets out our guiding principles for digitalisation and outlines the direction of travel proposed, including:

- The digital trends impacting the utility sector and enabling the digital transformation.
- Our design principles that underpin the strategic focus and direction proposed.
- The long-term outcomes from digitalisation and the future initiatives that we believe could best achieve them.
- Best practice initiatives already underway to drive digitalisation of our network and business.

Our digital vision is based on the engagement and feedback we have had to date, and we will continue to seek from our customers and stakeholders. We also seek to go beyond the normal standards of our own industry and will benchmark our plans against leading digital companies and other sectors from tech and finance to aviation, manufacturing and healthcare.

The strategy forms an important part of our approach to becoming a DSO and meeting the challenge of achieving net zero. It will be an integral part of our next long-term business plan, which we are developing for the next regulatory price control period, ED2, which will run from 2023-28.

Ensuring the right outcomes through principles-led design

The development of our strategy for digitalisation is underpinned by a set of clear design principles. This ensures that innovation and initiatives that we propose are focused on delivering the right outcomes for our customers, our stakeholders and our business.

- Customer-led and socially inclusive: focused on delivering outcomes like system resilience that meet the needs and expectations of every home and business we serve.
- Facilitating efficiency: promoting competitiveness in the energy market and driving efficiencies within the business to reduce costs and ensure affordable services.
- Maximising the value of data to us, our customers and stakeholders: delivering value from and improving visibility of data to drive new more productive ways of working.
- Cyber security: continuing to deliver industry leading and future-proof cyber security performance.
- Supporting net zero: ensuring the flexibility to adapt as we transition to DSO and a zero-carbon energy system.

Investing in core digital capabilities

Customers are at the heart of our digital transformation. Our strategy for the digitalisation of our network and our business is wholly focused on delivering the most efficient, reliable, affordable and safe network possible, while also enabling the transition to zero carbon. In line with our design principles, we believe that the best customer outcomes can be delivered through focused investment on eight core areas that are central to the delivery of a genuinely digital network and digital business:

Our digital vision is based on the engagement and feedback we have had to date, and we will continue to seek from our customers and stakeholders.

Delivering a digital energy network:

1. Promoting data transparency:
collecting and sharing energy system data in a consistent and open manner to promote grid efficiencies and compliance.

2. Enabling data analytics and insights:
to improve system resilience and reliability by promoting greater transparency through sharing data across the wider energy network.

3. Improving network operations:
through utilising emerging technology, data and digital capabilities.

4. Digitalising the energy system:
using digital devices, advanced communications and interconnected systems to drive real-time decision making.

Building a digital business:

5. Improving our technology capabilities:
to drive down IT costs and risk from unsupported information technology whilst being able to realise future digital opportunities.

6. Leveraging intelligent automation:
to reduce manual tasks, speed up processes and re-focus effort on value added activities that boost productivity and efficiency.

7. Transforming customer experiences:
to better understand the customer journey from all perspectives and touchpoints and adapt our services to specific customer segments.

8. Enabling a digital workplace:
to speed up our working processes, allow employees to work together more effectively, share knowledge and gain greater collective insights.

Customers and stakeholders are at the heart of our plans

As we continue to develop our business plan and future role as our regions' distribution system operator, we will continuously seek to engage our customers, stakeholders and everyone with an interest and seek their views openly and transparently.

This document is the first stage in implementing our strategy for digitalisation. We are now seeking feedback and will engage in an ongoing dialogue with customers, policy makers, regional stakeholders and colleagues to refine this strategy and contribute to the production of a business plan for the RIIO-ED2 price control period that exceeds expectations and provides the best outcomes for our customers.

We plan to engage widely with our stakeholders and embrace challenge from our Customer Engagement Group [link]: the independent panel of experts brought together to challenge and shape Northern Powergrid's future plans, to scrutinise our digital proposals. The development of this strategy will also be informed by the work of the Energy Networks Association data working group, established to share industry digital best practice and coordinate collaboration on digital strategies throughout 2020.

We expect to publish an updated version of this strategy in spring 2020 and will continue to refine our plans ahead of the formal submission of our business plan to the regulator in 2021.

Analysis methodology

Using analysis from internal and external sources we went through a maturity and ambition assessment.

Internal and external analysis

The internal analysis was used to identify the business, regulatory and energy drivers whilst the external analysis provided wider insight and key trends. The analysis was used to define a set of desired outcomes that would set our Roadmap for Digitalisation and wider ambition.

DSO Plan 2019

Digital Utilities Transform Framework

Energy Data Taskforce Report

RIIO ED2

RIIO-ED2 Business Plan Guidance

External supporting documents

Desired outcomes and proposed initiatives

Using the digital ambition and maturity assessment and the extensive analysis, a set of desired outcomes were derived. These outcomes were linked to a set of example initiatives to help us build our digital roadmap.

Desired outcomes and example initiatives

Our maturity and ambition assessment

Our set of desired outcomes were assessed against industry leaders and leading digital companies to better understand its current and future digital ambition and maturity.

