UK Power Networks
Delivering your electricity

Placing customers and communities at the heart of Net Zero

RIIO-ED2 Business Plan 2023 – 2028

How we have structured our plan

Introduction

Chapter 1:
A message from our CEO 01

Chapter 2:
Who we are 03

Chapter 3:
Executive summary 04

Appendix 1: Glossary

An open and transparent approach to business plans

Chapter 4:
Business Plan assurance 21

Appendix 3: DAG submission

Chapter 5:
Social Contract 23

Appendix 4: Social Contract

Chapter 6:
Our RIIO-ED1 track record 27

Appendix 2: Our RIIO-ED1 track record

Chapter 7:
Giving consumers a stronger voice 37

7.1 Customer and stakeholder engagement
7.2 Customer Engagement Group
7.3 Ongoing engagement

Appendix 6: CEG challenge

Chapter 8: **New**
Decarbonising our communities 53

8.1 Context
8.2 Critical success factors
8.3 Monitoring the implementation of our strategy

Delivering value for money services

Chapter 9:
Meeting the needs of consumers and network users 59

9.1 Customer service
9.2 Consumer vulnerability
9.3 Connections
9.4 Our Consumer Value Propositions

Appendix 7: CVP details
Appendix 8: Our vulnerability strategy
Appendix 9: Our Major Connections strategy

Chapter 10:
Maintaining a safe & resilient network (including): 87

10.3 Network reliability
10.4 Asset resilience
10.6 Workforce resilience

Appendix 10a:
Non-load overarching investment framework
Appendix 11: Reliability
Appendix 12: Cyber resilience strategy
Appendix 13: Workforce resilience strategy
Appendix 14: Climate change adaptation strategy
Appendix 15: Safety

Chapter 11:
Delivering an environmentally sustainable network 117

Achieving Net Zero

Appendix 16: Our Environmental Action Plan

A smart flexible energy system

Chapter 12:
Enabling whole system solutions 128

12.1 Whole systems
12.2 Establishing a DSO

Appendix 18: Our DSO strategy
Appendix 19a: Whole systems strategy
Appendix 19b: Local Area Energy Planning framework

Chapter 13:
Unlocking the potential of digital and data 152

Appendix 17a: Digitilisation strategy
Appendix 17b: IT&T strategy
Appendix 17c: Data best practice strategy

Chapter 14:

Innovation 159

Appendix 20: Our innovation strategy

Keeping consumer bills low

Chapter 15:
Competition 167

15.1 Competition
15.2 Early and late competition models
15.3 Native competition

Appendix 22: Procurement code of conduct

Our Business Plan is supported by a number of other documents. This includes 86 Engineering Justification Papers (EJP) and 37 Cost Benefit Analysis (CBA) to underpin the programmes of work contained in the Business Plan. We have also includes 11 Engagement Summaries and Line of Sight documents to provide traceability from our customer research and engagement to our commitments.

Chapter 16:
Managing uncertainty 171

16.1 Forecasting and scenarios
16.2 Managing external uncertainty
16.3 Real price effects
16.4 Ongoing efficiency
16.5 Regional factors

Appendix 21a: Load related expenditure
Appendix 21b: DFES technical report
Appendix 21c: Stakeholder reports
Appendix 23: Uncertainty mechanisms
Appendix 24: Regional factors

Chapter 17:
Costs and financial information 186

17.1 Overall totex summary
17.2 Totex forecast
17.3 Direct cost information
17.4 Indirect cost information
17.5 Access and charging reforms
17.6 Financial information

Appendix 25a: Financial Information
Appendix 25b: The cost of equity for RIIO-ED2
Appendix 25c: Review of Ofgem's FD additional costs of borrowing
Appendix 25e: Price Effects for the RIIO-ED2 Price Control Review
Appendix 26: Cost assessment and benchmarking

A message from our CEO

Having consulted on our Initial Business Plan, I am delighted to present an overview of our Final 2023-2028 Business Plan for RIIO-ED2. Our plan aims to maintain UK Power Networks as one of the best performing network companies in Great Britain. We will do this against a backdrop of transformative change in the energy system and in our society as we decarbonise every aspect of our economy.

We finalised our Business Plan at the same time that the UK was hosting the 26th UN Climate Change Conference of the Parties (COP26). It is clear that decarbonisation is one of the greatest challenges facing our generation. Engaging with our customers, wider communities and stakeholders on our role could not be more important; in fact, I believe it is vital in order to maintain public support for Net Zero. That's why we have undertaken our most extensive customer research and stakeholder engagement to date, involving over 19,000 people right across our regions, to help us develop a Business Plan that delivers on their needs and priorities. This included targeted conversations on our Initial RIIO-ED2 Business Plan proposals, conducted over the summer of 2021.

Our engagement has informed a new vision for our organisation, providing clarity of purpose for our 6,200 employees and our supply chain partners. Reflecting the changing world and our customers' and stakeholders' priorities, our vision can be summarised as four strategic imperatives that support our ambition to be the best performing Distribution Network and System Operator. These imperatives are to be an employer of choice, a respected and trusted corporate citizen, sustainably cost efficient and to enable the Net Zero transition for all.

Our vision

UK Power Networks' vision is to be:

- An employer of choice
- A respected and trusted corporate citizen
- Sustainably cost efficient
- Enabling the Net Zero transition for all

To be consistently the best-performing Distribution Network and System Operator in the UK within an agreed set of values

Respect | Continuous Improvement | Diversity and Inclusiveness | Responsibility | Unity | Integrity

We can all play our part in decarbonisation by becoming "producers" as well as "consumers" of energy and by responding to compelling propositions to consume when it's cheaper and greener to do so. This is key to placing customers and communities at the heart of Net Zero.

Aligned to this vision, we are making clear and unambiguous commitments – backed with targets, so that we can be held to account for our performance.

We will be pushing the frontier performance for our sector in the core areas of safety, customer service, reliability and resilience at the lowest possible cost for customers.

We have already distinguished ourselves in RIIO-ED1 and will now benchmark ourselves against the very best organisations, wherever they may be found.

But we know this is not enough. We heard loud and clear from our customers and other stakeholders that we need to demonstrate leadership to make this exciting Net Zero future a reality.

That's why we are:

- Making clear commitments to support our communities to decarbonise, by co-developing their local area energy plans.
- Proposing innovative approaches to lower connection costs in order to help unlock public on-street charging, tackling one of the key consumer barriers to buying an electric vehicle (EV).
- 'Walking the talk' – being the first DNO to verify its carbon targets, including supply chain emissions, with the Science Based Targets Initiative. Furthermore, setting ambitious Net Zero targets focused on our operational emissions by 2028.
- Going beyond Ofgem's minimum requirements to support those customers suffering fuel poverty who may be at risk of being left behind and vulnerable in this energy transition. We are also one of the signatories to the UK's 'Levelling Up Goals,' collaborating to deliver 14 social mobility goals.
- Playing a proactive role, working with other trusted organisations, to support our customers close the "knowledge gap" on how they can move to a more energy efficient and greener way of living.

Demonstrating the leadership to make Net Zero a reality requires us to recognise that aspects of the future cannot be known with certainty. Whilst the target of Net Zero by 2050 is clear, the pathways to get there are uncertain. We need to ensure that our networks do not block the path to decarbonisation, but we also need to protect consumers from unnecessary bill increases – the importance of this has been heightened by the tough economic conditions resulting from the Covid-19 pandemic and recent energy price rises.

We are going to make this exciting future a reality by:

- Establishing an independent Distribution System Operator (DSO), as a separate legal entity, by no later than 2023. Our DSO will have stretching performance measures and an independent supervisory board that will deliver transparency of investment decision-making and ensure that the overall lowest cost solutions for customers are adopted.
- Setting ambitious targets for opening up competition going beyond Ofgem's expectations. In addition to promoting competition in markets that are already contestable, we have challenged ourselves to lead the way by introducing competition in new areas of our business. We have identified over £100m of work to encourage wider competition in areas of our business not yet fully exposed to competition.
- Accelerating the development of the most open and liquid local flexibility markets that maximise the benefits of smart charging and other demand side solutions.
- Investing in state-of-the-art technology, from sensors in our substations through to Artificial Intelligence, and utilising smart metering data to get the most granular and accurate view of all our low voltage networks to maximise their utilisation and to ensure we invest in the right capacity at the right time.
- Openly publishing our network and asset data to unlock new innovation and customer propositions.
- Collaborating with other organisations to play our role in developing compelling consumer demand response propositions.

But technology and data alone are not enough. We need a different mindset that challenges the traditional view of Distribution Network Operators (DNOs). According to this traditional view, DNOs just invest in building the network, ignoring the full potential of a smarter and more efficient energy system. As we have shown in RIIO-ED1, we do not conform to the traditional stereotype of DNOs. We have built a culture that challenges the status quo, that encourages flexibility, innovation and collaboration, all underwritten by a workforce that operates with agility and pace.

Our extensive modelling, built bottom-up in conjunction with local authorities and technology experts, predicts that there will be anywhere between 1.6m to 2.7m EVs connected to our networks by the end of RIIO-ED2. To keep bills low, our strategy is to maximise the utilisation of the existing network first, to foster energy efficiency, and to promote the use of flexibility and market-based solutions. Only when we have exhausted all other options will we invest to upgrade the networks taking a "one touch" approach – as far as practical, we will seek to make a single intervention which will cover foreseeable future upgrades.

That's why in our Business Plan, we have included investment in our baseline plan of £4.6 billion where we are highly confident of the need. We have forecast the need for an additional £0.9 billion of potential investment subject to uncertainty mechanisms if the transition to Net Zero happens at the pace implied by the CCC's Widespread Engagement pathway. This approach – asking for a level of baseline spend that we are confident will be needed, but also building in the flexibility to respond to additional needs – will ensure we meet the challenge of Net Zero whilst protecting the interests of our customers; it will protect customers from paying for investments that they do not use.

We recognise our approach will require us to respond with agility if demand exceeds our base assumptions. We know we can do this because we faced a similar challenge in the last decade when we needed to connect renewables and operate a network with 9.5GW of distributed generation.

We have already begun work to further strengthen our organisational resilience to respond to higher levels of demand. We will continue to develop detailed plans that will ensure our workforce and supply chains are able to respond quickly as the pathway becomes clearer.

Our Business Plan is ambitious, well justified and delivers long-term value for money for our customers. If society-wide change occurs in line with our baseline plan, which represents the lowest cost pathway to Net Zero, customers will benefit from an average price decrease of 15% in real terms over the RIIO-ED2 period. But we can also deliver the investment required if the highest case scenario materialises, with an average price decrease of 10% in real terms.

Following completion of our Initial Business Plan in July 2021, we have received and acted on feedback from our Customer Engagement Group (CEG), the RIIO-2 Challenge Group and from Ofgem. We have also undertaken further engagement with our stakeholders, have challenged ourselves to be even more ambitious in areas that matter most, and have further developed our planning to ensure we are ready to hit the ground running from 1 April 2023.

I would like to thank all of our customers and stakeholders who gave up their valuable time to help design this Business Plan and to thank our CEG for their constructive challenge.

We do not underestimate the challenge ahead. The scale of the effort needed to decarbonise our society is huge – it is not going to be easy. We must innovate and we must be relentless in our search for new solutions. And, we need to be open minded about where these solutions will come from. This underlines the importance of greater collaboration, listening and ongoing engagement. We are committed to doing this with local and national government, other organisations and citizens from all ages and backgrounds. We need greater collaboration and engagement, so that we can identify and harness the best ideas and ensure the transition to Net Zero is just and fair. Our Business Plan does not mark the end of our engagement by any means. It reinforces our commitment to do more, to do it better and to do it faster, so we can have a positive impact in the communities that we have the privilege of serving.

Basil Scarsella
Chief Executive Officer, UK Power Networks

Chapter 2: Who we are

We are the UK's biggest electricity distributor delivering power to 8.4 million homes and businesses across London, the east and south east of England. We keep the lights on across 29,250 square kilometres, serving 19 million people from Cromer in the east to Brighton on the south coast.

In addition to keeping the lights on, safely and sustainably, we are responsible for caring for our customers in the most vulnerable circumstances across our communities

Maintain the safety and reliability of our electricity networks by doing no harm to people and places and making sure power cuts are as rare and short as possible.

Take care of the environment by reducing the environmental impact of our operations and enabling our country's transition to Net Zero carbon emissions.

Meet our customers' evolving needs by improving existing services and shaping new ones.

Go above and beyond for our communities by ensuring we remain legitimate and responsible in the eyes of our customers.

Support our customers in vulnerable circumstances and ensure they are not left behind during the complex energy transition.

Eastern Power Networks

We deliver power to North London and East Anglia, encompassing a diverse range of urban and rural areas as well as a huge coastline.

Read the **EPN plan**

London Power Networks

We look after the electricity network for Inner London, with responsibility for delivering power to iconic buildings and businesses as well as high-profile international events throughout the year.

Read the **LPN plan**

South Eastern Power Networks

We serve South London, Kent, East Sussex and parts of Surrey and West Sussex, covering a rich variety of customers and locations.

Read the **SPN plan**

UK Power Networks in numbers

70,888 GWh
Electricity distributed – 28% of Great Britain's total electricity distribution

9.77 GW
Distributed generation on our network

189,503 km
Total length of overhead (45,578 km) and underground (143,925 km) network

19m
people served – 29% of Great Britain's population

14,169 MW
Peak demand

Chapter 3:
Executive Summary

Placing customers and communities at the heart of Net Zero

We are committed to playing an ambitious role in supporting the transition to Net Zero, at the lowest cost to consumers. We will do this by getting better at identifying emerging customer needs, maximising the use of the existing network, creating opportunities for customer participation through flexibility, and through an efficient, purposeful organisation that has the resilience to respond to different levels of demand.

In this section:

3.1	Strategic context	**05**
3.2	A plan that places customers and communities at the heart of Net Zero	**07**
3.3	A plan which draws on the views of our customers and stakeholders	**08**
3.4	Listening and responding to feedback on our Initial Business Plan	**09**
3.5	Defining success for our business in this exciting future	**10**
3.6	A team that will deliver	**18**
3.7	A plan that has been through rigorous assurance	**20**
3.8	Board Assurance Statement	**20**
3.9	Sufficiently Independent Directors' Assurance Statement	**20**
3.10	The rest of our plan	**20**

3.1 Strategic context

Our RIIO-ED2 Business Plan for the period 2023-2028 is far from "business as usual."

If we are to deliver Net Zero by 2050, our business, together with the wider energy system and society at large, will undergo significant changes over the next decade.

The Government has made legally binding decarbonisation commitments that will have profound impacts on our lifestyles:

- The Prime Minister's Ten Point Plan for a green industrial revolution will create 250,000 jobs and bring forward the ban on the sale of new combustion engine vehicles in less than nine years from today.
- The Energy White Paper envisages the installation of 600,000 heat pumps per annum in less than seven years.

We are committed to playing a leading role in supporting the transition to Net Zero. We will do this in a way that protects customers from higher costs over RIIO-ED2, by maximising the scope for customer participation through flexibility and energy efficiency.

The next decade of decarbonisation will bring major change to the lifestyles of people and communities – from the way we refuel our vehicles, to heating our homes and using energy more wisely. However, there are enormous uncertainties about how society will achieve Net Zero – some of which are dependent on the extent to which consumers and businesses engage in the energy sector as "producers" of energy, and the degree to which they respond to price signals to consume energy when it's cheaper and greener to do so.

These uncertainties create a significant risk of over-investment or mistargeted expenditure resulting in consumers bearing unnecessary costs. This is more than a theoretical possibility. In the past, there have been occasions when customers in Great Britain had to pay for network reinforcement that was not needed. And this has also occurred overseas. For example, some networks in Australia made the mistake of reinforcing their networks to accommodate an anticipated increase in air conditioning load, but then found this reinforcement to be unnecessary as a result of increasing solar generation.

We are committed to playing an ambitious role in supporting the transition to Net Zero. However, we do not believe this requires customers to pay upfront for costly network expansion. To us, being genuinely ambitious means facilitating Net Zero at the lowest cost to consumers. We will do this by maximising the utilisation of the existing network first and exploring the scope for customer participation through flexibility. We are asking for a baseline allowance which is consistent with the lowest cost Net Zero pathway. This will provide us with strong motivation to push network utilisation, energy efficiency and consumer participation to the maximum.

Our strategy has generated a lot of discussion in the industry with "traditionalists" suggesting that we might be unable to respond to an increase in demand and therefore stand in the way of the transition to Net Zero. We believe this is a false premise; a high performing network company that seeks to deploy its capital efficiently and in the best interests of consumers would need to understand how it can meet demand wherever it may arise, and this is true regardless of whether it seeks a large ex-ante totex allowance or not. We recognise that we must be ready to accommodate the whole range of scenarios that could emerge, but that customers shouldn't have to pay upfront for this if we can use well designed uncertainty mechanisms. We have considered this at length and we believe that we can deliver by:

- Building market intelligence systems that provide early visibility of emerging customer and system needs, so that we have the maximum possible time to respond to unexpected changes in demand;
- Empowering our DSO to make decisions in the best interests of customers, having considered all potential solutions on a "level playing field basis", so that we can use every possible solution to solve unanticipated problems;
- Investing strategically, ahead of demand, in areas where there is a high certainty of need. These strategic investments include: unlocking an additional 2,400 on-street public chargers, working with Local Authorities; delivering an additional 7-8MW of capacity in areas located near 14 motorway and trunk road service stations; and helping 242,000 off-gas grid homes in our region to transition away from fossil fuels;
- Ensuring we have the resources to respond flexibly to need. We will do this by deploying automation and innovation, building our digital skills through the creation of a Digital Skills Academy and by further promoting competition in the connections market (so that parties who want to connect to our network have genuine choices about who can provide them with the services they want);
- Working with local authorities, community stakeholders and other utilities to help them realise their Net Zero ambitions by unlocking network investment consistently and in a timely way;
- Working with Ofgem to establish flexible and responsive mechanisms that match our funding to the volume of investment that we need to make; and
- Critically, continuously monitoring the implementation of our strategy so we can adjust what we do ("course-correct") to stay on track.

In summary, our Business Plan is the most efficient way forward to achieving Net Zero at the lowest cost, and we have also planned for the flexibility to respond to the unexpected.

Chapter 3: Executive Summary continued

The digital revolution will go far beyond the way that we interact with customers – it is transforming every aspect of our business.

Customers' expectations of good service are being set by the experience from our everyday lives – from how we bank, to how we shop. And COVID-19 has accelerated the digitalisation of many services in ways that will have a lasting impact on the way businesses serve their customers. More than ever before, we need to look beyond the utilities sector and set service standards that are admired by the best service providers in the market. This means using the latest digital technologies and techniques to meet our customers' individual expectations with ease, choice and convenience.

Data is intrinsic to the energy revolution which is being driven by decarbonisation, the increasingly decentralised nature of energy resources, rapid advances in technology and the emergence of new business models. Our customers and stakeholders need data to guide their choices towards a decarbonised future. Market participants need data to develop new products and services and to support market innovation. We need more accurate data to make better decisions about the way we invest in, operate and maintain our network. Finally, our supply chain partners need more data so they can respond with agility to new and pressing demands.

We need to step-up our capability in handling data, embracing an entrepreneurial and transformational mindset whilst retaining our engineering strengths. We will need to become a disrupter, thinking in new ways that mark a radical departure from the traditional thinking that has guided network companies over the last 100 years. We will need to be dynamic and agile, working in a collaborative way with others and placing an emphasis on innovation. We will be curious and tireless in striving to understand the needs and preferences of our customers. Drawing on the approach adopted by leading digitally-enabled organisations, we will have business and technology teams working seamlessly together on product and service developments. And we will continue to invest in flexible IT systems and infrastructure which will form the backbone of our digital capabilities.

There needs to be a just and fair transition to Net Zero.

It is important that the opportunities presented by this exciting future are open to everyone.

Given the scale of the change, we must think ahead to identify and address new forms of exclusion and inequality. Our customers' understanding of low carbon technologies (LCTs) is generally low, which creates the risk of exploitation, especially for those in vulnerable circumstances. Different customers will face radically different consequences from the transformation ahead of us. For example, those without off-street parking can be forced to pay up to 10 times more to charge their electric vehicles today. We need to be bold, anticipating and calling out situations that will leave our customers at a disadvantage. We need to propose solutions to address inequality and unfairness to help others, in collaboration with government and wider stakeholders.

We need to play an active role in tackling these issues working closely with our regulator and government; doing so is critical to engendering public trust in Net Zero. That trust cannot be taken for granted. Nor can we achieve our country's decarbonisation ambitions without it. We must work collaboratively to develop joined-up services that are focused on customers. We must support local authorities to help communities make the change and we must have a strong public purpose – operating with the highest standards of conduct, delivering positive outcomes for the environment and wider society, commanding trust by being as diverse as the communities that we serve.

Reflecting this new strategic context, we have updated our vision for the company, which sets the purpose and focus for our 6,200 employees and supply chain partners. We have made a clear commitment to enable the Net Zero transition for all. At the heart of this commitment is our ambition to establish the UK's first independent Distribution System Operator (DSO). Our DSO will lead our work to facilitate the transition to Net Zero.

Figure 1: Our company vision and focus areas

An employer of choice	A respected and trusted corporate citizen	Sustainably cost efficient	Enabling the Net Zero transition for all
• The safest – with an exemplary record • An organisation that employees are proud to work for • Creating the most diverse and inclusive DNO and DSO • Having a highly skilled and healthy workforce for both today and the long term • Strong and collaborative relationships with Trade Unions	• Ensuring the most reliable networks • Delivering the best customer satisfaction • Meeting the needs of our customers in vulnerable circumstances, both now and in the future • Being the most socially and environmentally responsible in our sector – through our social contract • Being the most innovative in our sector – becoming a disrupter, combining data, technology and new ideas • Ensuring our supply chain is efficient, sustainable and ethical	• Delivering at the lowest possible cost for our customers • Delivering frontier efficiency in the work that we do • Delivering on our commitments in a collaborative way with others • Delivering profitable growth in our Services and Connections businesses	• Establishing an independent DSO to maximise customer participation and efficiency in the network • Collaborating with local authorities and stakeholders to unlock regional decarbonisation plans through our DSO • Providing our customers and employees with information and support to help them work out the best options to go green • Playing a leadership role in addressing inequality and unfairness resulting from the energy transition
To be consistently the best-performing Distribution Network and System Operator in the UK within an agreed set of values			
Integrity | Respect | Continuous Improvement | Diversity and Inclusiveness | Responsibility | Unity			

3.2 A plan that places customers and communities at the heart of Net Zero

3.2.1 Envisioning the future

To build our Business Plan, we asked ourselves what 2030 could look like. We developed three scenarios (our Distribution Future Energy Scenarios, DFES) working with Element Energy. We tested those scenarios with local authorities including the Greater London Authority and low carbon technology experts, such as the Association of Decentralised Energy and British Solar Renewables. We sense-checked our views against the scenarios mandated in Ofgem's Business Plan Guidance, including the Climate Change Committee (CCC) scenarios published in the Sixth Carbon Budget. As a result, we also modelled a credible "high sensitivity" scenario reflecting the CCC's most aggressive Low Carbon Technology (LCT) take-up projections to understand the range of potential costs.

Together, the scenarios describe alternative ways that the energy system could deliver on the Government's commitments. Further information on our scenarios and forecasts can be found in Section 16.1: Forecasting and scenarios.

3.2.2 The structure of our demand-driven Business Plan

Our strategy is to include high confidence costs in our baseline allowances and ensure that we are ready to scale up to meet any decarbonisation pathway.

As evidenced during RIIO-ED1, it is impossible to predict accurately the roll-out of LCTs such as electric vehicles, heat pumps and distributed generation. In the past, customers have been asked to pay for network reinforcement that has proven to be unnecessary. Despite the electricity sector's best and well-intentioned efforts, and the scrutiny by Ofgem, forecasts of the uptake of LCTs during RIIO-ED1 proved to be widely inaccurate; only 20%[1] of the LCTs that were forecast actually materialised. As a result, customers ended up paying for investment that was not required and owners of regulated network businesses earned greater than expected returns, both damaging the legitimacy of the sector.

We must not repeat this experience in RIIO-ED2. For this reason, we have spent time to understand and manage the uncertainty implied by the various pathways to Net Zero.

For example, some of the most significant questions surround the way that customers will respond to the need to decarbonise heat. Whilst there is a common appreciation that we will need to move towards greater electrification of heat, the pace and scale of this change is far from clear. We currently have some 27,000 Heat Pump installations across our region, but we forecast the number of installations could grow to anywhere between 150,000 (an annual growth rate of 33%) and 440,000 (an annual growth rate of 59%) by the end of the RIIO-ED2 period. Similarly, the impact of energy efficiency and smart tariffs on peak demand on our networks is not certain.

Recognising this uncertainty, our Plan seeks funding that is flexible and responsive to the level of uncertain demand. Our Plan is based on high confidence investments that are well-justified. We think these high confidence investments are most closely aligned to one of the three scenarios we developed, the Consumer Transformation scenario. This is the lowest cost scenario that will deliver the transition to Net Zero because it assumes customers will change their behaviour to support decarbonisation – for example, by taking up smart charging. However, we can adapt our plan to meet whatever level of demand we face and we have proposed funding requirements that will be responsive to the level of demand associated with the take-up of LCTs.

1 Source: UKPN 2021 analysis.

Chapter 3: Executive Summary continued

The diagram below illustrates the flexibility that is built into our plan for a range of possible scenarios.

By being demand-driven, our Business Plan replicates, as far as feasible, the approach that a commercial business operating in a competitive market would undertake. It ensures that our product (electricity capacity) is available to customers whenever they require at the lowest possible cost, delivered with the best reliability, provided with world class service, resilient to unexpected events and of course preserving the safety of our employees and the communities we serve.

We think our Business Plan will simultaneously support the transition to Net Zero and deliver fair outcomes for our customers. We have thought hard about it and are convinced that it is the best way to deliver Net Zero in the way our stakeholders want, whilst protecting our customers from needless price increases. We are focused on taking actions that will encourage energy efficiency and flexibility. That is why we have proposed totex consistent with the Consumer Transformation scenario and the thrust of our whole Business Plan is to enable the transformational change implicit in that scenario. We will maximise the use of the network we have as efficiently as possible before spending money to expand network capacity. And when we do need to expand capacity, we will do so at lowest cost. If actual demand turns out to be lower than our forecast, then our proposed uncertainty mechanisms would allow for this, reducing allowances and ensuring that customers do not bear the cost of forecasting errors.

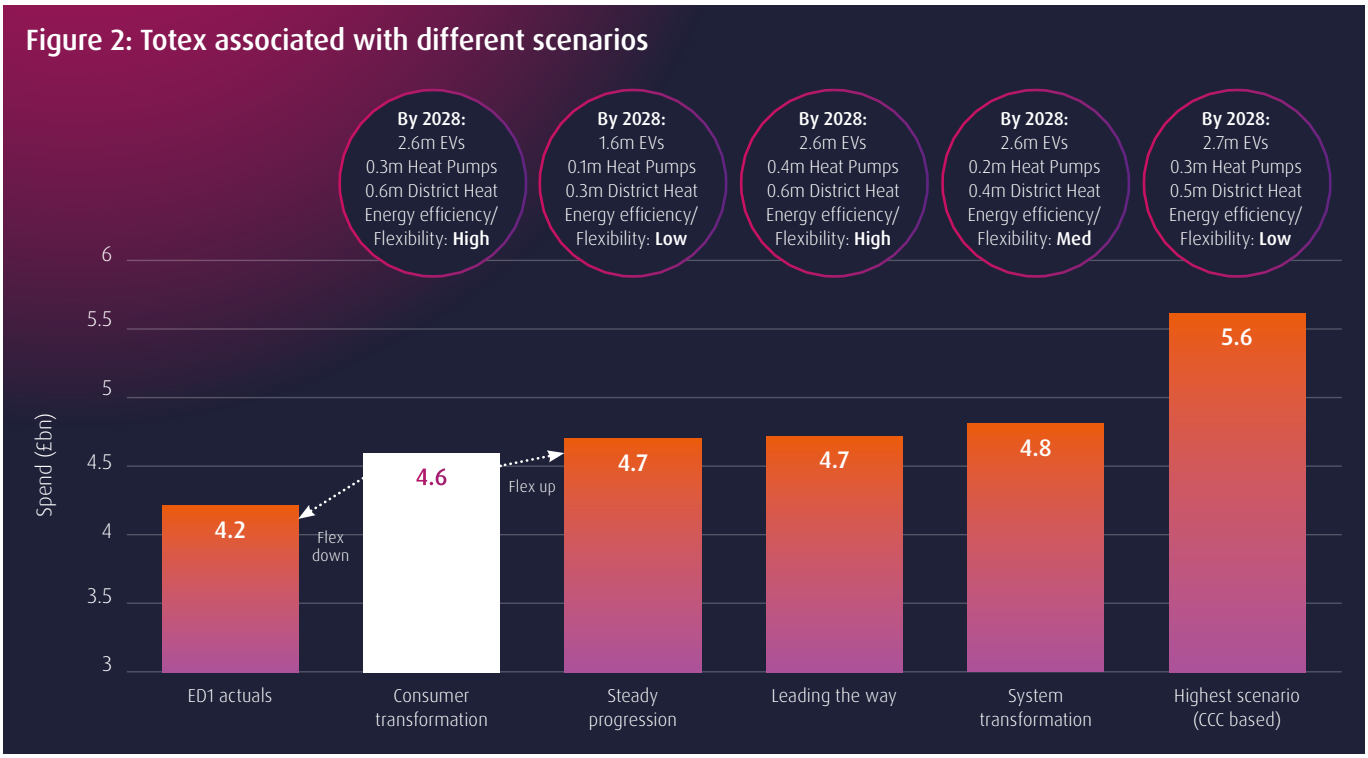
We have stress-tested our investment and operational plans (including our resources, supply chain and financeability) to ensure that we can respond with agility and remain resilient to all credible scenarios. We are confident our organisation has the skills and ability to "flex" to different levels of demand. Having done all this, we not only believe that we will not be a barrier to the delivery of Net Zero within our regions, but that our plan is the most ambitious and effective path to achieve that goal. Further details are provided in Section 10.6: Workforce resilience and Section 16.2: Managing external uncertainty.

3.3 A plan which draws on the views of our customers and stakeholders

A plan based on extensive engagement reflecting the changing environment and recognising that electricity is a low knowledge topic for many customers.

We are passionate about understanding the diverse needs of our existing and future customers, to understand what role they might take in the energy transition and to ensure that no one gets left behind. Building on our work in RIIO-ED1, we have undertaken our most comprehensive, wide ranging engagement programme ever, with over 19,000 customer interactions, 3,000 stakeholder interactions and we have analysed over 336,000 data points – this Business Plan is built on a solid understanding of our customers' wants and needs.

Figure 2: Totex associated with different scenarios



It is a programme that reflects the difficulties of researching customer preferences – difficulties which are amplified by the fact that our customers are not always knowledgeable about what we do. Our Customer Engagement Group (CEG) rightly challenged us hard to deliver meaningful engagement. Network business planning remains a difficult area to explore with customers because it involves testing issues of which they have no direct experience or often aren't aware. We developed an engagement programme which combined both depth and breadth of customer input, as well as utilising robust research methods and tools appropriate to the topics on which we were seeking customer views. We didn't always get this right first time, but by carefully considering the challenges from our CEG and making improvements, we uncovered actionable insights that helped shaped this plan for the benefit of our stakeholders and by customers.

When we tested our Plan with customers we found that, of those who felt they understood our plan, 86% of domestic and 88% of business customers rated our plan as acceptable. This shows strong support for our proposals.

However, 19% of customers did not understand our Plan and proportionally this was higher amongst those in the D and E socio-economic grades (semi-skilled and manual occupations). We debated with our CEG the need to adapt our approach for further acceptability testing ahead of our final submission in December 2021. We concluded that the most value would be extracted by running further focused qualitative engagement with customers in the D and E socio-economic grades to unpick why this group of customers found it particularly challenging to understand our Plan or elements of it. The learning from this will be used to inform our ongoing engagement in RIIO-ED2 and beyond.

3.4 Listening and responding to feedback on our Initial Business Plan

We are pleased that we have been seen by Ofgem and stakeholders as leading the industry in adopting Science Based Targets for carbon emissions and in the way we are setting the pace in establishing an independent DSO and driving greater competition. We believe our leadership in these areas provides clear evidence that will enable Ofgem to challenge the other DNOs to deliver benefits to customers.

Our updated plan has benefited from all of the comments and inputs we have received. In particular:

- Our base costs have increased by £250m. We have responded to feedback on our Initial Plan that we needed to be more ambitious in some areas. The Challenge Group expressed concerns that our initial package of Uncertainty Mechanisms transferred too much risk to customers. We have reviewed and streamlined our proposed portfolio of Uncertainty Mechanisms, which has led to a consequential increase in our base costs. We have also made more ambitious commitments to reduce oil leakage from our cables and our dependence on SF6 switchgear.
- We have thought hard about the proactive steps that we can take to ensure our networks do not stand in the way of the transition to Net Zero. In doing this, we forced ourselves to imagine what might go wrong and the mistakes that we might make that could undermine the transition to Net Zero. (We carried out what Matthew Syed recently described as a "pre-mortem"[2]) This has sharpened our understanding of the practical steps we can take to support the transition to Net Zero. **We describe the actions that followed from this exercise in a new chapter introduced in this Final Business Plan, titled "Decarbonising our communities".**
- We have continued our work with regional planning authorities to road test our Local Area Energy Planning Framework that we co-developed with Essex County Council and that we plan to use to assess all local area energy plans. Letters of support from these regional planning authorities are contained in Appendix 27: Letters of endorsement. We also engaged with both the Energy System Catapult and Citizens Advice to get their perspective and challenge. We have been encouraged by their positive feedback on our approach which delivers a practical solution that advances decarbonisation within our regions.
- We have continued to work with Ofgem to develop uncertainty mechanisms that can respond with agility to changing demands. But, we are keen that the mechanisms are not a "blank cheque". Their operation must protect consumers and we therefore propose the amount of funding that we can access through them is capped at the level of funding required for the High Scenario.
- We have continued to plan the creation of GB's first independent DSO. We have a detailed blueprint setting out how we will make this happen. And we have evolved our ideas for how our DSO can promote far greater competition. We will bring at least £100m of our RIIO-ED2 project delivery to market including connections-driven reinforcement, diversions of our assets and load related reinforcement. We will work with stakeholders such as ICPs and utility contractors to encourage them to compete for and deliver this work. This goes beyond Ofgem's baseline competition expectations and, based on our stakeholder feedback, the ambitions of other DNOs.
- Reflecting feedback from the Challenge Group and our CEG, we have refined our commitments to make our promises clearer and to make it easier to monitor what we have achieved.
- We have undertaken targeted engagement on specific aspects of our plan with customers and stakeholders and we have worked with our CEG to refine the way that we demonstrate the line of sight between our proposals and customer insight.
- We have reduced our proposed Consumer Value Propositions to focus on three areas only, which go beyond business as usual and have the strongest support of our stakeholders.

2 Matthew Syed, Black Box Thinking: The Surprising Truth About Success.

Chapter 3: Executive Summary continued

Figure 3: Our Seven Keys to Success

1. **Delivering a brilliant service for all**
   by staying in tune with customers' needs and expectations to deliver a responsive and high-quality service.
2. **Facilitating decarbonisation at the lowest cost**
   by maximising the use of the existing network with smart technologies and better data and being prepared to invest in new assets only when they are needed.
3. **Investing to maintain a safe, reliable and resilient network**
   by being responsible stewards of the network and investing for the long-term.
4. **Delivering the lowest possible bills whilst enabling Net Zero**
   by driving efficiency and innovation in everything that we do.
5. **Being a force for good in the communities we serve**
   by going beyond delivering a safe and reliable service at an affordable price and doing more to protect the environment and improve our communities.
6. **Being an employer of choice**
   by attracting, developing and retaining a skilled and motivated team that reflects the diverse population that we serve.
7. **Being a company that is worthy of your trust**
   by acting with the highest standards of conduct and transparency in the interests of our customers.

3.5 Defining success for our business in this exciting future

Our engagement helped us to understand customer and stakeholder priorities. To focus our efforts, we defined seven 'Keys to Success' to base our plan around, each backed-up with tangible commitments. We have sought to make this process transparent using 'Line of Sight' and Engagement Summary documents that explain our process – the way we have listened, assessed, triangulated and then committed to actions in specific areas. More detail can be found in Section 7.1: Customer and stakeholder engagement.

1 2 3 4 5 6 7

1. Delivering a brilliant service for all

From a position of leadership in our sector, we pledge to show by example that we can push the frontier even further. We will challenge ourselves to achieve the standards of customer experience delivered by best-in-class organisations such as John Lewis, AO.com, First Direct, Marks and Spencer, Amazon and Netflix.

> We are the best performing DNO on customer service and we plan to remain the best. We will challenge ourselves to deliver the highest standards of customer service and will go further to protect vulnerable customers.

We will get the essentials of customer service right even more of the time. We are making firm commitments to continue to be rated as the number one customer service provider in our sector and to increase our Broad Measure of Customer Satisfaction (BMCS) score.

We will give our customers a stronger voice by offering them the chance to provide feedback and rate our service every time they interact with us going well beyond the regulatory customer service measurement. We will segment the feedback from our vulnerable, low carbon and small business customers to understand how we should improve our services for their changing needs given the changing Net Zero context. All of our customers will be asked how we compare against the best of the best organisations they deal with in their day-to-day lives, Customer views will be independently scored by Trustpilot surveys and benchmarked by the Institute of Customer Service (ICS). Our ambitious commitment to be scored in the upper quartile of UK service providers by ICS by the end of the RIIO-ED2 period and be a 5* rated company on Trustpilot.

The table below summarises our key commitments in this area and highlights our commitments which are new for RIIO-ED2.

Ref	Our commitment
CS1	We will maintain our position as the number one service provider amongst our peers over the RIIO-ED2 period. We will aim to be the #1 DNO Group as measured by customer satisfaction, or to achieve at least a 93% score on average across our networks in each year of RIIO-ED2, whichever is higher.
CS2	We will benchmark ourselves against the UK Customer Satisfaction Index, demonstrating we are providing an excellent customer experience as compared to the best companies across the country. We will target to be in the upper quartile of service providers by the end of the RIIO-ED2 period. ** NEW **
CS6 DNO FIRST	Where we owe our customers compensation under the Guaranteed Standards, we will pay them directly through the method of their choice including directly to their bank account or working with suppliers to credit their energy bill. We will target a 90% digital payment rate by the end of RIIO-ED2. ** NEW **
CS7	We will improve our services through RIIO-ED2 based on a better understanding of our customers in vulnerable circumstances and from our low carbon and small business customers. We will target to be the #1 DNO Group as measured by customer satisfaction, or to achieve at least a 93% score on average across our networks in each year of RIIO-ED2 by measuring and reporting on these specific customer segments. ** NEW **
VS4	Our customers will only need to register to a Priority Services Register (PSR) once. We will develop automated data links by 2024 (at the latest) with other utility companies so that customers will automatically receive enhanced service from us and other organisations providing essential services. ** NEW **
VS5	We will help all medically dependent PSR customers realise the benefits of having a smart meter by sharing targeted advice every two years throughout RIIO-ED2. For example, we will utilise smart meters to establish new arrangements so that carers are automatically notified when a power cut occurs by 2024. ** NEW **
VS6 DNO FIRST	We will offer increased support for our medically dependent PSR customers by dispatching battery banks to customers who are at risk of being without power for more than 4 hours between 2024 and 2028. ** NEW **
VS7	In collaboration with regional partners we aim to provide targeted support to a total of 500,000 fuel poor customers over RIIO-ED2, investing £18m to support over 200,000 directly and 300,000 through partnership programmes, delivering £67m of benefits by 2028. Additionally, we will provide fuel poverty information to 800,000 customers each year, working with trusted partners.
VS8	We will provide information and help to 500,000 vulnerable customers over RIIO-ED2 to ensure no one is left behind in the changing energy system, at no cost to customers. As part of this, we will also co-fund grants towards the installation of low carbon technology systems via the UK Power Networks foundation. ** NEW **
VS10	We will deliver industry leading innovations to improve support to disadvantaged and vulnerable customers, ringfencing £5m of our Network Innovation Allowance (NIA) investment over the RIIO-ED2 period to focus in these areas.
MC3	Through continuous engagement, we will drive service improvements and the development of new connections products and services. We will measure our performance through a range of surveys on our connections services (including our Connections Engagement Satisfaction Survey, Ask the Expert, Distributed Generation Surgeries and Feasibility Studies). We will target at least an average customer engagement feedback score of 9/10 over RIIO-ED2.
COMP 1 DNO FIRST	We will adopt a frontier approach in driving competition into our traditional activities to maximise cost efficiency by opening up over £100m of work to competition during RIIO-ED2. The scope of this work will be drawn from load-related reinforcement schemes as well as connections-driven reinforcement and diversionary programmes. We will work with stakeholders to define the detailed scope of this work. ** NEW **

Details of our full list of commitments and more are described in Chapter 9: Meeting the needs of consumers and network users.