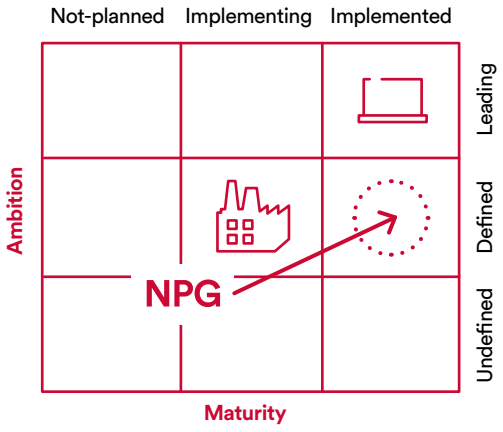
NPG

NPG's current state

NPG's future state

Energy & utilities

Digital natives

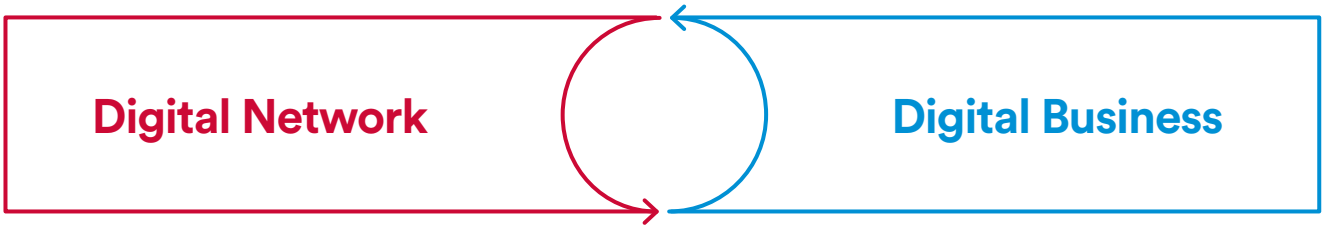


Outcome

A set of desired outcomes and initiatives were derived, helping us to explain our digital ambition and define a potential roadmap.

We recognise that, in order to deliver our vision and be the distribution system operator for our regions, we need to embrace digital as a business and that the two are intrinsically linked. This notion allowed us to explore and form two core capabilities that help set our ambition for digitalisation. We want to implement, operate and participate in a digital energy network whilst utilising technology and innovation to continuously evolve as a digital business.

Core capabilities



Desired outcomes

- Promoting data transparency
- Enabling data analytics and insights
- Improving network operations
- Digitalising the energy system

- Addressing technology affordability
- Leveraging intelligent automation
- Transforming the customer experience
- Enabling a digital workplace

Introduction

Key trends impacting the utility sector

DNOs are experiencing disruption, the change that occurs when new technologies and models affect existing value propositions. This trend is driving us to embrace digital.

Technology Push

Enhancing capabilities through technological and digital advancement

Consumer Expectations

Driving behaviours and expectations from non-Utilities experience

Value Chain Transformation

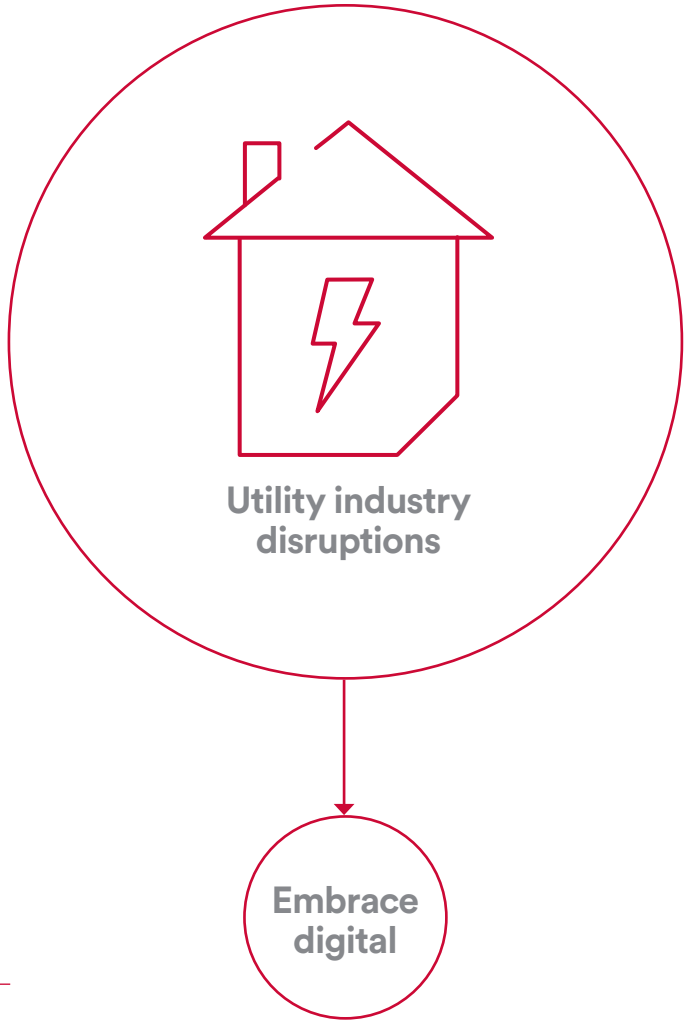
Changing business models e.g. DNO to DSO; managing the impact of energy transition

Transformation of the Workforce

Changing the ways of working; Impact of digital in the workplace

Regulatory Change

Providing opportunities whilst also imposing restrictions



Shifting from “digitisation” to “digital transformation”

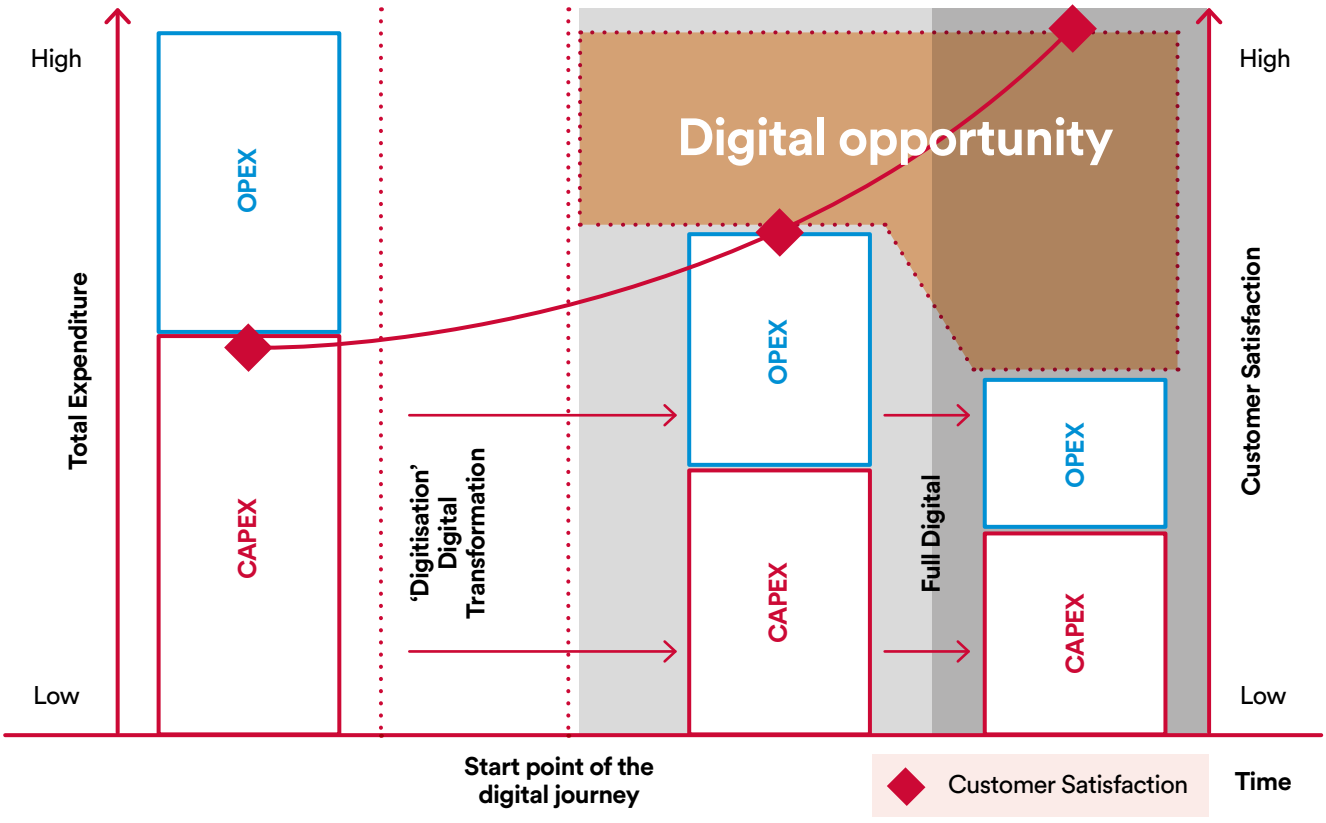
Some DNOs have embraced “digitisation” but to fully realise the benefits of digital, we may need to make a step change in this area.

“Next Generation” digital capabilities (people, process, technology and data) have been developing rapidly in their availability, relevance and adoption across all industries. The speed at which new products are developed and the impact on customer satisfaction are growing exponentially.

“Digital transformation” provides the opportunity to:

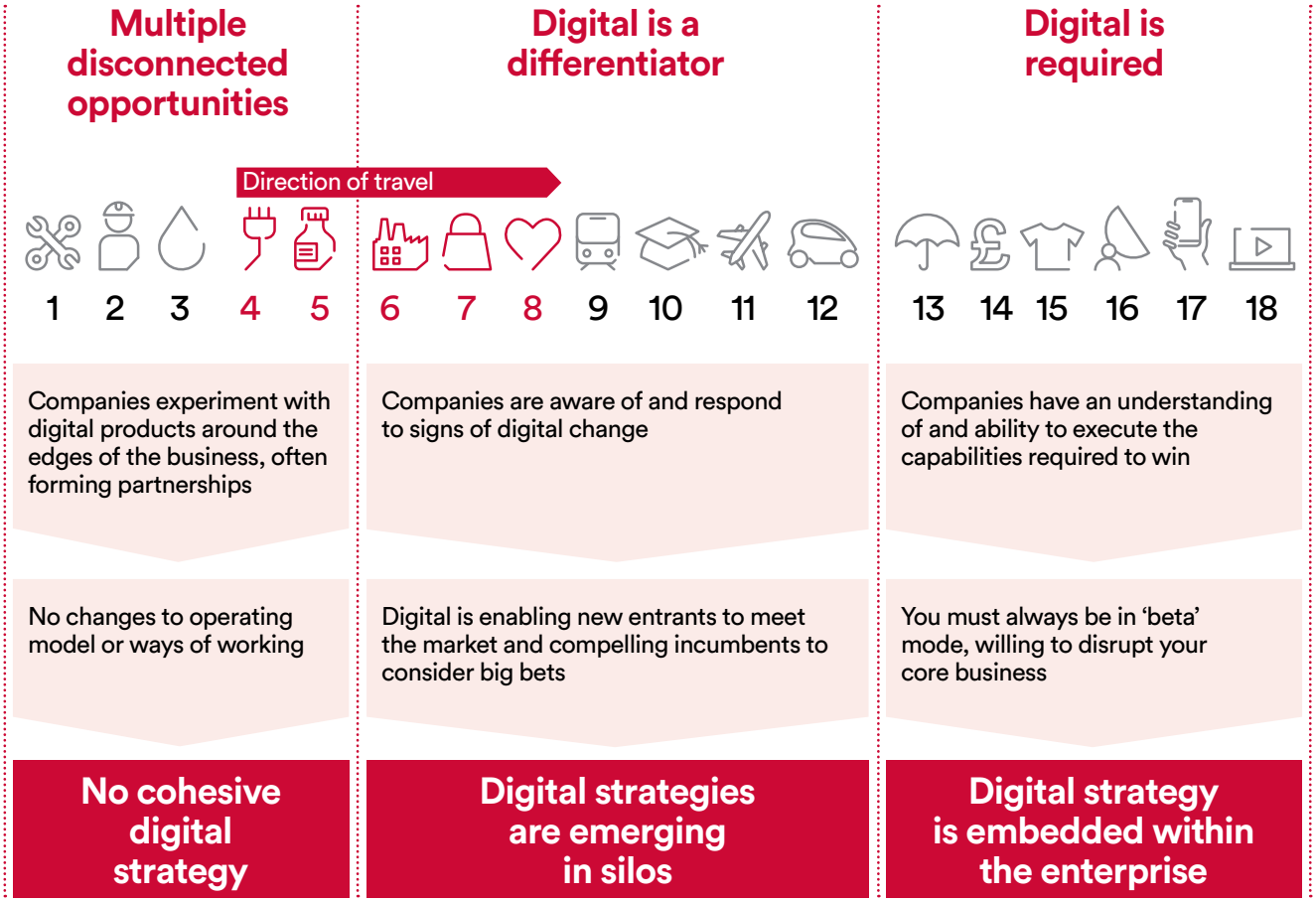
- Reduce total business costs, both Capex and Opex
- Drive higher standards of customer service
- Improve safety and employee satisfaction
- Increase investment effectiveness
- Coordinate network operations and market operations

This graph seeks to demonstrate the opportunity that digital could bring in terms of reducing the total operating expenditure of a business if adopted fully.



Positioning ourselves digitally – external benchmark

Far from being unwelcome, it is necessary to embrace disruption and "catch up" to leading digital companies to position us for success in the changing market.



Key

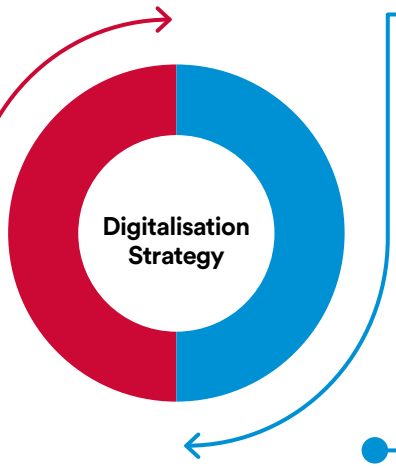
1 Construction
2 Mining
3 Oil and Gas
4 Utilities
5 Pharma
6 Manufacturing
7 Consumer Products
8 Healthcare
9 Transport
10 Education
11 Airlines
12 Auto
13 Insurance
14 Banking
15 Retail
16 Telco
17 Tech
18 Media

Digitalisation drivers and design principles

Driven by internal and external drivers, our Digitalisation Roadmap is underpinned by a set of design principles.

External drivers to change

- Adapting to changing customer needs
- Transitioning from a DNO to a DSO
- Complying with the new regulatory framework
- Energy transition and drive to “net zero” carbon



Internal drivers to change

- Improving productivity
- Optimising its cost structure
- Finding new ways of delivering value
- Embracing innovation

Underpinning design principles

Security is a hygiene factor
Continuing to lead security performance in the digital arena within the sector

Customer led
Transforming the value proposition to deliver experiences led by internal and external customer needs and enabled by new colleague solutions

Facilitating efficiency
Promoting competitiveness in the market and driving efficiencies within the business to offer affordable services

Maximising the value of data to us, our customers and our stakeholders
Delivering value and improving visibility of data to proactively drive new ways of working in a more productive way

Keeping the future in mind
Having flexibility within the design of the system to adapt to changes e.g. energy transition and the move from a DNO to DSO

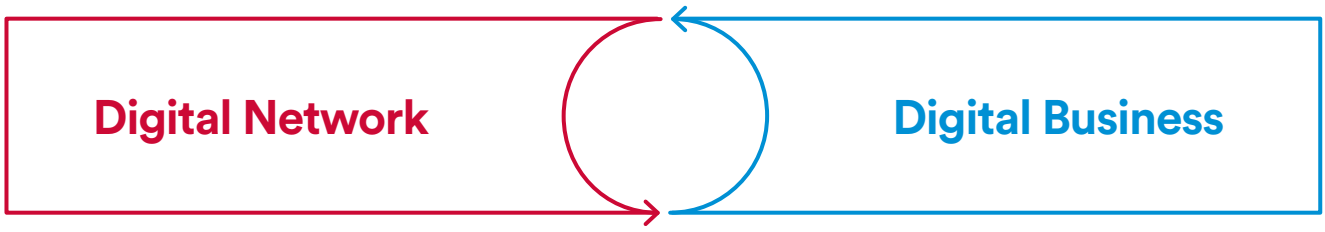
Desired outcomes

The design principles are supported by macro-capabilities, which iteratively optimise and transform the wider business and energy network. The macro-capabilities are underpinned by a set of desired outcomes, helping us shape a pathway to being digital leader.