Chapter 3: Executive Summary continued

1 2 3 4 5 6 7

2. Facilitating decarbonisation at the lowest cost

We will create an independent and legally separate DSO that delivers whole system value for consumers.

Our DSO will deliver direct benefits of approximately £410m and could enable between £780m to £2.6bn of wider whole system benefits (in net present value terms) up to 2040.

Our vision is of a dynamic distribution system with electricity demand and supply flexing in response to distribution-level conditions and market signals. This will lead to a more highly utilised distribution network with faster and cheaper access for the Low Carbon Technologies that will be needed to achieve Net Zero.

We will be deploying 26 innovation solutions developed in RIIO-ED1 to create more capacity and deliver more efficiently. Our plans already have c.£137m of savings incorporated from these solutions – over 21% more than we delivered in RIIO-ED1 on a like for like basis. When we are likely to exhaust the capacity in the existing network, we will utilise market-based flexibility solutions to create capacity at lowest cost. We will do this all the way down to the low voltage network to maximise opportunity for domestic level participation and cost savings for consumers.

To do this, we will establish an independent and legally separate Distribution System Operation (DSO) business unit by 2023 with an independent supervisory Board. This Board will produce an annual conflicts report which will be publicly available and highlight any conflicting decisions between the DNO and DSO. As a "DNO first", working with stakeholders, we will co-develop a DSO-DNO Operational Agreement that will clearly and unambiguously set out the respective roles, decision-making processes, operating and reporting procedures and ongoing governance arrangements for the DSO (as distinct from the DNO).

Our DSO will operate very differently to a traditional DNO. We will bring in new skills, people and systems for a business unit that will be highly focussed on technology, data and customers. Importantly, it will signal transparency and independence of investment decision making. Our DSO will deliver direct benefits by reducing the need to reinforce our network. It will also deliver wider system benefits, including by reducing the need to build larger scale renewable generation plant. We have worked closely with Imperial College London and the Carbon Trust to estimate the benefits that this will deliver for our customers. Chapter 12: Enabling whole system solutions sets out our commitments and the value that we are proposing from our strong working relationship with the ESO.

The table below summarises our key commitments in this area and highlights those which are new for RIIO-ED2.

Ref	Our commitment
DSO3	Our DSO function will deliver up to £410m reduction in load related expenditure during RIIO-ED2 through increased competition and use of LV flexibility, including at the domestic level.
DSO5 DNO FIRST	We will collect real time data through monitoring in all LV networks where we are forecasting constraints over RIIO-ED2, and will target 100% coverage of the rest of the network through advanced analytics using smart meter data. This will give us better insight to run the network at higher utilisation and to defer reinforcement actions for as long as possible. ** NEW **
DSO6 DNO FIRST	We will develop a new DSO stakeholder satisfaction survey. Once we establish a baseline at the start of RIIO-ED2 we will commit to improving our score by at least 10% over the period and publishing an annual DSO forward plan that will explain how we are responding to stakeholders' priorities. ** NEW **
DSO7	We will make a range of firm and flexible connection products available to all customers, from lowest cost through to highest access, with a maximum curtailment commitment from the start of RIIO-ED2, and will annually update our products based on stakeholder feedback. Where customers can't choose such products, we will explain the reasons why to those affected. ** NEW **
DSO8	We will be the UK's leading DSO in network data provision through a best practice service that opens data according to user priorities and customer value-add. Our ability to meet users' needs will be measured as part of an annual stakeholder survey from the start of RIIO-ED2. ** NEW **
DBP1	We will fulfil and exceed the recommendations outlined by the Energy Data Taskforce through the active open publication of our data across the RIIO-ED2 period, prioritised based on stakeholder engagement and an understanding of value to consumers. Our data will be appropriately licensed to enable third party use to support the development of an Open Energy System, facilitating Open Innovation and creating data services that deliver wider benefits to energy customers.
WS5	We will expand the geographic area of our South East Regional Development Programme (RDP) in RIIO-ED2 and deliver a RDP in East Anglia by 2024, as agreed with the ESO. We will unlock up to £130m of whole system benefits during RIIO-ED2.

Ref	Our commitment
WS6 DNO FIRST	We will work with the ESO to expand the Power Potential trial to be a business as usual offering across our EPN and SPN regions by 2028. This will be a world-first large scale rollout of a whole system reactive power management solution. **NEW**
WS7	Over RIIO-ED2 we will deliver 1GW of distributed energy resources (DER) capacity at no more than £8m, using smart interventions and new innovations, reporting progress in our annual business plan.
WS10 DNO FIRST	We will develop an energy efficiency flexibility product, running tenders every 6 months, starting in 2023. ** NEW **
WS12 DNO FIRST	We will run a process to identify and address market failures with respect to the provision of on-street charging, unlocking over 2,400 public charge points in areas of market failure by the end of RIIO-ED2. ** NEW **
WS13	We will run a process to identify and deliver an additional 7-8MW of capacity in areas located near 14 motorway and trunk road service stations, by running a call to market in 2024 and 2025, ensuring a maximum of 30 miles between charging across our regions.
WS15	We will ensure that 71% of off-gas grid homes in our regions have the suitable capacity to decarbonise their heating and transport by the end of RIIO-ED2. ** NEW **

Details of our full list of commitments and more are described in Section 12.1: Establishing a DSO and Section 12.2: Whole systems. Section 10.6: Workforce resilience and Section 17.6: Financial information. These chapters explain our activities that enable us to respond quickly for any decarbonisation scenario that materialises.

1 2 3 4 5 6 7

3. Investing to maintain a safe, reliable and resilient network

We know that customers value a safe, reliable and resilient supply of electricity, not just today but in the future. This is core to our purpose. As the energy system transitions to a more decarbonised and decentralised system with greater reliance on electricity, we will need to continually adapt our approach to maintaining system resilience and respond to extreme events such as the 9th of August 2019 low frequency incident which resulted in disruption across the South East.

This includes working closely with the ESO to develop innovative and lower cost solutions to technical issues arising from greater levels of distributed generation and other low carbon technologies connected to our networks. It also includes taking a co-ordinated approach to regional planning to optimise the use of these resources across transmission and distribution to deliver the lowest overall system cost. We explain our strategies and the actions that we are committing to in RIIO-ED2 within our DSO and whole systems sections of the Business Plan.

The table below summarises our commitments in this area and highlights our commitments which are new for RIIO-ED2:

Ref	Our commitment
S1	We will minimise injuries to our staff as measured by the Total Recordable Incident Rate (accident rate per 100,000 hours worked) striving to be less than 0.05 by the end of the RIIO-ED2 period.
OR1 DNO FIRST	We will continue to improve our organisational resilience capabilities by considering the changing risks our business faces. We will aim to achieve a "Good practice" rating against the BS65000 standard that will be independently assessed by the Emergency Planning College (EPC), by the end of the RIIO-ED2 period.
NR1	We will improve underlying network reliability (as measured by customer interruptions (CIs) and customer minutes lost (CMLs) by the end of RIIO-ED2. This improvement will not be impacted by the volume, type or location of low carbon technologies connecting to our network.
NR2	We will reduce 12-hour interruptions in normal weather conditions by 25% on average across RIIO-ED2 in each of our EPN, LPN and SPN regions, compared to the RIIO-ED1 average.
NR3 DNO FIRST	We will achieve a 10% reduction in the number of short interruptions experienced per customer (excluding those which are as a result of avoiding a customer interruption and those relating to exceptional events) by the end of RIIO-ED2 when compared to that experienced by our customers in the last five years of RIIO-ED1. We will also make an automatic compensation payment of £25 to customers who experience more than 25 high voltage short interruptions during a regulatory year (excluding those relating to exceptional events).

Chapter 3: Executive Summary continued

Ref	Our commitment
NR4	We will invest up to £28m which will deliver at least a 25% improvement in reliability for eligible Worst Served Customers (WSC). We expect that the equivalent of 10,000 customers per annum will see an improvement in the reliability of their power supplies from this investment. We will also explore innovation solutions to improve the service received by WSC where costs of traditional solutions prohibit their implementation.
AR1	To manage the risk of disruption to our customers from failure of our assets, we will target the replacement of the poorest condition assets on our network, delivering a NARM monetised risk point delta of £1.57 billion by the end of RIIO-ED2.
AR2	We will enhance our compliance with ETR138 across our network, protecting the electricity supplied to customers from 85 substation sites deemed at risk from flooding by the end of RIIO-ED2.
C1	We will continue to enhance our resilience to sophisticated cyber-attacks throughout RIIO-ED2 and comply with the Network and Information Systems Regulations 2018 through the National Cyber Security Centre (NCSC) Cyber Assessment Framework; in order to protect our networks, secure our customer data, and keep the public safe.
CR1	We will establish a steering group with key internal stakeholders to own and monitor the risks identified as part of the climate change strategy. The steering group will report to UK Power Networks' executives and publicly report on actions taken to mitigate against identified risks throughout RIIO-ED2 using the Annual Environmental Report.

1 2 3 4 5 6 7

4. Delivering the lowest possible bills whilst enabling Net Zero

During the COVID-19 pandemic, we learnt that nearly 38%[3] of our customers experienced a drop in their disposable income. However, the impact of the pandemic has been uneven across households, with lower income groups being hit particularly hard. Furthermore, the recent increases in gas prices are forecast to place even more families in fuel poverty[4].

Our baseline plan delivers a 15% reduction in bills in real terms over RIIO-ED2. Our approach protects customers from overpaying for assets that may not be required.

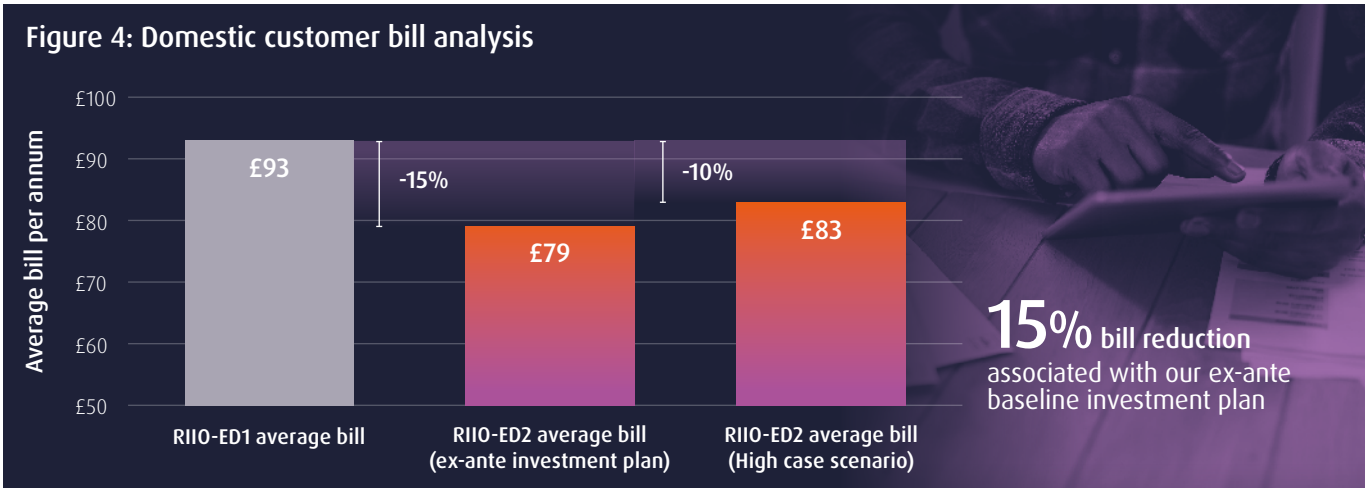
Given many of our customers face economic uncertainties, it is imperative that we keep electricity bills as low as possible. With this firmly in mind:

- We have only included "high confidence" costs within our baseline allowances.
- We have already incorporated savings of approximately £137m into these baseline costs by deploying innovative solutions. We are building on our strong record of innovation in RIIO-ED1 where we delivered 3 times the innovation savings compared to the nearest DNO through 50 solutions (more than double any other DNO).
- As well as benchmarking as the frontier company for efficiency in RIIO-ED1, each year we will deliver four times the efficiency improvements seen in the wider economy[5]. This equates to 1% per annum and approximately £230m of savings over the RIIO-ED2 period.

As explained, given the uncertainties in decarbonisation pathways, we have proposed well justified uncertainty mechanisms that will flex-up additional allowances if demand materialises necessitating investment in our networks.

The figure below shows the bill impact in real terms from both our high certainty ex-ante plan and what the bill could rise to if the High case scenario materialised and we had to invest up to £5.6 billion using the uncertainty mechanisms.

Figure 4: Domestic customer bill analysis



3 Savanta Covid Tracker Jan-April 2021
4 https://www.bbc.co.uk/news/business-58831110
5 Bank Of England Total Factor Productivity Analysis, 2019

The table below summarises our key commitments in this area:

Ref	Our commitment
DSO4	We will keep our costs down by taking a "flexibility and energy efficiency first" approach over RIIO-ED2 and 'will market test' all network needs before considering reinforcement. These needs will be procured through a range of long-term and short-term markets and products, which are inclusive by design and ensure no customer is left behind in the energy transition.
INN01	We will ring-fence £25m of our totex allowance and allocate a further £25m for investment of our own money over RIIO-ED2 to improve network performance for our customers through innovation projects. We will publish key business challenges quarterly in a structured process as well as remaining open to innovation ideas at any time.
INN02	We will allocate £25m Network Innovation Allowance (NIA) funding over the RIIO-ED2 period, of which £20m will go to third parties, targeted to ideas that deliver 4x wider societal return on investment.

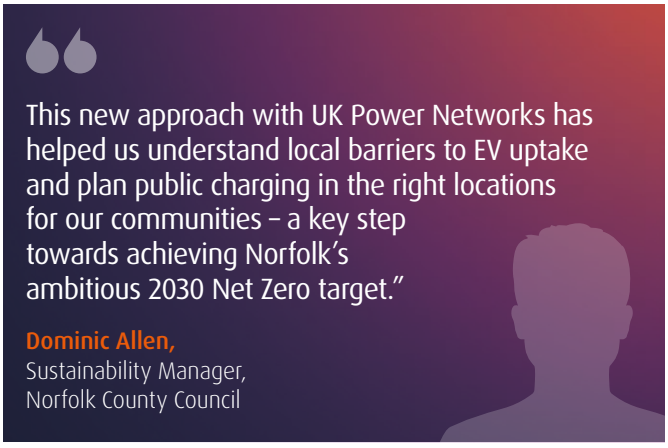
5. Being a force for good in the communities we serve

We will use all our resources – our people, data, expertise, networks and investment – to improve the environment and economic prospects for the communities that we serve.

During RIIO-ED2, we will use our expertise, data and influence to bring together local communities to deliver on their climate emergency plans. We will establish a dedicated local energy planning team as part of our DSO that will work with all regional planning authorities (over 100) in our regions, plus community energy groups and other local stakeholders, to develop actionable decarbonisation plans. This is a direct response to calls of support from local authorities who cite a lack of skills and data to develop delivery plans.

As a "DNO first", we have designed a systematic approach with County Councils to assess local plans and enable network investment to be unlocked quickly and consistently. Further details about this approach can be found in Appendix 19b: Local Area Planning Framework. Our framework supports decarbonisation planning in a pragmatic way reflecting the realities faced by many local authority planning functions; it has been tailored so that it can be used by individuals in Local Authorities who may not be familiar with the energy industry. We have already tested this approach with Essex County Council as a trial (to learn and improve so that we can scale it with confidence). We will support all regional planning authorities to make progress and build momentum. We have 15 regional planning authorities already providing their endorsement and support for this approach as a result of their involvement in helping to design the framework. Importantly, we recognise that given this is a fast-changing area, we will need to keep the framework under review. We will make improvements each year with regional planning authorities as we learn and improve together.

We will work with government, Ofgem and Local Authorities to address market failures in the provision of on-street and en-route EV charging. Being bold and calling out the "gaps" and more importantly, proposing solutions to address inequality and unfairness in collaboration with government and wider stakeholders is crucial. During RIIO-ED2 we will socialise a greater share of the network upgrade costs to facilitate widespread public charging. We have demonstrated this approach and its benefits through our Green Recovery investment programme and our Charge Collective trials. Hence, we have included a Consumer Value Proposition (CVP) to ensure that some regions do not get left behind during this transition to electric vehicles, including those in rural areas. We believe that our approach to support regions that are at risk of being left behind could deliver £16m in benefits over 10 years, for which we have provided a detailed cost benefit analysis. We will work jointly with Local Authorities to provide a compelling case to Ofgem for why the regulatory framework should be modified to unlock this type of investment.



We will continue to ensure that our communities remain safe around our electricity assets. We will work in collaboration with trade associations and other partners, combining data analytics with high impact communications, to reduce the number of third-party overhead line and underground cable strikes by at least 20% over RIIO-ED2. We will also ramp-up our Be Bright, Stay Safe campaign to reach 300,000 people every year, with advice and guidance to remain safe around our assets prioritised (based on risk using data about injuries).

We will establish a social fund (The UK Power Networks Foundation), with contributions by both the shareholder and employees of up to £4m (equivalent to approximately 1% of annual profits) to advance good causes in the communities that we serve.

Chapter 3: Executive Summary continued

The table below summarises our commitments in this area and highlights our commitments which are new for RIIO-ED2:

Ref	Our commitment
WS1	We will engage with all 127 regional and local planning authorities on their climate plans each year of RIIO-ED2, offering a three-tiered support service utilising a framework to assess, develop action plans, and deliver investments where a prescribed level of certainty is achieved in period. ** NEW **
WS2	By 2024, we will provide core planning datasets via an on-line self-service energy planning tool to support the planning process for our local authorities, helping them make the best choices for their communities.
WS4	We will embed a requirement to have explicitly considered whole system solutions as part of our investment planning and investment governance by the start of RIIO-ED2.
S2	We will reduce the number of third-party overhead line and underground cable strikes by at least 20% over RIIO-ED2 (relative to the average of RIIO-ED1 actuals from 2015-2020).
S3	We will increase our commitment to engage with the public around safety issues, focusing on those who are at highest risk of injury from contact with our networks by engaging with 300,000 people per year during RIIO-ED2 (vs. 250,000 people per year during RIIO-ED1).

1 2 3 4 5 6 7

6. Being an employer of choice

Our people have been the driving force behind our performance improvement in RIIO-ED1. A competent, motivated, and stable workforce is an essential pre-requisite to our provision of a highly reliable network and excellence in customer service. We are among only 2% of organisations our size, and the first DNO, to hold an Investors in People Platinum Award.

We will match our workforce to the diverse population that we serve, fostering stronger links with, and building trust from, our communities. We will continue to improve our recruitment processes to ensure equality of access for all people. We will increase BAME applications for early career roles, working closely with local schools. We will establish a "see it to be it" work experience programme to help over a hundred candidates from disadvantaged and under-represented groups to progress their careers. We will also reduce the gender pay gap achieving gender parity in non-direct roles by 2028.

> "I believe UK Power Networks are the first DNO and indeed major utility to achieve the prestigious Platinum award. This is an exceptional achievement given the disparate nature of the workforce and just reward for the entire organisation's persistent drive over the past ten years to become genuinely high performing."
>
> **Bruce MacRae**
> IiP-licensed practitioner

We will be recognised as an employer of choice and will continue to seek independent verification of our performance by Investors in People (IIP) and Best Companies. Our aim will be to retain our Platinum status with the Investors in People and be one of the Top 25 Best Companies to work for in the UK.

The table below summarises our commitments in this area and highlights our commitments which are new for RIIO-ED2:

Ref	Our commitment
WR1 DNO FIRST	We will sustain high levels of employee engagement throughout RIIO-ED2, ensuring that the benefits of a motivated workforce are passed onto our consumers. We will benchmark nationally and globally as a leader in the field and target retention of our Platinum Investors in People accreditation and Best Companies listing throughout RIIO-ED2.
WR2 DNO FIRST	We will continue to build a diverse workforce to reflect and serve our communities by further improving equality of employment access, measuring continuous performance improvement. We will retain our NES accreditation and status as a Top 50 Inclusive Employer throughout RIIO-ED2.
WR3	We will establish a Digital Skills Academy to provide DSO and digital future skills, deliver 510 accredited apprenticeship NVQs in Leadership and Management and 200 IET accredited technical or digital apprenticeships throughout RIIO-ED2. We will target the achievement of an "Outstanding" OFSTED rating for our training programmes in the period.

Full details of these commitments and more are described in Section 10.6 Workforce resilience within Chapter 10: Maintaining a safe and resilient network.

1 2 3 4 5 6 7

7. Being a company that is worthy of your trust

In the context of a changing energy landscape, we are placing increasing importance on the social purpose of our company including the introduction of a Social Contract.

We face an exciting future, but one that can only be realised if customers trust us to do the right thing and to act with the highest standards of conduct.

We will place increasing importance on the social purpose of our company. We will introduce a Social Contract informed by our customers and stakeholders. This will bring together, in a single place, all our Environmental, Social and Corporate Governance arrangements and performance reporting, maximising transparency and public scrutiny and going further than the UK Corporate Governance Code. The Social Contract is our way of communicating why we are a company that is worthy of customer trust.

We will update our Articles of Association to embed an explicit public interest commitment – a "DNO first". By making this change, we will demonstrate to our customers that social purpose is at the heart of everything we do and is aligned with our ambition to be the most socially and environmentally responsible DNO. To make this change effective and embedded in our culture and ways of working, we are also proposing the following further changes:

- We will enhance both our short and long-term remuneration schemes to link reward to a balanced set of specific customer and environmental targets at all levels within the organisation. We will report on this annually and be held to account for our performance.
- We will continue to operate a flexible and responsible dividend policy - returns will be linked to performance and we will maintain a level of debt that is consistent with an investment grade credit rating.
- We will "walk the talk" on the environment, by reducing our directly controlled carbon emissions to Net Zero by 2028. We will reduce our NOx emissions by over 30% to reduce negative air pollution impacts on our communities. We are committed to going twice as far as future legislation will require in improving biodiversity. We will also deliver stretching targets for the recovery, reuse and recycling of waste and promote circular economy principles in our supply chain to minimise waste.
- Our shareholders will spend £20m of their own money to support customers in vulnerable circumstances.

Ref	Our commitment
OE2	We will collate, store and disseminate insights from our ongoing engagement programme to drive more informed actions both internally with our staff, from Board level down, and supply chain partners, as well as externally with stakeholders, regulators and policy makers. We will have measurement and reporting systems in place enabling us to track business changes attributable to ongoing engagement.
SC2	We will enhance our Annual Review for greater transparency by publishing our performance against our Environmental, Social and Governance commitments every year during RIIO-ED2. ** NEW **
EAP1	We will review our Environmental Action Plan annually to ensure our work continues to meet our customers' evolving expectations, that our response is based on the latest science and that we incorporate any emerging best practice. We will establish a new sub-committee of the Board to monitor our performance and will report our progress through our Annual Environmental Report. ** NEW **
EAP2	For our full carbon footprint, including losses and indirect scope 3 emissions, we will exceed our reduction target approved by the Science Based Target initiative (SBTi) at Well Below 2°C. We will commit to the Business Ambition for 1.5°C SBTi campaign. We will report our progress through our Annual Environmental Report and update our targets in line with SBTi protocols. ** NEW **
EAP3	We will reduce our directly controllable carbon emissions (scope 1 and 2 emissions, excluding losses) exceeding a 1.5°C reduction trajectory and offset any remaining residual emission to achieve Net Zero by 2028 using high quality verified offsets. We will report our progress through our Annual Environmental Report. ** NEW **
EAP4	As part of our verified Science Based Target, we will work with our suppliers to reduce our supply chain carbon emissions (scope 3) by 25% by 2028, compared to a 2018/19 baseline. We will report our progress through our Annual Environmental Report. ** NEW **
EAP5	We will develop and implement a circular economy tool to address our high impact materials by the start of RIIO-ED2. We will subsequently set and monitor our reduction targets through our Annual Environmental Report. ** NEW **
EAP7	We will increase the biodiversity of new major substation developments by a net-gain of 10-20% and at 100 existing sites by a net-gain of 30% overall over the RIIO-2 period, compared to the beginning of the period, as measured by the DEFRA biodiversity tool.
EAP8	We will reduce NOx emissions by 33% over the RIIO-ED2 period compared to the beginning of the period, improving air quality for our customers.
EAP9	We will reduce annual leakage from Fluid Filled Cables by 15% by the end of the RIIO-ED2 period compared to the beginning of the period.

Chapter 3: Executive Summary continued

3.6 A team that will deliver

We know our plan is ambitious; it needs to be, given the scale of the decarbonisation challenge that we must collectively overcome to achieve Net Zero. However, we resolutely believe that we can deliver on our ambitions, because:

- We have a track record of delivering on our promises.
- We are forward thinking, preparing for the risks ahead and guarding against complacency.
- We have already started – we can hit the ground running both financially and operationally.

We have a strong performance track record.

We have turned around our business completely, transforming it into the leader in the sector. We are ready for the next phase of our journey to maintain this leadership position.

In 2010, UK Power Networks acquired the three networks of London Power Networks (LPN), Eastern Power Networks (EPN) and South Eastern Power Networks (SPN). These networks were perceived as poor performers. Immediately after the change of ownership in October 2010, we sought to establish the core purpose of the organisation – to serve our customers and communities. Through extensive stakeholder engagement we established a clear business vision.

This vision was converted into clear, simple and challenging business targets that were aligned: from the Board, to the CEO and right through the whole organisation at all levels. We developed a sustainable high-performance culture within the organisation – every employee and partner organisation knew the purpose of the company and felt responsible and accountable for their performance and actions consistent with the company's goals and targets.

Our track record in RIIO-ED1 speaks for itself. Since 2010 we have delivered: the best safety record, been recognised as one of the Top 25 Best Large Companies to Work For (the only DNO in the list), have achieved the highest network reliability, delivered the best industry customer service, and delivered nearly £284m of innovation driven savings – 3 times more than the nearest network company. And we have delivered these results whilst keeping customer bills low; our customers will have benefitted by approximately £444m in the form of lower bills over the full RIIO-ED1 period and we now rank first in terms of efficiency compared to the other DNO groups.

You can read more about our track record in Chapter 6: Our RIIO-ED1 track record.

Figure 5: Our cost benchmark against peers in RIIO-ED1

Rank	Group	Efficiency score (ratio between costs and industry average)
1st	UKPN	91%
2nd	ENWL	96%
3rd	NPG	98%
4th	SSE	102%
5th	WPD	109%
6th	SP	110%

Source: Cost benchmarking undertaken by UK Power Networks and assured by NERA.

For further information on our cost benchmarking see Chapter 17: Costs and financial information.

We deliver on our promises and have a culture that continuously seeks improvement from the best and applies it for the benefit of our customers.

As part of our RIIO-ED1 Business Plan, we committed to 77 outputs that were crafted with our customers and the communities we serve. We are on track to deliver all bar one of these commitments – the only commitment that may not be delivered relates to the undergrounding of overhead lines in Areas of Outstanding Natural Beauty (AoNB), which we explain further in Chapter 6: RIIO-ED1 track record.

We have continued to engage with our stakeholders and customers on an ongoing basis going beyond some of our original commitments, and are delivering more than we promised by listening and acting proactively:

- We delivered class leading customer service performance (92.8%[6] satisfaction) by learning and adapting advanced techniques from consumer retail, fintech and technology sectors into our customer services. Ofgem's own independent expert panel cited UK Power Networks as class leaders in our approach in 2020.
- We currently have 1.97m households on our Priority Services Register – delivering tailored services to those most vulnerable and in need of help in our regions.
- We are the first DNO to establish an Environmental Action Plan with carbon reduction commitments verified by the Science Based Targets initiative and aligned to the UN Sustainable Development Goals.
- We are the first DNO to establish a DSO strategy deploying a leading-edge advanced network management system, Low Voltage monitoring sensors (which provide more visibility of the utilisation of our network than ever before) and procurement of flexibility ahead of peers in the UK and we are independently recognised as the global leader in smart grid development.
- We delivered sector-leading levels of network reliability as a DNO group.

6 UK Power Networks group performance (2020/21 regulatory year)

We have demonstrated that by being good listeners, we can drive better performance. This ethos will be even more important in RIIO-ED2 as we will need to work collaboratively with many more parties to achieve success.

Figure 6: Listening and acting on feedback

What a fantastic company

What a fantastic company, as large as they are they could easily fob off the customer but they do the absolute opposite!! Customer service is outrageously good and the after sales is on par with that. I don't even pay these people direct and they treated me like the most valued customer ever!! I have to say I'm shocked with pleasure and I wouldn't want any other provider covering my area (for want of another phrase ha ha ha) THANK YOU UKPN!!!

Michael Bullen

Trustpilot

UK Power Networks has shown it is willing to listen to stakeholders, including those beyond the energy industry. They have recognised the importance of listening and sharing knowledge in order to innovate towards achieving win-win outcomes.

Technology Innovation Manager
Society of Motor Manufacturers and Traders

If all the DNOs were as good as UK Power Networks we would be delighted! I cannot emphasise enough how much they have done over the years to open up the markets. It has been so valuable for us and there is not much else that they could really do. We are very pleased and we do not have any complaints about the service.

David Overman
GTC, Electricity Networks Director (Independent Connections Provider)

We have detailed implementation plans

We have translated our ambitions into actionable plans. Through the development of these plans, we have considered the impact on our resources and supply chain, as well as what might go wrong, and we have robust plans for mitigating these risks. For example, we have modelled the impact of increasing investment by up to 31% to facilitate increased low carbon technologies. This has indicated there will be demand for an additional 1,515 full-time equivalent employees (FTE) across the business over a 5-year period from a mixture of directly employed staff, contractors and supply chain partners. Importantly, we have developed these plans with the individuals and supply chain partners who will be responsible for delivering them and they have made their personal commitment to delivering on these promises. In short, we have the team, a strong supply chain and the "can-do" mindset to make this happen. Further details of our approach are contained in Section 10.6: Workforce resilience.

We are ready to hit the ground running in RIIO-ED2

We are ready to demonstrate delivery from day one of RIIO-ED2. We have started already:

- We are working with six regional planning authorities to co-develop a framework to unlock local investment. We have written support from County Councils and we are mobilising our team to scale up and deliver at pace – starting now in RIIO-ED1.
- We are adapting our customer journeys based on research and feedback – we worked with over 1,750 customers to explore how they are likely to interact with us to work out how we need to adapt our services to support them better, including how to connect an EV charger or heat pump. That insight is being used to inform changes that we are trialling now, so we can scale-up during RIIO-ED2.
- We are building a detailed blueprint for a newly established DSO – we have undertaken the most in-depth design for how an independent DSO will operate to provide complete transparency of investment decisions. Our plans are already underway to recruit the new skills and establish the independent supervisory Board overseeing the DSO development before the start of RIIO-ED2.
- We are well advanced in our flexibility programme. As a DNO first, we have recently contracted 310MW of flexibility capacity to be delivered by electric vehicles and domestic storage in our regions. By working proactively with others, we will demonstrate first-hand how this smart future is being made a reality – providing further confidence in our strategy and being the pathfinder for others to follow, learn and benefit. We are super excited by this!

Chapter 3: Executive Summary continued

> It is fantastic to see UKPN's leadership in using residential flexibility from EVs to keep network bills down for all. In working with UKPN, we are creating a smart charging system that easily enables consumers to charge at the lowest possible cost, using the greenest energy, which is critical for achieving our Net Zero targets"
>
> **David Watson**
> CEO Ohme

- We are undertaking detailed resource planning for Net Zero scenarios – as part of our workforce and supply chain resilience plans, we are putting in place the arrangements needed to enable us to flex our delivery capabilities (both internally and with our supply chain partners) to deal with any scenario that transpires. We have undertaken extensive engagement with the leadership of our supply chain partners to set the right "tone from the top" within all the organisations critical to success.

3.7 A plan that has been through rigorous assurance

We have followed best practice and implemented an assurance strategy that provides confidence in the quality, completeness and accuracy of our plan. This is based on:

- The use of internal assurance to review and challenge the Business Plan, including independent benchmarking of our efficiency.
- Where appropriate, input from specialist external advisers for topics such as financeability.
- Formal external assurance by EY, who were appointed to confirm the accuracy of data submitted in the plan, as well as other specialist assurance providers for our customer research.
- Critically, the extensive involvement of our Board in the development of the plan.

We have also had extensive challenge from our CEG on material aspects of our plan and what it means for customers such as on our investment strategy, customer research and preparedness to adapt to future decarbonisation pathways.

Our Board has satisfied itself that our plan is high quality and that UK Power Networks is financeable during the RIIO-ED2 price control period, on both the notional and actual capital structure using the Ofgem SSMD working assumptions. However, this assurance should not be interpreted as the Board's acceptance of Ofgem's financial framework and the proposed working assumptions for cost of capital allowances. We set out our views on financeability in Appendix 25a: Financial information.

3.8 Board Assurance Statement

Set out below is the Board Assurance Statement from the board of directors of our three DNOs.

"Having approved the assurance framework, reviewed the assurance findings and management's response, we have collectively and individually satisfied ourselves that the assurance undertaken demonstrates that the Business Plan has a strong research base, is accurate, ambitious, efficient, deliverable and financeable (on both a notional and actual capital structure basis, using Ofgem working assumptions for cost of capital allowances)."

Andrew John Hunter
Director and Chairman – UK Power Networks Holdings Limited and UK Power Networks' wholly owned subsidiaries

3.9 Sufficiently Independent Directors' Assurance Statement

Set out below is the Assurance Statement from the Sufficiently Independent Directors of our three DNOs.

"Having approved the assurance framework, reviewed the assurance findings and management's response, we have satisfied ourselves that the assurance undertaken demonstrates that the Business Plan and associated costs have been tested for accuracy, ambition and efficiency."

Christopher Clarke
Sufficiently Independent Director of London Power Networks plc, Eastern Power Networks plc and South Eastern Power Networks plc

Paul Jeffery
Sufficiently Independent Director of London Power Networks plc, Eastern Power Networks plc and South Eastern Power Networks plc

3.10 The rest of our plan

In the following pages we set out how we have identified and responded to customer needs. We start by explaining how we have assured ourselves that our plan is high quality.

Chapter 4:
Business Plan Assurance

We have followed a robust assurance process to ensure that our Business Plan is of high quality i.e. that it is accurate, ambitious, efficient, financeable and, where applicable, has a clear line of sight from customer and stakeholder feedback through to commitments and actions.

In this section:

4.1	Comprehensive Board engagement throughout the planning process	22
4.2	Ensuring robust and independent assurance	22

Chapter 4: Business Plan Assurance continued

4.1 Comprehensive Board engagement throughout the planning process

Our Board has been actively engaged in the development of the Business Plan over the last two years:

- Our Chief Executive Officer and Executive Board member, Basil Scarsella, has overseen the day-to-day development of the Business Plan.
- Our Board has reviewed, challenged and shaped the key strategic areas of the plan.
- Our Board-appointed advisors have undertaken specific independent reviews of the Business Plan.
- Our Board supplemented its governance committees by establishing an additional RIIO-ED2 committee comprising Board members, both of our Sufficiently Independent Directors and appointed representatives. This committee has met formally 17 times providing review, challenge and oversight over the complete development of the Business Plan.
- Our Sufficiently Independent Directors, Mr Paul Jeffery and Mr Christopher Clarke, have both been full time members of the RIIO-ED2 committee providing an independent perspective and challenge on accuracy, financeability, efficiency and ambition.
- Mr Paul Jeffery has also been appointed to be the Board member with a direct link to the Chair of the Customer Engagement Group on all matters related to the research and engagement programme underpinning the Business Plan.

4.2 Ensuring robust and independent assurance

We have had a strong compliance culture since our formation in 2010. The mantra that has been driven through all levels of the organisation is "to trust but verify." Throughout RIIO-ED1, we adopted a "four lines of defence" assurance process to verify our regulatory submissions. This process, which goes beyond Ofgem's Data Assurance Guidance (DAG), has been used as the basis for the assurance of the RIIO-ED2 Business Plan. It comprises the following:

- First line assurance – business owner/subject matter expert review followed by Executive and Senior Management review, verification and sign-off.
- Second line assurance – Internal challenge provided by the price control team to check quality, deliverability and efficiency.
- Third line assurance – Extensive engagement with independent consultants to bring external challenge and expertise to test our ambition, customer engagement process and efficiency.
- Fourth line assurance – Specific independent reviews of key areas in the plan. This is described in more detail later in the chapter.

These four lines of assurance are supplemented by the welcome challenge from both our Customer Engagement Group (CEG) and Ofgem's RIIO-2 Challenge Group (CG) – please see Appendix 6: CEG challenge and Appendix 28: Responding to the Challenge Group's feedback.

Our independent assurance

As part of our fourth line assurance, we procured the following pieces of assurance to provide the Board and our Sufficiently Independent Directors with additional confidence over specific areas of our plan. This includes:

- **Customer and stakeholder engagement:** Explain Market Research reviewed the core research programme to ensure the research techniques were of high quality and therefore provide confidence that the findings could be relied on. SIA Partners (SIA) reviewed and verified the underpinning evidence that management developed, to show the line of sight from customer and stakeholder insights into business plan commitments and actions.
- **Accuracy:** EY were appointed to provide assurance over the accuracy of the data submitted in our Business Plan (both narrative and underpinning data tables). EY also worked with us to coordinate the DAG process.
- **Financeability:** Technical experts from First Economics supported by an independent team from KPMG reviewed our plan against a suite of factors to enable our Board to conclude that our Business Plan is financeable.
- **Efficiency:** Technical experts from NERA provided a detailed review of our Business Plan against a suite of tests, including benchmarking and ongoing efficiency assumptions.
- **Asset Utilisation:** Global professional services company GHD undertook a detailed and independent audit of the asset utilisation data of our secondary networks. This data underpins our proposed uncertainty mechanisms for load related investment and this audit provides confidence in that data.

To assess ambition, which is subjective, management have triangulated several sources of information with the support of Complete Strategy to form an overall assessment of whether UK Power Networks' business plan is ambitious. This included considering all DNO Initial Business plans, plus feedback from the CEG, CG and stakeholders, such as Citizens Advice.

The assurance activities above enabled our Sufficiently Independent Directors and our Board to provide their assurance statements. These assurance statements are presented on page 20 of this plan.

Chapter 5:
Social Contract

In the context of a changing energy landscape, we are placing increasing importance on the social purpose of our company. We are therefore introducing a Social Contract to report all the organisation's Environmental, Social and Corporate Governance arrangements and performance.

In this section:

5.1	Strategic context	**24**
5.2	Testing our Social Contract with customers and stakeholders	**25**
5.3	Our Social Contract commitments for RIIO-ED2	**25**
5.4	How we will reinforce the social purpose of the organisation with robust and transparent arrangements	**26**

Chapter 5: Social Contract continued

5.1 Strategic context

We recognise the privileged position we hold within society as a provider of an essential service. During RIIO-ED1, our vision included being the most socially and environmentally responsible DNO. However, given the scale of the effort needed to support the transition to Net Zero, we know we must do more. Consumer participation through flexibility and demand side management will be critical to delivering Net Zero in a smart way and at lowest cost. Participation will not come about without consumer trust. We need to place increasing importance on the social purpose of our company especially given how important trust, fairness and transparency are going to be to achieve our strategy and maintain public support for Net Zero.

In summary, for RIIO-ED2, we will:

1. Report annually on the achievement of our social purpose commitments.
2. Update the organisation's Articles of Association to embed an explicit public interest commitment.
3. Enhance the remuneration policy of our leadership and employees to link rewards to specific customer and environmental RIIO-ED2 Business Plan outputs.
4. Continue to monitor and improve our strategy by engaging with customers and stakeholders on an ongoing basis, including through our Citizens' Assemblies.
5. Establish a social fund (The UK Power Networks Foundation), with contributions by both the shareholder and employees, to advance good causes in the communities that we serve.

Learning from best practice

Our Social Contract proposals have drawn on research into best practice (e.g. Sustainability First[1], Business in the Community[2], and McKinsey[3]). In summary, the best practice analysis provides clear ideas on common features of trusted and responsible companies. These include:

- **To "walk the talk"** – The Board must embed a purpose-led business model by being accountable to every employee for the full impact of company operations and work with stakeholders to deliver sustainable positive change in society. The governance approach and performance of the business should be reported in a transparent and easy-to-understand manner. Moreover, the most forward-thinking companies have adopted remuneration polices in line with the requirements of the UK Corporate Governance Code even if it was not a formal requirement for them to do so[4].
- **Promote "collaboration and partnership"** – Ensuring the supply chain is aligned with social purpose by adopting a values-driven culture with measurable targets, including environmental goals.
- **Embed "fairness in operation"** – Aligning the remuneration policy to a wider societal interest, supporting those that are vulnerable, as well as treating employees with respect.
- **Undertake "ongoing engagement with stakeholders and customers"** – Understanding their long-term needs and including their involvement in the complex trade-offs and choices that will be a feature of achieving Net Zero.

We have been challenged by our CEG as to why we believe that our social purpose commitments form a Social Contract given that a "contract" has specific characteristics (e.g. binding agreement between two or more parties, with negotiated terms and conditions that are enforceable.) We have used the term 'Social Contract' to contain all our social purpose commitments in a single place such that our customers, citizens and stakeholders can hold us to account on our promises. Our engagement with stakeholders at our CEO panel supported this idea and encouraged our intent to communicate our social purpose in this way. Our Social Contract may not be a "traditional contract" which we would expect other parties to explicitly sign, but we will be proactive in seeking customer views on our role and performance as part of ongoing engagement in RIIO-ED2 to ensure we continue to adapt our organisation to be fit for the future and the changing environment that it will operate in. For example, the next evolution of our Social Contract will seek to explore our relationship with customers and how their actions (e.g. selling services to the Grid, demand side management) could help us facilitate Net Zero at lowest cost by making the most efficient use of the existing network before creating more capacity. That is a win for consumers and a win for networks. Our DSO strategy explains more about how we are making this concept a reality working with trusted intermediaries to maximise consumer participation for a lower cost and more efficient energy system.

1 Regulation for the future: The implications of public purpose for policy and regulation in utilities (sustainabilityfirst.org.uk)
2 The Responsible Business Map, BITC, https://www.bitc.org.uk/the-responsible-business-map/
3 The case for stakeholder capitalism, McKinsey, https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-case-for-stakeholder-capitalism
4 For example, Danone, Siemens and Unilever have explicitly included sustainability metrics, which in a number of cases are externally audited, within their remuneration policies.

5.2 Testing our Social Contract with customers and stakeholders

Our thinking in this area has been informed by direct stakeholder and customer engagement, including our CEO panel[5]. We further explored the concept of a Social Contract with over 700 domestic customers across our licence areas via deliberative focus groups and a quantitative online survey. We explored areas including what makes a company trusted, the importance of a social contract, the commitments a social contract should contain and how to measure and communicate performance against the contract.

5.3 Our Social Contract commitments for RIIO-ED2

Based on the feedback from the CEO and our customer research, we have proposed Social Contract principles. These are shown in our Social Contract in Appendix 4: Social Contract. We believe it is important that there is a clear line of sight from our Social Contract principles to the UN Sustainable Development Goals (SDGs) through to the specific actions we will take to deliver on them. This is reinforced by our customer feedback which highlighted that the principles are easier to understand if they are clearly linked to outputs that are relevant and meaningful. In Appendix 4 we provide a full mapping of our RIIO-ED2 commitments to our Social Contract principles.

Delivering our commitments

We propose two specific business plan commitments tied to our Social Contract, below:

Commitment SC1

We will establish the UK Power Networks Foundation fund to support those most in need in the communities we serve. We will contribute up to £4m (approximately 1% of profit after tax) to the fund each year during RIIO-ED2.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
£4m per annum.	Shareholder funded.	The UK Power Networks Foundation fund will provide targeted support worth up to £4m p.a. to our communities. This will range from supporting customers during power cuts, to helping communities decarbonise. The fund will also be open to employee contributions, further increasing the financial support available to our communities.	Giving something back to the community should be a focus for us.

Commitment SC2

We will enhance our Annual Review for greater transparency by publishing our performance against our Environmental, Social and Governance commitments every year during RIIO-ED2.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Customers will have a greater understanding of how we are delivering in areas that matter to them by increasing the transparency of our reporting of performance against our Social Contract.	From our customer research transparent reporting was a key priority.

5 A group of senior individuals from industry, NGOs and charities that provide advice to UK Power Networks, they meet twice per year.

Chapter 5: Social Contract continued

5.4 How we will reinforce the social purpose of the organisation with robust and transparent arrangements

Embedding social purpose from the Board level down

Our best practice research has highlighted the importance of Board level commitment to social objectives. In its "Fair for the Future" project – Sustainability First considers that companies should amend their Articles of Association to embed a public interest commitment within them to demonstrate Board level commitment to fairer social outcomes. We agree, and UK Power Networks Holdings will be amending its Articles of Association to include a clear public interest commitment such as the following:

> "The purpose of the Company is to conduct its business and operations for the benefit of its members as a whole while maintaining a reputation for high standards of business conduct, delivering long-term value for its customers and seeking positive outcomes for the environment and society benefiting the citizens in its region."

Helping to deliver positive change in the communities we serve

The sentiment from our State of the Nation customer research demonstrated that overall responsibility is felt to lie with utility providers and government, rather than other customers, to support those who are more vulnerable. Our proposed approach is to develop an annual social fund, the "UK Power Networks Foundation," which would provide £4 million per annum of funding to support our communities. This would range from supporting customers during power cuts to helping communities decarbonise. The fund will also be open to employee contributions, hence increasing the financial support available to our communities.

Linking remuneration to a holistic view of performance

A key principle of the UK Corporate Governance Code is that:

> "Remuneration policies and practices should be designed to support strategy and promote long-term sustainable success. Executive remuneration should be aligned to company purpose and values and be clearly linked to the delivery of the company's long-term strategy."

Our executive and company remuneration policy has always been linked to the key priorities of our customers which underpin our vision and values. The current UK Power Networks incentive plan is focused on delivering on important elements in our vision, with additional performance-linked metrics on individual targets.

According to our RIIO-ED2 stakeholder research, customers still highly value our four key priorities. In addition, the research has also highlighted that customers place a high value on our sustainability performance. We are proposing to amend our current executive and employee company incentive plans to specifically include a sustainability measure which will be a composite metric comprising a balanced set of environmental commitments including carbon, oil reduction and SF6 leakage reduction. Further information on our proposed company incentive plan is set out in our Social Contract (Appendix 4).

The UK Corporate Governance Code also suggests that executive remuneration should be linked to long term performance. To align with this, we propose to include the following metrics in our executive long-term incentive plan:

- The delivery of our RIIO-ED2 network health index targets.
- A customer satisfaction measure specifically focused on customers' experience of connecting to zero carbon technologies e.g. electric vehicles, heat pumps and renewable generation.

Again, further information on our proposed long term incentive plan is set out in our Social Contract (Appendix 4).

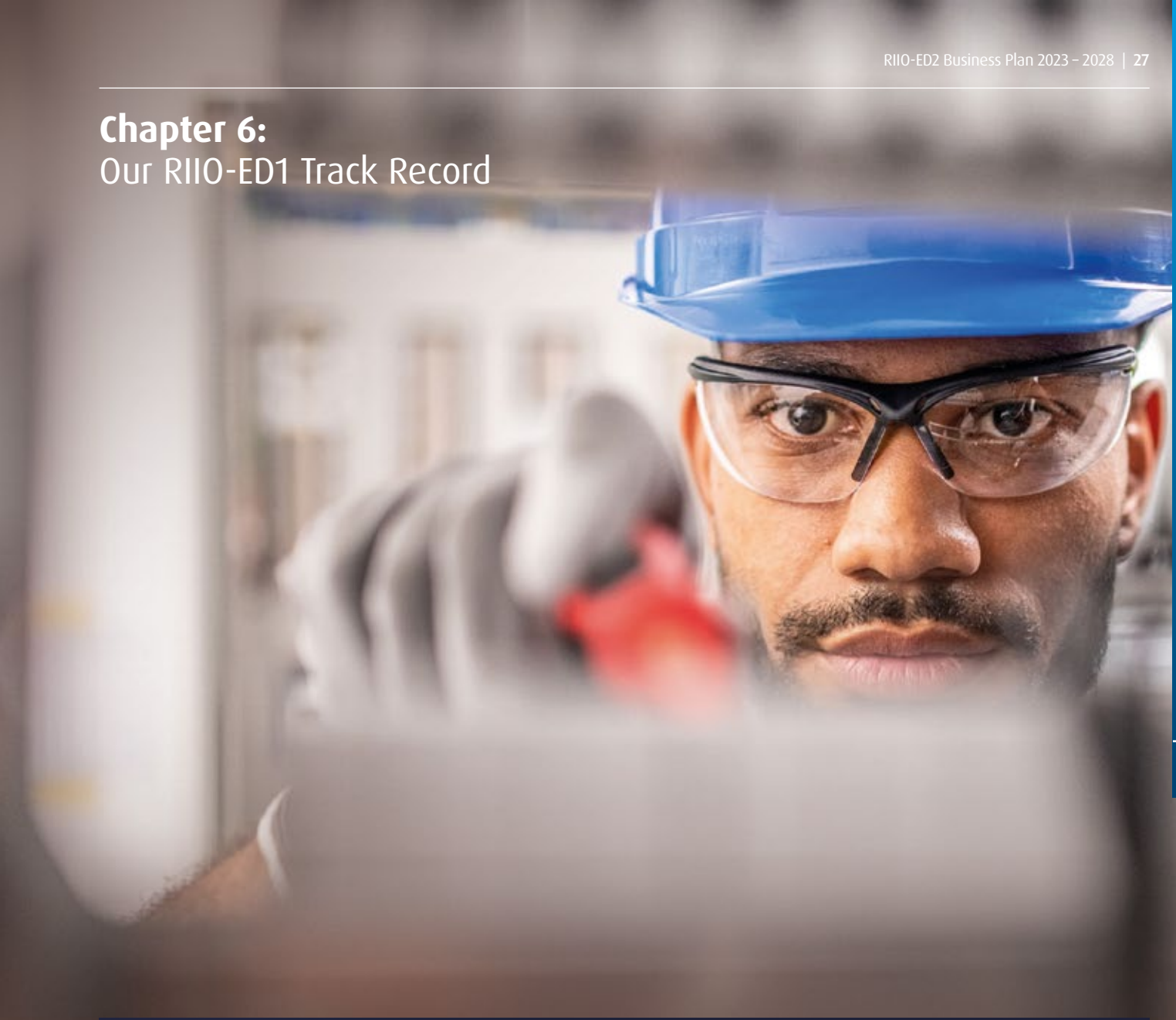
How we will report our performance and be held to account

A key priority of our customers is transparent reporting of performance against the Social Contract. To address this, we will build on our existing social purpose reporting within our Annual Review. Our domestic customers told us that they would also like to see our performance more widely publicised through a range of social media channels. We agree, and will publicise, our performance via a range of channels including Twitter, LinkedIn and Facebook. We will regularly review our Social Contract performance reporting framework with our stakeholders to ensure that it continues to meet their needs.

As highlighted by our CEO panel, accreditations/independent assessment by respected third parties provides a fair assessment on whether our performance meets the targets we have set ourselves. We have achieved a wide range of accreditations over the years, including the Responsible Business Tracker that assessed our performance on corporate social responsibility based on the UN Sustainable Development Goals[6], the Carbon Trust Standard (a DNO first) which examines our effort in reducing carbon emissions across the supply chain[7] and Investors in People (Platinum status, a DNO first) that recognises our high performance in people management.[8] We will build on this strong base and seek to introduce additional third party assessment where practicable.

6 The Responsible Business Tracker, https://www.bitc.org.uk/the-responsible-business-tracker/
7 The Carbon Trust Standard, https://www.carbontrust.com/what-we-do/assurance-and-certification/the-carbon-trust-standard
8 Investors in People, https://www.investorsinpeople.com/

Chapter 6:
Our RIIO-ED1 Track Record



In this section:

6.1	What our performance means for customers	**28**
6.2	Our purpose and vision	**28**
6.3	RIIO-ED1 financial performance	**31**
6.4	Reducing the customer bill	**32**
6.5	RIIO-ED1 incentives and outputs	**32**

Chapter 6: Our RIIO-ED1 Track Record continued

6.1 What our performance means for customers

Below we demonstrate key areas of our track record in RIIO-ED1[1] and how we have delivered class leading performance for the benefit of our customers. Underpinning these achievements is our belief that we should only spend money when it is necessary, in order to deliver a high performing network for the lowest cost to our customers.

Figure 7: Our performance in key areas

64%

Safer networks: 64% reduction in Member of Public (MoP) injuries over RIIO-ED1

18%

More reliable networks: 18% reduction in Customer Interruptions

23%

More reliable networks: 23% reduction in Customer Minutes Lost

93%

Improved customer service: 93% satisfaction score achieved

5,000

Over 5,000 customers categorised as 'worse served' have seen an improvement in network reliability

74%

74% improvement in our RIIO-ED1 complaints metric score, as well as being the least complained about DNO

1.97m

1.97m customers on our Priority Services Register, rating our service 93%

£57.5m

£57.5m (nominal prices) of benefits for customers in or at risk of fuel poverty

6.2 Our purpose and vision

Establishing a clear purpose and vision

In 2010, UK Power Networks acquired the three networks of London Power Networks (LPN), Eastern Power Networks (EPN) and South Eastern Power Networks (SPN). At the time, the business was widely perceived as being poor performing.

Immediately after the change of ownership, we sought to establish the core purpose of the organisation – to serve our customers and communities and through extensive stakeholder engagement and research, establish a business vision for the organisation.

We have translated our vision into a strong public purpose and converted it into clear and challenging targets for our employees and partner organisations, in order to drive a high-performance culture within the whole organisation.

Having a clear strategy to realise our vision

Our strategy to deliver the vision is simple; to deliver our committed outputs at the lowest possible cost thereby keeping bills low, whilst delivering great service and reliability for our customers. We have continually tested this strategy with our stakeholders, including Ofgem to seek constructive challenge. We believe this strategy delivers for customers and is aligned with Ofgem's RIIO-ED1 strategy. At the time, Ofgem's strategy was focused on delivering: lower bills, improved reliability and safety, better quality of service, lower environmental impact from network operations and better social outcomes.

The vision was developed around the key principles of safety, network reliability, customer service and being the lowest cost DNO and has evolved and expanded to meet the changing needs of our customers and stakeholders, who have helped inform our vision from the very beginning.

1 All of the numbers in this chapter are in 2020/21 prices unless stated otherwise.

Figure 8: Our performance against the vision

Employer of Choice	Respected and Trusted Corporate Citizen	Sustainably Cost Efficient
• Industry best in terms of safety since 2013. • Ranked third most inclusive employer in the UK, against companies such as Capgemini and Bupa. • Only DNO to achieve the Investors in People Platinum award – only 2% of organisations our size have achieved Platinum. • Sunday Times best 25 Big Companies to work for 6 years running – the only DNO and large Utility in the Top 10.	• LPN is the best DNO in the industry in terms of CI and CML performance. • Customer service scores reaching 9.28 (#1 in the industry in 20/21) and rated as 5 stars on Trustpilot. • Reduced our Complaints Metric score by 74% whilst also becoming the least complained about DNO. • £284m in Innovation savings – 1st out of all DNOs. • Delivered fuel poverty advice to 2.51m people. • 1st DNO to achieve the Carbon Trust Standard for carbon. • Ranked number #1 for smart grid capabilities globally in the Singapore Power Group's Smart Grid Index. • 2019 winner of the Edison Electric Institute International award for our leading role in enabling decarbonisation. • CIPS Supply Chain Platinum accreditation – only DNO and one of 16 companies internationally that has been awarded Platinum.	• Lowest cost DNO on average in the industry. • Ranked first in terms of efficiency compared to the other DNO groups. • 73 of our 77 RIIO-ED1 commitments are green.

Shifting gears in RIIO-ED1 on efficiency

When we took over the business, we were faced with a significant requirement to spend money to repair large numbers of legacy network defects, managing poor capital delivery methods and addressing inefficiencies in work practices that were largely still based on paper and manual processes. It was within this context that the RIIO-ED1 Business Plan was prepared in 2012/13 (within 18 months of acquisition); with cost efficiency performance still lagging early operational improvements. Consequently, management took a prudent and reasonable view of what efficiencies could be realised over RIIO-ED1.

Following the RIIO-ED1 Final Determination, we worked hard to ensure our cost efficiency performance matched our operational performance by:

- Ensuring all levels of management had clear accountability and targets directly linked to their personal remuneration.
- Aligning the incentives of our supply chain (such as our EDISON Alliance) with our own incentives. Our partners share the gain as well as any pain for the over or under delivery of work compared to the Ofgem allowances.
- Adopting a commercial discipline for innovation, ensuring that new ideas are translated into improved business performance for the benefit of customers. We are forecasting to deliver £284m (nominal prices) in benefits from innovation in RIIO-ED1 (3 times the nearest DNO) across 50 solutions (over 2 times the nearest DNO). We have been recognised internationally for deploying smart grid capability and challenging the status quo (see Chapter 12: Enabling whole system solutions).

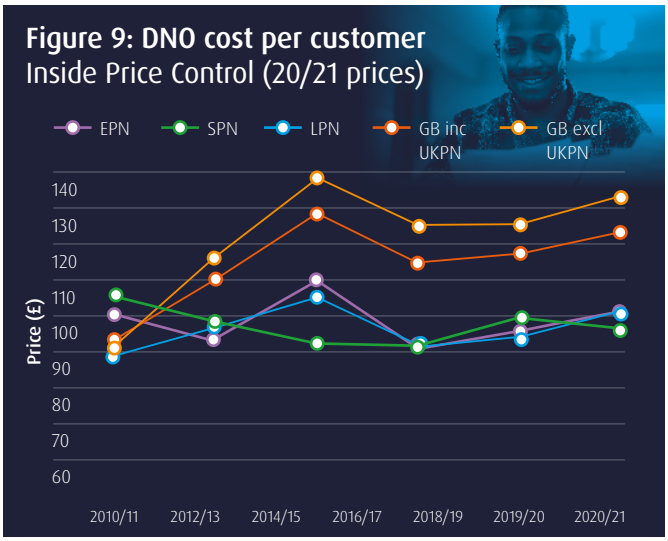
> One of the biggest changes I have seen since the start of UKPN 10 years ago is the increased focus on our vision compared with predecessor companies. Our targets and incentives have been strongly aligned to our vision and the impact of this has cascaded through the business, increasing my personal accountability, my team's accountability and resulting in improved performance across all of our directorates".
>
> **Steve White,**
> Head of Network Control and Operations

- Refocusing our delivery model to insource activities, where we need greater control over efficiency and responsiveness.
- Challenging ourselves to ensure that every pound that we invest is linked to outputs and is necessary. We do not conform to the traditional stereotype of DNOs (according to which DNOs are expected to spend in line with their allowance and grow their Regulated Asset Base (RAB), regardless of changing external circumstances). As a testament to that, because demand has been lower than anticipated, we are forecasting to underspend on our load related allowances by 49%, before the application of reopeners. Our allowance at the start of RIIO-ED1 was £1,117m for the period, however we only forecast to spend £548m by the end of the period. The majority of this benefit will be returned to customers, meaning they benefit by £508m. The remaining benefits delivered through greater efficiencies and innovation are retained by UK Power Networks.

Chapter 6: Our RIIO-ED1 Track Record continued

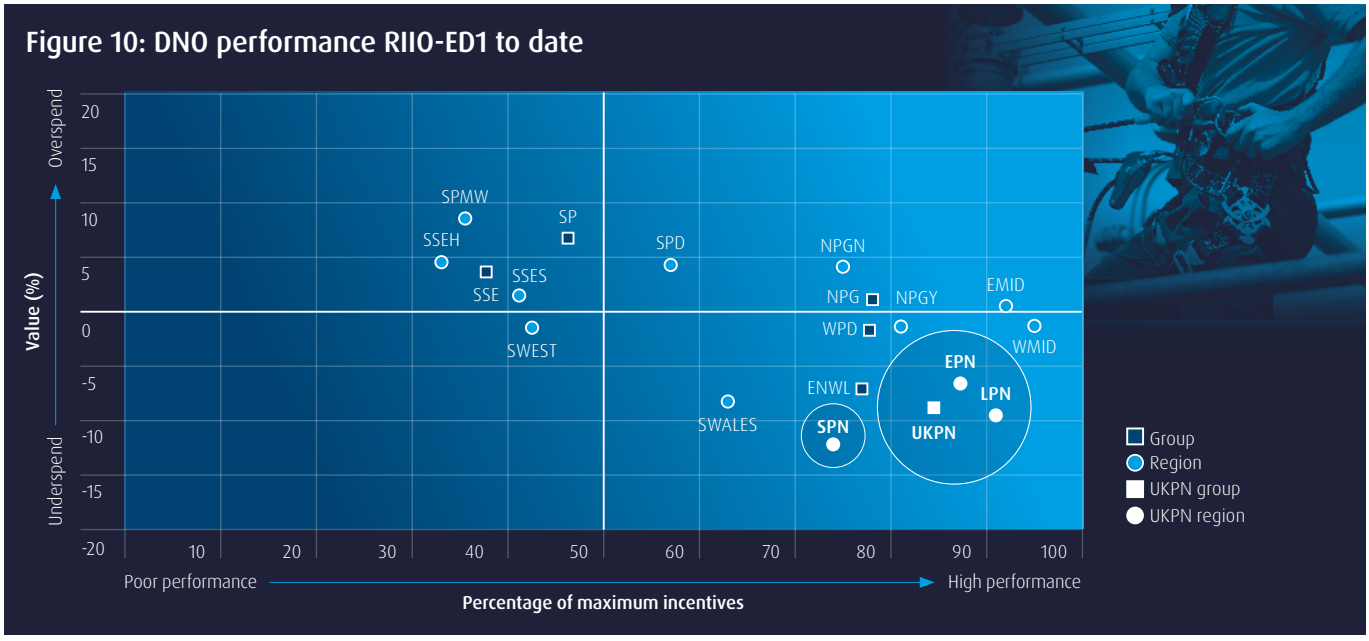
The results

The figure below demonstrates how we have driven down costs using a simple approach: total net expenditure inside price control divided by customer numbers.



We consider that a high performing company is one that delivers their outputs for the lowest cost overall – in the bottom right of the quadrant graph shown below. UK Power Networks as a DNO group, as well as our three individual licensees all fall into this category, with our performance setting the frontier and demonstrating industry leading levels of efficiency. We have outperformed the allowances by 9% (post reopeners)[2] for the first six years of RIIO-ED1, whilst delivering all of our outputs, earning 84% of the maximum incentive revenue available.

For the full 8-year RIIO-ED1 period, in the 2020/21 annual regulatory submissions, we forecast an outperformance of around 5%, once all the RIIO-ED1 uncertainty mechanisms are processed. Indeed, despite significant falls in both peak demand and units distributed in the period compared to the forecasts that company business plans were predicated on, we are currently the only DNO Group to forecast triggering the load related reopener adjustment mechanism at the end of the period.



2 The reopener accounts for material over or underspends against allowances, where efficient and where the difference between actual expenditure and allowances is greater than 20% of the original allowances. We are forecasting to trigger the reopener in the areas of Load and High Value Projects.

6.3 RIIO-ED1 financial performance

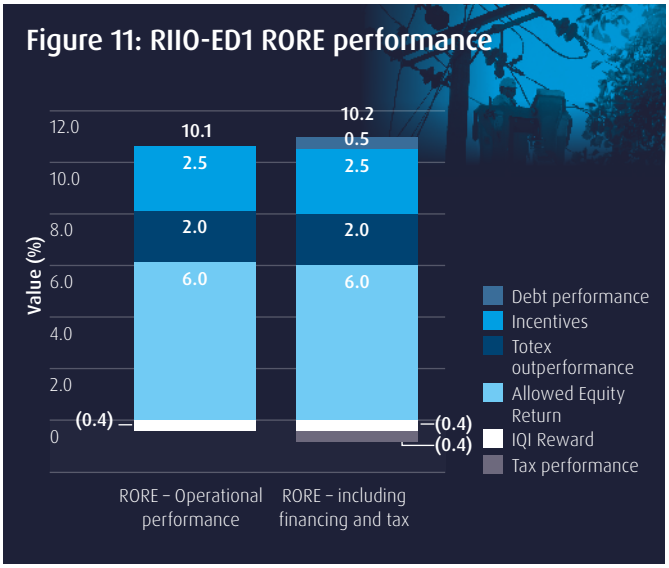
Ofgem uses the Return on Regulatory Equity (RoRE) as an indicator of overall financial performance and an estimate of the annual return that shareholders could expect. After six years of RIIO-ED1, our RoRE performance post reopeners is 10.2% across our three networks on a notional gearing, placing us as the top performer in the sector. Securing this level of return is consistent with the original expectation of the RIIO framework – Ofgem made public their view that top performing companies could expect to earn double-digit RoRE returns[3].

There are two key drivers that contribute significantly to our RoRE performance over the first six years of RIIO-ED1:

- **Totex outperformance of £263m** (2%) post application of the sharing factor[4] resulting from us delivering our committed outputs at the lowest possible cost. Our customers also receive £230m from our outperformance in the form of lower bills.
- **Incentive performance of £330m** (2.5%) earned as a result of delivering excellent performance for the benefit of customers. In particular, improved reliability (18% improvement in customer interruptions over RIIO-ED1), customer service (with scores reaching 93% satisfaction by the end of the sixth year of RIIO-ED1, placing us as the best performing DNO group), time to connect and quote, and stakeholder engagement (where we have achieved first place for the past two years). We have continued to set the performance frontier for the sector pushing performance well above that required to earn 100% of a number of the incentives. Our reliability performance in our LPN and EPN licence areas exceed the target to earn the available incentives.

Over this period, our frontier performance has enabled us to distribute annual average dividends of £215 million (nominal prices) from our regulated activities to shareholders.

Figure 11: RIIO-ED1 RORE performance

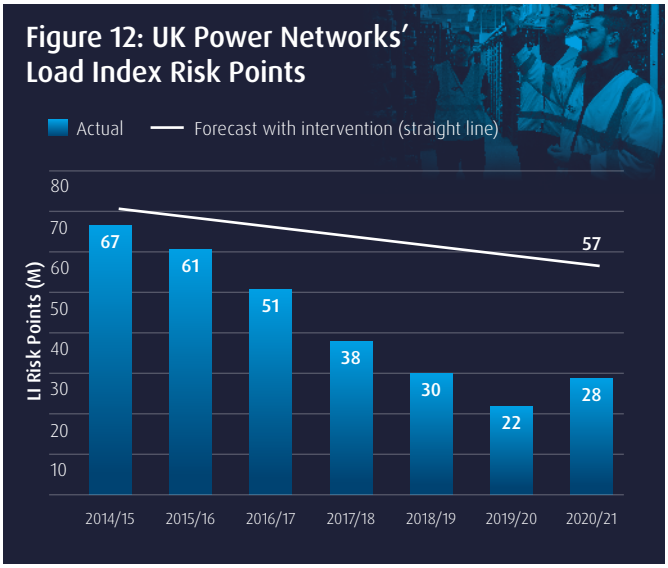


Totex outperformance

We have benchmarked our costs using the model that Ofgem used in RIIO-ED1. Our approach and calculations have been assured by NERA. Based on six years of actual data, the benchmarking shows that our efficiency score has improved markedly since the price control was set in 2014. We rank 1st **in terms of efficiency** compared to the other DNO groups.

Whilst underspending our allowance keeps bills low for customers, this is not done at the expense of our service, as has been demonstrated by our strong Load index (LI) performance. Our LI risk points have been below the target for each year, demonstrating that the level of reinforcement has more than kept pace with outturn requirements. Further information on our network capacity during RIIO-ED1 and expected capacity at the start of RIIO-ED2, as well as the benefits realised from a smart energy system are detailed in Appendix 2: our RIIO-ED1 track record.

Figure 12: UK Power Networks' Load Index Risk Points



For the first six years of RIIO-ED1, our 9% outperformance can be broken down into the key drivers shown in Figure 14. We have delivered underspends in the cost categories of Load and Non-Load and overspent in areas such as Closely Associated Indirects. Any overspend we have incurred has been offset by efficiencies delivered, as well as the development of innovative solutions. We believe in spending money only when it is necessary, in order to be able to deliver a high performing network for the lowest cost to our customers. Full details of our expenditure against each of the categories below are contained within Appendix 2: our RIIO-ED1 track record.

3 Consultation on strategy for the next electricity distribution price controls – RIIO-ED1 – Financial issues.

4 The sharing factor is a mechanism to share the over or underspend between customers and licensees. UK Power Networks receive 53% of any under or overspend and customers receive 47%.

Chapter 6: Our RIIO-ED1 Track Record continued

Figure 13: RIIO-ED1 DNO efficiency analysis assured by NERA

By region

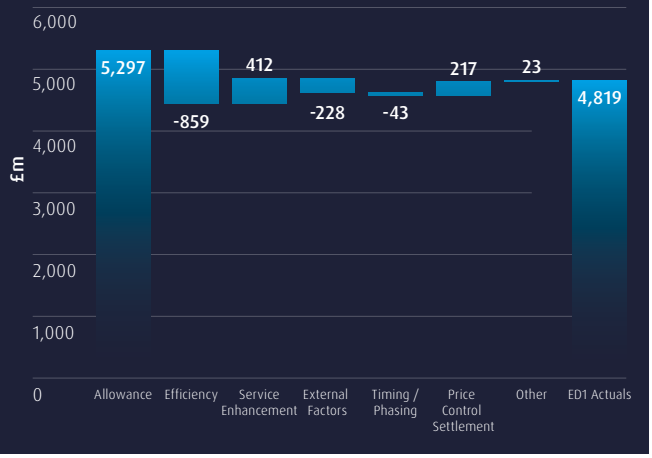
	Rank	Score (%)	GAP to benchmark (£m)
SPN	1	84	-46.2
LPN	2	92	-20.6
NPGY	3	95	-13.9
ENWL	4	96	-12.2
EPN	5	96	-14.8
SWales	6	97	-5.3
SPD	7	99	-2.2
NPGN	8	101	1.9
SSES	9	102	5.6
SSEH	10	104	6.7
EMID	11	105	16.7
WMID	12	112	36.1
SWest	13	121	47.3
SPMW	14	122	51.0

By group

	Rank	Score (%)	Gap to benchmark (£m)
UKPN	1	91	-81.6
ENWL	2	96	-12.2
NPG	3	98	-12.0
SSE	4	102	12.3
WPD	5	109	94.8
SP	6	110	48.8

Note: Ranking calculated using 2011-21 data. 2020-21 prices.

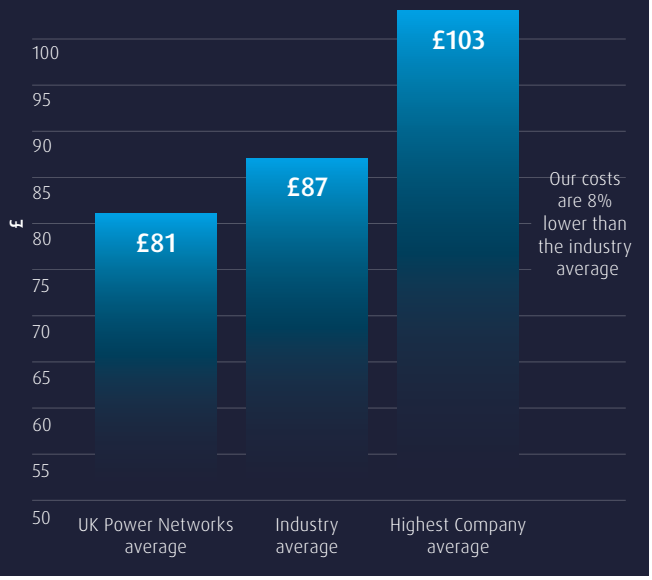
Figure 14: UK Power Networks' RIIO-ED1 (2015/16 – 2020-21) Totex Movements post reopeners (£m)[5] 2020/21 prices



6.4 Reducing the customer bill

Reflecting our strong performance on costs, over the last six years, on average our charges have been 8% lower than the industry average. Over the full RIIO-ED1 period our customers will benefit by approximately £444m in the form of lower bills through the totex incentive mechanism and operation of the close-out adjustments.

Figure 15: Average annual domestic distribution costs RIIO-ED1 to date 6 years (2020/21 prices)



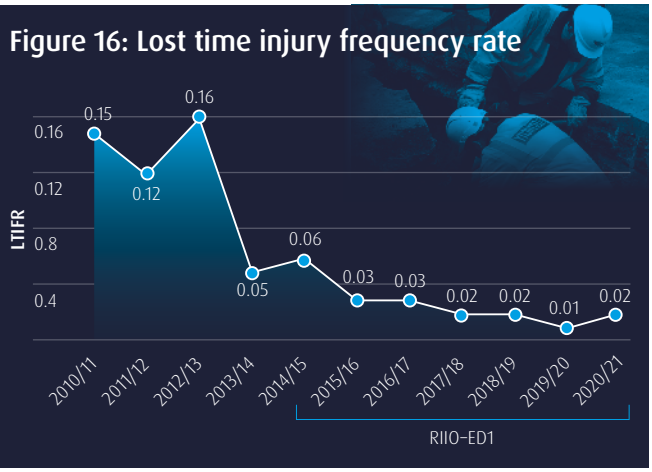
6.5 RIIO-ED1 incentives and outputs

We are on target to deliver all of our outputs in the RIIO-ED1 framework, however our aim is to not just meet expectations, but to go above and beyond for our customers and adapt to reflect the changing environment we operate in. That environment has already evolved significantly since the establishment of the RIIO-ED1 framework, and continues to do so.

A safe and engaged workforce

Safety is our top priority and we are proud to say we are the safest DNO to work for in Great Britain, following an immense amount of work undertaken to implement a strong safety culture throughout our organisation. We have seen a **58%** improvement in our Lost Time Injury Frequency Rate (LTIFR) since the beginning of RIIO-ED1, as well as a **64%** reduction in Member of Public (MoP) injuries.

Figure 16: Lost time injury frequency rate



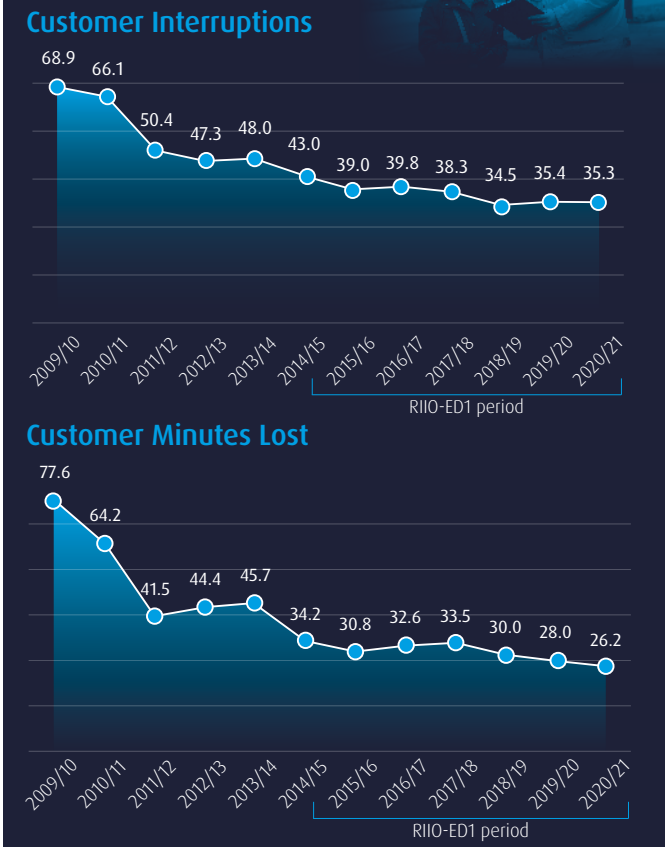
5 Our allowance and underspend has been adjusted to reflect a six-year view of any price control true-up mechanisms we expect to occur at the end of the price control. This is derived from RRP information for the first six years of RIIO-ED1 and does not contain the full suite of enduring value adjustments and PCFM adjustments used in the RORE calculation.

We aim to be an organisation that our employees feel proud to work for as well as increasing our focus on diversity and inclusiveness over RIIO-ED1. We are ranked the third most inclusive employer in the UK, beating companies such as Capgemini and Mitie, and were awarded the Investors in People Platinum award. Our work to recruit and retain a diverse workforce has been recognised through achieving the National Equality Standard. We also feature in the Sunday Times Best 25 Big Companies to work for and have done so for 6 years running, being the only DNO and utility company to feature in the top 10.

The most reliable network

Network reliability is an increasingly important focus area for customers and stakeholders as we move to a world where society is more dependent on electricity than ever before. It is imperative that we ensure we provide a reliable electricity supply. We have seen an 18% improvement in our Customer Interruptions (CI) performance since the beginning of RIIO-ED1 and a 23% reduction in Customer Minutes Lost (CML), with 2020/21 being our best ever year for CML performance. Our London network is industry leading in terms of both CI and CML performance.

Figure 17: Customer Interruptions and Customer Minutes Lost



A new 'Head of Quality of Supply' role was introduced in order to place further managerial focus on improving our network performance. In 2019/20 we implemented an extensive programme of improvements to our equipment right across the areas in which we operate, replacing it as necessary and installing innovative, cutting edge models wherever possible. We introduced a new approach to organising our operational teams called Mission Directed Work Teams (MDWT). This method helps us take an increasingly rigorous approach to gathering and analysing data about our supply performance at a location level. Information about faults is key to understanding how we deal with them. We hold weekly performance calls, which help us focus on the restoration of supplies after network automation has taken place and the learnings are replicated across our networks. This year we have introduced fault passage indicators which are a new way of detecting much more accurately where on a length of network a fault is located, meaning our engineers can find and fix faults more quickly.

Delivering the best customer service

As energy becomes a bigger part of all of our lives, so does the level of service our customers expect from us. We are focused on not only delivering the best in class customer service but also going beyond the industry to deliver a level of customer service that is better than that of national leaders. On Trustpilot, 96% of customers rate our service as "Excellent". Our scores have seen a further improvement, reaching 92.8% for the 2021/22 regulatory year, where we are first compared to all DNOs.

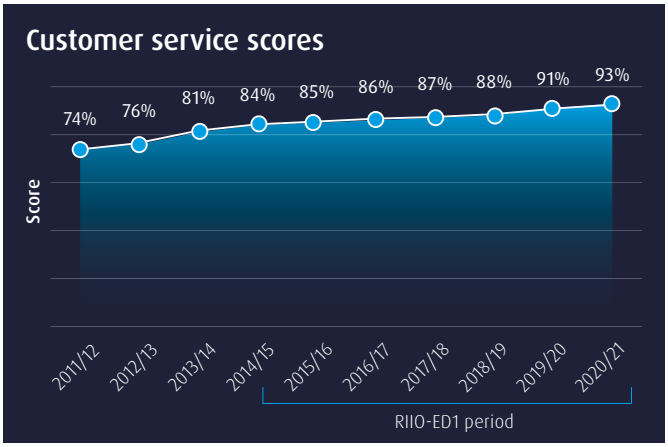
We also occupy first place for the connections element of Broad Measure of Customer Service (BMCS) in the 2020/21 regulatory year and in the latest regulatory year (2021/22) we are ranked first across all elements of BMCS. The table below shows our performance against the other DNOs based on a weighted average for the full 2020/21 regulatory year.