Design Principles

- Security is a hygiene factor
- Customer led
- Facilitating efficiency
- Maximising the value of data to us, our customers and our stakeholders
- Keeping the future in mind

Core capabilities



Desired outcomes

- Promoting data transparency
- Enabling data analytics and insights
- Improving network operations
- Digitalising the energy system
- Addressing technology affordability
- Leveraging intelligent automation
- Transforming the customer experience
- Enabling a digital workplace

The journey so far: digital network

Over the past few years we have already committed significant time and effort to getting underway with some of these initiatives.

Capability	Outcome	Initiative	
Digital network	Promoting Data Transparency	Members of the open data group	We have become members of the Open Data Institute to deepen our skills and understanding of open data, We are publishing and consulting early next year on our Distributed Future Energy Scenarios through open data, to co-develop our regional forecasts together with our stakeholders.
	Enabling data analytics and insights	Condition based risk management	Use of mathematical algorithms to assess & predict asset health using data. Informs capital investment decision making, determination of maintenance policy and regulatory reporting on network outputs.
		Distribution system analysis	Power system design tools form a "digital twin" of the network used to model a wide variety of operational conditions as we transition to more active network operation. In combination with network monitoring data this is a key DSO enabler to providing information on the energy network.
		Fault anticipation	Our Foresight project is developing fault prediction and location techniques using data collected on our low voltage network and deploying network technology to automate the restoration of supplies to customers.
	Improving network operations	Smart Grid Enablers Deployed	We are delivering a £83 million Smart Grid Enablers programme, which is transforming our ability to monitor, control and communicate with more than 860 major substations and 8,000 distribution substations. This will enable us to respond to real-time information about power flow on our network.
		Active network management	Rollout of standardised control systems to provide quick and cost effective flexible connections for customers. Continued development of integration with core network management system and provision of real time data to other network operators
		Network automation	Deployment of remotely controlled network switches in conjunction with automated network switching algorithms to minimise the number & duration of customer interruptions.
	Digitalising the energy system	Auto design	Innovation project that allows customers to interact with a digital model of our network and self quote for network connections such as new housing and public electric vehicle charging points. The tool also provides a first of its kind heat map of capacity for local low voltage networks.
		Smart metering	Cross-business programme covering: deployment of smart metering gateway, use of smart metering data in daily operation of the network and responding to customer interruptions, exploring innovative ways of using smart metering data in network design.

The journey so far: digital business

As well as initiatives that have begun our journey to being a leading digital business.

Capability	Outcome	Initiative	
Digital Business	Improving operational performance of the IT function	Removal of obsolete technology	We are moving to an evergreen technology environment whereby we are continually iterating to avoid technology debt and encourage the adoption of emerging technology to drive efficiencies.
	Leveraging intelligent automation	Robotic Process Automation pilots	We have successfully piloted a number of RPA initiatives across our back and front office functions proving that we can make efficiency gains and make process improvements in a rapid and responsive way.
		Machine learning data pilots	We have undertaken a proof of concept whereby we have ingested some of our operational data into a repository and allowed a machine learning algorithm to spot patterns that might help us predict things such as our estimated time to recover from a fault.
	Transforming customer experience	CRM Multi-phase implementation	We have deployed an agile developed customer relationship management tool to allow our customers to self-serve on an increasing number of services we provide. We will continue to develop new services throughout ED1 and utilise this as an underpinning service into ED2.
		Customer Records	We have been progressively implementing Oracle Customer Relationship Management (CRM) across our key service lines. We now provide a fully- integrated service across all communication channels and hold a single record of customer information, which plays a key part in our customer satisfaction improvement plans.
		Self quote tool for LV connection works	Automation tool is a new online, self-service tool that will give budget estimates on LV connections in minutes, and for free. It has the ability to guide customers to the most cost-effective connection option. We expect it will accelerate low carbon technology deployment by our customers, and to assist our own LV design processes.
	Enabling a digital workplace	Modern Technology Deployment	We are enabling new capabilities for our colleagues by investing in rolling out modern devices and software to support efficient collaboration, better connectivity and ease of use. All of which allows our colleagues to be empowered to deliver excellent customer service.

The journey so far: digitalisation case studies

Some further case studies of our journey so far.

‘Activating Community Energy’: gaming as a way to engage customers in flexibility

We ran the world’s first trial to show how a mobile game could be used to incentivise households to reduce their consumption at times of peak demand. More than 2,000 customers took part in GenGame, competing for cash prizes by turning off washing machines, televisions, lights and other home devices. The three-year project demonstrated that players could be encouraged to cut their electricity consumption by an average 11%.