Figure 18: DNO customer service scores (2020/21 Reg performance)

2020/21 regulatory performance		
DNO group	**Score**	**Rank**
UK Power Networks	**92.8**	**1**
Scottish Power	92.3	2
Western Power Distribution	91.8	3
Electricity Northwest	90.8	4
Northern Powergrid	90.4	5
SSE	88.2	6

Chapter 6: Our RIIO-ED1 Track Record continued

In addition to our customer satisfaction scores, we have introduced many other sources of customer feedback data, such as pulse surveys, Trustpilot reviews and information from complaints. We use this data to learn about what satisfies our customers and, increasingly, what delights them about the service we provide. We have been using increasingly sophisticated ways to analyse the data that we collect from our operations to understand what leads to customer satisfaction.



We are now able to look at what we know about our customers and the services they use from many perspectives, such as network performance, geography, the particular customer journey, circumstances or demographics. We were the first DNO to be awarded 5 stars on Trustpilot with over 2,600 customers independently and publicly rating our performance as excellent and receiving over 39 times the number of reviews of any other network operator, with the nearest DNO achieving a rating of 3.1 stars. We were also the first DNO to implement Rant and Rave surveys, which is used successfully in the Fintech industry, to ensure that we receive real-time feedback from our customers in order to further improve our service. This enables us to substantially increase the "voice of the customer" feedback into our services compared to relying on the industry BMCS sampling that takes place across all DNOs.

Our data is granular, with targets and customer service performance measured at a team level. This helps us to pinpoint any service issues quickly, and work with teams to develop targeted improvement plans. Data also enables better information for customers, in real-time, while we are providing a service, and for post service support and care. Looking from these different angles helps us understand in some detail the differing priorities and pressure points our customers experience and enables us to identify possible concerns and resolve them proactively for our customers.

For example, there is a general enquiries service that we provide both for our commercial and domestic customers. We noticed that while our domestic customers scored us highly in terms of satisfaction for this service, our commercial customers were not so happy. We drilled into the detail of what was behind these scores. It became clear that for commercial customers, there was a communication breakdown between the initial site visit to assess their needs and the appointment to carry out the work. This was particularly prevalent in a certain location of our business operations. In light of this insight, we changed our processes for this segment of our customers and now, for commercial customers, we also send the engineers who will carry out the work on the initial site visit. That way, we are able to design and deliver a solution quickly, and it will be right the first time. We quickly saw an improvement in our satisfaction scores among this subset of our customers, from 81% in 2019 to 95% in 2020.

We also took machine learning experience gleaned from technology disruptors, like Netflix and Amazon, to develop an advanced machine learning tool for customer connections. Taking three years of customer feedback combined with our own internal performance data, we created a predictive algorithm to flag up potential dissatisfaction in each individual customer's journey. We demonstrated that the algorithm could achieve 91% accuracy and the artificial intelligence continues to learn and improve as more data is added to it. Our customer service teams use this tool, which displays daily prioritised recommendations to support early interventions and anticipate problems before they arise. This has helped our customer-facing teams to understand individual customers' particular needs and so provide them with a more tailored service.

In addition, we have also seen an improvement in our Complaints Metric score of 74% since the beginning of RIIO-ED1, demonstrating our efforts to resolve complaints quicker.

Supporting vulnerable customers

Meeting the needs of the customers and communities we serve is at the heart of our vision and ensuring that no one is left behind, particularly when it comes to those in vulnerable circumstances, is of the utmost importance to us.

In RIIO-ED1 we have:

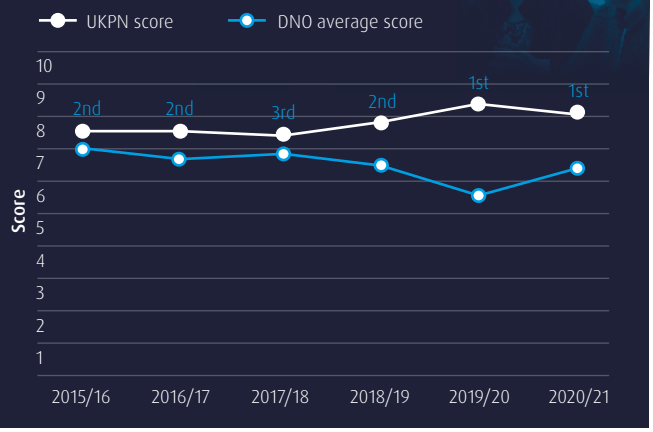
- Delivered £57.5m of benefits for customers in or at risk of fuel proverty, with additional £19.5m to be realised over the coming years.
- 1.97m customers on our Priority Services Register, rating our service 93%.

Our Stakeholder Engagement and Consumer Vulnerability (SECV) submission for 2020/21 was ranked first by Ofgem's independent expert panel. This was for the second successive year, demonstrating the focus we have put into helping vulnerable customers and engaging with our stakeholders to better understand their needs. In 2020, we won the 'Stakeholder Engagement Initiative of the Year' title at the Network Awards for our 'lifting families out of fuel poverty' project. We supported over 845,000 customers who were at risk of living in fuel poverty and increased our fuel poverty programme from five to 35 initiatives by introducing our Fuel Poverty Forum in 2019/20, bringing experts together to help shape our delivery model. In 2018/19 we also introduced our £300k Power Partners Innovation Fund to trial new ways to tackle fuel poverty and identify local partners. At our Partners Forum, the Royal Association of Deaf People (RAD) and DeafBlind UK asked how we could support British Sign Language (BSL) users with their energy bills, we worked with NEA and deafPLUS to train advisers to help with fuel debt through debt advocacy, tariff switching and benefit checks.

> We want to ensure that fewer deaf people are faced with fuel poverty. This is why we partnered with UK Power Networks to offer fuel and energy advise to our clients"
>
> **Gary Williams,**
> deafPLUS CEO

Figure 19 shows the continued progression we have made as a business across RIIO-ED1, which has been acknowledged in the rankings, scores and feedback provided by Ofgem's independent panel. We have outperformed the trend in industry group scores over RIIO-ED1. We attribute our performance to the hard work, dedication and constant striving to learn and improve that underpins the ethos of our business.

Figure 19: UK Power Networks' SECV performance RIIO-ED1



Ensuring a sustainable business

As the UK works towards achieving its Net Zero targets, our role as a DNO in reducing our environmental impact is more important than ever. We have reduced our Business Carbon Footprint (BCF) by 31%[6] since the start of RIIO-ED1 and partnered with the Carbon Trust to better understand our contribution to global greenhouse gas emissions. We were an early adopter in setting ourselves a Science Based target for reduction. We have the lowest Sulphur hexafluoride emissions (SF6) out of all DNOs, at 0.11% of SF6 emitted as a percentage of our SF6 bank. We have reduced our Fluid Filled Cable (FFC) leakage by 25% since the beginning of RIIO-ED1 through improved leak location and repairs. We are focussed on managing our losses and in 2020/21 alone we replaced 1,090 distribution transformers and 11 primary and grid transformers with Ecodesign specification units, reducing our losses by 4,689 MWh per annum. We have also worked with our stakeholders to establish our Green Action Plan which goes beyond the environmental commitments that we made in RIIO-ED1, with additional targets that are more comprehensive and ambitious.

We are the first DNO to achieve the Carbon Trust Standard.

Focussing on our network health

Maintaining the health of our network is extremely important in ensuring we are able to deliver a reliable electricity supply for our customers. Throughout RIIO-ED1 we have used data to ensure the health of our assets is sustained both now and in the future. Our strong performance against the Health Index and Load Index demonstrates our plan of refurbishment, replacement and reinforcement has been successful. We have already delivered 81% of our risk delta in our Health Index and are targeting a delivery of between 100-105% by the end of the period. Our strong Load Index position has also been achieved through the use of Innovative solutions, such as the Real Time Transformer Rating (RTTR)[7]. Further detail on the volumes and cost of our asset interventions during RIIO-ED1 are detailed in Appendix 2: Our RIIO-ED1 track record.

Improving connections performance

The Average Time to Quote and Connect incentive was new for RIIO-ED1. Year one of the control was the first time any quotes or connections counted towards the mechanism. As such, it presented an artificially "low" point as it did not include any in-flight jobs or requests that were submitted pre 1st April 2015. Accordingly, year two of the incentive gives a more reflective baseline from which to measure performance. As can be seen in Figure 20, significant progress has been made across all elements of this incentive, with the performance improvements on the time to connect element of the incentive, arguably the more important element of the incentive, seeing double digit improvements across all of our DNOs.

6 This reduction has been calculated based on the methodology used in Ofgem's Annual Report. It includes Scope 1 and 2 emissions (excluding Losses) and includes selected elements of Scope 3 emissions.

7 RTTR enables consideration of environmental-specific, accurate thermal data on transformers and the effect it will have in real time.

Chapter 6: Our RIIO-ED1 Track Record continued

Figure 20: Average Time to Quote and Connect RIIO-ED1 performance

Average Time to Quote and Connect UK Power Networks' performance (days)							
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Change Year 2 to Year 6
Quote (LVSSA)	4.61	5.69	6.24	6.55	5.51	4.34	-24%
Connect (LVSSA)	40.57	55.57	40.24	38.41	36.15	34.92	-37%
Quote (LVSSB)	7.26	8.22	9.54	8.78	6.46	5.55	-32%
Connect (LVSSB)	47.70	63.88	46.69	49.04	43.43	44.13	-31%

In addition, under the Incentive on Connections Engagement (ICE) incentive (a downside only incentive), we have not received a penalty throughout RIIO-ED1.

Looking beyond the sector

We are always looking for ways we can further improve the service we deliver for our customers, beyond the targets that we are measured against by the regulator. In RIIO-ED1 we have set up a new Data Analytics team that are highly skilled in analysing our network and customer data and turning that into insight we can use to further improve our performance in key areas that are important to customers. As highlighted above, we were the first DNO to use Rant and Rave surveying as a method of gaining feedback from customers to inform service improvements, with over 5,000 surveys conducted in 2019/20 alone. We were also the first DNO to establish an Environmental Action Plan with carbon reduction commitments aligned to the Science Based Targets initiative and UN Sustainable Development Goals.

COVID-19 impact

The start of 2020/21 saw the early stages of the COVID-19 crisis. However, with a strong business resilience plan, we were able to maintain our excellent performance and will continue to do so. Numerous measures were implemented to ensure the safety and wellbeing of our employees – both operational and office based as well as our customers and members of the public that we interact with. This is reflected in our best year for employee engagement scores which demonstrates the proactive and positive approach management has taken.

Moreover, the COVID-19 pandemic has not stopped us from delivering our additional services for our customers in vulnerable circumstances. We have adapted our service and found new ways to operate in order to accommodate the extra pressures that the pandemic has brought with it. Our response times (the time it took us to answer the phone) remained below four seconds, compared to an average call waiting time in the utility industry of more than 45 minutes, and our customer satisfaction scores were at levels of 93% during the height of the pandemic.

RIIO-ED1 Commitments

The RIIO-ED1 Business Plan was developed in consultation with stakeholders, and under the same business vision. We committed to 77 outputs directly informed by customers and the communities we serve. Progress against delivering these outputs has been strong and to date 73 of the commitments are graded as green, meaning 95% of our commitments are either already delivered, or are on track to be met by the end of RIIO-ED1.

Three of our commitments are graded amber. One amber commitment relates to having a year where no employee or contractor is unable to come into work due to a work-related injury. This is arguably one of the most ambitious targets we committed to for RIIO-ED1, and whilst we deliver industry leading levels of safety, to date we have yet to achieve an entire year with no work-related injuries – our longest period without a Lost Time Injury (LTI) being 425 days.

Our fluid filled cable leakage was slightly above our target for the 2020/21 regulatory year and we continue to ensure that our fluid filled cable leakage remains an area of focus. Our final amber relates to our commitment to improve the load index of our network by reducing the number of highly rated sites. We are below our target in EPN and LPN, but above the target in SPN. Work is underway to reduce the number of highly rated sites in SPN.

The sole red commitment relates to the undergrounding of overhead lines in Areas of Outstanding Natural Beauty (AoNB). Our commitment was to underground the equivalent of 176km of HV overhead lines and it is unlikely that this commitment will be delivered in full by the end of the period. The AoNB allowance we received in RIIO-ED1 is a 'Use it or lose it' allowance, therefore any allowance that does not get spent will be returned to customers. However, there are still opportunities for further undergrounding, and we will continue to engage with stakeholders in order to progress additional schemes. We have an additional 81km of lines that are either in the delivery stage or have been consented to be removed by the end of the RIIO-ED1 period and are already in discussions with our steering groups to ensure the pipeline of viable schemes for RIIO-ED2 is in place so we can deliver more, faster in future.

Chapter 7:
Giving consumers a stronger voice

For RIIO-ED2 we have undertaken our most comprehensive, wide ranging engagement programme ever, with over 19,000 customer interactions[1], 3,000 stakeholder interactions and 336,000 data points analysed. We have also exposed our thinking to expert and detailed challenge from our Customer Engagement Group.

In this section:

7.1	Customer and stakeholder engagement	38
7.2	Customer Engagement Group	43
7.3	Ongoing engagement	45

How to navigate our engagement

Our engagement has delivered key insights that have helped shape many of the commitments within this plan.

To help follow the journey of insight to action, we have created a suite of supporting documents for topics where the engagement has had a significant impact on our thinking. These link the commitment to the business thinking and to the engagement insight that helped shape that view.

1 ····► 2 ····► 3

Commitment CS1

We will maintain our position as the number one service provider amongst our peers over the RIIO-ED2 period. We will aim to be the #1 DNO Group as measured by customer satisfaction, or to achieve at least a 93% score on average across our networks in each year of ED2, whichever is higher.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	This commitment is covered by the Customer Satisfaction Survey which is a common Output Delivery Incentives (ODIs) (Financial).	Customers will have a simpler and quicker experience when interacting with us. They will receive industry-leading levels of service, tailored to their needs when they experience a power cut, wish to connect or make a general enquiry.	Our customers have a generally positive view of our services and appear to place a high degree of trust in UKPN and the information it gives (see key insight I-CS2, I-CS3, I-CS4, I-CS5, I-CS6, I-CS7 and I-CS8 in our Line of Sight – Customer Service document).

Navigate to Line of Sight document

LoS

The Line of Sight explains how the engagement insight has been triangulated with other factors such as legislative, regulatory or engineering requirements to shape the commitments within the plan.

Navigate to Engagement Summary document

ES

The Engagement Summary details all the engagement that has been undertaken and triangulated to generate useful insight that has been used to shape our thinking and ambition.

Business Plan areas where Line of Sight and Engagement Summary documents have been created:

- Customer Services
- Vulnerability
- Reliability and Resilience
- Environmental Action Plan
- Workforce Resilience
- Whole Systems
- Digitalisation and Data
- Major Connections
- Innovation
- Facilitating Net Zero
- DSO

1 Our customer interactions comprise of 16,146 customer interactions through the core customer engagement programme and 3,133 customer interactions through the bespoke research.

Chapter 7: Giving consumers a stronger voice continued

7.1 Customer and stakeholder engagement

Delivering a step change in engagement

Addressing the challenge of the energy transition and helping others to progress toward a Net Zero future requires our business to change, but arguably it requires our customers to make even bigger transformations to their lives. Moving away from petrol or diesel and relying on electricity to get from A to B is an alien concept for many, but government policy indicates that this will soon be a reality. However, it doesn't stop there – changes to how we heat our homes, or where our power comes from will mean significant intrusion and changes to our customers' lifestyles and their relationship with us as a business. Furthermore, there are real questions about how to secure the country's journey toward Net Zero in a fair way. To elicit views on these complex subjects we needed a different approach from the way utilities have traditionally run engagement.

We considered that asking customers to sit in half-day workshops without context was unlikely to provide much benefit. Likewise, we did not think it realistic to ask our customers to read lengthy consultation documents and expect meaningful responses. Furthermore, we did not believe running a predominantly stakeholder-led engagement programme was appropriate given the increased customer interaction with the energy system through RIIO-ED2 and beyond. Therefore, together with our external experts, we set out to design our most extensive engagement programme ever. Despite having to contend with the engagement challenges brought about by the COVID-19 pandemic, we built a programme that was demographically representative and allowed our customers to inform our Business Plan.

Undertaking this detailed research programme was not without its challenges. Choosing whether to engage with our customers on a topic or not, or ensuring we provided enough context for them to make informed comments was difficult. Our CEG provided robust challenge on our approach. Whilst we didn't always get this right first time, we are proud of the lengths we have gone to, to elicit opinion from our customers and uncover actionable insight that has made a real difference to the shape of this Business Plan. As a result, we feel we have not only produced a plan that meets the needs of our stakeholders but the homes and business we serve as well.

Our Principles – Starting with the customer in mind

Knowledge and awareness of our sector is low, in particular with domestic customers. This makes engaging with them about our services and responsibilities challenging. It involves issues that they are often not aware of or have not directly experienced. Moreover, we are asking them to provide insight on decisions we could take that could run across multiple decades or affect future generations. As a result, it is not a simple task to develop a research and engagement programme that enables a genuine view of customer priorities or a real two-way discussion to solve challenges and create business plans together. We learned the importance of providing customers and stakeholders with the right background information to allow them to express informed views whilst not allowing this information to unduly colour their opinions. We also recognised that as a regulated business, our customers are able to help shape our plan more in some areas than others. For example, customers are well-placed to help us understand how our customer services should evolve to changing needs, whereas other areas of our plan, such as the interventions we undertake on our asset base, are driven from engineering, regulatory and legislative requirements.

It is important that customers and stakeholders are asked meaningful questions, firstly in areas where they are likely to have opinions and secondly where their opinion can actually have an impact. However, we knew that with the increased interaction and dependency customers will place on the future energy system, we had to break down barriers of awareness. Therefore, we set out to build a framework for the engagement programme that started with the customer in mind, working hard to make interactions at an appropriate level with suitable context to allow for reliable results. This took substantial effort and consideration but was an approach that delivered a step change on our previous methods of engagement.

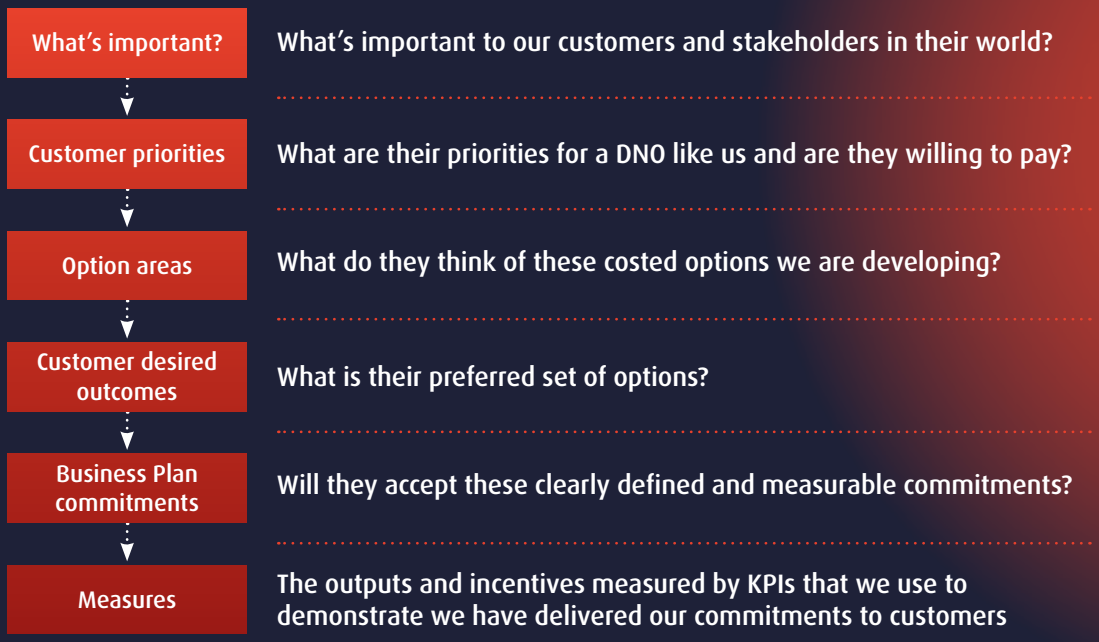
We also appreciate that we need to continue on this journey. We have applied the lessons from the engagement we have done to date to help shape how we will develop and deliver our ongoing engagement, specifically with customers into RIIO-ED2 see – Section 7.3: Ongoing engagement.

Our framework was grounded in a set of guidelines, namely:

Talking to people as individuals. This allowed us to understand what is most important to them and then use that insight to shape our services and commitments based on their needs.

Being very clear on the 'fitness for purpose' of evidence sources. Across our engagement programme, we sought multiple reference points to develop a clearer understanding of customer views. We have provided detailed findings of each stage of the research and how we have used the different evidence sources for each key Business Plan topic area in separate 'Engagement Summary' documents. Our CEG provided valuable feedback on the robustness of our research and we adapted our approach where necessary to reflect their challenges.

Figure 21: Our engagement approach



Taking an iterative approach. This enabled us to build knowledge over time.

Taking account of the demographics of the regions. We ensured our programme of engagement recruited customers that were representative of those that we serve, both domestic and business, including boosting the numbers of those voices seldom heard, such as vulnerable or hard to reach groups where relevant.

Choosing the right tools for each topic. We developed a multi-method approach to customer consultation to match conversations with appropriate research techniques, from questionnaires, to 1-2-1 interviews, to interactive games. This ensured we built high quality insights to allow us to make better business decisions.

Detailed information on the way we used our understanding of what really mattered to our customers can be found alongside our commitments in every section of our Business Plan. Where engagement has had a more significant impact, further detail can be found in our suite of Line of Sight and Engagement Summary documents. These documents articulate how we have taken customer priorities and built a more detailed understanding through further engagement with customers and stakeholders.

Our engagement programme: Developing insight for our Business Plan

Whilst we felt we had a good understanding of many of the current priorities of our customers from our RIIO-ED1 touchpoints, we didn't want to predetermine views to push them in a particular direction. We started by asking them to tell us what was important to them in the context of energy, before bringing the findings of this together with the findings from our historical engagement activities and using this collective insight to delve deeper with both our customers and stakeholders to build a plan that delivered on the issues that matter.

We built the programme with three core elements:

1. **Core customer insight programme** – so we could get closer to our bill payers' needs than we have ever done before. We developed a programme that enabled us to understand their core requirements but also sought their views on key issues such as the environment and looking after those in society who are most in need.
2. **Deep stakeholder conversations** – using stakeholder expertise to help shape and challenge our thinking on the development of our plan through co-creation activities.
3. **Bespoke research and data analytics** – by commissioning set-piece research, looking back at historical engagement and using advanced analytics on customer touchpoints such as customer satisfaction and complaints data we could ensure we built a rich, more rounded picture of customer sentiment and the areas of importance.

Chapter 7: Giving consumers a stronger voice continued

Below, we provide an overview of these three core elements, but for more detail, including the size, scope and methodologies used, please see Appendix 5: Our RIIO-ED2 customer and stakeholder engagement programme.

Core customer insight programme

The core customer insight programme was made up of five phases. We started by seeking a broad understanding of general consumer attitudes, preferences and needs in the context of their daily lives. Using this insight, along with learning from other parts of our programme we delved deeper into customer priorities, linking them with our services and their willingness to pay before presenting costed options. Finally, where relevant, research was triangulated and presented to customers to understand the level of acceptance and support for our plan.

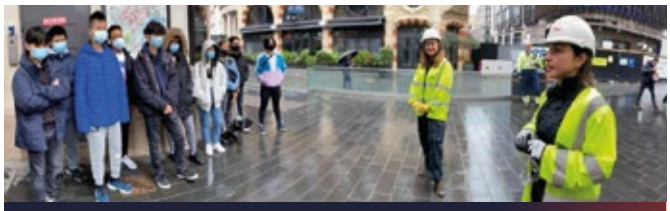


Figure 22: our customer insight programme in numbers

Phase 1, Understanding priorities – We called this piece of research the 'State of the Nation'. It enabled us to gain a baseline understanding of the views of domestic customers. This was a large, demographically representative, quantitative survey of our regions that featured additional qualitative focus groups and 1-2-1 interviews for hard to reach groups.

Phase 2, Priority development – Using our findings from Phase 1 and combining these with insight from previous RIIO-ED1 engagement, we sought to unpack the areas of priority in greater detail through qualitative engagement with both domestic customers, businesses and stakeholders to further understand their current and future priorities. This was particularly challenging in the case of domestic customers and small businesses. Indeed, as a result of constructive challenge from our CEG we commissioned additional sessions on both Net Zero and vulnerability to provide sufficient context such that the insight generated could be relied upon.

Phase 3, Willingness to pay – Using stated preference methods through a large quantitative study, we sought to understand how much domestic customers and businesses value specific attributes of the plan and differing service levels. Respondents were asked to make trade-offs between service levels and bill impacts on 15 different attributes across three areas: reliability, environment and long-term planning. Providing an appropriate level of context in these complex areas so that domestic customers could make informed trade-offs was difficult, as recognised by regulators and our CEG. Whilst opinion of this research technique varies, we chose to use the results carefully, using the data to inform relative weightings on customer preference as opposed to directly inputting values into our cost benefit analysis.

Phase 4, Options testing – Using everything we had learnt from the core customer, stakeholder and bespoke research, we pulled together packages of Business Plan options with associated bill impacts. This large quantitative study (which encompassed domestic customers and businesses) also featured significant in-depth focus groups which helped us to build a Plan orientated towards the areas that matter most and to understand further customers' preferred options.

Phase 5, Acceptability testing – This was a further substantial quantitative study aimed at finding out how acceptable key areas of our Plan and the associated bill were for our customers. Testing found that of those who understood our Plan, 86% of domestic and 88% of business customers rated our plan as acceptable. This shows strong support for our Plan. Moreover, analysis of key topic areas demonstrated the robustness of the process of triangulation we went through when developing our Business Plan commitments (see triangulation section later in the chapter).

However, our business is not familiar to a number of our customers, with levels of acceptance and understanding being statistically lower with younger customers and those from the D and E socio-economic groups. So whilst the overall acceptance for those that did understand our Plan is high, this process re-emphasised the importance of providing information and context that is accessible to different customer groups. This is an area we discussed at length with our CEG, and as a result we have undertaken further research to learn how we can communicate with all audiences more effectively. We will use this learning and factor it into our ongoing engagement, which is particularly important given our desire to engage more deeply with our customers over the RIIO-ED2 period.

Deep stakeholder conversations

Alongside the core customer engagement, we ran a large stakeholder programme to help answer strategic questions and to challenge our thinking. For specific aspects of our Plan, we developed a process of co-creation where we worked with a group of experts over a longer period of time informed by forums, webinars, interviews, questionnaires and our current RIIO-ED1 engagement activity. To enable this, we established seven co-creation panels with industry experts to challenge us on our ambition, feeding in results from the customer programme where necessary to ensure views were grounded in context.

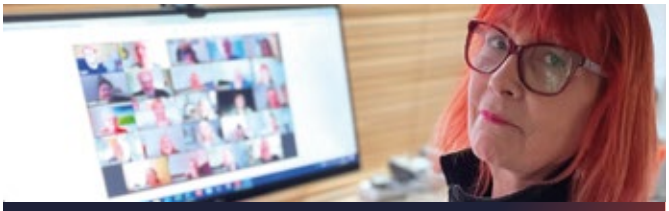


Figure 23: bespoke research and analytics

2,927
stakeholder interactions

144 focus groups/ workshops

35 regional engagement sessions

These co-creation expert panels covered the following business plan areas, specifically our; DSO strategy, Environmental Action Plan, whole systems strategy, vulnerability strategy, Major Connections strategy, innovation strategy and our cyber resilience strategy.

The thoughts and ideas of our stakeholders were tested with customers in Phase 4 (Options testing) of the core customer insight programme.

We then went through another round of stakeholder engagement with our co-creation panels and key expert stakeholders to gain feedback on the scope and ambition of our Initial Business Plan along with the further development of specific areas. We used the insight from these sessions to refine and finalise our Business Plan.

Bespoke research and data analytics

Alongside the core customer and stakeholder strands we looked back at what we knew already from past engagement, research and trials and synthesised those findings. Furthermore, we analysed the feedback provided to us every day by customers through customer satisfaction surveys and complaints data, to develop a fuller view of customer needs.

We used this rich pool of data and applied analytical techniques such as machine learning to pull out actionable insights on customer touchpoints.

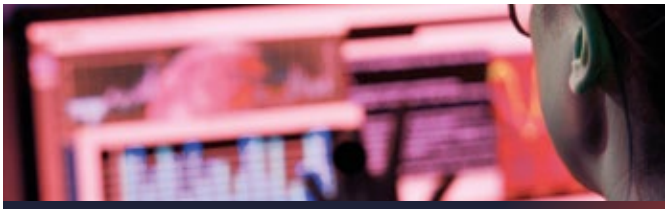


Figure 24: deep stakeholder conversations in numbers

336,047
customer data points

plus an additional **3,133** customer interactions from:

5 surveys

32 focus groups workshops

62 in-depth interviews

1 interactive Net Zero game

This engagement stream helped define areas of additional bespoke research we needed to undertake to complement the other two strands of the engagement programme. Key examples include:

- **Customer journeys** – We spoke to over 1,750 customers to gather both quantitative and qualitative insight into their experiences when accessing our services. This research has been used to influence the design of our customer journeys and associated service commitments.
- **Social contract** – We consulted with over 750 customers via questionnaires and focus groups to understand their views on the concept of a social contract and our proposed principles.
- **Customer attitudes to public charging (Charge Collective)** – We surveyed over 500 current car owners who park their vehicles on-street to understand their attitudes and preferences to EV on-street charging which has informed our Consumer Value Proposition (CVP) in this area.
- **DFES local authority engagement** – We held 14 regional engagement sessions covering 97 local authorities, 9 Councils and six Local Enterprise Partnerships to discuss our future energy scenarios, understand their regional ambitions and gather feedback on projected LCTs in their areas. In addition, we followed this up with five sessions to co-create an evidence framework to unlock local investment to facilitate their Net Zero ambitions. Finally, we held another round of 17 regional engagement sessions to gain feedback on our Initial Business Plan and what it meant for their local areas, including our proposals to support local authorities with their climate action plans.

Chapter 7: Giving consumers a stronger voice continued

Triangulation – bringing our findings together

Unsurprisingly, not all customers or stakeholders share the same views. One person's absolute priority might be another's 'nice to have'. That is why, when we looked at the research, we had to consider the broad sentiment of views, placing appropriate weightings on the most robust sources, whilst paying particular attention to certain customer segments to ensure they are not disproportionally impacted by our decisions. These views also had to be set alongside other important considerations such as engineering needs and regulatory or environmental obligations. We call this process 'triangulation', and we undertook a two-part process to distil our findings:

1. **Bottom-up triangulation** – this involved business leaders reflecting on the range of insights and different considerations and making a balanced decision. This was done after Phase 3 of the core customer insight programme, and after the stakeholder expert panels, to help ensure the options tested in Phase 4 were grounded in the findings of the engagement programme and the external environment within which we operate. It was also repeated after Phase 4 for areas of the plan where the results were clear cut, i.e. there was an obvious direction from customers.
2. **Top-down triangulation** – this involved holding sessions to review areas where our insights were contradictory or finely balanced, or where customers and stakeholder views challenged Ofgem's RIIO-ED2 framework. For example, on vulnerability, where customers clearly wanted us to support those in need, but also challenged us to ensure that support was only being provided to those that would most benefit from assistance. We used a third party to facilitate and moderate the sessions to ensure a rounded view of the research and business strategy we took. You can find out more about the triangulation process in Appendix 5: Our RIIO-ED2 customer and stakeholder engagement programme and in the relevant Line of Sight documents.

Results – Insight to action

Early outputs from the programme of research and engagement highlighted a number of priority themes which customers and stakeholders stated we needed to focus on if we were to best meet their needs.

Building on this understanding, we developed seven 'Keys to Success' that would enable us to deliver on our ambition to put customers and communities at the heart of Net Zero (see Chapter 3: Executive Summary).

1 Delivering a brilliant service for all

Our relationship with customers is set to change, and with that change comes growing customer expectations, whether it be the ways they want to interact with us, the type of information they want access to or the speed in which they want a resolution to a query. This changed context required us to consider a number of strategic questions which we sought answers to:

- **What are customers' views of the strengths and weaknesses of customer service now?**
- **How important is good customer service?**
- **What are the most important things to get right?**
- **How can we meet expectations in the new digital economy?**
- **Has COVID-19 changed expectations of customer services?**
- **How should we improve our services to customers?**
- **How should we adapt our services to deal with the requirement to decarbonise?**

2 Facilitating decarbonisation at the lowest cost

Sweeping legislative requirements will mean customers are being required to make significant changes to their lives in the transition to Net Zero. This will have implications on all aspects of society, with some benefiting and others at risk of being left behind. To ensure we can facilitate this transition, but do so in a fair and equitable way, meant we needed to uncover specific insight:

- **How important is supporting the country's commitment to meeting Net Zero by 2050?**
- **How important is it that everyone benefits from the low carbon economy?**
- **What are the barriers to LCT adoption?**
- **How ambitious should we be in facilitating the transition to Net Zero?**
- **What (if anything) would customers be willing to pay to facilitate the transition to Net Zero?**
- **What areas should we focus on to support the transition to Net Zero?**

To understand the diverse needs of our existing and future customers we had to engage deeply, encouraging them to answer strategic questions that would help inform our thinking and define our Business Plan commitments. Some areas such as the continuation of a reliable supply of electricity were considered core to our role. Whereas in other areas, such as the environment, customers were keen to see positive outcomes, but were also looking for someone to take a leadership role to help them understand what more they could do.

Further detail on our engagement programme can be found in Appendix 5: Our RIIO-ED2 customer and stakeholder engagement programme. This documents the relative strengths and weaknesses of different engagement techniques, along with a more granular explanation of each phase of the research. The results and triangulation of our findings for key business plan topics can be found within the Line of Sight and Engagement Summary documents.

7.2. Customer Engagement Group

Our Customer Engagement Group's 'better and different' philosophy, with its diverse skills and expertise, has ensured our Business Plan has undergone significant and robust scrutiny. This has driven us not only to deliver the fundamental needs of our customers and stakeholders but also to push the boundaries on ambition and raise the bar on our performance and service.

Doing it differently

Whilst this is the first time that Ofgem has invited DNOs to interact with a Customer Engagement Group (CEG), they are not new to other sectors. We wanted to learn from the experience of working with engagement groups. We recruited a skilled group that would subject us to the highest level of challenge and rigour – ultimately ensuring we deliver the best plan that puts our customers and stakeholders at its very core.

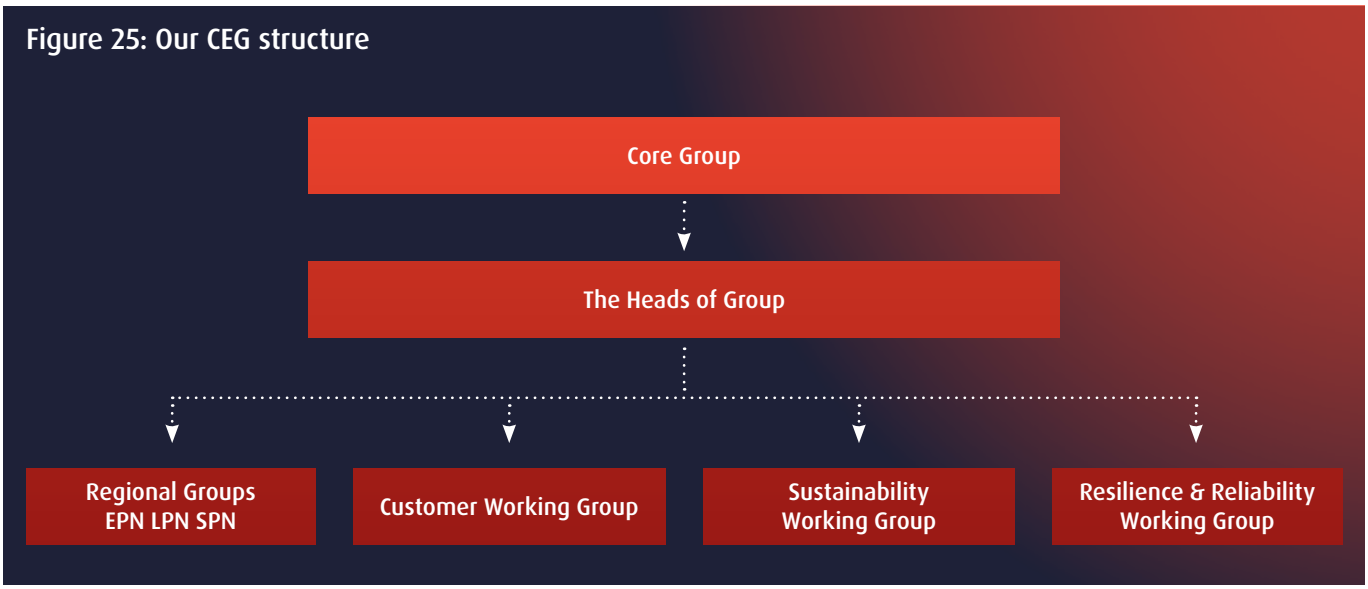
Independent by design

Through a competitive and independent recruitment process we hired our Chair, Ann Bishop, in the summer of 2019. Ann has worked with regulated infrastructure businesses and regulators for more than thirty years, but it was her reputation for promoting constructive challenge to the status quo that made her the stand-out candidate – aligning with our own ambitions to develop a 'better and different' challenge forum. Ann was given full freedom to recruit the individuals she wanted for her CEG. By October 2019 the group was 17 members strong, ranging from past CEOs, to academics and sector experts, to consumer advocates. For more information on the group's membership with detailed biographies please see Appendix 6: CEG challenge.

A structure to deliver robust challenge

Working together with our Chair we wanted to develop a structure for the CEG that not only covered Ofgem's target outcomes and business plan topic areas for RIIO-ED2, but also allowed the members to scrutinise and challenge the areas that matter most to our customers and stakeholders. This led us to the creation of two strategic and governance groups and three thematic Working Groups – 'The Customer', 'The Sustainability' and 'The Reliability and Resilience' Working Groups. In addition, the CEG had three Regional Groups covering each of our licence areas (EPN, LPN and SPN).

Figure 25: Our CEG structure



This matrix approach was used so the CEG could work flexibly and consistently, allowing members to make the best use of their skills and expertise when considering the needs and priorities of our large and diverse customer and stakeholder base.

Whilst each working group was responsible for ensuring the results of the engagement programme were being captured accurately and driving our plan, the Customer Working Group ensured the expansive engagement programme we undertook was robust and reliable. This was achieved by:

- Challenging the methodology and materials of the engagement programme. As a result of this challenge we commissioned additional research to explore the areas of Net Zero and vulnerability in further detail using revised stimulus material.
- Attending engagement events which allowed members to witness first-hand how engagements were being run, captured and reflected in our Business Plan.
- Frequent interaction with the research and engagement team and supporting agencies at each stage of the Business Plan's development to understand how the research's conclusions and insights were being reflected in the plan.

Chapter 7: Giving consumers a stronger voice continued

Defining a clear purpose from the start

The CEG developed its Terms of Reference and challenge process.

This process ensured the CEG focussed on the areas of materiality to customers and helped clarify where further work was required. Each area of the Business Plan had its own CEG challenge criteria, however there were common themes:

- Have we met the baseline requirements as set out by Ofgem in their Business Plan guidance?
- Have we proposed a Customer Value Proposition, and if so, does it deliver value above the baseline requirements?
- Have we proposed any performance metrics, and if so, are they robust, relevant and ambitious?
- Are plans justified by customer and stakeholder engagement?
- How have we interpreted research findings and triangulated them against other considerations such as regulatory requirements, business ambition and deliverability?

A full list of challenge criteria can be found in Appendix 6: CEG challenge.

Measuring the CEG's impact

The CEG's work did not just take place at a working level, the CEG was allowed full access to our business, including regular interaction with the CEO and the Board. Each area of the Business Plan was scrutinised by the CEG through a number of meetings and the sharing of data, helping to provide a more robust Business Plan that reflects the wants and needs of our customers and stakeholders.

The CEG interaction with us involved over 112 meetings, totaling over 224 hours of scrutiny. It raised 11 formal challenges throughout our Business Plan development. A series of Scrutiny Sessions were then held between July and December 2021 to close out issues in a specific and targeted manner. A full index of the challenges, Scrutiny Sessions held, and our responses, can be found in our Appendix 6: CEG challenge.

The CEG will continue in its role until the start of RIIO-ED2. We intend to maintain independent scrutiny and challenge of the delivery of our Business Plan during RIIO-ED2. Within this context, it is expected that an ongoing role for a form of CEG will be implemented with a specific remit and scope that is aligned to Ofgem's future enhanced engagement requirements once these are known.

Figure 26: The CEG's approach

RIIO-ED2 Challenge Group

In addition to the work of our CEG, the independent RIIO-ED2 Challenge Group has provided a further challenge across our Business Plan development process. This group works across all companies within the electricity distribution sector, and thus provided useful scrutiny to push best practice and ambition across all DNOs. The Challenge Group met our Senior Management Team a number of times, and helped us to improve our Plan. Specifically the Challenge Group:

- encouraged us to make our commitments clearer and to adopt an unambiguous baseline;
- challenged us to do more on reducing SF6 and losses;
- asked us to provide a better explanation of the way our scenarios compared to those developed by the Electricity System Operator; and
- prompted changes in the way that we propose to address the needs of customers in vulnerable situations.

The discussion on CVPs was particularly helpful. It led us to challenge ourselves on the rationale and supporting evidence to qualify a CVP for inclusion in the Business Plan. Our response to these challenges can be found in Appendix 28: Responding to the Challenge Group feedback.

7.3 Ongoing engagement

Delivering a successful engagement programme during RIIO-ED2 (2023 – 2028)

For our engagement during RIIO-ED2 to be considered successful it must have three core characteristics:

It must be purposeful. We must be clear why we are engaging, understand the outcomes that we are hoping to achieve and ensure that the engagement we do delivers on those outcomes. In other words, we must adopt the same focused approach that shaped our engagement in RIIO-ED1.

It must drive change. Insight must drive decisions and actions which lead to positive changes in outcomes for customers and society.

It must incorporate learning. We need to make sure we adopt the right mechanisms to embed resulting learning and insight in our business.

Our strategic approach to engagement leading up to and throughout RIIO-ED2 will build on the foundation of our engagement during RIIO-ED1. It incorporates the key lessons learned in preparing this Business Plan, and the feedback from our CEG, including the need for:

- Clarity on why we are engaging with particular individuals or groups, including the outcomes we are aiming for;
- Co-ordination of different types of engagement to maximise their value and robustness, appreciating the relative strengths and weaknesses of different modes of engagement; and
- Insight that is appreciated and used productively.

Effective engagement with customers and stakeholders is critical to driving sustainable performance improvement, as well as wider benefits to society. We could not have delivered high customer satisfaction scores, or attained the positive outcomes with stakeholders from our work to support the decarbonisation of heat and transport, or supported our vulnerable customers, were it not for such engagement at all levels of our organisation.

We therefore build on our strong track record in stakeholder engagement – as confirmed by the independent scrutiny of the RIIO-ED1 Stakeholder Engagement and Consumer Vulnerability Panel, which has ranked us first in the energy sector for the last two years.

But we cannot rest on that track record. As a result of the challenges that face us as we support the transition to a Net Zero society, and the radical re-shaping of our energy landscape, we must evolve our approach to customer and stakeholder engagement. Our ambition for RIIO-ED2 is to place our customers and communities at the heart of Net Zero.

Our ongoing engagement will play a central and critical role in delivering on this ambition. Put another way, the value that our engagement will deliver over RIIO-ED2 will be felt across the whole spectrum of our activities and the outcomes that we deliver for customers.

More specifically, we know that to meet the challenges in RIIO-ED2, we need to further deepen and widen our engagement, particularly with our domestic customers. Understanding expectations for customer service remains important. However, in the future, we will want to enable customers to help us co-design new services, and provide us with rich intelligence on the way they view the transition to low carbon technologies. More than that, we want our engagement not only to lead to concrete positive action on our part, but also on the part of policymakers, of regulators, of other stakeholders and also on the part of customers themselves. The UK will not achieve Net Zero unless everyone takes the right actions – enabling our customers to act is a core part of our engagement approach

In the rest of this section, we describe how our ongoing engagement strategy will be shaped by the **purposes** for which we engage, our **strategy**, and describe how we engage. Finally, we identify specific **commitments** for action.

Purpose: why engage?

We engage with customers and stakeholders for four main reasons:

- To shape our strategy
- To improve our services
- To learn and develop best practice
- To influence

Shaping our company vision and strategy

Our company vision defines the purpose of the organisation and how this translates into focus areas and measurable targets for our 6,200 employees and our supply chain partners. This vision has and should evolve to reflect the changing external environment. For example, over RIIO-ED1, trust, facilitating Net Zero and diversity have become important aspects of our vision, reflecting stakeholder and employee feedback.

We will continue to engage on our vision over RIIO-ED2. We set out in more detail below how our ongoing engagement approach will adapt to the strategic context and the challenges we face over RIIO-ED2.

Improving our services and offerings for our customers

Insights from engagement with customers and stakeholders shape all of our services and customer offerings. Improvements in our services have been linked to the results from our engagement activities:

- **Customer service journeys** – customer feedback mechanisms and research into our customers' experience of general enquiries, power cuts and small connections have and will drive improvements. Customer research has shaped new customer journeys for the use of low carbon technology.

Chapter 7: Giving consumers a stronger voice continued

- **Service design for vulnerability** – our vulnerability proposals reflect conversations with domestic and business customers and were co-designed with knowledgeable experts.
- **DSO flexibility product development** – work with stakeholders has enabled us to understand barriers to participation in flexibility markets and helped us start to develop inclusive and commercially attractive flexibility offerings.
- **Connections product development** – engagement with connections customers and stakeholders has been instrumental in shaping plans for opening our network data, and enabling greater competition and choice.

Learning and sharing best practice

We engage to learn from best in class organisations and sectors, to improve services and business practice. For example, we have adapted real time customer feedback and machine learning applications from the financial services sector to tailor "next best actions" for our connections team. Similarly, we have deployed advanced analytics with Google to digitise our maps more quickly, cheaply and accurately.

We also engage to disseminate best practice where we are pushing the boundaries forward. For example, via our Charge Collective project, we are working with stakeholders across the industry to find solutions to the need to deliver public vehicle charging points.

Influencing behaviour, policy and regulation

Good outcomes for customers and society depend not only on what we do but also on the actions of others. How consumers behave, individually and collectively, will influence outcomes for all. Our engagement has a purpose beyond simply understanding – it can also influence consumer behaviour directly. Further, we use our engagement to inform and influence policymakers and regulators: one example is our work on more meaningful measures of network reliability.

Strategic Context: our Seven Keys

We describe here the strategic considerations for our ongoing engagement, under each of the Seven Keys that are set out in the Executive Summary of this Business Plan. Our approach will build on what we know, and adapt to our new and different challenges. For each of the Seven Keys, we draw out (in red boxes) the implications for our ongoing engagement, providing either high-level direction for the programme or, in some cases, identifying specific features.

Delivering a brilliant service for all

Customers expect great service all the time. But we know their needs and expectations are driven by wider experience and don't stay still. We strive to adapt our services accordingly. Recent experience of Covid-19 provides a compelling example not only of how quickly expectations can move, but also of how fast we need to adapt to meet them.

We are not starting from scratch: our engagement in RIIO-ED1 has helped us understand better what our customers expect. For example, customers want their services to be tailored to their individual situations, and they want choice about their services and how we interact with them. We have responded to this in our RIIO-ED2 Business Plan. But these expectations also drive how we should engage with customers: we hear the message that we need to engage with customers as individuals. That means that we need to be more sophisticated about how we "segment" our customer base – i.e. what groups and categories we use in engagement.

The digital and connected world continues to accelerate customers' expectations as people access information about global standards of good service. Our engagement needs to keep up. During RIIO-ED2, we expect to engage with a wider range of people and businesses (impartial experts, consumers and service providers) who can help us to understand and keep abreast of the highest standards in customer service. This speaks to the need for continuing innovation, creativity and deployment of a wide range of techniques: for example, expert panels, on-line groups and communities, community outreach or AI-driven data exploitation.

Implications for ongoing engagement:

- Engagement will adapt and evolve to new circumstances. Our strategy for RIIO-ED2 will be operationalised in annual plans, starting from 2022/23.
- We will seek out and use the latest and best engagement techniques, embracing advanced digital technologies and exploiting data.
- We will use partnerships and independent experts to gain insight into best practice in customer service.

Facilitating decarbonisation at the lowest cost

Providing leadership in the transformation of our energy system is front and centre of our Business Plan. However, much is uncertain, such as the:

- Level of public understanding and support for decarbonisation ambitions.
- Speed and extent of charging network roll out and attitudes to, and take up of, electric vehicles.
- Level of understanding of, and response to, heat decarbonisation options, especially the potential cost and disruption.
- Feasibility of hydrogen or other energy vectors.
- Role of local government, and its capacity to plan/deliver emission reductions.
- Level of understanding of, and appetite for, participation in energy markets by people and businesses, whether by actively managing energy consumption, provision of energy or other services.

- Success of arrangements for distribution system operation in encouraging new low carbon energy sources and in ensuring fair markets.
- Emergence of new service/product markets and new business models.
- Extent of public financing for the UK's Net Zero ambitions.

Our approach to customer engagement is a critical part of our approach to help facilitate this transition. We must create awareness of the opportunities and challenges, bring clarity to the complexity for consumers and stakeholders, who increasingly will become active participants in the energy space. Changes in the energy system will also create new categorisations amongst our consumer base, for example those with heat pumps or groups who find it difficult to access opportunities for various reasons.

Gathering insight into customer and stakeholder views also provides a rich source of intelligence to inform decision-making of policymakers and regulators. Sharing information widely multiplies its potential value. We do this already. For example, we make a low carbon technology market intelligence report available to BEIS, Ofgem and other stakeholders. We see ongoing engagement as an essential tool to enable us to generate insight and data which can help influence the regulatory and policy landscape to secure good customer outcomes.

We take a whole systems perspective: our actions will influence what other actors in the energy sector do, and increasingly, we recognise the inter-relationships with other sectors such as heat and transport. Ongoing engagement is essential to reveal and drive benefit from joined-up approaches and initiatives.

So, during RIIO-ED2 there will need to be more emphasis on securing participation and action on the part of others, particularly to maximise the benefits of smart tariffs and technologies to facilitate Net Zero at lowest cost. Our actions need to dovetail with others' for the best overall response. This is behind our ambitious plan to work with all Local Authorities in our region to facilitate local decarbonisation and Net Zero plans.

Energy suppliers too will be critical in achieving transformative change in the energy system. They are likely to be the ones bringing to market the new smart products and services purchased by end consumers. It will be critical that we understand what this emerging market looks like, how it could impact participation and how benefits to consumers are maximised. We will therefore need to engage deeply with energy suppliers and our good track record demonstrated by Project Shift (trialling different ways to send price signals to consumers to use electricity when it is cheaper and greener to do so) stands us in good stead.

Implications for ongoing engagement:

- Experts and panels will be devoted to the challenges of Net Zero.
- Engagement will include projects, partnerships and initiatives aimed at participation and behaviour change.
- We will promote joined up thinking across energy and other sectors.
- New customer and stakeholder segmentation will reflect the variety of customer experience of Net Zero.
- We will deliver insight to enable effective policy and regulation

Investing to maintain a safe, reliable and resilient network

Making sure our networks are safe, reliable and resilient has always been central to what we do. However, the challenges in achieving this are changing; not only because of the need to achieve Net Zero, but also because of the changes to the climate. Doing this will require joined up thinking between UK Power Networks and other DNOs, regulators and policymakers.

It will be crucial for us to understand the upcoming demand from customers as the way they use electricity changes. Increased deployment of smart meters, the roll out and connection of new low carbon technologies such as EV charging or electric heating, coupled with the development of smart tariffs could have a big impact on usage patterns. We need to be ready to cope with such changes, both at a macro level (for example, the scale and timing of expected investment) but also in identifying low-level operational issues, requiring the need for refined or new products and services, to continue meeting expectations on safety, customer satisfaction, reliability and efficiency. This will require us to engage with customers to understand trends in usage, their experience of our service, their sentiment towards low carbon technology and their intention to invest and require connection to our networks.

We face macro-level threats to the resilience of our networks, for example the potential for flooding to interrupt supplies. Such risks require us to understand customers' views about resilience and risk to services. We understand that resilience can be a difficult topic for customers - threats may have a relatively low chance of occurring, albeit with potentially high impact.

Our customers expect a reliable service; it's a base need. But when we consider our network performance across our licence areas, there is a spread of performance across them. This is to be expected, given the inherent variations in network configuration, differing standards that were applicable when equipment was installed, and other factors. We will ensure that engagement is framed by a localised picture of network reliability.

Chapter 7: Giving consumers a stronger voice continued

We are looking to lead joined up thinking across the industry to improve reliability for all customers. We have already stated our ambition to lead the sector on reliability, with ambitious targets on reducing short interruptions and the number of worst served customers, but we have also proposed new metrics on repeat disruptions and total time not supplied. We want to take this further still.

To do this, we need to understand in greater detail what our customers' expectations are when it comes to a reliable service, and indeed what the impact is on them when a disruption occurs, particularly post Covid-19 recovery. These views, along with the data we capture on our new metrics throughout RIIO-ED2 will allow us to develop an evidence base to shape an argument for extending the regulatory framework to cover all aspects of reliability, helping to improve the experience of not only our customers, but of those across the whole of Great Britain.

Implications for ongoing engagement:

- We will deliver insight into expectations and the potential usage of electricity networks, especially in relation to the take-up of low carbon technologies.
- We will frame engagement on expectations of reliability against service level variation across the customer base
- We will engage to inform and encourage better joined up understanding and regulation of reliability nationally.

Delivering the lowest possible bills whilst enabling Net Zero

Customers expect us to deliver great service at the lowest possible price. There is nothing new about this. However, COVID-19 has brought their financial situation into sharp focus for many people and businesses. The full economic impact of COVID-19 has not yet played out and no doubt some will find themselves permanently affected.

Customers will be concerned about upward pressures on the overall cost of energy. We have seen unprecedented levels of wholesale power prices in recent months which will be reflected in energy bills paid by consumers. On top of this, there is the question about how the costs of the UK's Net Zero transition will be met. This is something that has only just started to be aired publicly and it is likely that many will not be aware of the potential scale of costs they may face, particularly when it comes to moving away from carbon-intensive domestic heating. Many customers, too, tell us that they see electric vehicles as an option only for the relatively well-off.

Faced with these pressures, customers may want to reconsider the balance between costs, risks and service and will want us to reconsider those trade-offs in delivering on our RIIO-ED2 plans. They will also be concerned about inter-generational fairness – i.e. trading lower bills now for higher bills for the future.

Such trade-offs have always been difficult to engage on, but the path to Net Zero, which involves complex multi-dimensional challenges, makes them all the more difficult. This suggests that we need sophisticated engagement techniques which allow debate and discussion of complex issues.

Innovation in engagement: Citizens Panels

Using Citizens Panels could ensure breadth and depth of debate when discussing complex and challenging areas such as Net Zero and vulnerability. They focus on the role of individuals as citizens, rather than as customers. We have noted the success of the Climate Assembly in helping people understand, and make recommendations on, how the UK could satisfy its climate change law. Well-designed and facilitated Citizens Panels can be used to bring a full range of perspectives to the table to address the inherently complex trade-offs involved in such issues.

The whole thrust of our RIIO-ED2 strategy recognises the importance of trying to find the lowest cost way to Net Zero. We plan to invest only when we are confident in the need. But that means that plans may change as new information or policy emerges. Such changes to plans will have impacts on consumers' bills. Our ongoing engagement must address the specific changes in depth as and when they are progressed, so that customers understand how their bills will change and can have a say on new proposals.

Implications for ongoing engagement:

- We will develop innovative ways to inform and engage with customers and stakeholders about difficult issues and trade-offs.
- We will be open about the challenges involved over the coming years, in particular the potential costs of decarbonisation for consumers.
- Engagement will involve innovative techniques such as Citizens Panels which allow for breadth and depth of debate.
- We will ensure that we talk with customers and stakeholders about future changes in the Plan as current uncertainties resolve.

Being a force for good in the communities we serve

Society now expects businesses of all types to consider their social and environmental impact. We are committed to being a force for good in society, doing more to help communities and to protect our environment.

One very important aspect of this is our ambition to bring together local communities to deliver on their climate emergency plans. Our dedicated local energy planning team will work with all the local authorities in our regions, plus community energy groups and other local stakeholders, to develop actionable plans which will help overcome constraints on resources and limited expertise. This represents a significant investment in engagement with communities.

We will also engage with stakeholders to understand how we can better help to meet other environmental challenges such as declining biodiversity and air pollution. We will look to create effective partnerships and undertake joined-up initiatives. Engaging widely with customers and stakeholders on environmental issues will be central to this.

We intend to engage with other public bodies and community energy groups, particularly about changes to the energy system, as well as other aspects of our work that have a social impact.

Helping those who are vulnerable touches on all parts of our business and is embedded in the way we operate: it is a key area where we devote substantial effort towards being a force for good. Our approach has been successful, but we see some growing challenges:

- the ongoing impact of the COVID-19 pandemic;
- potential for exclusion from opportunities arising as the energy system changes;
- digital exclusion; and
- business vulnerability.

Tackling these challenges will require better understanding of their impacts and how they create or alter vulnerabilities. We will tailor our engagement to reach people who are affected, to ensure we hear their specific concerns, viewpoints, and requirements and make sure they are aware of, and can access, support. We have already started down this path, for example by developing a Net Zero Advice Line.

We tailor engagement to reach disadvantaged audiences for example to allow those with disabilities, or a lack of mobility, to participate fully.

We will also engage independent experts and groups. Our Consumer Vulnerability Council has proved immensely valuable in shaping our Vulnerability Strategy and it will continue throughout RIIO-ED2, supported by engagement with a number of other groups and panels.

Implications for ongoing engagement:

- We will roll out our comprehensive engagement programme across all our local authorities.
- We will identify and understand vulnerabilities in greater detail and reach those affected.
- We should involve a full range of independent experts and panels, and continue the role of our Consumer Vulnerability Council.

Being an employer of choice

Our people are vital to our success and therefore to delivering the desired outcomes for our customers. We want to be an employer that people want to work for, so we look to make our workplace one which attracts the best. That means we will engage with stakeholders to understand best practice in attracting and recruiting candidates and developing our people.

We strive to create a culture within UK Power Networks which will underpin our ability to deliver on the significant challenges presented by the future transformation of the sector. This means that we will need to continue to focus on transforming our culture, and seeking external perspectives on that journey will provide important input into our progress and direction.

We strive to improve the skills, diversity and experience of our workforce. We recognise that more of our people will need to have the skills to engage with customers and stakeholders effectively, given the importance of engagement in achieving our goals. It is not just the preserve of a small set of experts but a core capability.

When we engage on issues that affect customers, we talk to our employees too. We recognise that they have unrivalled information and expertise, and they are individuals who can be important agents for change.

Implications for ongoing engagement:

- We should include specific engagement activities which involve our employees.
- All our employees should understand our engagement approach and we will provide training to build engagement skills.
- We will engage all of our diverse workforce and their representatives, including Trade Unions.
- We will seek external input to help transform our business culture.

Being a company that is worthy of your trust

Society's expectations of business have been evolving rapidly, especially those of companies that provide essential services and have a monopoly licence to do so. There are now greater expectations that such businesses will do more, and say more, about matters such as business purpose, responsibility, sustainability, environmental stewardship, diversity and inclusion, social mobility, employee welfare, transparency, ownership and profit. We are taking action. For example, our RIIO-ED2 plans include a new Social Contract between us and civil society

Trust is won with difficulty, but easily lost. We know that we need to be worthy of the trust of consumers and stakeholders and our ongoing engagement will tackle that issue directly by asking experts and customers how we can best make sure that we are considered trustworthy.

Our ongoing engagement with our customers is itself a way that we can build and maintain trust. We will build on what we have learned. Some of the things we need to do well during RIIO-ED2 are to:

- Frame any engagement impartially and be fully open about relevant context.
- Be open and innovative in thinking about how to engage on difficult issues.
- Be transparent about what the outcomes of engagement were and how they have impacted our thinking and actions.

Data will be a key enabler in RIIO-ED2 and using data brings specific trust issues associated with privacy, security and transparency, about rights to, and usage of, data.

We will need to engage to ensure that we are up to date with best practice in this area.

Chapter 7: Giving consumers a stronger voice continued

Implications for ongoing engagement:

- We will explicitly tackle issues of trust via targeted engagement activities with stakeholders and customers.
- We will report transparently on engagement results, insight and outcomes for customers.
- We will seek innovative ways to engage on difficult issues and use experts to provide independent challenge.

How we engage: segmentation and inclusivity

Individual customers and stakeholders are not defined by categories. A person can be a customer, consumer, citizen and stakeholder with differing concerns or views from each perspective.

The landscape of customers and stakeholders is complex and continues to change. Of course, we cannot engage with everyone individually to understand their needs and views. Therefore, we need to "segment" our customer base in a way that allows us to capture meaningful insight from different types of customer or stakeholder. Traditional segmentation (such as by age, gender or socio-economic group) will remain important but we want our segmentation to be more sophisticated and thus allow richer insight. This is in line with customers' expectation of more tailored approaches.

We therefore expect to define and use new types of segment across our engagement. Customer groupings might be defined by the way in which people are affected by or engage in the energy system transition, for example as users of particular LCT, or those in danger of being excluded. We will undertake regular and comprehensive reviews or our segmentation approach, testing it with external stakeholders.

One especially important engagement segment is customers for whom engagement is less easy. We need to ensure that we do not listen to some voices over others, simply because they are easier to access. We must be fully inclusive: we will identify, and encourage participation by all segments of our customer base including those that are hard-to-reach.

How we engage: appropriate engagement

No single engagement technique can deliver complete insight that might be 'mined' from a particular customer or stakeholder group: each technique has its strengths and weaknesses. Our engagement programme will deploy a range of techniques which are most appropriate to the specific engagement outcomes sought, with the overall aim of building a clear and rich picture of what our customers and stakeholders think.

Different types of engagement will be deployed in a coherent and coordinated way to maximise the value we obtain from them, for example by doing qualitative work to explore issues so that quantitative questions are well-designed, or sensibly combine topics of relevance. We expect to continue to use innovative techniques to allow for co-design, to enable rapid feedback to extract more useful insight from high volume transactional feedback.

We also recognise that we need to tailor our engagement in some cases to make sure that those we engage with can contribute effectively. Our approach will therefore look to help customers to engage – we found in RIIO-ED1 that people in some socio-economic groups struggled to engage with the topics we wanted to talk about. Our learning here is that we may need to spend more time building their understanding so that we can then obtain meaningful input. We will build on an approach we have explored during Phase 5b Acceptability Testing.

How we engage: using the insight

We need to get better at making sure we generate insight from our work and at recording and assimilating that insight. We need to continually update our understanding and ensure that new information about customers' expectations, experience and sentiment is captured and used. We need to be able to articulate more clearly what it is that we know, and what we don't, so that we can make better decisions, take more effective action and plan future engagement better.

We will therefore implement formal business processes to capture, share and assimilate knowledge both between different functional areas of the business, and also between senior management and the front-line. We will ensure that we have regular reporting and assimilation of engagement insight so that it leads to actionable plans which can be driven through the organisation. Insight from engagement will be embedded more thoroughly into decision-making. These business processes will be part of a new overarching knowledge management framework encompassing clear accountabilities, data repositories, and effective governance. We will engage with expert stakeholders on developing this framework.

How we engage: planning and delivery

We will use an annual planning and delivery cycle with the plan for each year building on the learning of the past. The annual plans will set out the specific issues/purposes which need to be addressed, the specific groups that need to be engaged and the specific questions that need to be answered. Our approach will allow rapid adaptation and flexibility in the event that engagement needs arise requiring a quicker timeframe for action.

We will implement our Ongoing Engagement Strategy from April 2022, a year before the start of RIIO-ED2, with the first Annual Engagement Plan covering 2022/23.

How we engage: governance and resourcing

Engagement is a core strategic tool by which we secure the outcomes that we want to achieve for customers, society and our business. Therefore, governance of ongoing engagement is the responsibility of the Executive Management which will ensure that the top teams engage with the substance of the engagement and the insight arising.

Our engagement approach will also be subject to independent scrutiny, both at an overall level, and for specific topics. We will consult customers, experts and independent stakeholders

to test our engagement approaches and plans. We will maintain topic-specific independent expert panels, including ones devoted to Net Zero and Consumer Vulnerability.

Undertaking customer and stakeholder engagement is increasingly a skilled and specialist task. The front-end of the process has been traditionally outsourced to expert market research providers. However, in preparing for RIIO-ED2, we have learnt that the whole engagement cycle demands a capability to be able to commission research effectively (so that it is targeted and relevant) and handle the outcomes, and to correctly interpret and best use the insight arising. We need to develop the capabilities and scale needed to navigate the increasingly complex changes in our external environment.

We will therefore put in place an expert central engagement team by the start of RIIO-ED2. We will also tender for a strategic framework for "market research and engagement" creating a pool of providers that will build knowledge of the sector, our business and key issues for customers and stakeholders.

How we engage: measuring success

Our strategic engagement approach will be successful if it clearly benefits customers via improved services and new initiatives which will help them navigate their daily lives. Benefits should also flow if our insight develops a robust basis for developing future plans for RIIO-ED3 and beyond.

Furthermore, the emphasis on engaging customers to understand and influence behaviours should enable customers to better navigate a path through the energy system transition and help ensure that their goals are achieved. We intend to measure the effectiveness of our engagement in three ways:

- **Measuring direct feedback** from those we engage with and using this to improve ongoing engagement techniques. We do this today, for example in our connections market engagement, as well as our DSO product development.
- **Measuring the achievement of expected outcomes**; engagement should result in improved performance on measurable outcomes. We will measure wider societal benefits, using tools such as Social Return on Investment (SROI).
- **Benchmarking against external standards**. It is important that we subject ourselves to regular objective independent measurement of the quality of our engagement. Inclusive Service Verification is deeply embedded within our business and will help to ensure that we remain up to date and focused on how our services can be made available to all.

Our Formal Business Plan Commitments

Many of the actions that we have highlighted above we see as business as usual. However, we also think it is important that we hold ourselves to account formally using Business Plan commitments.

The nature of ongoing engagement means that if we do it well, then it will contribute to the delivery of outcomes right across the plan. It is therefore difficult to measure the outcomes of ongoing engagement directly. Our Business Plan commitments are therefore focused on the actions that we commit to take.

Engagement needs to be appropriate and robustly conducted, generate useful insight and lead to good decisions. These three imperatives lie behind the four Business Plan commitments we make here.

Delivering our commitments

Commitment OE1

We will run a comprehensive annual ongoing engagement programme to obtain meaningful insights to help improve our activities and decisions. We will consult stakeholders, such as our CEO panel and Stakeholder Councils in the development of our annual plan and importantly provide opportunities for them to proactively raise issues for discussion.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Hearing from customers and stakeholders in ways which enable more in-depth discussions will enrich thinking about how we can support them with new products and services. It will also help us to understand how we take customers with us to address the wider strategic and policy challenges. Involving independent stakeholders in developing of our plan should help ensure that it is focussed on customer priorities and needs.	The CEG have emphasised the importance of using robust and appropriate techniques, of ensuring the right expertise and best practice is applied. They have stressed the benefit of independent involvement in developing our plans. Regular communication and engagement is going to be key to find the solutions to some of the complex issues that need to be overcome for us to achieve Net Zero in our communities.

Chapter 7: Giving consumers a stronger voice continued

Commitment OE2

We will collate, store and disseminate insights from our ongoing engagement programme to drive more informed actions both internally with our staff, from Board level down, and supply chain partners, as well as externally with stakeholders, regulators and policy makers. We will have measurement and reporting systems in place enabling us to track business changes attributable to ongoing engagement.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Complete and current understanding of stakeholder/customer perspectives will ensure that the full implications of what we learn from customers are recognised across all parts of the business and help lead to the right plans and actions for customers.	The CEG questioned whether we can do better in sharing insight across the business and have highlighted the value of developing specific business processes to do so. Stakeholders have highlighted the importance of effective knowledge sharing within and outside our business.

Commitment OE3

We will create a dedicated core team of engagement and research specialists with the skills required to develop and maintain a comprehensive ongoing engagement programme.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Building skills and expertise within our business will result in higher quality engagement with customers and positioning engagement as a core business competency will be key to ensuring our culture remains focussed on outcomes for customers.	Stakeholders have emphasised the importance of ensuring that we build our own skills rather than placing too much reliance on third party suppliers. Company participants need to have the listening skills to be open to new perspectives rather than simply looking for confirmation of their own views and they need to have the knowledge/expertise to ensure the right mechanisms are being used with the right audiences to get meaningful feedback.

Commitment OE4

We will report annually on the outcomes of our ongoing engagement programme, communicating publicly how it has influenced our actions and decisions.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure	Included in baseline allowances	A commitment to openness and transparency will help customers and stakeholders hold us to account, providing assurance that their investment in engagement is worthwhile and results in meaningful improvements in outcomes.	Stakeholders have emphasised the importance of engagement being actionable, leading to positive benefit for customers, and of transparently reporting the outcomes.

Chapter 8:
Decarbonising our communities
New

In this section, we explain how the key components of our business plan come together to support decarbonisation within our communities. Importantly, it also explains how we will monitor our progress and adapt our strategy as required.

In this section:

8.1	Context	**54**
8.2	Critical success factors	**55**
8.3	Monitoring the implementation of our strategy	**58**

Chapter 8: Decarbonising our communities continued

8.1 Context

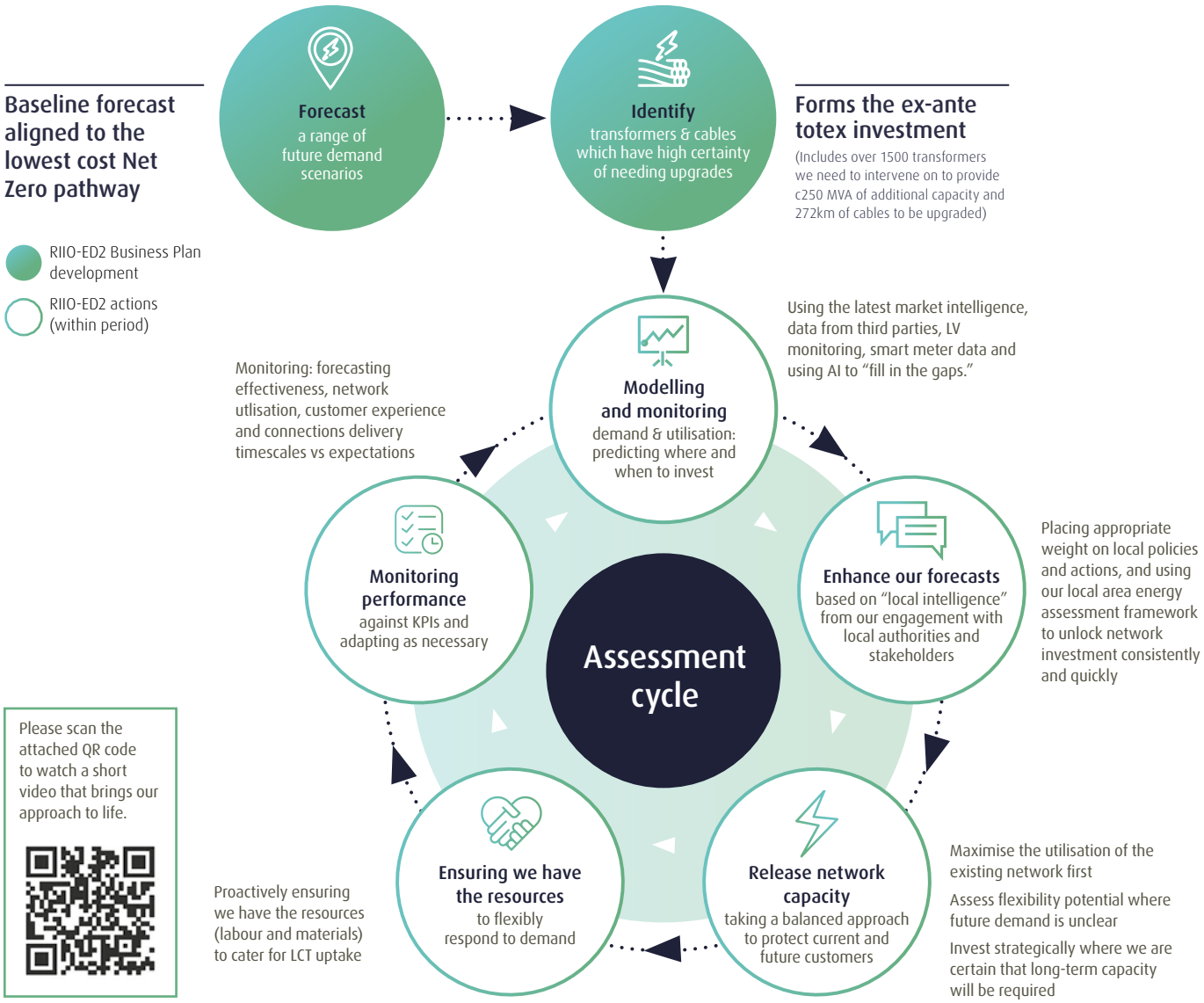
UK Power Networks is crystal clear that it will be a failure on our part if, in RIIO-ED2, people are not able to connect low carbon technologies quickly and easily. Without this, we will fall short of meeting the needs of our customers and we will delay the deployment of technology that will reduce carbon emissions, to the detriment of society as a whole. Furthermore, to retain the confidence of our customers for the Net Zero transition, we also need to ensure that we do this at the lowest possible cost.

The key challenge to this however is that the nature, scale, pace and timing of the transformation of the energy system remains the subject of significant uncertainty. As a network company, we therefore need to be demand-driven and able to adapt quickly as circumstances change and the needs of our customers become clearer.

We are aware that other companies have asked for significant ex-ante increases in totex investment rather than utilising uncertainty mechanisms citing the risk of being a potential barrier to low carbon transition.

We do not believe this position is in the best interests of current and future customers given the uncertainty described above. The greater use of flexibility services will create options which will reduce the need for immediate investment. Moreover, our view is that a well-justified and robust investment approach is independent of whether allowances are requested up front (ex-ante) or through in-period adjustments enacted through uncertainty mechanisms, provided these are designed correctly. This is a point that we have explored extensively with our CEG. Put simply, even if we asked for all the expenditure allowances ex-ante, we would still need to plan the network efficiently based on confidence in demand (utilisation) to ensure investments are well justified and consumers are protected from unnecessary price increases. This is exactly the approach that a commercial business, operating in a competitive market would undertake, to ensure an efficient deployment of capital.

Figure 27: Delivering on our strategy



Please scan the attached QR code to watch a short video that brings our approach to life.

We have introduced this new section in our Final Business Plan based on stakeholder feedback on our Initial Business Plan. We describe our strategy to facilitate decarbonisation in our communities at a practical level whilst protecting current and future customers. The infographic on the prior page shows how we will (i) take the most sensible initial forecast of future demand as the baseline for our business plan; (ii) have a thorough and continuous process that will constantly generate new information and forecasts allowing us to continually update our plan; (iii) act rapidly on this information to ensure that our network is used as efficiently as possible, but also that we invest rapidly to create new capacity where it is needed. Taken together, we believe this approach will facilitate Net Zero on time and at the lowest cost to consumers. We encourage you to scan the attached QR code to watch a short video that brings our approach to life.

We have considered the critical success factors that will ensure that we are a facilitator and not a blocker for decarbonisation within our regions. Principally these include providing capacity at the right time and right place, ensuring local intelligence is factored into our forecasts and investment plans through strong ongoing engagement, taking a balanced approach to investment that protects current and future customers, having a responsive regulatory framework that releases allowances on a timely basis and finally ensuring that we have the resources (labour and materials) to flexibly respond to demand.

However, no business plan can claim to have all the answers worked out for a transformational change for which there is no precedent globally. Measurement against key targets is our way of ensuring we remain on track for the Net Zero transition. Therefore, we outline the metrics that we intend to measure and publicly report our progress to all interested customers, stakeholders, Ofgem and government (both national and local).

8.2 Critical success factors

Building greater intelligence of emerging customer and system needs to invest at the right time and right place

Having set-out the starting point for our plan, we have considered how it will respond dynamically to events. We know that customer demand for Low Carbon Technologies (LCTs) such as electric vehicles and heat pumps will rise, but the scale, pace, location and timing of that rise is uncertain. Failure to correctly anticipate demand could lead to delays in network capacity provision and inhibit the transition. Our business plan commits us to have the best market intelligence, at both an aggregate and local level. This will be combined with an in-depth understanding of our network and the wider system, and its constraints, including the potential for smart, flexible or energy efficiency solutions, so that we can prepare and respond flexibly and efficiently.

Our market intelligence will draw on different types of market data including:

- **Customer attitudes.** We will use market research, ongoing engagement and third-party sources to understand shifts in customer attitudes that could impact LCT uptake and input into our product and service development both for the DNO and DSO businesses. We are trialling AI platforms that can ingest publicly available structured and unstructured data from external organisations to measure how sentiment on specific topics such as EVs or Heat pumps is changing. This will enable us to understand the external environment in a more quantitative way to inform our strategy.
- **Data from LCT industry suppliers, manufacturers and other third parties.** We will work in partnership with, and use data and forecasting provided by, suppliers and manufacturers serving the LCT sector such as EV dealers, Heat Pump manufacturers and charge point installers, to gain an insight into expected demand. We will seek to supplement this with data from other companies that could provide an insight into expected consumer demand at a regional level, such as credit card companies, internet search engines or electricity suppliers offering smart tariffs. Digital technology enables a wealth of opportunities to interact and share data compliantly with other organisations at scale using Application Programming Interfaces (APIs). Our intent is to maximise this potential to ensure we are ready for whatever our customers need from our networks.
- **Intelligence from our ongoing engagement programme with local authorities and stakeholders.** This will be crucial for us to understand, at a macro level, upcoming demand from their investment plans that we will need to be ready for. It will also identify micro level issues about our products and services that will need to be refined or potentially created to address operational issues on the ground impacting safety, customer satisfaction, reliability and efficiency. Critically, we will continue to engage proactively with the local authorities in our areas to improve our understanding of their evolving plans and needs.

This will be overlaid onto an in-depth understanding of our network and the wider system, which we will gain from:

- **Deploying LV monitoring.** We will collect real time data through mobile monitoring of the transformers that make up our LV networks where we are forecasting constraints over RIIO-ED2.
- **Use of smart metering data.** We will work with energy suppliers to supplement our LV monitors with smart meter data that is aggregated to protect consumer privacy, but still useful to be able to understand emerging system needs
- **Use of advanced analytics.** We will target visibility of 100% of our networks by using AI and predictive analytics to "fill in the gaps" where we don't have monitoring or smart meters. This will support us with a form of risk index to target our investment decision making.