Domestic customers are an important potential source of flexibility. Homes account for 95% of our customers and 35% of the electricity we distribute, and domestic energy use will grow as electric vehicles and heat pumps are adopted more widely. The Activating Community Engagement (ACE) project generated important insights into how to recruit customers to provide flexibility, how to maintain their engagement and how to use gaming technology to maximise results. It also helped us understand important demographic issues such as which types of customers are most likely to take part and which can deliver the most flexibility.

Domestic demand side response (DSR) could compete in the new flexibility markets that are being developed, but it would require an aggregator to achieve the necessary scale. By testing a technology that enables domestic DSR, ACE is helping an emerging market diversify its offering. Community energy groups have told us they need support to kick-start this market and level the playing field on providing flexibility services. A market in domestic DSR will ultimately benefit our customers, by giving them more choice, and the energy system, by providing more competition for flexibility tenders.

‘Foresight’: using data intelligence to avoid power cuts

The transition to DSO includes making use of intelligence from data to develop increasingly active networks that deliver high levels of reliability and availability for customers. Identifying and preventing potential power cuts before they happen will help us deliver on this customer-focused ambition. We can do so by improving our understanding of our network’s status through data analysis. Foresight is a three-year project that will enable us to spot the tell-tale signals on the network before a fault happens. It will improve our understanding of indicative pre-fault behaviour of low-voltage cable networks and our ability to develop management options for it.

A greater understanding of fault types will support a radical change in our approach to replacement works and will improve network reliability, efficiency and maintenance programmes, which will benefit our customers and result in less physical disruption on the network and roads. If we can fix faults in advance, we will keep the power flowing to all of our customers and not only play our part in resource conservation by saving materials, but also minimise the need to dig up roads, which causes traffic disruption for local businesses and householders. Northern Powergrid currently has a policy that sees 250 metre sections replaced after four faults. With Foresight completed, the company will be able to minimise the time taken on cable replacement programmes by only replacing short faulty sections.

The journey so far: digitalisation case studies

Some further case studies of our journey so far.

Flexibility services

Our Customer-Led Distribution System (CLDS)48 project is exploring how to accommodate large volumes of new technologies, such as local generation and electric vehicles, at least cost, while at the same time enabling customers to earn income by selling energy or services to balance the network. It will make recommendations on the market design and industry structure, and contribute to our roadmap for transition. We will explore various platforms on which flexibility can be traded and which may provide the required back-office functions. We will provide a level playing field for all technologies and business models providing solutions to capacity constraints. Customer technologies will compete on their merits

Realising smart meter benefits

Widespread roll-out of smart meters and the associated introduction of half hourly settlement and time of use tariffs will allow new offerings to emerge as choices for customers. We will monitor the impact of these tariffs on customer behaviour, specifically changes to customer demand profiles and energy consumption. This in turn will require us to reassess some of our network planning and design assumptions. Initial indications from innovation projects and early trials with customers are that these changes in demand profiles can help to prevent network constraints from arising. The half hourly settlement and time of use tariffs technology and the associated commercial offerings, in turn, make it possible for us to pass on flexibility signals to a wider range of customers compared to now. Engagement with energy suppliers will be required to understand how network cost signals will be experienced by and made visible to customers.

Desired outcomes

Desired outcomes

Our desired outcomes have been analysed to derive a set of initiatives that will create a digital roadmap for the remaining years of the current regulatory RIIO-ED1 period (2020–2023) as well as the next regulatory RIIO-ED2 period (2023+).

Digital Network

Digital Business

Promoting data transparency
— Contributing to an open energy system while managing risks and information security appropriately
— Enabling data (e.g. asset data and energy system data) to be shared in a data catalogue

Enabling data analytics and insights
— Enabling the use of data to improve performance
— Maintaining a digitally accessible asset register

Improving network operations
— Leveraging data-driven tools to improve network operations

Digitalising the energy system
— Maintaining a digitally enabled energy infrastructure
— Improving network monitoring capabilities and automating network decision making

Improving our technology capabilities
— Addressing technology affordability
— Reducing technical debt

Leveraging intelligent automation
— Enabling the workforce with automation tools that help them focus on value added tasks

Transforming customer experience
— Accessing accurate customer information on an omni-channel basis to provide tailored services

Enabling a digital workplace
— Enhancing employee collaboration and mobility with the latest digital platforms, skills and collaboration spaces

Promoting data transparency

Enhancing data consistency promotes data accuracy and compliance, driving standardisation in data-related activities.

Outcome

We will unlock innovation in the design and operation of the electricity grid by collecting and sharing energy system data in a consistent and open manner to promote grid efficiencies and compliance.

Benefits

- Promoting data consistency improves governance, reporting and supports growth of and adaptation of a flexible energy network for the transition of DNO to DSO
- Having clear ownership of datasets improves the usability, integrity, compliance and security of the data
- Identifying data quality and granularity issues promotes data quality, helping asset managers better understand the assets

Example initiatives	Example impact on us
Data Strategy	— A Data Strategy will provide a strategic direction and standards for data related activities (e.g.: acquire, store, manage, share and use) — We will be able to undertake data-related activities in a consistent and open manner across the organisation
Data Catalogue	— A Data Catalogue will allow the user to locate data sets quickly — We will establish a good understanding of the existing data and identify gaps across the organisation
Data Platform	— We will create a data platform (e.g.: data lake) to integrate both network and business data — The Data Platform is a broader initiative that expands the current “Asset Data Platform” to the broader business

Enabling data analytics and insights

Leveraging analytics will provide meaningful insights to foster greater visibility of the energy system.

Outcome

We can leverage data analytics to improve system resilience and reliability by promoting a more transparent view through sharing data across the wider energy network.

Benefits

- Having a better visibility of the energy system brings greater resilience and reliability
- Allowing third parties to extract and input data drives market competition
- Enhancing cybersecurity allows potential threats to be detected and prevented at an early stage

Example initiatives	Example impact on us
Creating an "NPG Analytics Function"	— The new analytics function will be a dedicated team that will extract value from data to deliver insights — The dedicated analytics team will help to industrialise the use of analytics across the wider business
Drive a common Cyber function across OT and IT	— We will be able to further reduce the risk to threats by creating a dedicated cybersecurity function across OT and IT — The team will be able to leverage predictive analytics to anticipate risks and threats at an early stage
Open APIs for data	— We will allow third parties to extract and input asset data through the use of open APIs — A "digital system map" can be created using the asset data to enable grater competition and drive investment

Improving network operations

Embracing technology innovation will drive safety, reliability and efficiency throughout our business.

Outcome

We will be able to improve operational efficiencies whilst enhancing the safety and reliability of the network by embracing emerging technologies and digital opportunities. This will allow us to start moving towards a preventative maintenance culture.

Benefits

- Improving network monitoring capabilities supports predictive maintenance, driving down capex and opex
- Transforming the current control centre and wider operational management of the distribution network
- Automating field operations improves security of supply by reducing response time, driving down Customer Interruptions (CIs) and Customer Minutes Lost (CMLs)

Example initiatives	Example impact on us
Intelligent work scheduling	— An intelligent work scheduling platform will use asset and operations data to visualise and optimise field work schedules — We will optimise resources to improve productivity and reduce labour costs
Control centre of the future	— Our control centre(s) will be able to independently regulate the dynamic grid with an autopilot function whilst keeping the grid stable — We can promote reliable services as a neutral market facilitator, facilitating flexibility in the network
Blockchain technology to streamline transactions along the utility value chain	— We will explore the potential of blockchain to allow real-time transactions balancing power supply and demand so promoting a prosumer model — We will use blockchain to monitor and maintain the network more efficiently and securely, leading to faster response times

Digitalising the energy system

Advanced technology and data analytics will digitalise the energy network, driving real-time decision making, improving stability and reliability of the grid.

Outcome

We will control, optimise and manage the network more effectively by using digital devices, advanced communications and interconnected systems to drive real-time decision making.

Benefits

- Increasing remote data access promotes seamless and flexible business operations whilst driving employees' productivity
- Further automating network decision making improves operational safety whilst reducing response time
- Leveraging the use of data analytics to optimise operations drives IT and OT convergence

Example initiatives	Example impact on us
Deployment of IoT enabled sensors across the network	— We will be able to further increase the number of available energy system datasets by installing IoT-enabled sensors — Updating the infrastructure with IoT enabled sensors will unlock new data capabilities and opportunities
Digital asset lifecycle management platform	— Asset managers and users will record and process asset data more effectively through the use of a digital asset lifecycle management platform — The platform will allow us to make critical data-driven decision throughout the asset's lifecycle from design to decommissioning
Digital field services	— We will enhance and automate field operations by the use of digital field services — Examples of digital field services: drones for line inspection, augmented reality for better locating underground lines and substation inspection robots

Improving our technology capabilities

Addressing technology affordability will allow us to optimise its cost structure by reducing technical debt, moving the IT function towards a leaner IT function.

Outcome

We will be able to improve operational efficiencies whilst enhancing the safety and reliability of the network by embracing emerging technologies and digital opportunities. This will allow us to start moving towards a preventative maintenance culture.

Benefits

- Improving network monitoring capabilities supports predictive maintenance, driving down capex and opex
- Transforming the current control centre and wider operational management of the distribution network
- Automating field operations improves security of supply by reducing response time, driving down Customer Interruptions (CIs) and Customer Minutes Lost (CMLs)

Example initiatives

Example impact on us

Cloud transformation

- Leveraging a cloud based IT model will enable us to seize digital opportunities
- By adopting a hybrid cloud operating model, we will start the journey towards a more effective IT function

Applications rationalisation

- An application rationalisation programme will help us reduce cost by identifying which apps should be kept, retired or consolidated
- After the rationalisation, decommissioning apps will allow us to shut down legacy applications to reduce maintenance costs

Building an effective digital partner ecosystem

- We will assess and engage the right digital partners and commercial models to deliver valuable digital products and services
- By partnering up with new providers, we will leverage an ecosystem to allow the introduction of new capabilities when needed

Leveraging intelligent automation

Intelligent automation will enable us to reduce manual tasks and so focus on value added activities.