Chapter 8: Decarbonising our communities continued

We strive to achieve exceptional customer service in all aspects of our business and facilitating the Net Zero transition is no exception. If customers face difficulties in connecting their LCT, this could dampen future demand and jeopardise the transition itself. We will make our connections process faster and easier by collaborating with third parties to avoid disjointed and poor customer experiences. We aim to instantaneously process at least 80% of general enquiry supply upgrades via self-service offerings by the end of RIIO-ED2, delivering a 93% average customer service satisfaction score over RIIO-ED2.

Our regions have seen the greatest uptake of LCTs to date and we expect this trend to continue. We will leverage our position at the forefront of the energy transition to share both information and our experience with other DNOs and connection providers in the market to facilitate the national effort to achieve Net Zero.

Working with Local Authorities and Stakeholders to enhance our forecasting and investment plans

Many of the urgent changes and decisions which are needed to reduce emissions and reach Net Zero have a strong local dimension – a 'one size fits all' approach will not work. Local Authorities and stakeholders are key to understanding the solutions that will work in their areas. We have engaged with local government to understand their needs and they have emphasised the importance of our role in helping them to achieve this goal.

We will work in partnership with Local Authorities, community energy stakeholders and other utilities to help them to realise their Net Zero ambitions. We will use our planning expertise, data, resources and convening power to help Local Authorities unlock the investment required by well-justified Net Zero local area energy plans. We will engage with all 127 regional and local planning authorities on their climate plans, offering a three-tiered support service utilising a framework to self-assess, develop action plans and unlock network investment where a prescribed level of certainty is achieved. This "local intelligence" will be critical to enhance the accuracy of our forecasts and scenarios, ensuring we attach appropriate weight to local policies that could accelerate decarbonisation. We are establishing a new team with specific accountability for this as part of our newly established DSO. Based on feedback from Local Authorities through our engagement on the Initial Business Plan, we are doubling the size of the team to 20 FTE and will monitor LA satisfaction with the service provided by this team and report on it externally.

Further, by 2024, we will provide core planning datasets via an on-line, self-service energy planning tool to support the planning process for our local authorities, helping them make the best choices for their communities. All our data will be accessible using modern and open standards to enable external parties to consume it in a machine-readable format.

Taking a balanced approach to Net Zero investment that protects current and future customers

A key element of ensuring a successful energy transition will be to minimise the cost burden on current and future consumers. The recent energy market crises with families facing cripplingly high energy bills resulting from wholesale gas prices, reinforces our strategy of facilitating Net Zero at the lowest possible cost. To this end, we will strive to achieve a smarter, and more highly utilised, distribution network so that we do not spend our customers' money where it is not needed. We will use flexibility services to minimise the need for immediate investment and to maximise the options we have in the future. By maximising utilisation of the existing network before approving asset-based solutions, we will ensure that we don't deploy solutions today that are inappropriate for meeting the problems of tomorrow. We can then ensure that any investment in capacity is in the right place, at the right time.

Establishing an independent and legally separate DSO business unit with an independent DSO Supervisory Board and supplemented with regular public reporting to maximise transparency is a key part of this vision. This will deliver cost savings through increased competition and use of flexibility and energy efficiency to "market test" network needs before considering traditional reinforcement. The intent is to demonstrate independence of investment decision making that considers all solutions on a level playing field and which is in the best interest of current and future consumers, separate from the DNO asset business. We are doing this as a result of direct stakeholder engagement with market participants that strongly encouraged us to go as far and fast as we could to address the risk of conflicts of interest and perceived bias towards network asset solutions. We aim to set the standard for the industry on transparency of decision making by publishing our day-ahead operational plan and schedule of flexibility services and curtailment, and a monthly control room dispatch decision report.

The network data provided by the DSO will also facilitate innovation and new market propositions and our longer-term vision is that its independence provides a stepping stone to unlocking competition in every part of the network, which could ultimately extend into asset replacement, greater non-contestable connections work and operating contracts.

We will take a balanced approach across price controls to protect current and future customers; investing strategically where we are certain that long-term capacity will be required; holding off on other investments until future demand is clearer; and ensuring that, where we do intervene on the network, this long-term view will minimise costs.

For example, we will enhance our replacement programmes that are principally driven by improving asset health to also provide additional capacity where it is required. We estimate that an additional 700MW of capacity c.5% increase on existing ED1 capacity) will be delivered by taking this integrated approach.

We will invest strategically, ahead of demand, where there is a high certainty of need across potential scenarios. In doing so, we will accelerate the transition, smooth workload and ensure that we only touch the network once to upsize to 2050 demand requirements where it is demonstrably efficient to do so. Such strategic investments include:

- **Unlocking an additional 2400 on-street public chargers working with Local Authorities** across our regions to tackle EV inequality driven by market conditions and drive greater EV adoption amongst communities that are at risk of being left behind in the transition. For example, those living in cities, flats and council estates are less likely to have access to a driveway to be able to charge at home and suffer some of the worst air quality.
- **Helping 242,000 off-gas grid homes in our regions (that will be disproportionately affected by the energy transition) to transition away from fossil fuels** by ensuring that they have the capacity to decarbonise their heating and transport by the end of RIIO-ED2. However, our approach is not just about investing in additional network capacity. Decarbonisation of heat will not happen unless we think about the solutions in a different and more joined up way. We need to work with trusted parties to engage local communities so that there is understanding of why a change is needed and how that change could be implemented with them, tailored to their needs. Signposting them to government grants and as well as energy efficiency advice will also be key. UK Power Networks needs to be part of a broader coalition with communities to make the change happen and that is our intent in making this area a consumer value proposition tied to actual outcomes.

Having a responsive regulatory framework that releases allowances in a timely way

Our strategy to optimise existing capacity and step back from committing to a significant proportion of speculative investment until demand is clearer, requires a flexible and responsive regulatory funding framework.

The application of uncertainty mechanisms is key to making such adaptive regulation a reality. We are proposing a "capacity volume driver" to allow our regulatory funding to be adjusted as the volume of investment required at a secondary network level becomes more certain. This will enable additional funding to be released where additional capacity can be justified at a local substation level.

We will need the necessary funding to be released up-front on an annual basis and adjusted in period should the up-front forecasts differ from out-turn demand and capacity provision. Our proposed capacity volume driver only triggers a "full" increase in allowances when we can demonstrate that an asset's utilisation has reached a specific capacity utilisation trigger point. This application of a unit cost allowance to the additional capacity provided will incentivise cost efficiency; both by incentivising the use of flexibility and energy efficiency where possible, and by incentivising a long-term view to 2050 when determining the appropriate level of investment. By aiming to only replace transformers, dig up roads or re-lay cables once, we will not only minimise long-term costs to customers, but we will free up resources to address capacity constraints elsewhere on our network.

Other aspects of our regulatory framework, such as the financial incentives we face in relation to customer satisfaction and network performance will complement this mechanism by ensuring that investment in capacity is timely and avoids placing excessive strain on our network.

We are dependent on Ofgem now to finalise these arrangements given the criticality of uncertainty mechanisms to our strategy. We know that speed in responding to our customers' requests and speed in reacting to changing patterns of demand is going to be key. The mechanism we propose will avoid formal reopeners to the price control which take considerable time, as well as involving staff time and resource for both us and Ofgem.

Ensuring we have the resources (labour and materials) to flexibly respond to demand

We have discussed the importance of optimising existing network capacity before seeking to augment it, and the same principle applies to our organisational capacity. We will optimise our existing physical resources by harnessing automation and innovation (including self-service tools for quotations and connections) and cross-skilling our existing workforce with the key skills needed. We will source and develop the digital, information and customer skills needed to support delivery of Net Zero through training, reskilling and the creation of a Digital Skills Academy. Furthermore, as our smart metering workloads reduce, our smart metering team (approx. 210 FTE) will be redeployed to undertake fuse upgrades to support getting homes and business ready for EVs and heat pumps during RIIO-ED2.

We will also ensure that our customers can benefit from a genuine choice in connection providers across the whole spectrum of connections by maximising the potential for competition in the connections market. Our extensive experience in distributed generation tells us that offering customers a genuine choice and opening markets creates powerful, dynamic forces that enable significant volumes of work to be delivered in short timescales. We are leading the industry in opening our connection activities to competition: we will go further than any other DNO to re-define currently non-contestable work as contestable services over the RIIO-ED2 period, enabling Independent Connection Providers to bid for work that we currently do. Furthermore, through our independent DSO, we will competitively tender £100M of investment that is currently completely outside the scope of contestability. This will entail the DNO having to compete with other potential providers to ensure the best value for consumers.

Chapter 8: Decarbonising our communities continued

We already have experience of flexing to respond to customers' requirements having connected ~3GW of solar powered distributed generation to our networks since 2010, and we are confident in our estimates of the resources required under a high-case scenario for LCT roll-out based on our analysis. We estimate that there will be demand for an additional 1,515 full-time equivalent employees (FTEs) across the business over a 5-year period from a mixture of directly employed staff, contractors and supply chain partners.

Following consideration of the relevant risks and mitigating actions (as outlined in Appendix 13: Workforce resilience), we are confident that we will be able to deliver these resources. Short lead times for hiring new staff and consistently high application to vacancy ratios will allow us to respond quickly to anticipated demand. We have also engaged extensively with our construction alliance partners and supply chain contractors to put resourcing arrangements in place and discuss lead times to ramp up if required. What is most important, is the ability to have an early warning of risks to give the maximum time to respond. That's why we have put in place monitoring of labour and equipment market supply and demand changes to be able to adapt to new circumstances as they unfold.

8.3 Monitoring the implementation of our strategy

We believe that we have a robust strategy that addresses the risks of us being a potential blocker to decarbonisation. However, we know that is not enough. It is clear that the companies that succeed will be those that can adapt quickly and efficiently as circumstances change.

It will therefore be necessary for us to constantly monitor the performance of our strategy and adjust to "course-correct" as appropriate. This feedback loop will be fundamental to ensuring that we are on track and that we stay on track – that we are meeting customer expectations now and that we can plan effectively to continue to do so in the future.

In order to ensure exceptional performance in customer service and satisfaction, we have determined targets for several key performance indicators, and we will continually monitor our performance against these targets:

1. We will measure and report on the accuracy of our LCT update forecasts annually (we will target a +/- 15% variance).
2. We will measure the actual and forecast utilisation of our 120k transformers on an annual basis (we will aim to maintain network utilisation within +/- 20% of the target agreed with Ofgem).
3. We will measure the C-SAT scores for our LCT customers on a weekly basis (we will target a 93% satisfaction or #1 DNO Group average).
4. We will measure the C-SAT score for Major Connections customers on a weekly basis (we will target a 90% satisfaction or #1 DNO Group average).
5. We will measure satisfaction after every engagement event (we will target 90% satisfaction from LCT customers).
6. We will measure complaints from LCT connection customers (we will set the target for this metric once we have established a baseline).
7. We will report on engagement scores for local authorities on an annual basis (we will target an average of 90% satisfaction over RIIO-ED2).
8. We will measure how well we are meeting connection timescales through a weekly CSAT survey (we will target an average of 90% satisfaction over RIIO-ED2).

We will embed these measures in our management incentive frameworks to ensure that our executive and overall company remuneration policy is linked to the key priorities of customers.

Furthermore, we will continue to use engagement with customers and stakeholders where we listen, understand, test ideas and act on feedback. We will continue to use such engagement to pinpoint and address issues for our customers in shaping new and existing customer journeys, as well as informing the complex trade-offs underpinning Net Zero decisions.

Engagement with connections customers and stakeholders will also continue to help shape plans for opening our network data and enabling greater competition and choice for customers in delivery of their infrastructure requirements.

In summary we are confident, but not complacent about our strategy to ensure we are not a blocker to decarbonisation in our regions. We are already working on implementation plans for our proposals and developing solutions to ensure we can hit the ground running in RIIO-ED2. We also realise that we can have a well thought through strategy that could become irrelevant if we are not on top of the changes in our external environment. That's why our ongoing engagement with customers and stakeholders, coupled with monitoring of key metrics is pivotal to provide the feedback loop needed to keep iterating and improving our business strategy.

Chapter 9:
Meeting needs of consumers and network users

We outline our plans for meeting the needs of consumers and network users to maintain our position as the number one customer service provider in our sector.

In this section:

9.1	Customer service	60
9.2	Consumer vulnerability	68
9.3	Connections	76
9.4	Our consumer value propositions	83

How this chapter links to our Keys to Success:

1. Delivering a brilliant service for all
2. Facilitating decarbonisation at the lowest cost
3. Investing to maintain a safe, reliable and resilient network
4. Delivering the lowest possible bills whilst enabling Net Zero
5. Being a force for good in the communities we serve
6. Being an employer of choice
7. Being a company that is worthy of your trust

Chapter 9: Meeting needs of consumers and network users continued

9.1 Customer service

We will lead the industry in the delivery of great customer service

We serve more than 8.4 million homes and businesses across the South East of England. From the urban areas in London to the more rural areas of East Anglia, we serve a diverse demographic of customers. We operate in some of the most prosperous parts of the country, at the same time we also serve communities where high proportions of individuals and households find themselves in vulnerable situations.

We aim to continue being rated as the number one customer service provider in our sector and to increase our Broad Measure of Customer Service (BMCS) score beyond the average of 8.84 achieved over RIIO-ED1 to date – we are targeting 9.3 in RIIO-ED2 to remain the number one DNO Group. We have ambitious plans, building on the trust we have earned, to go further and benchmark ourselves against the "best of the best" across any sector through the UK Customer Satisfaction Index.

We will always be there when our customers need us, especially when they are in vulnerable circumstances. We will further improve our service to meet our customers' individual expectations with ease, choice and convenience. We will provide local tailoring of services based on data and insights from customers. As a DNO first, for RIIO-ED2 we offer the convenience of automated Guaranteed Standard payments. And we will do all of this without increasing our overall spend on serving customers.

Our strategy

Our Customer Service strategy is focused and simple

There are four pillars to our RIIO-ED2 customer service strategy.

1. Helping our customers when they need us most

We will provide good support in the event of a power cut and are committed to restoring power quickly on the rare occasion it fails.

We will provide extra care to any customers in vulnerable circumstances. Our one-stop shop service will offer a single registration for priority services with UK Power Networks and other utility providers.

We will work with our partners to provide inclusive services to ensure no one is left behind in a changing world.

2. Making it easy for our customers

Life is busy. Our customers have told us they need easy access to clear communications in a timely manner, so we will provide them with high quality information and support when they need it; quickly.

We will ensure our costs and timelines are clear and upfront.

3. Offering our customers choice and convenience

Our customers are individuals and we are committed to tailoring our service to fulfil their individual needs. From their preferred method of communication, through to the best time to arrange a visit.

We recognise many people like the personal touch so we will provide a designated contact if required.

We will also offer tailored services for customers in vulnerable circumstances, those seeking to use low carbon technology (LCT), and for small and medium-sized business customers.

4. Helping our customers to reduce their carbon footprint

Our customers are concerned about their impact on the planet.

Through our partnerships we will provide advice and guidance on low carbon technology such as electric vehicle (EV) charging at home or work, installing heat pumps or solar panels to reduce their carbon footprint.

We will help our customers to reduce their energy bills and support local authorities to help make the transition.

The move towards a Net Zero economy will bring with it major changes to the lifestyles of people and communities, from how they refuel their vehicles to heating their homes and using energy wisely. In its report ('Flexibility in Great Britain')[1], the Carbon Trust highlights that to maximise the benefits of flexibility, households and businesses will need to play an active role in the development and operation of the country's future energy system. Consumer engagement and confidence building is critical to scaling up the provision of demand-side flexibility, including through the operation of their smart appliances, electric vehicle charging and home heating systems. Drawing on our customer research and having reviewed external research, we understand that our customers are concerned about the environment and climate change. However, there are barriers to their ability to change what they do. These barriers range from upfront costs through to a lack of general knowledge of the changes needed to achieve Net Zero and how these will be paid for.

1 https://publications.carbontrust.com/flex-gb/analysis.

So that customers can make informed choices about the options available to them for decarbonising their home, transport and general lifestyle, there needs to be much better information and support available to them. Government, companies, charities and regulators need to play their part in making this happen.

Given the hundreds of thousands of customer interactions we have every year, we have a role to play – increasing awareness and promoting better information. We are really excited to be launching a new Net Zero Advice Service where we will direct our customers to trusted intermediaries who can provide information ranging from the basics of what low carbon technologies are, through to unbiased information to help them understand the choices available and the various financial support schemes from Government. The Net Zero Advice Service is being designed and will be constantly refined by our customers, for our customers.

We appreciate that there are significant barriers to overcome to support customers in the energy transition, but if they don't understand why they need to make the change and the best options available to them, they won't act. That's why we think developing this service will start to help close the knowledge gap for those customers that interact with us for a range of other services.

We acknowledge that others may be better placed to provide this service. But we have a strong track record, for example helping the transport sector with the roll-out of electric vehicles – we think there is an opportunity to capitalise on this experience. Our ambition is to offer this platform to other DNOs and GDNs, to share best practice and create a consistent experience for all GB customers industry-wide, with an ultimate aim to hand this to an independent trusted party if we can make it a success.

An ambitious plan with meaningful commitments

From a position of leadership in our sector, we pledge to show by example that we can push the frontier even further. We will get the essentials of customer service right more of the time. With ambitious commitments to continue to be rated as number one customer service provider in our sector and to increase our BMCS score beyond the average of 8.84 achieved over RIIO-ED1 to date. We recognise the ways in which customers choose to contact us are constantly evolving so through RIIO-ED2 we will offer customers communication in the channel of their choice.

Despite the high standards we expect of ourselves, unfortunately things do go wrong leading customers to complain. We will be fully transparent with our customers and stakeholders, by publishing the number of complaints we receive and our performance to reduce them by getting things right first time. Our ambition is to remain the least complained about DNO[2] and we are committing to resolve customer complaints quickly and to their satisfaction.

We are increasing the high standards we have set while accommodating the additional change required to help customers move towards Net Zero carbon. We have two DNO firsts: the launch of our Net Zero Advisory Service to help our customers reduce their own carbon footprint; and a commitment to offer automated Guaranteed Service payments.

We will give our customers a stronger voice by offering them the chance to provide real-time feedback and to rate our service, every time they interact with us using tools such as Rant & Rave – going well beyond regulatory requirements to drive continuous service improvement. We are committed to specifically segmenting the feedback from those who are vulnerable, as well as low carbon and small business customers, to understand how we should improve our services for their changing needs. Our customers will be asked how we compare against the best of the best organisations they deal with in their day-to-day lives. This will be independently scored by Trustpilot surveys where we will target 5* performance. We will benchmark against the Institute of Customer Service targeting to be in the upper quartile of service providers in the UK.

Full details of these commitments are described later in this section.

Our plan delivers value for money

We offer value for money by improving our customer experiences without increasing customer service spend. Our customers tell us they want continual improvements: evolution not revolution. This was confirmed by our 'willingness to pay research', through which we learned that, in general, customers often have a high willingness to pay to maintain their current service level (i.e. avoiding a deterioration) but are less willing to pay for improvements in service.

We will strive to give our customers the type of "best in class" service that matches organisations such as John Lewis and Marks and Spencer. Delivering this level of service will require additional investment. However, we will offset these additional costs through improved efficiency.

We will deliver value to our customers:

- By evolving our service, based on customer feedback and expectations.
- By allowing our customers to choose the channel of communication that is most efficient for them.
- By reducing complaints.
- By paying compensation under the Guaranteed Standards automatically without delay.

2 Measured by complaints per 100,000 customers.

Chapter 9: Meeting needs of consumers and network users continued

A forward-looking plan addressing changing needs and expectations

Digital technology is continuously evolving and shifting customer behaviour; the use of digital technology has surged[3], and UK adults now spend about a quarter of their waking day online. Research shows that many people are moving away from established forms of communication e.g. landline calls, SMS text messages and email, and adopting newer methods such as WhatsApp and Facebook Messenger.

However, we will remain alert to ensuring that customers are not left behind through the lack of digital access whist we increase the use of digital technology. Our experience and separate research from the Institute of Customer Service annual survey confirms that human contact remains something many consumers want and need. We have also been reminded that not everything is predictable. As witnessed through the COVID-19 global pandemic, successful organisations are those with agility and resilience to maintain services and respond proactively to changes in their customers' and employees' circumstances.

We have a fully costed digitalisation plan to deliver on our commitments. It focuses on investment in technology such as Customer Relationship Management (CRM) to support resilience, simplicity and integration; tailored digital solutions; and improved access to data. Our omnichannel approach to gathering and analysing feedback, which integrates different insight from all of the channels used by our customers, will enable us to continue to drive improvement in our service. We will derive insight by compliantly aggregating data seamlessly across phone, face-to-face conversations, social media, surveys, and other channels of information. All of this will drive a better, more consistent user experience using more automated systems resulting in improved efficiency. More detail on our digital plans can be found in our digitalisation strategy (see Chapter 13: Unlocking the potential of digital and data).

The plan our customers expect of us and one our people want to deliver

Our service plan is built from key learnings from our bespoke Customer Journey Research. This research explored the journeys that our residential and commercial customers experience for connections, general enquiries and power cuts. It comprised of 11 online focus groups, 25 in-depth interviews and quantitative surveys of 1,700 customers. This provided many actionable insights for service improvement that we built into our plans.

Furthermore, our service plan was supplemented with findings from our five-phase RIIO-ED2 customer research programme and analysis from our RIIO-ED1 engagements. This rounded view ensures we had coverage across all service offerings from a range of demographic perspectives, including residential and commercial customers, those in vulnerable circumstances, and those seeking low carbon lifestyles.

Full details of our research programme can be found in: Appendix 5: Our RIIO-ED2 Customer and stakeholder engagement programme.

The findings from this research can be summarised as:

- While customers rate our current service as very good, they want it to be excellent and more individually tailored. They want this through evolution not revolution.
- They expect us to communicate with them in the channel of their choice.
- Some want and need more assistance, particularly customers in vulnerable circumstances.
- Some specifically want more help to navigate through the major changes to lifestyles that the move to Net Zero carbon will bring.

Our supporting document Line of Sight – Customer Service provides further details.

We used insight and learning from our experience of RIIO-ED1

Our RIIO-ED1 operational insight and experience from customers has been thorough and invaluable. To date, we have surveyed approximately 14,000 customers every year to understand their satisfaction with our core services, supported by around 75,000 pulse text surveys ("Rant & Rave") to understand customer sentiment. Our Line of Sight-Customer Service document provides further information on the insights from our work.

This has allowed us to better understand exactly how customers rate our services in terms of effort and ease, time to serve, quality of information we provide and how effectively we communicate. This RIIO-ED1 feedback provides us with a solid foundation on which we can build our RIIO-ED2 plans.

3 Ofcom's Online Nation report.

We engaged our staff to develop and own the commitments in this plan

We know from our own experience and the research of organisations like the Institute of Customer Service (ICS) that engagement of employees is a key factor in delivering great service to our customers: *"ICS: Employee engagement is crucial to business performance because it leads to better customer experiences... The relationship between employee engagement and customer satisfaction is a virtuous cycle: high levels of employee engagement contributes to better customer satisfaction..."*[4]

ICS' research *("How to define and measure the return on investment of customer service")* shows that organisations with the highest levels of employee engagement tend to achieve superior customer satisfaction. A one-point improvement in employee engagement is linked to 0.41% uplift in customer satisfaction. Our employee engagement score currently stands at 85% and we have been independently recognised as a top 10 employer in the Best Companies list.

For RIIO-ED2, we ran workshops with our employees to engage them in tailoring our key customer journeys. We learnt much from our frontline staff who engage daily with our customers, on the doorstep or on the telephone, and know more than anyone what it takes to deliver 10/10 customer service each and every time. The workshops also highlighted current customer service resource and technology challenges (as outlined in Chapter 13: Unlocking the potential of digital and data), supporting our aim to address these and provide timely and accurate information.

We have shaped and tested our plan against leading practices outside of our sector

Our customers can have confidence in our strategy and plan. It is further informed and cross-referenced against independent research undertaken by the Institute of Customer Service across 200 different organisations looking at what customers expect now and in the future. Our UKCSI score has gone up by 4.9 points over the previous year and we now rank 4th out of 34 organisations in our sector, up from 14th. Our supporting document Line of Sight – Customer Service provides further details.

Delivering our commitments

Our service plan makes stretching commitments

We have seven customer commitments that underpin our service strategy. We explain below what each commitment is, why we have proposed it and how we will achieve it.

Commitment CS1

We will maintain our position as the number one service provider amongst our peers over the RIIO-ED2 period. We will aim to be the #1 DNO Group as measured by customer satisfaction, or to achieve at least a 93% score on average across our networks in each year of RIIO-ED2, whichever is higher.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	This commitment is covered by the Customer Satisfaction Survey which is a common Output Delivery Incentives (ODIs) (Financial).	Customers will have a simpler and quicker experience when interacting with us. They will receive industry-leading levels of service, tailored to their needs when they experience a power cut, wish to connect or make a general enquiry.	Our customers have a generally positive view of our services and appear to place a high degree of trust in UK Power Networks and the information it gives (see key insight I-CS2, I-CS3, I-CS4, I-CS5, I-CS6, I-CS7 and I-CS8 in our Line of Sight – Customer Service document).

The Broad Measure of Customer Satisfaction incentive demonstrates our improvement in service. We extended our performance beyond the maximum incentive cap over RIIO-ED1 and will continue to push further to deliver the best possible service at an affordable cost for our customers.

We set a high bar on customer satisfaction because customer satisfaction builds trust and reputation – something vital for us and for our industry overall. The Institute of Customer Service ('How to define and measure the return on investment of customer service') confirms that companies who score a 9 or 10 for customer satisfaction have the highest ratings for trust, reputation, and loyalty. Trust is integral to efficient and productive relationships.

Customers have told us that good information is critical. Information should be relevant, clear, accurate and provided to customers when they need it. Customers' experiences of digital technology continue to drive higher expectations about choice, tailoring and continuing innovation. Stakeholders are looking for more information sharing and joined-up approaches with other service providers to drive better customer experiences.

4 https://www.instituteofcustomerservice.com/roi-customer-service/

Chapter 9: Meeting needs of consumers and network users continued

We will continuously improve the experience of customers when in contact with us by:

- Gathering more data so we can better deliver on customer needs and preferences.
- Better planning and coordination of our works to minimise disruption to customers.
- Greater use of mitigating actions (such as provision of temporary environmentally friendly power generation) to help maintain supplies for customers.
- Giving more timely, accurate and tailored information (such as notification of planned work and provision of estimated restoration times) through channels of customers' choices.
- Simplifying and speeding up our connection services process.
- Providing better information on first point of contact.

We know from our research that customers and stakeholders have very high expectations. So we will capitalise on the digital revolution and the data we can access. Customers, particularly business customers, are expecting innovation and adaptation of services and tailoring of services to their needs. Customers are looking for smartphone apps and mobile friendly webpages that enable services which are efficient and make key interactions easy. We will further embrace the use of digital technology and internet-enabled contact channels to improve customer choice and levels of service (as explained in Chapter 13: Unlocking the potential of digital and data).

We will continue to embed a customer-centric culture with our staff and supply chain partners. As mentioned above and noted in Chapter 14: Innovation, we encourage everyone to share lessons learned and ideas for improvement. We will additionally work with other DNOs to drive improvements in assessment and measurement of customer satisfaction.

Commitment CS2

We will benchmark ourselves against the UK Customer Satisfaction Index, demonstrating we are providing an excellent customer experience compared to the best companies across the country. We will target to be in the upper quartile of service providers by the end of the RIIO-ED2 period. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	We will report on our performance.	Service improvements.	Customers and stakeholders have very high expectations that UK Power Networks will capitalise on the digital revolution and the data that they can access. (see key insight I-CS2 and ICS-3 in our Line of Sight – Customer Service document).

As noted above, in July 2021 UK Power Networks' UKCSI score has gone up by 4.9 points over 2020, and we are now ranked 4th out of 34 organisations in the sector (up from 14th) positioning us in the top 5 utilities. To stay that way we need to look beyond the sector. This is because customer expectations are set by the best service they receive across all sectors and therefore we need to continue to listen and adapt in order to achieve our commitments. The ICS benchmarking is a way of quantitatively measuring our relative performance and the effectiveness of our engagement and service improvement work, this is why we aim to be in the top quartile of all service providers by the end of RIIO-ED2.

Commitment CS3

We will provide customers communication through the channel of their choice for all services at least 90% of the time over RIIO-ED2, offering choice and convenience. We will capture customers' preferred language and use this in our contacts with them over RIIO-ED2. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	We will report on our performance.	Greater choice and convenience in how they contact and interact with us.	Customers place very high value on effective communication. Customers seek options in ways to contact us. Despite or perhaps because of the digital revolution, customers are anxious not to lose the human aspect of the relationship. This is particularly important for people who are less adept with digital technology or who are socially isolated. (see key insights I-CS4, I-CS5, I-CS6 and I-CS7 in our Line of Sight – Customer Service document).

During RIIO-ED1 we have been working hard to develop our customer contact channels, we currently offer customers 30 channels to communicate with us. We will continue to deploy a range of channel-based technologies specifically targeting better service and choice for customers; for example:

- New customer service channels (e.g. chat bots) for less complex queries so agents will be freed-up to handle more critical and complex queries, using technology such as Machine Learning, AI and Robotic Process Automation.
- Access to simple video updates directly from the teams in the field working on their jobs using VR/AR, cloud technology and edge computing.
- Paperless options for outbound communications such as geo-targeted social media campaigns to tailor messaging by community.

Regardless of the channel customers use to contact us, we will respond on average in less than 10 seconds for emergencies and power cuts. We will respond to customers through the channel they used to contact us 90% of the time. This target reflects that there will be occasions when we need to contact customers on an alternative channel. For example by using video tutorials when resetting customer trip switches. Therefore we have set what we believe to be an ambitious and stretching commitment.

Commitment CS4

We will resolve customer complaints quickly and to customers' satisfaction, improving against our RIIO-ED1 baseline performance in each year of RIIO-ED2. We will target 89% 1st day resolution and 99% 31-day resolution (vs 77% 1st day and 96% 31-day average achieved in RIIO-ED1[5]).

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex, utilise existing process efficiencies to repurpose resource.	See the Customer Satisfaction Survey which is a common ODI(F).	We will improve the speed at which we resolve complaints and achieve satisfactory resolution for our customers.	Customers tell us that if we fail to deliver good service and they need to complain, we should respond quickly and professionally (see key insights I-CS2, I-CS3, I-CS4 and I-CS5 in our Line of Sight – Customer Service document).

Commitment CS5

We will reduce the overall volume of complaints by getting it right first time, maintaining our position as the least complained about DNO as measured by complaints per 100,000 customers in each year of RIIO-ED2. We will target 55 complaints per 100,000 customers (vs 99 average achieved in RIIO-ED1 [6]).

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex, utilise existing process efficiencies to repurpose resource.	We will report on our performance.	More customers will get the 10/10 service they deserve every time from us, reducing the number of complaints we receive.	When things go wrong customers rightly complain, they expect us to get it right first time, every time. (see key insights I-CS4 and I-CS5 in our Line of Sight – Customer Service document).

We expect to be held to account on managing and reducing the overall number of complaints we receive, in the same way as happens in other sectors. This includes our energy retail, water and telecom peers and those from the banking sector, the police and the NHS. It helps to build trust and transparency with customers and confidence in the sector overall.

> Being transparent about the number of complaints that firms receive is helpful for the industry and consumers. Firms can compare their performance with their peers and consumers have an additional source of information about the firms we regulate."
>
> **Financial Conduct Authority.**

Our complaints resolution approach is simple. We are committed to reducing the overall volume of complaints by getting it right first time. This commitment has resulted in being the least complained about DNO, at the same time as improving the speed and focus on resolving the complaint. We are proud to be ranked third in the country by the Institute of Customer Service 2020 annual survey for this complaint resolution approach, and the only utility company to feature in the top 10 of best performing organisations[7]. The improvements in our processes for handling customer complaints, along with new data-led measures, have significantly improved our complaints performance throughout RIIO-ED1 with a 55% reduction in the number of complaints per 100,000 customers, 66% lower than the industry average for distribution network operators.

5 First 6 years of RIIO-ED1.
6 First 6 years of RIIO-ED1.
7 https://www.instituteofcustomerservice.com/product/ukcsi-jan-2021/

Chapter 9: Meeting needs of consumers and network users continued

By their nature, some customers do not have a propensity to complain as much as others; for example, rural and lower income customers tend to complain less than customers in other socio-economic groups. By tailoring and segmenting customer feedback and triangulating this with research, we will ensure that every customer is heard and that investments are focused appropriately.

The additional actions we will take to improve our complaints performance include:

- Offering automated and prompt compensation payment to customers. This improves our service recovery and avoids adding to the dissatisfaction and inconvenience customers have already experienced as a result of our service failing.
- Fully engaging our engineering teams in taking ownership to resolve complaints at the source, helping faster resolution. This also gives our engineering teams the opportunity to learn and improve. We will develop digestible digital data for our operations managers to clearly identify, track and, if necessary, escalate the complaints they are dealing with.
- Tailoring approaches regionally and focusing specifically on where data shows complaint hotspots.
- Expanding our use of Strategic Service Reviews whereby our executives collectively review the more complex complaint cases together with the teams involved in delivering the service on the ground. Learning from how safety events are managed, the review of these cases is supported with a more forensic level of investigation of the root causes and creation of improvement actions that are formally tracked to resolution. It also reinforces a culture that customer service is everyone's responsibility.
- Further deployment of analytics, combining complaints data with customer and operational data to help proactively identify improvement actions.

Commitment CS6

Where we owe our customers compensation under the Guaranteed Standards, we will pay them directly through the method of their choice including directly to their bank account or working with suppliers to credit their energy bill. We will target a 90% digital payment rate by the end of RIIO-ED2. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex, utilise existing process efficiencies to repurpose resource.	Payments are made in accordance with Electricity Guaranteed Standards. We will report on our performance.	Customers are paid their due with minimal fuss when we fail our service agreements.	Customers want simplicity, ease of use, convenience, services tailored to their circumstances, the ability to choose how to communicate and correct relevant information delivered without hassle at the right time. (see key insights I-CS2, in our Line of Sight – Customer Service document).

We passionately believe that a customer should not be further burdened by needing to apply for compensation when we fail our guaranteed standards. It was our error so, wherever feasible, we should automatically pay what we owe. And we are not alone in thinking this way. In 2019, it was announced that most broadband and home phone customers will be automatically compensated within 30 calendar days of the issue for loss of service, delayed installations or missed appointments, under an agreement struck between the biggest telecoms providers and Ofcom.

We aim for the best, yet occasionally we are unable to meet our own high standards. Longer power cuts for example may mean loss of fridge and freezer food for customers. Sometimes this means a customer is rightly entitled to a compensation payment from us which is generally equal in value to free use of our network for a year. So, where we owe our customers compensation under the Guaranteed Standards, we will pay customers directly through a method of their choice including to their bank account or working with suppliers to credit their energy bill. To ensure we are ready to scale this improvement from the start of RIIO-ED2 we are currently working with Octopus Energy on a trial to automatically credit customers' energy bills if we fail to get the power back on within 12 hours (known as EGS 2 – Supply Restoration).

Commitment CS7

We will improve our services through RIIO-ED2 based on a better understanding of our customers in vulnerable circumstances and from our low carbon and small business customers. We will target to be the #1 DNO Group as measured by customer satisfaction, or to achieve at least a 93% score on average across our networks in each year of RIIO-ED2 by measuring and reporting on these specific customer segments. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex, utilise existing process efficiencies to repurpose resource.	See the Customer Satisfaction Survey which is a common ODI(F).	Additional support for our vulnerable customers, LCT customers and small business customers.	Customers in vulnerable circumstances require personalised support, commercial customers expect minimal disruption, LCT customers expect more tailored advice and information (see key insights I-CS6, ICS-7 and I-CS8 in our Line of Sight – Customer Service document).

In the changing energy system, customers are saying they expect us to work hand-in-hand with local authorities and groups to help them make the change towards Net Zero. They have told us help needs to be about more than just technology: it must cover all aspects of transition and be tailored to their needs. We will specifically segment the feedback from our customers in vulnerable circumstances and our low carbon and small business customers. This will enable us to understand how we should improve our services for their changing needs. We will additionally use learning from sectors such as FinTech to tailor this service.

Customers are looking for information, presented clearly and enabled digitally, to improve their understanding and unlock opportunities. Simple-to-use digital tools should show customers what technology and services are available where they are and how to access them. Business customers have very high expectations about the potential of the digital economy and want tailored relevant information and services as much as residents.

The speed to complete a new connection is particularly important to new customers. We will continue to improve the efficiency of our Connections journey for business customers including:

- Greater use of digital and self-service applications with every customer offered a designated point of contact.
- By explaining clearly, at time of initial enquiry, what will happen throughout the process, so customers know what to expect.
- Through quotations provided sooner and with option to have quotes and ongoing updates/communications by email.
- By providing online account facilities so customers can track connections, book site visits and provide payment information.

The pricing of connections is addressed in the Connections section of our plan. We will develop new service offerings for our customers and with these come new customer journeys. Common to all these journeys is providing customers with communication through the channel of their choice. From the latest apps for technology lovers, to a personalised telephone call for those less able or willing to use technology. Please see Appendix 8: Our vulnerability strategy for details.

Relevant appendices

For additional information please refer to the following supporting documents:

Line of Sight – Customer service.

Chapter 9: Meeting needs of consumers and network users continued

9.2 Consumer vulnerability

We aim to deliver the greatest possible support to individuals in our communities who need it most

We deliver a service that is essential to the wellbeing of millions and we will do everything we can to meet the needs of our customers in vulnerable circumstances. We are contributing £20m of our shareholders money to add impetus to our plans.

We are proud of the way we have supported individuals in our communities during RIIO-ED1, including establishing an industry-leading network of partners, to help us deliver tailored and lasting support and almost quadrupling the number of customers on our Priority Services Register (PSR)[8]. Further information on our activities to support vulnerable customers in RIIO-ED1, including the role innovation has played, are provided in Appendix 8: Our vulnerability strategy.

However, we cannot be complacent. The context within which we are operating is changing. These changes (e.g. the challenge of achieving Net Zero) will have profound implications for the way that we support individuals in our communities, but the precise nature of these changes is hard to fathom. We can only determine the role that we should play by conducting in-depth research programmes and through conversations with our customers and other stakeholders.

Through these conversations we have sought to answer: the role that we should play, how our services should be tailored to meet the needs of customers in vulnerable situations, how the needs of individuals in our communities will change, and how much our customers are willing to pay to support customers in vulnerable situations.

We have found that vulnerability is complex, multidimensional and ever-changing. People can become vulnerable as a result of life situations and socio-economic drivers, as well as their ability to engage with energy products and services.

How we define vulnerability

We define 'vulnerability' as a situation that can arise when aspects of the energy market combine with someone's personal circumstances or the characteristics of their environment to create conditions where they are more likely to suffer detriment. This definition is inclusive, covering businesses and communities as well as domestic consumers and has been shaped over time through engagement with partners and key stakeholders.

Our strategy

We will achieve these outcomes by focusing on three strategic priorities that form the basis of our vulnerability strategy

1. Supporting our customers in vulnerable circumstances through all our service journeys

We will enhance our essential services provision by increasing the reach, the breadth and depth of our support to our customers that need it most, expanding tailored support. By expanding and maintaining our Priority Services Register, enhancing our use of data and tailoring customer journeys, we will make sure PSR customers are fully supported when they engage with our services.

We aim to deliver a minimum of £5.6m gross benefits to our customers by supporting our PSR customers through all service journeys.

2. Delivering greater support to our people and communities in need

We will help alleviate the critical challenges of fuel poverty and ensure no-one is left behind in the changing energy system by focusing on maximising digital inclusion, facilitating a fair and just Net Zero transition and maximising participation in a smart and flexible future.

We aim to deliver a minimum of £80m gross benefits to our customers by delivering greater support to our customers in or at risk of fuel poverty and ensuring no one is left behind in the energy transition.