Outcome

We will be able to leverage a set of automation tools that will reduce manual tasks, speed up processes and re-focus effort on value added activities to boost productivity and

Benefits

- Faster process cycle times means shorter lead time and thus improves productivity
- Performing tasks the same way every time improves consistency and compliance with regulation
- Reduction of errors offers extreme accuracy and uniformity

Example initiatives	Example impact on us
Organisation-wide map of business processes	— An organisation-wide process map will allow us to have a single view of its business processes — We will be able to identify processes to be automated in the future
Development of an automation business case	— Business cases will enable us to understand the return on investment of automation — We will be able to prioritise the processes that can be automated based on the business case
RPA discovery	— An RPA discovery will serve as a proof of concept to assess the benefits in a safe testing environment — We will be able to test, learn and industrialise RPA post discovery
Machine learning discovery	— A machine learning discovery will allow us to test the benefits of machine learning for its processes — We will understand the value of different machine learning techniques, e.g.: supervised, unsupervised and reinforced, to later operationalise the techniques across the wider business

Transforming customer experience

We will transform the customer experience to offer customer-centric and tailored services to specific customer segments.

Outcome

We can deliver enhanced customer experience by tailoring and improving our services. We will continue our journey to understand our customer's journey from all perspectives and touchpoints to adapt our services to specific customer segments.

Benefits

- Providing integrated omni-channel experiences and tailoring services will improve customer satisfaction and perception
- Providing customers with the ability to self-serve reduces the costs of services and improves the customer journey

Example initiatives	Example impact on us
Omni-channel customer experience	— We will create an integrated customer experience across multiple channels — Delivering an integrated and seamless customer journey will enable us to drive customer satisfaction by putting the customer at the centre
Integrated customer and asset data platform	— A single view of the customer will connect all the customer touch points in one place — Having a single view of the customer and connecting it with asset data will provide an efficient and effortless services to our customer and colleagues (e.g.: integrating Connection Records)
Self-services platform	— We will create a self-service platform to offer services without the need for human interaction — The platform will allow customers to ask for new services as well as to check the current status of tickets (e.g.: job tracking)
Tailored services	— We will leverage data to segment customers and improve its services — By adding analytics to customer data, we will anticipate the customer's needs and offer tailored services to specific segments whilst improving its perception

Enabling a digital workplace

The digital workplace initiatives aim to provide our employees with digital tools and skills to improve mobility, collaboration and productivity, moving the workforce away from routine work whilst improving the overall employee experience.

Outcome

The digital workplace aims to enable employees with the platforms and tools to speed up work processes and work together effectively. Such platforms would enhance the sense of community as employees connect across the organisation, share knowledge and gain insights from each other.

Benefits

- Enhancing collaboration will speed up working processes and thus improve operational efficiency
- Employee satisfaction drives talent retention
- Embracing new ways of working will help us become more agile in the way we work

Example initiatives	Example impact on us
Employee experience assessment	— An employee experience assessment will undercover the pain points that employees encounter in their activities, e.g.: field, office and contact centre activities — The assessment will allow us to focus future investment on digital skills and tools to address employee's needs and wants
Workforce upskilling	— A workforce upskilling initiative will allow us to understand our current employees' digital abilities and provide a direction on how to fill the digital ability gaps — By upskilling the workforce and bringing them on the digital journey, we will improve talent attraction and retention
Creating a "Digital Delivery Capability"	— A "Digital Delivery Capability" will foster a delivery model that can rapidly supply digital products and services to both us and our customers — Establishing a "Digital Delivery Capability" will align approaches to leading industry practice whilst giving us the ability to embrace in new ways of working

Customer impact

The work we intend to do and the initiatives we expect to kick off have the needs of our customers at their heart.

We will support the growth and adaption of a flexible energy network by promoting data consistency and improving governance and reporting.

We will help drive greater resilience and reliability by continuously improving the visibility of energy system data for ourselves and other interested parties.

We will enable third parties to extract and share data with us to help drive market competition.

All while continuing to enhance our cybersecurity posture, allowing potential threats to be detected and prevented at an early stage.

We will drive down Customer Interruptions (CIs) and Customer Minutes Lost (CMLs) by continuing to automate field operations, improving security of supply by reducing response times.

We will improve operational safety whilst reducing response times by further automating network decisions.

Conclusions and next steps

Conclusions and next steps

We have set our ambition at a high level and now we need to engage with our stakeholders and sector to build this into our business plan for RIIO-ED2.

Our ambition is clear, we seek to embrace digitalisation whilst staying true to our principles.

We believe that setting our ambitions in this way can drive a real and positive impact for our customers.

Although this is the initial publication of our roadmap, we seek to begin a series of engagements with stakeholders to build on this in 2020 and to help shape this area of our business plan for our next regulatory period.

Have your say

Please tell us what you think about our Roadmap for Digitalisation, how you feel about some of the key themes of this publication and our ambition to underpin our 2023-2028 business plan with technology and open data.

We would welcome your views on the goals, objectives and principles and our direction of travel we are setting out in this publication. We expect to have a specific set of engagements emerging in 2020 but any views on our plans are welcomed at any time. Send your comments to: yourpowergrid@northernpowergrid.com

Glossary

Some of this document used terms that might be unfamiliar so we have tried to explain some of these below.

DER:
Distributed energy resource

DG:
Distributed generation

DNO:
Distribution network operator

DSO:
Distribution system operator

DSR:
Demand side response

EHV:
Extra high voltage

ESO:
Electricity system operator

EV:
Electric vehicle

HV:
High voltage

LV:
Low voltage

LCTs:
Low-carbon technologies

RIIO-ED1 or ED1:
The current price control which runs from 1 April 2015 to 31 March 2023

RIIO-ED2 or ED2:
The next price control which will run from 1 April 2023 to 31 March 2028

RPA:
Robotic Process Automation

V2G:
Vehicle-to-grid