3. Innovating for all

We will develop innovation programmes to maximise the reach, breadth and depth of our support for customers in vulnerable circumstances, ensuring we deliver Social Return on Investment. We will do this by partnering with other organisations.

We aim to deliver a minimum of £20m gross benefits to our customers by delivering innovation projects focused on consumer vulnerability.

8 A database provided by energy suppliers, network operators and water companies. Any customer who is in a vulnerable situation, whether permanently or temporarily, can be added to the PSR.

Our strategy reflects this complexity and is set to deliver four main customer outcomes:

- **Fair and appropriate access** to the opportunities presented by the energy market.
- **An affordable energy supply**, above and beyond our impact on bills.
- **Protection and safeguarding** from detriment stemming from aspects, particularly new aspects, of the energy market.
- **Wider social value**, supporting customers in fuel poverty and ensuring no one is left behind in the energy transition.

This section provides an overview of our Vulnerability strategy. Our detailed plans are set out in Appendix 8: Our vulnerability strategy.

Our Vulnerability strategy is ambitious

A core element of our vision is to be a respected and trusted corporate citizen. Building on our achievements in RIIO-ED1, we believe we have developed a strategy that sets us apart from every other network company:

- We will provide a better service to those who need it most, ensuring that those who are medically dependent are not left without life sustaining power, and that vulnerable customers can access the benefits of smart metering.
- We will extend the coverage of the Priority Services Register. We measure this in two ways: first by measuring the overall proportion of eligible customers registered on our PSR and second by measuring the number of customers registered as a proportion of total customers. We are therefore targeting to increase the proportion of eligible customers to 86%, up from 56%. This equates to 37% of our households being registered in total, this is up from 24% as of March 2021.
- We will ensure that vulnerable customers will only need to register for Priority Services once by developing automated data links with other utility companies by 2024. We will also explore opportunities to expand our data sharing capabilities by collaborating with partners in new sectors, such as Telecommunications.
- We will keep our Priority Services Register data up to date, ensuring that we contact customers to update their PSR data every 18 months, rather than the 24 month frequency required by Ofgem. In addition, we will conduct proactive data quality checks on 100% of our PSR records every 12 months.
- We will invest £20m of shareholder funding of which:
  - £9m will help 500,000 customers in, or at risk of entering fuel poverty. Through this they will receive £67m of enduring social and financial value as a result of our pan utility collaboration with regional partners to provide targeted fuel poverty support to record numbers of customers.
  - £11m will be part of a social fund to help customers in vulnerable circumstances through the energy transition. We will additionally set up a UK Power Networks Foundation to independently manage the majority of this fund.
- We are ring-fencing 20%, equivalent to £5m of our Network Innovation Allowance for projects which will benefit vulnerable customers. E.g. a portable battery pack to restore power to vulnerable customers during power supply interruptions.
- Overall, to deliver this ambitious strategy we will invest around £40 million over the RIIO-ED2 period (not counting the Network Innovation Allowance) – a fourfold increase compared to our investment in RIIO-ED1. Responding to diverging views from customers and stakeholders as to who should fund this much needed support and reflecting our own ambition, we propose to invest £20m in shareholder funding (out of the total £40m).

> I am proud of our work to support vulnerable customers. But we cannot be complacent. We operate in a fast-changing environment. Many will benefit from the opportunities associated with the Net Zero transition, but equally many are at risk of being left behind. I want UK Power Networks to deliver the greatest possible support to our customers in vulnerable circumstances today and in the future. Delivery of our vulnerability strategy will be personally led by me at an executive level."
>
> **Suleman Alli,**
> Director of Strategy and Customer Service

We are striking the right balance between ambition and protecting our wider customer base

While our plan is ambitious, we are always conscious of the need to protect our customers from unnecessary increases to their bills. We have achieved this by:

- Assessing our proposals against their Social Return on Investment (SROI), to ensure that our customers' money is well spent, including shareholder-funded initiatives.
- Continuing to adopt an outcome-based approach when we select the initiatives that we will invest in – we will measure the real impact delivered based on net financial benefits to consumers and society as a whole.
- Seeking opportunities to partner with other organisations to find ways to reduce overall costs and to share the expenditure.
- Ensuring that our shareholder funding and the resulting services are having a real impact for our customers by reporting annually on these investments and the associated benefits delivered.

Chapter 9: Meeting needs of consumers and network users continued

The evolving context within which we have framed our strategy

There are important differences in vulnerability across our regions

Vulnerability is a multi-dimensional problem and there are important differences in vulnerability across our regions. Figure 28 provides a visual representation of the geographical dispersion of vulnerability across our regions.

The pandemic has increased the number of customers in vulnerable situations

We estimate that there are 3.5m households in vulnerable circumstances eligible for our Priority Services, of which over 56% are registered on our PSR. The pandemic has increased the overall number of consumers in vulnerable situations in our regions, in some instances disproportionately compared to the rest of England. For example, the region has seen a disproportionately high increase in those claiming unemployment benefits (average increase of 160% across the East, South East and London compared to an average of 115% nationally, with London being worse hit with the numbers almost trebling). According to the latest government data there are 981,080 households in fuel poverty in our regions, however this number is expected to grow. Understanding the pandemic-driven changing needs and geographical distributions helps us channel our partnerships in the areas of most need.

Small and medium-sized (SME) businesses can also require support

We define a SME business in vulnerable circumstances as a business:

- Whose operation is susceptible to a single power outage caused by factors outside its control, which regardless of duration:
  - Has the potential to significantly impact the lives and wellbeing of its employees or customers.
  - Impacts the business' operations to such a degree that it results in material financial loss to the business.
- Whose main point of contact has an impairment or communication need that, when identified, requires adjustments to ensure all communication from us is accessible.

This definition has been shaped by our engagement with a representative group of 282 SMEs in 2021, through which we learnt that our support to business customers should be 'sector-agnostic' and prioritised by the primary and secondary impact an outage would have on their employees and customers in the absence of suitable risk management in place. This resulted in us developing a two-tier Extra Care Register system with 12 new services for those SMEs most impacted.

Our support services to SME businesses in vulnerable circumstances in RIIO-ED2 will build on the strong foundations we have developed for our Extra Care Register. Appendix 8: Our vulnerability strategy illustrates the list of services we already offer to our Extra Care Register customers today as business as usual, in RIIO-ED2 we will focus on increasing the reach of this support to ensure more businesses in vulnerable circumstances can access the priority services they are eligible for.

Data plays a vital role in improving our understanding of vulnerability and helping us to target responses

The fluid and multidimensional nature of vulnerability make it impossible to have a comprehensive and precise picture of all situations of vulnerability across all customers at any point in time. We have developed and refined a sophisticated approach to data that gives us an up to date and granular picture of the vulnerability issues that affect our customers. Our approach to data revolves around:

- The Priority Services Register – growing and maintaining the PSR is one of our key priorities.
- Targeted vulnerability datasets – We gather and regularly update multiple vulnerability datasets, including information ranging from unemployment, to indices of multiple deprivation (IMD) data.
- Bespoke research to understand evolving regional vulnerabilities – We regularly conduct bespoke research to complement our understanding of the dynamics of vulnerability across the different demographic groups and communities we serve. The learning we have gathered through research like 'Faith and Power' and our innovation project 'energywise' has informed our fuel poverty support schemes tailored to reach ethnic minority groups in areas like East London, Brent, Lambeth, Enfield, Luton, and across mosques in the South East.
- Partnerships with like-minded organisations – For example, we formed a partnership with South East Water to assess the impact of COVID-19 in our regions, mapping the related vulnerabilities at Middle Layer Super Output Area level.

New challenges are emerging

As the energy system evolves, our customers will experience new barriers in engaging with the energy market. In response, we have transitioned from assessing vulnerability through a static lens to understanding exclusion as a transitory, complex, multi-dimensional and dynamic concept.

We recognise that vulnerability is dynamic and that unexpected circumstances (such as COVID-19) may change the number of people at risk. By 2030, we think as many as 1.58m disadvantaged customers are at risk of being left behind in the way that they engage with the energy system. We have developed a spatial and temporal mapping tool that helps us forecast where and when our customers will face barriers.

An example of this capability is illustrated in the figure below. The image on the left of the figure shows the estimated level of vulnerability in 2020 for the selected barrier 'Lack of accessibility', while the image on the right shows the positive and negative trends (or difference in opportunity levels) between 2020 and 2030.

Given the evolving nature of our customer needs, data and ongoing training of our staff and partners will continue to play a key role as enablers that underpin our vulnerability strategy and commitments. We will continue to refresh and expand our approach to data and our vulnerability mapping tool to capture new and updated datasets throughout RIIO-ED2. We will also deliver in-depth vulnerability training to 100% of our customer-facing staff and vulnerability awareness training to all UK Power Networks staff.

How we will provide greater support for more customers in vulnerable circumstances

We will play an enhanced role in addressing vulnerability in areas where we can deliver the highest social impact. We will do this by increasing the reach, breadth and depth of our support, and helping to bring about an affordable and just Net Zero transition. Appendix 8: Our vulnerability strategy describes in detail our portfolio of existing services and illustrates how our RIIO-ED2 commitments build upon these strong foundations enhancing our support services. We will go beyond our specific role as a network operator to tackle energy consumer vulnerability issues in a holistic sense and in the way that is best for each customer.

Fuel poverty is central to our RIIO-ED2 vulnerability strategy. We aim to facilitate a pan-utility collaboration with regional partners to provide targeted fuel poverty support to a total of 500,000 fuel poor customers across our regions over RIIO-ED2. To achieve this, if Ofgem accepts our CVP proposals, we propose investing £18m to support over 200,000 customers directly and 300,000 through regional collaboration programmes – delivering £67m of benefits by 2028.

Everything we do will be aligned to five key principles: inclusive, collaborative, impactful, innovative and agile. These principles will guide how we will work to address vulnerability. We use them to assess our actions (to make sure everything we do is impactful and inclusive) and to ensure that we rise to the challenge of supporting vulnerable customers in the right way.

Having an agile approach to vulnerability is particularly important so we can address the 'intersectionality' of our customers' needs. By being agile we can respond with services that match a customer's specific circumstances. For example, if an elderly customer suffering from dementia and in fuel poverty manifests distress during a power outage, our staff will be equipped to provide immediate support (hot food, blankets, hotel rooms) and are trained to refer the customer to partners that can address both mental health issues and provide income maximisation advice and advice on energy efficiency measures.

Figure 28: Example of forecast vulnerability by location

Chapter 9: Meeting needs of consumers and network users continued

We will embed social sustainability into our business. In order to do this, we will embed social sustainability principles in all our governance processes. Our Vulnerability strategy touches on all aspects of our Business Plan. It has informed our Digitalisation strategy, our DSO strategy, our approach to delivering outstanding customer service, the focus of our innovation, and our plans to secure a resilient workforce. Embedding social sustainability principles across the business will require a cultural change and robust frameworks to measure success as illustrated in Appendix 8: Our vulnerability strategy.

Our commitments to our customers are real and will be monitored

Our customers want us to continue helping people that are in vulnerable circumstances. Our Vulnerability strategy has been shaped and informed by our extensive customer and stakeholder engagement programme and comprehensive research. Informed by our stakeholders, we set out 20 specific and measurable Key Performance Indicators (KPIs) against our 11 commitments. We will publish an annual report on our performance and progress against these KPIs to ensure our customers and stakeholders keep us accountable for delivering a strategy which they have shaped and influenced.

Recognising that consumer vulnerability is a complex topic that cannot be explored via a single channel, we designed a bespoke methodology to collect a broad range of insights from multiple perspectives[9].

Key messages from our engagement:

1. Supporting our customers in vulnerable circumstances through all our service journeys

Customers agreed to us increasing the number of PSR customers receiving extra support during a power cut. However, they also expect us to help customers who are most impacted as a result of our service.

2. Delivering greater support to our people and communities in need

Customers said that moves towards eradicating fuel poverty will always be welcomed, but there are different views on the extent to which UK Power Networks should focus on this and pass costs on to wider customers.

We should deliver this service through partnerships with organisations best placed to provide this support.

Customers broadly agree that more could be done to educate people on low carbon technologies and more efficient means of heating homes, particularly as the market evolves. However, our support should go beyond information and advice, and should deliver tangible outcomes to improve people's lives.

3. Innovating for all

Stakeholders told us that a substantial amount of NIA funding should be attributed to consumer vulnerability, and that we should ensure that innovation funding in this area delivers significant value to customers and the wider society.

Delivering our commitments

1. Supporting our customers in vulnerable circumstances through all our service journeys

Commitment VS1

We will continue to improve satisfaction of our PSR registered customers over our RIIO-ED1 baseline. We will target to be the #1 DNO Group as measured by PSR customer satisfaction or at least delivering 93% scores on average across our networks in each year of RIIO-ED2 (vs. 91.5% average achieved in RIIO-ED1) – whichever is higher.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Vulnerable customers will be more satisfied and be better able to engage with the services we provide, ultimately receiving better support.	Greater sophistication and innovative approaches are essential in identifying, categorising and understanding different vulnerabilities. Note should be taken of customers' own perceptions of their vulnerabilities and the impact on them of our services. (see key insight I-VS1, I-VS2, IVS3, I-VS5, I-VS7, I-VS8, I-VS11, I-VS12, I-VS13, I-VS14, I-VS15, and I-VS16 in our Line of Sight – Vulnerability document).

9 Further details on the stakeholder engagement and research we have undertaken is set out in Appendix 8: Our vulnerability strategy.

Commitment VS2

We will expand the scope and reach of our Priority Services Register, delivering an overall 30% increase in registrations from the end of RIIO-ED1 in those categories that are most impacted by our service by the end of RIIO-ED2. We will target 3m households and 600,000 businesses registered.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	We are targeting to increase the proportion of eligible customers to 86% from 56%. In addition, eligible businesses in vulnerable circumstances will receive extra support.	The prospect of us looking to increase numbers on the PSR is met with positivity. We need to ensure our support is tailored to those with vulnerabilities, with priority to those most affected, especially medically dependent customers (see key insight I-VS3, I-VS4, I-VS15 and I-VS16 in our Line of Sight – Vulnerability document).

Commitment VS3

We will keep our Priority Services Register (PSR) data up to date to maintain the relevance of our service, ensuring that we contact customers to update their PSR data and refresh our understanding of their needs every 18 months. In addition we will conduct proactive data quality checks on 100% of our PSR records every 12 months throughout RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	We will deliver an up to date and relevant view of our PSR customer's individual needs, allowing us to tailor the support we provide.	Business Options Testing confirmed that customers want us to ensure our support for vulnerable customers. Up to date data is key to providing such services (see key insight I-VS3, I-VS4, I-VS15 and I-VS16 in our Line of Sight – Vulnerability document).

Commitment VS4

Our customers will only need to register to a Priority Services Register once. We will develop automated data links by 2024 (at the latest) with other utility companies so that customers will automatically receive enhanced service from us and other organisations providing essential services. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Customers only need to register with one party to receive extra care support from all their utilities.	Customers are asking for a one stop shop approach to vulnerability and more holistic support. Stakeholders want us to partner with other utilities to collaborate and deliver better services (see key insight I-VS5 and I-VS14 in our Line of Sight – Vulnerability document).

Commitment VS5

We will help all medically dependent PSR customers realise the benefits of having a smart meter by sharing targeted advice every two years throughout RIIO-ED2. For example, we will utilise smart meters to establish new arrangements so that carers are automatically notified when a power cut occurs by 2024. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Customers who are medically dependent will have a faster response to their needs. Customer support structures, such as carers will be automatically notified in the event of a power cut.	Customers in vulnerable situations can be (and feel) particularly exposed to the impact of power cuts. We needed to ensure support is tailored to those with vulnerabilities, with priority to those most affected. (see key insight I-VS6 and I-VS16 in our Line of Sight – Vulnerability document).

Chapter 9: Meeting needs of consumers and network users continued

Commitment VS6

We will offer increased support for our medically dependent PSR customers by dispatching battery banks to customers who are at risk of being without power for more than 4 hours between 2024 and 2028. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£4m included in RIIO-ED2 operational costs	Included in baseline allowances.	Customers who are medically dependent will be able to continue to use a power supply to meet their medical needs whilst power is restored.	Customers in vulnerable situations can be (and feel) particularly exposed to the impact of power cuts. (see key insight I-VS6 and I-VS16 in our Line of Sight – Vulnerability document).

2. Delivering greater support to our people and communities in need

Commitment VS7

In collaboration with regional partners we aim to provide targeted support to a total of 500,000 fuel poor customers over RIIO-ED2, investing £18m to support over 200,000 directly and 300,000 through partnership programmes, delivering £67m of benefits by 2028. Additionally, we will provide fuel poverty information to 800,000 customers each year, working with trusted partners.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£18m	(£9m shareholder funded and £9m applied under a CVP).	500,000 customers in vulnerable circumstances will receive £67m of enduring social and financial value. Our support will include direct financial support to help those struggling to pay their bills, alongside practical support.	These are concerns about the inconsistency of services to customers in vulnerable circumstances (CIVS) and the fuel poor. (see key insight I-VS10 and I-VS18 in our Line of Sight – Vulnerability document).

Commitment VS8

We will provide information and help to 500,000 vulnerable customers over RIIO-ED2 to ensure no one is left behind in the changing energy system, at no cost to customers. As part of this, we will also co-fund grants towards the installation of low carbon technology systems via the UK Power Networks foundation. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£11m shareholder funded at no cost to customers, in the main administered independently through the UK Power Networks foundation.	Shareholder funded at no cost to customers.	We will provide customers with practical steps to consider in the uptake of Low Carbon Technology. We will also increase digital inclusion and deliver value to customers by increasing participation in smart and flexible services.	Stakeholders want us to play a leading role in promoting awareness and information as a trusted party in the energy sector. There is broad agreement that more could be done to educate people on low carbon technologies and more efficient means of heating homes, particularly as the market evolves. (see key insight I-VS10 and I-VS18 in our Line of Sight – Vulnerability document).

Commitment VS9

We will establish an annual cycle of research and engagement, to shape our vulnerability plans as our understanding in this area develops and the priorities of our customers change. We will use this to inform the publication of an updated RIIO-ED2 Vulnerability strategy in 2025 and 2027.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Our more detailed understanding of customers evolving needs, allowing us to provide more targeted support. We will share identified best practices with other companies to benefit more customers outside our areas.	Our stakeholders want us to refresh our understanding of customer needs regularly (see key insight I-VS12 and I-VS13 in our Line of Sight – Vulnerability document).

3. Innovating for all

Commitment VS10

We will deliver industry leading innovations to improve support to disadvantaged and vulnerable customers, ringfencing £5m of our Network Innovation Allowance (NIA) investment over the RIIO-ED2 period to focus in these areas.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£5m. (Inclusive of UK Power Networks' 10% mandatory investment).	Included in Network Innovation Allowances.	Vulnerable and disadvantaged customers will experience the benefits of innovative solutions.	Stakeholders fed back that we should focus innovation on ensuring a fair and just Net Zero transition. (see key insight I-VS5, I-VS8, I-VS12 and I-VS14 in our Line of Sight – Vulnerability document).

Commitment VS11

We will collaborate with other organisations to ensure at least 50% of our vulnerability innovation initiatives in RIIO-ED2 are delivered in partnership with other utilities and will attract £750,000 funding from these partnerships across the period.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£0.75m (this is an external contribution and not included in baseline allowances).	No UKPN costs-leverage external funding contributions.	Benefits from partnerships between UK Power Networks and other utilities.	Stakeholders told us that supporting vulnerable customers is not solely UK Power Networks' responsibility. There should be a collaborative, joined-up approach. The right organisational culture is a key enabler for effective action on vulnerability. (see key insight I-VS2, I-VS9, I-VS10 and I-VS14 in our Line of Sight – Vulnerability document).

Relevant appendices

For additional information please refer to the following appendices:

Appendix 8: Our vulnerability strategy

Chapter 9: Meeting needs of consumers and network users continued

9.3 Connections

9.3.1. We will provide best in class service to customers who want to connect to our networks

Providing a connection to the electricity network is one of our core services. We help developers to connect new houses and new energy sources to the electricity network and our connections service is becoming increasingly important as the UK transitions to a lower carbon economy.

Our connections strategy has been driven by feedback from customer surveys and through stakeholder engagement. We have worked closely with our customers and other stakeholders throughout RIIO-ED1. Over the last six years, more than 5,500 customers participated in our satisfaction survey, over 2,600 customers attended our stakeholder events, we have answered more than 6,000 "Ask the Expert" enquiries, have held more than 450 "Ask the Expert" surgeries, and more than 1,300 stakeholders have subscribed to our mailing lists. By working with our local stakeholders (such as local authorities), we have developed our view of what these policy changes will mean for uptake of low carbon technologies and economic load growth (these views are presented in Section 16.1: Forecasting and scenarios).

> I work with all utilities as my company's utility manager and I believe UK Power Networks have the best engagement strategy of all companies"
>
> **London Square Developments**

The success and progress of our RIIO-ED1 engagement activity is demonstrated by the feedback we have received:

- We ask Major Connections customers the same questions that we include in the BMCS survey for Minor Connections. In 2020, the average satisfaction score from the nearly 1,300 customers who provided feedback was 92.2%.
- Our "Ask-the-Expert" and distributed generation surgeries are also valuable sources of feedback and score customer satisfaction ratings of well over 90%.

We and Ofgem categorise customers who want to connect to our network into "minor" and "major" connections. This Section first sets out our approach for Minor Connections and then introduces our strategy for Major Connections:

- Minor Connections typically comprise up to four domestic connections or a single three-phase connection to a business property. Customers for Minor Connections are typically domestic or small business owners, but in many cases will extend to large national organisations if, for example, we are installing a telecoms supply for the road or rail network or a small builder's supply to a large development site.
- The definition of Major Connections is broader, covering larger low voltage connections, connections at all other voltages, generation, storage and all connections requiring any level of network reinforcement. Major Connections customers are typically businesses of all sizes, but depending on the local network and connection requirements, include many domestic customers also.

9.3.2. Minor Connections

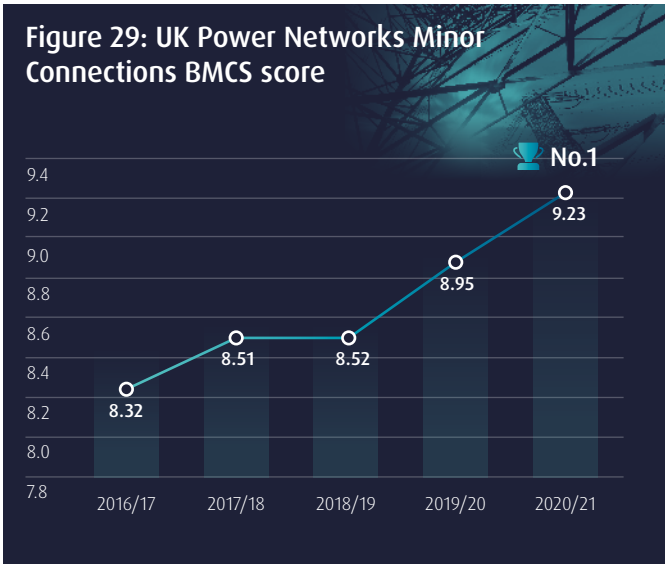
Customers who want to connect to our networks will benefit from our proposals to enhance the services we provide to all customers (set out in Section 9.1: Customer service).

During RIIO-ED1, we have faced strong incentives to drive customer service for Minor Connections, in the form of an Average Time to Quote/Connect regulatory incentive and the BMCS. This incentive framework will continue in RIIO-ED2, driving further improvements in our performance.

Minor Connections activities contribute 50% of the overall BMCS score (alongside general enquiries and faults). We have delivered significant improvements in customer satisfaction as we developed our service culture. We are now the highest-performing DNO according to the Minor Connections BMCS and our ambition is to further improve our performance and remain the most customer-focused electricity network.

Our excellent track record in our Minor Connections BMCS score also reflects that we are delivering value for money to these customers. Our customers' views on the value for money of the connection we provide forms part of the score they provide in the survey. We will continue to focus on providing great value in this area, which will be demonstrated by further improvements in the scores our customers give us.

Figure 29: UK Power Networks Minor Connections BMCS score



The increased LCT roll-out will result in a higher number of connection requests, putting pressure on delivering connections work for customers in a timely, cost-efficient manner whilst retaining the supportive, successful customer journey to deliver high satisfaction feedback.

Our customers want: ease of access to web-based information, access to specialist advice, and clear information on choices. Minor Connections customers share these needs with Major Connections and we will continue to develop our services through RIIO-ED2 using all of our platforms (phone, email, web-portal and text) to ensure customer choice in how they interact with us. Minor Connections customers will also benefit from our initiatives, as outlined in Section 12.1: Whole systems to provide advice and fuse upgrades.

9.3.3. Major Connections

Our Major Connections customers have very diverse interests. They range from industrial and commercial companies, to renewable generators, to housing developers and even to some types of domestic customers. Our extensive engagement programme has sought to canvas and take account of the broad range of their views.

Our connections service will be increasingly important as the UK transitions to a low carbon economy. To deliver the necessary changes to transport and heating infrastructure, the level of connections needed over the coming decade is unprecedented. All of this will require a huge effort. We are committed to playing our part in delivering new grid connections but we cannot do this alone. That is why we are strong advocates for creating a flourishing connections market. Connections are already open to competition – we are not the only provider. In fact, around 70% of the market is already served by competitive connection providers[10] and we are committed to expanding the scope of competitive provision so that our customers have a genuine choice in who they want to use to address their diverse connection needs. We are committed to addressing the needs of our Major Connections customers in all market segments. We will strive to achieve a greater than 9/10 customer satisfaction score on all connection journeys. Finally, we will maximise the range of options available to our customers by extending the scope of competition.

Our ambition is to deliver tangible improvements in the service we provide to connecting customers

Our Major Connections strategy builds on our strengths and our achievements in RIIO-ED1. We believe that our strategy is ambitious because:

- **We will deliver a great service**, reflected in an industry-leading customer satisfaction score of at least 9/10.
- **We will continue to evolve our propositions** and will measure and publicly report on the effectiveness of our efforts to do so.
- **We will make data accessible** that will allow our customers to self-serve.
- **We will lead the industry in promoting competition** for currently non-contestable works for the benefit of customers.
- **We will introduce first-of-a-kind connection products and services** that will address pressing customer needs.

We tested our plans with 66 Major Connections customers through our Spring 2021 engagement events. More than 85% of these customers agreed that our plans were meeting or exceeding their expectations. 88% of our customers and other stakeholders consider that our data access plans meet their expectations of an ambitious plan; from the same group 27% have indicated that our plans exceed their expectations.

We further tested our plans in September and October 2021, when we presented our proposed actions and commitments to 87 customers during our stakeholder engagement events. Our customers endorsed our proposals.

We will drive efficiency and ensure our customers benefit from innovation

Our connections activity, both Minor and Major Connections, is regulated and we are obliged to remain cost reflective. Where competition is a strong feature of the market, there is a natural pressure to drive efficiency and minimise our prices.

On a practical level, some of the business improvements we have introduced already deliver efficiency improvements (and corresponding cost reductions) including: automated entry of customer application data for all web generated and pdf applications; automation of key critical process steps, and "quote letter generation" based on output entered directly by a site surveyor.

We have a strong track record of technical innovation and the application of learning to deliver real-world benefits to our customers. Examples of this include:

- **Flexible Distributed Generation (DG) connections:** Traditionally, when generators connect to the distribution network they pay for sufficient capacity to be built for them to generate at maximum output all the time. This can be prohibitively expensive. For a flexible connection the generation customer agrees to reduce their output from time to time, to fit within available network capacity. They can then connect more quickly at significantly lower cost. UK Power Networks was the first DNO to offer this approach across the whole of its network and in the period 2016-2020, this has saved connecting customers £72.6m.
- **Flexibility services/Demand Side Response (DSR):** Typically, as demand on the network reaches the available capacity, more capacity is built. Flexibility services, where customers adjust their demand to match the capacity, offer an alternative to building additional network capacity to meet demand, saving significant capital investment. This can be delivered either by a reduction in import from demand customers, or by generators increasing export for a contracted period. This is a relatively new introduction to business-as-usual, but it is already delivering savings for customers.

10 UK Power Networks internal quarterly Market Share Report, Q1, 2021.

Chapter 9: Meeting needs of consumers and network users continued

Our strategy

We will focus our efforts through three strategic pillars:

1. Making it easy for our customers

We will address our customers' connection needs by providing sector-leading customer satisfaction.

We will provide connection customers with easy access to digitised information (on the capacity and location of our network assets), to facilitate self-service.

2. Staying in tune with our customers' emerging needs

Through continuous engagement, we will drive service improvements and the development of new products and services.

We will evolve our services for our key customer segments; Metered demand, independent connection providers, distributed energy resource customers and local authorities.

3. Promoting a competitive connections market

We will work with our stakeholders to go further than any other DNO to achieve a material increase in the scope of contestable services.

- **Timed connections:** Network demand is higher at some times, while "allowed capacity" for connections is constant at any time of day. Timed connections allow customers to use more capacity during off-peak times, something especially useful for EV charging, enabling them to connect more quickly and at lower cost. Again, this is a relatively new product and has, to date, saved connecting customers £2.8m. It is anticipated this approach will be a very large contributor to ensuring the low carbon transition is managed cost-efficiently.

Improving our connection offerings to better accommodate our evolving customer needs is at the centre of our EV Readiness Strategy. In March 2020 we finalised a tool that allows us to assess a timed connection offer quicker, getting customers such as bus garages connected faster and at considerably lower cost. We will continue to harness innovation to drive improved customer outcomes during RIIO-ED2. The following innovation and research programmes are underway now and will be deployed at scale in RIIO-ED2 to support our connections work:

- A project to deliver a software solution to analyse the network for opportunities for timed connections in an automated manner. This will lead to a reduction in time to assess timed connections, leading to faster, lower-cost connections and lower costs through reduced need for reinforcement.
- A study into the application of Active Network Management software to time-profiled connections (up to 48 segments per day). This will be trialled as part of the Optimise Prime Network Innovation Competition-funded innovation project. Going a stage beyond simple time-profiled connections, this will allow connecting customers to benefit from yet higher asset utilisation to reduce the connection cost of depot-based electric vehicle fleet charging.

The context within which we have developed our strategy

Competition: We have worked hard with independent connection providers and customers to ensure that we provide every opportunity for competition to flourish. Competition in connections activity is well-developed across Major Connections, particularly at higher voltages. Our overall market share of connections across the whole of Major Connections in 2020 was 31% (measured by the capacity of the connections). Our commitment to further develop competition across Major Connections is outlined later in the chapter.

Our CEG challenged us to demonstrate measures for ensuring Minor Connections and smaller Major Connections customers have choice and obtain value for money. Whilst Minor Connections are deemed non-competitive, we have striven to go further; from 2017, we an introduced an innovative product which allows independent connections providers (ICPs) to self-serve and notify us of Minor Connections they undertake. In addition, Minor Connections customers are specifically asked their views on value for money in the industry-wide Broad Measure of Customer Satisfaction. Mirroring this approach across all Major Connections activity, we have surveyed customers during RIIO-ED1, similarly asking specifically for their views on value for money when we survey the level of their customer satisfaction. We will continue to adopt this approach in RIIO-ED2. Finally we comply with the Quotation Accuracy Scheme – we provide information which enable customers to assess the consistency of their Offers with our connection charging statement[11].

Working with our stakeholders during RIIO-ED2, we will continue to introduce innovative products to stimulate competition.

11 QAS Scheme (ukpowernetworks.co.uk)

Facilitation of Net Zero: Our forecasts show strong growth through the RIIO-ED2 period and the need to be prepared for further acceleration into RIIO-ED3. We anticipate a significantly increased uptake of electric vehicles, electric heating and distributed renewable energy sources, all of which will need to connect to our network in order for us to achieve Net Zero as a country. Customers who will require our connections services to drive this low carbon transition include local authorities, electric vehicle charge-point installers, generation and storage asset owners, independent connection providers and energy retailers.

For example:

- There has been a significant change in the mix of connections work during RIIO-ED1 towards supporting a lower carbon economy, and we expect this will continue in RIIO-ED2. Since 2010, we have connected nearly 5GW of distributed generation.
- Ofgem's proposed changes to charging for connections (which will largely remove connecting customer contributions and recover costs from the wider set of users), will further facilitate an efficient path towards Net Zero.
- The number of electric vehicles (EVs) and Plug-in Hybrid Electric Vehicles (PHEVs) connecting to our network to charge is expected to increase significantly over the next seven years (from around 180,000 EVs registered in our licence area as of October 2021[12] to between 1.6m and 2.7m EVs & PHEVs forecasted to connect to our network by 2028[13]). We have a key role to play in facilitating the uptake of EVs in RIIO-ED2 in the most cost-effective manner. We have already seen a significant and growing volume of on-highway EV charging points connected to our network. Many of these low-voltage connections are undertaken by ICPs, in many cases via the self-serve notification process outlined above. Moreover, our engagement with local authorities has revealed a strong demand for connections for public transport and electric heating. EV charging solutions, including en-route, destination or depot-based charging hubs, will often require connections of significant capacity, falling into the Major Connections domain. Our Major Connections strategy detailed in Appendix 9 outlines how we will harness innovation and set challenging targets aligning our interests to those of our customers in order to exceed customer expectations in leading the way towards Net Zero.

In 2020, we held 14 regional engagement sessions covering 116 local authorities and three Local Enterprise Partnerships to discuss our future energy scenarios, understand their local and regional ambitions and to gather feedback on projected LCTs in their area. We ran focused sessions to co-develop an interactive tool to make it easier for them to use our forecasts. We are now working with Cambridge City Council, Cambridgeshire County Council, Norfolk County Council and the London Borough of Redbridge to bring together their local knowledge and our expertise to ensure charge-points are planned in optimal locations to meet community needs.

> This new approach with UKPN has helped us understand local barriers to EV uptake and plan public charging in the right locations for our communities – a key step towards achieving Norfolk's ambitious 2030 Net Zero target."
>
> **Dominic Allen,**
> Sustainability Manager,
> Norfolk County Council

Resourcing: We have mapped our resource requirements for the provision of connections against each of the Distribution Future Energy Scenarios (DFES) and are scaling up our resources to meet recent growth in demand for LCT connections. We are confident that we will be able to meet the additional demand as a similar, rapid increase in demand for our connections services was seen in the period since 2010 when 5GW of distributed generation was connected to our networks. These aspects are part of a wider resource planning exercise discussed in more detail in Section 10.6: Workforce resilience.

Innovation: The pace of change will require us to refine our online services allowing their more frequent use. We will also need to support automated solutions through Application Programming Interfaces. We think that high performance in this next decade will be achieved by those organisations that can combine a strong customer service culture with technology, data and innovation to deliver brilliant services to their customers. We have made changes to the way we operate to ensure we are strongly positioned for this exciting future. Innovation will play a significant part in helping to meet the resourcing challenge for large LCT connections through the digital transformation of our asset data and through enabling more efficient decisions to be made on optimum connection solutions. Ensuring this information is available for our customers will also deliver further improvements in efficiency where customers are able to self-serve. Our innovation strategy is discussed in more detail in Chapter 14.

Our commitments are real and will be monitored

We are continually striving to improve, and we have set ourselves ambitious targets. We will: continue to evolve our service provision in this area, deliver exceptional service to our customers, and support the uptake of low carbon technologies in the most cost-effective manner.

12 UK Power Networks' Market Intelligence Report June 2020.
13 According to UK Power Networks' 2021 DFES Model (ranges from Steady Progression and System Transformation Scenarios).

Chapter 9: Meeting needs of consumers and network users continued

Delivering our commitments

1. Making it easy for our customers

Commitment MC1

We will continue to address our Major Connections customers' needs by providing sector-leading customer satisfaction. We will aim to be the #1 DNO Group as measured by customer satisfaction, or to achieve at least a 90% score on average across our networks in each year of RIIO-ED2 (vs 88.6% average achieved in RIIO-ED1) – whichever is higher.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£450k over the RIIO-ED2 period.	ODI(F)	The improvements we make to the customer journey will mean customers will get the connection that best suits their needs through a process that works for them. By following the broad measure questions used for Minor Connections, which include questions on value and timeliness of quotation/ connection, we are ensuring customer outcomes are aligned to ours.	93% of our customers supported the use of the quotation and connection survey method to gauge feedback and to underpin a suitable incentive mechanism. (See key insight I-C2, I-C4, I-C5 in our Line of Sight – Major Connections document).

Customers tell us that they value access to support, to ensure that their application is processed with the minimum amount of delay and rework. Our experience tells us that getting the details correct leads to a smoother, quicker process that produces an efficient quote that meets the customer's needs. That is why we have introduced "Ask the Expert" and other subject-specific group surgeries to support our customers before they make an application.

One area where our customers feel we can improve is the detail we provide in the costings that form part of our connections offer. Customers want clarity to help them make important business investment decisions. Greater transparency will help customers make informed decisions and be sure they are getting value for money from the offer we are providing them.

Our proposed Business Plan actions include the following (full details can be found in Appendix 9: Our Major Connections strategy):

- Providing clear support to all types of customers who want to access knowledge and services associated with connections.
- Making improvements to the customer journey which will mean customers will get the connection that best suits their needs.
- Building intuitive automated intelligent computer algorithms ("bots") on our website that sign-post our customers to the correct area of our business. This reflects feedback we have received that customers want us to work harder to ensure they can get to the right department and the right person, first time.

Commitment MC2

We will provide connection customers with easy access to digitised information (on the capacity and location of our network assets), to facilitate self-service by the end of RIIO-ED2. We will publish heat maps for both generation and demand over the same timeframe. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
Included as part of our plans outlined in Chapter 13 Unlocking the potential of digital and data.	Included in baseline allowance.	Customers will be able to make informed choices regarding their connection. Better consolidation of network usage data will improve the ability to self-serve and enable quicker, more efficient assessment of connection options.	This has been a priority area identified by our customers. Between 63% and 75% of respondents consider improved network data should be our top priority. 89% of our customers stated that our commitments met their aspirations for our RIIO-ED2 connections services in this area. (See key insight I-C3 in our Line of Sight – Major Connections document).

Customers tell us that they want certainty of available capacity and insight into the likely level of future demands on the network. They are also keen to understand the "tipping point" i.e. the maximum load that can be taken before reinforcement is required to the network. Having this information in the right format will help customers to better understand how their connection fits with wider network conditions, allowing them to make better-informed decisions.

Customers have also told us that we need to do better in providing up-to-date data, in the right format and in a timely way. Customers are particularly keen to have access to network data at voltage levels in which they operate, and visibility of the impact of future network developments, including other committed connections.

During 2020, we introduced our optioneering product. This product gives generation customers pricing options at three different level of output. Whilst customers value this information, they have also told us that they would like to see forecast curtailment data presented on heat maps, alongside demand and generation capacities.

We will invest in our network mapping offering by further digitising network records and making them available in a format that will allow customers to interact with our data through their own applications. On top of this, we are committing to publish forward-looking available network capacity data down to high voltage feeders. This will allow users to identify areas of network constraint and inform them of possible future flexible connection options.

Our proposed Business Plan actions include the following (full details can be found in Appendix 9: Our Major Connections strategy):

- Consulting with the market to prioritise an implementation plan based on customer needs and value.
- Providing real-time access to digitised asset capacity data and locational data (down to high-voltage feeders).
- Co-designing these digital services directly with customers to ensure we address their issues comprehensively.

2. Staying in tune with our customers' emerging needs

Commitment MC3

Through continuous engagement, we will drive service improvements and the development of new connections products and services. We will measure our performance through a range of surveys on our connections services (including our Connections Engagement Satisfaction Survey, Ask the Expert, Distributed Generation Surgeries and Feasibility Studies). We will target at least an average customer engagement feedback score of 9/10 over RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£2.4m for engagement activities, managing the improvement plan and implementing changes to our information systems.	ODI(F).	We will build a detailed picture of our connection customers' evolving needs and expectations. This insight will ensure that the new services and products exceed their expectations.	Customers are looking for us to innovate to stay in tune with their needs. We have heard that we should maintain a high level of engagement and manage the delivery of this strategy. (See key insight I-C1, I-C2, I-C6 in our Line of Sight – Major Connections document).

Innovative solutions, such as flexible connections, can often shorten connection times and significantly reduce connection charges.

We will engage with customers and other stakeholders to drive best-practice for connections services and products. To measure how well we are delivering for our customers, we will ask them to score our engagement and the delivery of new initiatives and report on this score, aiming to score at least 9/10.

Our proposed Business Plan actions include the following (full details can be found in Appendix 9: Our Major Connections strategy):

- Developing and implementing a plan to engage with potential connections customers.
- Improving network access by managing interactivity and offering flexible connections.
- Introducing a process that allows applications to be prioritised in the interactive queue where it can be seen that this will be of benefit to other applications.
- Further extending the offering of flexible connections to any customer who may benefit from such an offering and allowing access to network capacity for future applicants.
- Extending the existing portfolio of products which provide customers additional support in achieving quicker, more efficient connections.

Chapter 9: Meeting needs of consumers and network users continued

Ofgem's reform of access and charging

Ofgem's Access SCR will deliver fundamental reform of the charging and access arrangements our customers will see when they apply to us or an independent provider for a connection to the electricity distribution system. We support Ofgem's objectives of facilitating faster and less costly connections with the ultimate goal of supporting the country to meet its Net Zero targets.

We have assessed the impact of Ofgem's 'minded to' position and more detail on this can be found in Section 17.5.

We are committed to working with and supporting Ofgem between now and their Final Decision to ensure the reformed connections process works well and delivers for customers with particular focus on:

- Ensuring our customers continue to receive an excellent level of service, regardless of any increase in connection volumes when the reform is implemented on 1st April 2023.
- Customers retaining choice over how and when their connection is delivered to meet their needs and project timescales.
- Providing clarity to customers as the new arrangements are introduced, making sure they get the connection that meets their needs at the right cost and at the right time.

Facilitating competition

We are leading the industry in opening up our connection activities to competition. During RIIO-ED1, we have seen a significant volume of connections work, delivered both exclusively by us and increasingly, by ICPs and IDNOs. We have already introduced our Small Service Self-Serve initiative which allows independent providers to provide connections to customers with minimal input from us. ICPs are delivering more projects than ever before.

But we believe we need to go further, and our customers agree. Facilitating a competitive connections market and the drive towards Net Zero are two strategic goals which support one another. Supporting the number of connections needed over the coming decade, whilst driving cost efficiency into our work programmes requires a huge effort. Together with major capital investment schemes, we will further open diversionary and reinforcement work to competition and ensure accredited ICPs are able to compete for this work.

This commitment, in light of the likely changes to the connections charging arrangements proposed for RIIO-ED2, is incorporated into the Competition chapter of our business plan (see Chapter 15).

Our proposed Business Plan actions include the following:

- Offering rent-a-jointer and post-fault re-connection services for unmetered or highway connections, to deliver quick efficient connections.
- Exploring how we can increase the bounds of contestability and consulting with the market to prioritise an implementation plan based on customer needs and value and then delivering on it.

Relevant appendices

For additional information please refer to the following appendices:

Appendix 9: Our Major Connections strategy.

9.4 Our Consumer Value Propositions

Ofgem has established Consumer Value Propositions (CVPs) to reward network companies that develop propositions that generate significant value for consumers and that go beyond minimum requirements and 'business-as-usual' operations. This section sets out our approach to CVPs, including the costs and benefits of each of our proposals.

We identified five initiatives in our Initial Business Plan for potential inclusion as CVPs. Triangulating subsequent feedback from Ofgem, the Challenge Group and further rounds of targeted stakeholder engagement, our Final Business Plan includes three initiatives as CVPs: Consumer Vulnerability; On-Street Public Charging and Off-Gas Grid. The two removed CVPs have been adopted as BAU activities. Our remaining three CVPs include £85m of costs delivering £187m of gross benefit and £103m of net benefits (in present value terms).

> UKPN has embraced the use of SROI for its RIIO-ED2 business plan using the industry-agreed common methodology. The business has continued to improve the adoption and sophistication of this approach, building upon the SROI measurements undertaken as part of its annual engagement programme. Our review of UKPN's RIIO-ED2 initiatives and CVPs confirms that the values and approach are robust and aligned to best practice in the sector."
>
> **Scott Flavell,**
> Partner – Energy & Utilities,
> Sia Partners

We believe our proposals qualify for a CVP on the following basis:

- **They exceed minimum requirements set out in Ofgem's Business Plan Guidance.**
- **They generate additional value to customers and society:** We have used an industry-agreed common methodology for estimating the Social Return on Investment (SROI) from our initiatives, and the resulting estimates have been verified externally by SIA Partners.
- **They generate quantifiable benefits:** We have focused on those areas where benefits can be most clearly demonstrated by means of quantifying increased welfare for consumers and our communities. We have set clear measures of success per CVP enabling us to monitor achievement during and at the end of the period, which we will include in our annual business planning reporting.
- **They are based on commitments in our Business Plan** which have a "line of sight" from our stakeholder and customer engagement work.

We had productive engagement with our CEG on the topic of CVPs. One of the interesting issues from the discussion related to the balance of risks between us and customers and how that could be managed effectively. This got us thinking about the way in which we could ensure a framework where risk and reward is shared equitably.

Our proposal is that rather than funding CVPs up front in totex allowances, the CVP mechanism should emulate the success of the Interruptions Incentive Scheme (IIS) which incentivises the delivery of customer benefits from improved reliability at the lowest cost. Importantly, the risk of the investment not being delivered and/or failing to deliver the anticipated benefits does not fall solely on customers. This risk is shared equally between network companies and customers through the totex sharing factor, meaning that network companies have "skin in the game" to deliver the initiatives in a timely, efficient and effective manner that maximises the benefits which are shared with customers. Funding for CVPs, in our view, should adopt the same approach.

Under our proposal:

- Totex associated with delivering the CVPs is not included in the baseline allowances. It is treated as optional additions with customers and DNOs sharing the burden 50/50.
- Customers therefore only fund 50% of the costs of delivering the CVP initiative, whilst receiving an equivalent proportion of any associated benefit.
- DNOs would have a strong incentive to only put forward CVPs where they have a high confidence in both the costs of delivering the initiative and its associated benefits.
- Customers benefit from lower overall costs. The sharing of costs creates an incentive to deliver the initiatives at the lowest overall cost whilst maximising the benefits which are shared equally.
- Costs and the associated benefit values are agreed upfront, together with the measures of success we will monitor achievement against, to release the UK Power Networks benefits share at the end of the period.
- If the agreed success measures of the CVP are not delivered at the end of the price control, DNOs return rewards and customers are protected.

We recognise this is a novel approach to CVPs that has not been utilised in the RIIO-2 price controls thus far, however we firmly believe that it creates the right incentive properties to deliver the maximum benefits at the lowest cost to consumers and has a strong precedent in the reliability incentives that have been in operation for more than a decade. The table overleaf shows the net benefits to customers and us for our three CVPs under this proposed regulatory construct.

Chapter 9: Meeting needs of consumers and network users continued

Figure 30: Proposed CVP risk sharing

CVP description	BPDT cost £m	Cost (PV) £m	Benefits (PV) £m	50% Cost split DNO share £m	50% Cost split Customer share £m	50% Gross Benefit split DNO share £m	50% Gross Benefit split Customer share £m	Net DNO share £m	Net customer share £m
Consumer vulnerability	-£9.00	-£8.41	£13.48	-£4.2	-£4.2	£6.7	£6.7	£2.5	£2.5
Whole systems-public charging	-£7.30	-£6.82	£16.12	-£3.4	-£3.4	£8.1	£8.1	£4.7	£4.7
Whole systems-off gas grid	-£75.25	-£69.56	£158.21	-£34.8	-£34.8	£79.1	£79.1	£44.3	£44.3
Total	-£91.55	-£84.79	£187.81	-£42.4	-£42.4	£93.9	£93.9	£51.5	£51.5

The table shows that if the initiatives deliver the expected value of £187.81m, this benefit will be shared 50/50, with the initial cost also being shared 50/50 and trued-up upon successful delivery of the agreed success measures. In this instance customers will contribute £136.3m and receive benefits totalling £187.81m, yielding a net benefit to customers of £51.5m. In the unlikely event that the outputs were not delivered in full, the DNO share of the undelivered benefits would be clawed back proportionately and the costs would be shared (as opposed to customers bearing the full risk under the existing framework).

Based upon discussions with Ofgem and subsequent guidance, we have excluded the costs associated with our CVPs from our ex-ante totex expenditure and presented them as optional inclusions should Ofgem wish for us to deliver these interventions. We provide an overview of our three CVPs in this section. Please note that all costs and benefits are stated in present value terms. We have used different time periods for the present value calculation appropriate to the investment in each CVP. Further details are available in Appendix 7: CVP details, including the SROI calculations, underlying assumptions and rationale.

Our Consumer Vulnerability CVP

CVP	BPDT Cost	Cost (PV)	Benefit (PV)	Benefit (NPV)	Total SROI
Fuel Poverty support	£-9m	£-8.41m	**£13.48m**	**£5.10m**	**£0.60**

Fuel poverty is central to our RIIO-ED2 vulnerability strategy, where we aim to facilitate a pan-utility collaboration with regional partners to provide targeted fuel poverty support to a total of 500,000 fuel poor customers across our regions over RIIO-ED2. To achieve this, we propose investing £18m in our business plan to support over 200,000 customers directly and 300,000 through regional collaboration programmes, delivering £67m of benefits by 2028. Additionally, through our partnerships we will directly provide fuel poverty information to 800,000 customers each year.

To achieve our portion of the 200,000 we propose investing £9m of our shareholders money to support over 100,000 customers directly and propose a further £9m funded by customers under this CVP to support the remaining 100,000.

We will facilitate a pan-utility programme working with local charity partners that have strong links in the communities we serve to provide in-depth, practical and tailored financial support to the needs of the individual customers.

Our joint collaborative work with partners will aim to deliver £63m of direct savings to customers and we also estimate wider societal benefits of £4m resulting from reduced CO_2 emissions from our work to improve energy efficiency.

We have proposed this is as a CVP as it goes well beyond Ofgem's baseline standard of "being involved in two-way flow partnerships supporting vulnerable customers." We are taking a leadership role to coordinate and facilitate cross utility focus on poverty to deliver more support for more customers in an efficient coordinated way. We are committing our own funds and proposing for customers to match fund this CVP to deliver a ten-fold increase over the level of support provided to customers in RIIO-ED1. We are going to build on our track record from RIIO-ED1 but supercharge it for RIIO-ED2 bringing our regional utilities along with us. This is about taking joint accountability to make a positive difference to those most vulnerable in our communities.

We will measure our success by:

- Reporting the volume of personalised support interventions delivered per year, helping customers in their home to reduce costs or maximise income.
- Monitoring the typical savings delivered from these interventions using ECO3 data (or more recent data when it becomes available) and research by expert sources such as the Energy Savings Trust and Parity Projects.
- An annual assessment, by appointing an independent company to assess the value of the support actually delivered for customers as part of our work to provide transparency and confidence to Ofgem, customers and wider stakeholders.

Our whole systems CVP for on-street public charging

CVP	BPDT Cost	Cost (PV)	Benefit (PV)	Benefit (NPV)	Total SROI
Public Charging	£-7.30m	£-6.82m	**£16.12m**	**£9.30m**	**£1.36**

In a "first of a kind" initiative, we will use the approach trialled in our Charge Collective project[14] to unlock the market to provide an additional 2400 (20%) of on-street public chargers across our regions. We want to tackle the "charging deserts" highlighted by the CMA by taking a targeted approach. We will work with local authorities to identify areas which exhibit a high concentration of no off-street parking, coupled with poor air quality, social deprivation and high connection costs. Our research shows that this combination of factors risks disadvantaged communities being left behind.

Within our Charge Collective trial, we have used a competitive process to reveal the size of the market failure in different contexts. We will use this information to socialise an appropriate amount of connection costs to make the installation of charge points viable[15]. **Importantly, we do not intend to own or operate charge points.**

The societal benefits associated with the fall in both CO_2 and NOx emissions have been quantified using government published figures at £15.1m. The initiative will also yield financial savings totaling £1m for over 24,000 drivers that will directly benefit.

This CVP goes beyond minimum requirements, because we are proactively acting as a catalyst for change. We will apply a novel approach to support ~50% of our customers who do not have access to off-street parking to transition to EVs, by facilitating charging infrastructure in areas that otherwise would be left behind. It is essential that this market failure is addressed to achieve the country's carbon targets and ensure that those in areas of higher deprivation receive fair treatment compared to those fortunate to have off-street parking and who receive free fuse upgrades and government support to install home charge points. This is an area that is widely recognised as an issue with the most recent report from the Society of Motor Manufacturers and Traders (SMMT) on 29 June, titled "Full Throttle: Driving UK Automotive Competitiveness"[16] highlighting the need for action.

By working closely with local authorities, charge point operators, investors and local communities, we can deliver the capacity necessary to facilitate the EV transition and make it inclusive. We have already demonstrated that this approach works through our Charge Collective trial and we are confident that we can make a positive difference in our communities by scaling up our innovative approach in RIIO-ED2.

We will build upon the following framework to measure, quantify and report outcomes.

We will measure our success in the areas we provide support:

- Reporting the volume of chargers delivered in the areas we provide support per year over the period.
- Monitoring the volume of new EV registrations for households without a drive and within 5 minutes' walk of these chargers.

We have selected 5 minutes' walk to be able to attribute the outcome to our intervention. This is based on customer research that was undertaken with over 500 customers by Explain Market Research which highlighted that customers would be more willing to switch to an EV if they were within 5 minutes' walk of public chargers.

14 Charge Collective is a pilot project working in partnership with local councils in Cambridge, Norwich and the London Borough of Redbridge to help ensure that no one is left behind in the EV revolution.

15 Ofgem are currently evaluating our sandbox application (reference ERS/004). If approved, this will allow us to trial the partial socialisation of connection costs through the Charge Collective project.

16 https://www.smmt.co.uk/reports/competitiveness/

Chapter 9: Meeting needs of consumers and network users continued

We will multiply this number of EVs by the financial benefit of switching to an EV based on our SROI methodology detailed in Appendix 7: CVP details. We will do the same to calculate the CO_2 and air quality benefits.

Our whole systems CVP for off-gas grid infrastructure

CVP	BPDT Cost	Cost (PV)	Benefit (PV)	Benefit (NPV)	Total SROI
Off-Gas grid	-£75.25m	-£69.56m	**£158.21m**	**£88.65m**	**£1.27**

We challenged ourselves as to why this should form a CVP and not just be treated as traditional totex investment. The reality is that decarbonising heat is complex and that households living off the gas grid are likely to be disproportionately affected by the energy transition. Our research has shown that there is a general poor awareness of what transitioning to low carbon heat means amongst consumers. Decarbonisation of heat will not happen unless we think about the solutions in a different and more joined up way. Putting in the network capacity to support customers is not enough to deliver the actual end outcome. We need to work with trusted parties to engage local communities so that there is understanding of why a change is needed and how that change could be implemented with them in practical terms, tailored to their needs. Signposting them to government grants and available support as well information about energy efficiency along with individual home energy decarbonisation plans will also be key.

We will take a proactive approach to heat decarbonisation in areas of high certainty, building on our innovative Communiheat and Heat Street projects, such that, by the end of RIIO-ED2, there is suitable network capacity to support the transition away from fossil fuels by 242,000 (71%) of homes in off-gas grid communities.

Our approach for this CVP is wider than simply network capacity and electrification delivery, we will build upon and use our Communiheat playbook, working in collaboration with trusted local community partners and Local Area Energy Planning (LAEP) experts across these communities to engage, inform and support households to decarbonise their heating and transport faster and more efficiently.

Additionally, we will adopt a whole system, 'dig once' approach to ensure minimum disruption and lowest costs (simultaneously providing capacity for electric heat and EV charging and partnering with telecoms infrastructure providers) and working in partnership with trusted intermediaries to roll out energy efficiency and other support programmes.

This will yield financial savings to customers of £2.8m from lower heating costs and energy efficiency, as well as network coordination and societal benefits associated with an earlier reduction in CO_2 emissions against the counterfactual approach valued at £86m. We have been conservative in our calculation of these benefits; full details are provided in our CVP appendix document.

We will build upon the following framework to measure, quantify and report outcomes so that our performance can be evaluated. We will measure our success by:

- Reporting the volume of homes with suitable capacity to decarbonise their heat and transport needs delivered per year over the period.
- Reporting the volume of homes transitioning as a result of our coordinated approach with community partners.
- Reporting on the number of homes taking up energy efficiency measures as a result of our energy efficiency advice programme.

> As the DNO covering the vast majority of the GLA area, UKPN has engaged very closely with GLA over both its ongoing work and the development of its investment plans for the future. There are also more specific investments that I would like to endorse. These also include supporting the roll out of on-street charging facilities (including the necessary upgrades to the network) for electric vehicles and supporting fuel poverty alleviation with half of the £18 million funding coming from shareholder funds.
>
> In conclusion, the Mayor and I are very grateful for the constructive role the UKPN are playing in enabling the decarbonisation of London by 2030".
>
> **Shirley Rodrigues,**
> Deputy Mayor for Environment and Energy

Chapter 10:
Maintaining a safe & resilient network

We know that the most valuable thing we can do for our customers is ensure that they have a safe, reliable and resilient supply of electricity; not just today but in the future. This is core to our purpose as a DNO.

In this section:

10.1	Our resilience framework	**88**
10.2	Organisational resilience	**89**
10.3	Network reliability	**91**
10.4	Asset resilience	**97**
10.5	Environmental resilience	**100**
10.6	Workforce resilience	**104**
10.7	Supply chain resilience	**109**
10.8	Cyber resilience	**110**
10.9	Electricity system restoration (ESR)	**111**
10.10	Telecoms	**112**
10.11	Physical security	**113**
10.12	Safety	**113**

How this chapter links to our Keys to Success:

1. Delivering a brilliant service for all
2. Facilitating decarbonisation at the lowest cost
3. Investing to maintain a safe, reliable and resilient network
4. Delivering the lowest possible bills whilst enabling Net Zero
5. Being a force for good in the communities we serve
6. Being an employer of choice
7. Being a company that is worthy of your trust

Chapter 10: Maintaining a safe & resilient network continued

10.1 Our resilience framework

We are investing in our resilience framework so we can face the challenges RIIO-ED2 will present.

As a society, we depend on our ability to access electricity "on demand" and around the clock – whether this is to power essential services, run our businesses, or for our day-to-day activities. Our customers have made it clear that they expect a reliable service from us and believe that we should invest, where necessary, to ensure we meet this expectation. However, providing the reliability our customers expect is driven by more than just responding to interruptions in supply, it is about an organisation's ability to respond to any unexpected disruption through the high functioning capabilities of its systems and people.

Over the course of RIIO-ED2, and beyond, our network and business will face a wide range of challenges. This will include the integration of an increasing number of intermittent generation sources, cyber threats, changing climate patterns and the uncertainties that will arise from our transformed relationship with our customers as we support the Net Zero transition.

Responding to these challenges during RIIO-ED1 and considering how we will meet these challenges during RIIO-ED2 has led us to change how we assess the risks to our business and how we ensure that our organisation is resilient not only to the business risks we face today, but also those risks that we cannot predict as we plan for RIIO-ED2.

We are expecting our relationship with many of our customers to change as we make more data available about our networks and how they are used. We will need to forge new customer relationships with the creation of our new, independent DSO business unit and at the same time the demands to connect low carbon technologies[1] to our networks will mean we need to be prepared and able to respond to whatever scenario may arise. Our resilience framework is therefore critical for us to be able to deliver on the expectations of our customers and wider communities.

For many years the focus of our resilience activities was in the avoidance of power cuts and restoration of services following an interruption to supply or major event impacting the electricity network. Since the early 2000s our approach to resilience has evolved to include a wider range of business activities, including our systems and people. At the start of RIIO-ED1, we refreshed our Resilience Framework based on approaches from the Cabinet Office and other organisational resilience models, to challenge our thinking using best practices from other industries. This has also been informed through our experiences in preparing for the London Olympics in 2012, major unplanned events and more recently our response to the COVID-19 pandemic. We have worked alongside the Cabinet Office Emergency Planning College (EPC) to enhance our resilience capabilities and align ourselves to the British Standard, BS 65 000: Guidance for Organisational resilience[2].

We have achieved significant improvements in our resilience maturity assessment from the EPC since we started using their framework. The EPC framework[3] scores organisational resilience on a scale of 0 (very limited) to 5 (optimised). In RIIO-ED1, our target is to achieve Level 4 ("Good Practice") in all five areas of the assessment. In our latest baseline review conducted in September 2021, we beat our target by achieving Level 5 in "risk management" and "leadership and culture categories" and Level 4 in the remaining 3 categories.

We are the only DNO to have undertaken such a detailed maturity review and submitted itself for independent external assessment like this. The EPC has stated that they were "impressed by the enthusiasm, knowledge and commitment in UK Power Networks' drive to embed organisational resilience into its culture".

How our resilience framework operates

Our Resilience Framework is comprised of two parts:

1. Resilience capabilities and approach:
Maintaining a safe and resilient network is not just about our operational resilience, it is about having strategy, governance processes, resources and systems in place to ensure that resilience is built into every decision we make and is driven into the mindsets, culture and ways of working. It is also about ensuring that we are financially resilient and have a clear understanding of how we need to act in a crisis to meet the needs of our customers and society.

Therefore, the capabilities and approach required for our resilience framework cover our processes, systems and organisational structures ensuring that they are resilient to a range of current and future challenges. We have developed our capabilities to include (but not be limited to) effective risk management, continuity planning and crisis management, strong leadership and culture, and clear strategic governance.

We maintain a continuous improvement programme to embed resilience right through our organisation.

We consider ourselves to be a learning organisation – one that guards against complacency and is curious to seek improvement in every facet of its performance. This culture also applies to our thinking on organisational resilience.

2. Our focus areas for resilience:
This covers key aspects of our operations which are of significance for providing a resilient service to customers (network resilience, cyber resilience, workforce resilience etc). For each focus area, we dedicate a team of relevant individuals to lead our work by thinking through the key risks to resilience and how they would mitigate these to ensure overall business continuity. These teams are challenged at the regular Organisational Resilience Leadership Team (ORLT) forum to stress test our thinking and approaches to ensure they remain current to the changing external environment. Organisational resilience cannot operate in a silo. It needs to link to the parts of our business that need to adapt to continue to succeed and prosper.

1 We expect that different trajectories with have different implications for each of our networks, the DSO and our whole systems initiatives.
2 Organisational resilience standard published | BSI (bsigroup.com).
3 The UK Cabinet Office assessment framework ranks on a scale of 0 (very limited) to 5 (optimised) with Level 4 being classed as very good and consistent with the role of an organisation such as UK Power Networks.

Therefore, ongoing engagement with customers (to understand their barriers to achieving Net Zero) and our innovation focus areas must continue to be tied to our resilience activities.

Figure 31 summarises the key capabilities and approach in our resilience framework (top part of the Figure) as well as the key focus areas (bottom part of the Figure.) Many of the focus areas align with Ofgem's business plan topics for resilience but our framework includes a wider approach to resilience, including, the recognition that our framework underpins and drives "energy system resilience". Energy system resilience represents our holistic and sustainable response to longer term challenges in our industry and society as a whole including: climate change, customer behavioural change, cyber threat and increasing dependence on low carbon technologies.

In the remainder of this section we discuss our RIIO-ED2 plans for each focus area.

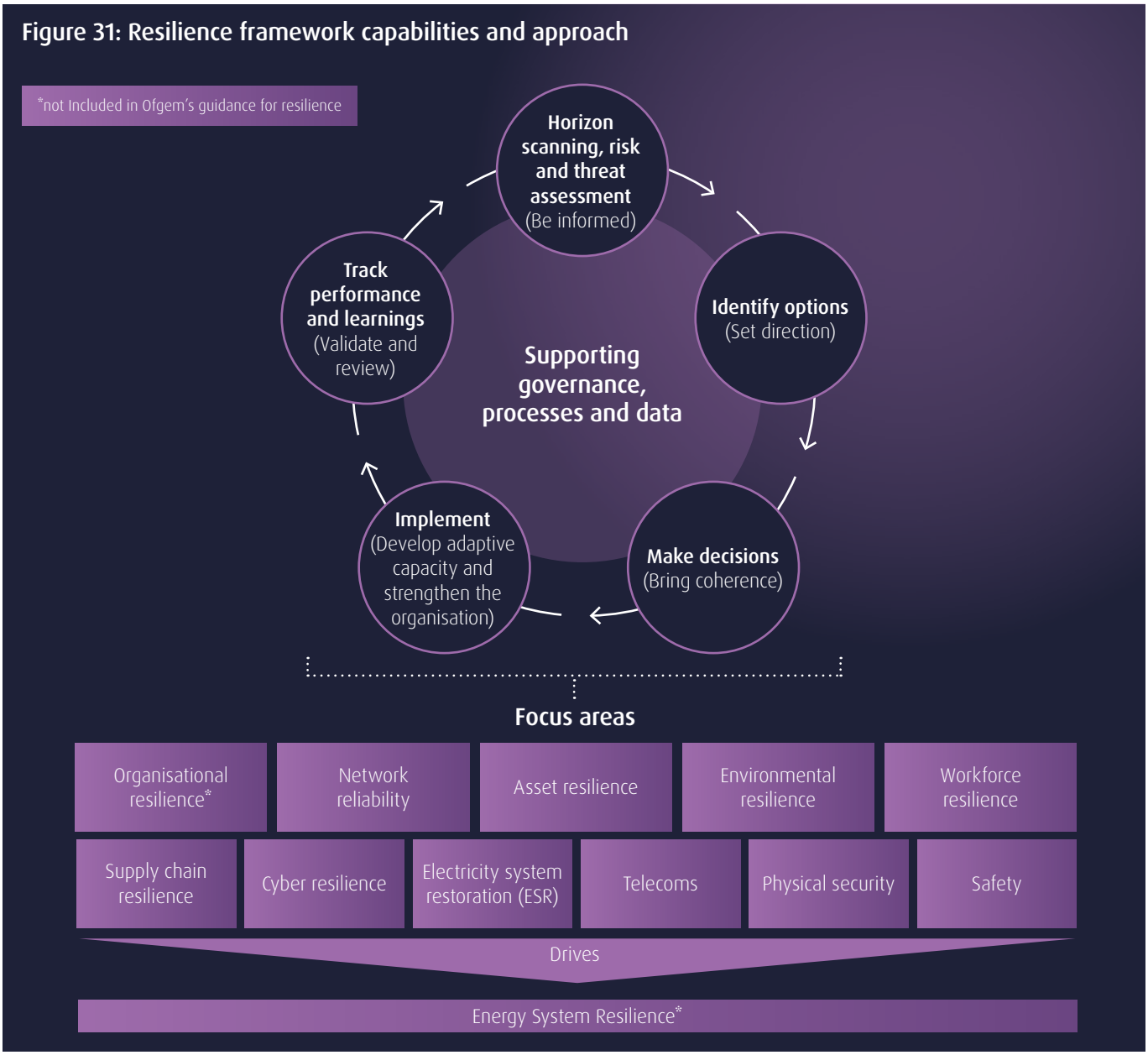
10.2 Organisational resilience

The COVID-19 pandemic has demonstrated that we are now living in a more volatile, uncertain and complex world. On top of this, we expect RIIO-ED2 to bring transformative change to our networks and our relationship with our customers. Only some of these changes are understood at this point in time. As a result, for RIIO-ED2, we are making enhancements to our resilience framework so that we can adapt to the challenges that may arise.

We have adopted the British Standard definition of Organisational resilience:

> "the ability of an organisation to anticipate, prepare for, and respond and adapt to incremental change and sudden disruptions in order to survive and prosper"

Figure 31: Resilience framework capabilities and approach



Chapter 10: Maintaining a safe & resilient network continued

Securing organisational resilience has the full support of the Board and Shareholders, driving a culture that takes resilience seriously at all levels. We already have in place the necessary structures to guide delivery of these initiatives. Our Organisational Resilience Leadership Team acts as a central governance structure with the Director of Network Operations as its Chair. This structure has been operating for a number of years and reports to the Executive Management Team. This governance structure will be enhanced in RIIO-ED2 by the introduction of a Climate Change Resilience Steering Group who will own, deliver and report on our environmental resilience plan – see Section 10.5: Environmental resilience.

RIIO-ED2 commitment: matching best practice from leading organisations

We have set our sights on achieving leadership and best practice in organisational resilience because it is needed to ensure we can meet customer expectations in the longer-term, and because we recognise this is a clear priority for government and policy makers.

Delivering our commitments

Commitment OR1

We will continue to improve our organisational resilience capabilities considering the changing risks our business faces. We will aim to achieve a "Good practice" rating against the BS65000 standard that will be independently assessed by the Emergency Planning College (EPC), by the end of the RIIO-ED2 period.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	Enhancements to our organisational resilience capabilities ensures we can respond effectively and efficiently to any unplanned risk events, improving our ability to maintain reliability and a high level of service for our customers in the event of any significant disruption.	Providing a reliable service is seen as a base requirement now and in the future. Supporting evidence from The Cabinet Office and The National Infrastructure Commission is detailed below.

Our ambition is that our organisational resilience is in line with best practice across businesses globally (not just DNOs), as is appropriate for an infrastructure operator providing an essential service to 8.4m customers in the UK. Our service area also covers London, where we have a responsibility to ensure resilience and continuity of supply to the UK's centres of finance and national government. In developing our plan for RIIO-ED2, we have also taken on board:

- The expectations of government and Ofgem.
- The Cabinet Office's requirement that responsibility for resilience of Critical National Infrastructure (CNI) lies with the owners and operators[4] of the assets.
- The National Infrastructure Commission recommendations that resilience standards are produced and reviewed every five years and that regulators and infrastructure operators work closely together to meet key obligations, including stress testing[5].

We have commenced work on implementing the National Infrastructure Commission's recommendations ahead of formal adoption by the UK Government[6] as part of our programme of continuous improvement. In RIIO-ED2 we will continue to lead the way through the introduction, in particular, of greater stress testing of our business systems and processes to ensure we can manage any type of disruption that puts extreme pressure on us. This is a form of testing that is regularly conducted within the financial sector and has become an accepted technique for banks, their shareholders and financial regulators to become comfortable that the bank has appropriate resilience in place.

Our action plan to meet our RIIO-ED2 resilience commitments

We are strengthening our approach to resilience for RIIO-ED2, including:

- **Upgrading our stress testing and resource planning:** we will conduct an annual programme of tests and also test internal and external strategic interdependencies. As discussed in the workforce resilience section below, we have adopted the scenario testing approach to workforce planning for RIIO-ED2 which informed our flexible resourcing model, assessment of workforce requirements, testing management spans of control and risks to our supply chain. Further details of the workforce scenario testing can be found in Appendix 13: Workforce resilience strategy. It is this analysis and resilience planning for the workforce that is the basis of us being able to adopt the flexible delivery of connections and other work on our networks to respond to demand in RIIO-ED2 and beyond.

4 Keeping the country running: natural hazards and infrastructure – GOV.UK (www.gov.uk).
5 Anticipate-React-Recover-28-May-2020.pdf (nic.org.uk).
6 A recent study by the National Infrastructure Commission (May 2020) made a series of recommendations to the Government on how to improve the resilience of our national infrastructure.

- **Maintaining and enhancing alignment to BS 65 000:** by being assigned a minimum of 'Good Practice' on the EPC resilience scale in each area of the Government resilience review by the end of the RIIO-ED2 period. We will also assist Ofgem should they wish to develop a framework for measuring organisational resilience for DNOs in a consistent way. We will also align our resilience approach to recommendations in the National Infrastructure Commission (NIC) Report, Anticipate, React, Recover.
- During the last assessment by the EPC, it was stated that the leadership and culture observed within UK Power Networks demonstrated "Optimising" (Level 5) which means we have optimising levels of capability in the areas of business continuity, IT Disaster Recovery, cyber security, incident and emergency (crisis) management. In RIIO-ED2, we will further cultivate our culture to help maintain a robust governance structure (including holding managers to account) to ensure that all the relevant workstreams in the Organisational resilience programme devote the time and energy to meet the targets set for UK Power Networks' organisational resilience capability.
- **We are making changes to our organisation and culture in RIIO-ED2 to support our workforce resilience:** the creation of the DSO will facilitate flexibility and accountability for the operation of the network. We plan to add more staff to customer relationship management activities to support our customers through the low carbon transition as well as improving the diversity and inclusivity of our organisation throughout its structure. Further details are provided in the workforce resilience section of this plan.
- **Our resilience framework and organisational resilience activities underpin and drive a new focus area on energy system resilience:** which takes into consideration the full range of solutions to address the longer-term changes in the energy market. This will include how we adapt our customer research and ongoing engagement activities to understand the barriers to consumer behaviour change needed to deliver Net Zero at lowest cost.

The remainder of this section of our plan describes our commitments and delivery plans for key resilience focus areas for RIIO-ED2.

10.3 Network reliability

Keeping the lights on is a fundamental element of what we do. We recognise that power cuts can adversely affect our customers lives, it is our biggest source of complaints. Our research shows that 40% of customers who experienced power cuts found they had a significant impact on their lives, as a result a reliable service is seen as a base requirement.

There was also consideration that we should try to help those customers who receive a higher number of interruptions in order to provide a fairer and more equitable level of service across our customer base.

We will continue to deliver high levels of reliability in respect of existing performance measures which our customers have confirmed is a core requirement for us. However, we are also proposing additional performance measures for RIIO-ED2. Our new reliability performance measures for RIIO-ED2 reflect the wider electrification required to support Net Zero and also consider the outcomes of our customer consultation process, they include:

- A 10% reduction in short interruptions (a DNO first) with a compensatory payment to customers experiencing more than 25 high voltage short interruptions in the year (a further DNO first).
- Two new reputational reporting commitments measuring multiple loss of power events and Total Time Not Supplied (TTNS) to enhance our understanding of the customer experience regarding reliability.

Our ambition is to improve underlying network reliability

UK Power Networks is reducing both the frequency and duration of power cuts which are important priorities for our customers. Through RIIO-ED2 we expect to connect a significant volume of additional low carbon technologies to customers' homes and businesses as part of meeting the Net Zero challenge. As our customers become more reliant on electricity to heat and power their homes the impact of power cuts on their lives will increase. We are committed to gathering views on this through our ongoing engagement.

Our ambition for RIIO-ED2 is to improve our underlying network reliability by the end of RIIO-ED2, irrespective of the volume, type or location of low carbon technologies connecting to our network**.** This commitment is made without the requirement for additional funding as improvements will be funded through the Interruptions Incentive Scheme (IIS) incentive. In addition, we want to ensure we achieve a reduction in the impact of planned outages and make improvements to customers who receive service below the average. This is supported by our commitments to reduce short interruptions and the number of worst served customers on our network.

However, we want to go further. We are proposing two new measures of reliability performance and are collecting new data to inform and set new targets – all aimed at improving service and limiting the impact disruption causes to our customers. Indeed we want to use this data, alongside meaningful research and engagement with our customers to proactively influence the regulatory framework design for RIIO-ED3.

Chapter 10: Maintaining a safe & resilient network continued

Our strategy

In RIIO-ED2 we commit to the following:

1. Delivering reliability for customers throughout RIIO-ED2

- Improve the underlying network reliability by the end of RIIO-ED2, irrespective of the volume, type or location of low carbon technologies connecting to our network.
- By the end of RIIO-ED2 reduce 12 hour interruptions in normal weather conditions by 25% in each of our EPN, LPN and SPN regions compared to the RIIO-ED1 average.
- Following two Ofgem-defined ODIs ('Interruptions Incentive Scheme' and 'Electricity Guaranteed standards').

2. Targeting improvements to short interruptions and transforming service for our worst served customers (WSC)

- Deliver a 10% reduction in the number of short interruptions experienced per customer (excluding those which are as a result of avoiding a customer interruption and those relating to exceptional events) by the end of RIIO-ED2 when compared to that experienced by our customers in the last five years of RIIO-ED1.
- Introduce an automatic compensation payment of £25 to customers who experience more than 25 high voltage short interruptions during a regulatory year (excluding those relating to exceptional events).
- Deliver work to ensure that as many WSC as possible see at least a 25% improvement in their reliability through work conducted under the WSC mechanism up to a total expenditure of £28m. We will also explore innovative solutions to improve the service received by WSC where costs of traditional solutions prohibit their implementation.

3. A step change in the transparency of interruptions reporting

- Develop a bespoke reporting metric for the multiple loss of power occurrences of three minutes or longer, covering all voltage levels. Subject to the penetration of smart metering to a high enough level to provide a robust dataset, by the end of 2024 we will propose an improvement target for this area in each of our networks to be delivered by the end of RIIO-ED2.
- Develop a bespoke reporting metric to track the Total Time Not Supplied for individual customers who have a smart meter. Subject to the penetration of smart metering to a high enough level to provide a robust dataset, by the end of 2024 we will propose an improvement target for this area.
- These new reporting metrics will help us to provide quantitative evidence to inform future regulatory design based on actual data.

We are confident this approach is ambitious because our commitments build on and exceed our strong performance in RIIO-ED1 against a backdrop of transformative change over the next decade in our industry.

We have delivered a strong performance in RIIO-ED1

During the RIIO-ED1 period we have delivered significant improvements in reliability across all three networks. Our industry leading level of reliability[7] (which has seen an 18% improvement in our Customer Interruptions and a 23% reduction in Customer Minutes Lost, since the beginning of RIIO-ED1) has enabled Ofgem, through its approach to setting Interruptions Incentive Scheme (IIS) targets for RIIO-ED2, to use our leading performance to benchmark and set new targets for all DNOs in Great Britain. This yields additional customer value beyond the benefits seen by customers in our region and ensures that all customers in the country either see improved performance or lower bills where their local network fails to keep pace with frontier performers such as UK Power Networks. Full details of what we have achieved in network reliability and other aspects can be found in Chapter 6: Our RIIO-ED1 track record.

The application of our resilience framework in RIIO-ED1 resulted in the identification and justification of investment in network reliability management. This took the form of automation of key parts of the network which resulted in an acceleration in the rate at which interruptions to supply could be rectified.

However, network reliability should also consider:

- **Short interruptions** which are power cuts lasting under three minutes. Our work in RIIO-ED1 to reduce the overall level of supply interruptions has resulted in an increase in short interruptions. Whilst investment in auto reclosers on the LV network has reduced the length of power cuts and also reduced the initial impact of the power cut, it has had the expected consequential impact of increasing the number shorter interruptions to customers' supply of electricity.

7 UK Power Networks' analysis to support this claim is provided in Appendix 2: Our RIIO-ED1 track record.

- **Worst Served Customers (WSC)** are customers that have experienced at least twelve power cuts (at high voltage) in a three-year period; with a minimum of two power cuts in each year). We have already met our RIIO-ED1 commitment to reduce the number of WSC across our networks. To date 23 schemes have been completed across EPN and SPN with over 5,000 customers seeing an improvement in performance of greater than the 25% requirement. Almost 90% of the WSC customers present at the start of RIIO-ED1 have already seen performance improvements, through a combination of dedicated WSC schemes as well as general network improvement activity. WSC tend to be on overhead or mixed overhead/underground networks which means that LPN does not have any WSC.

More information on our RIIO-ED1 performance on all these metrics broken down by DNO is included in Appendix 2: Our RIIO-ED1 track record.

Our commitments

We are making a number of commitments as part of our Network Reliability plan, which we outline below. For each commitment, we provide a table which details the associated expenditure, regulatory treatment, customer benefit, and the customer and stakeholder insights on which it is based. Further details of our customer and stakeholder engagement and insights are provided in the supporting document Line of Sight – Reliability and Resilience.

Continuing to deliver on unplanned power cuts

We will continue to invest in the network to prevent increases in fault numbers whilst, as outlined below, working to reduce the impact of faults on our customers by using new technology.

Delivering our commitments

Commitment NR1

We will improve underlying network reliability (as measured by customer interruptions (CIs) and customer minutes lost (CMLs)) by the end of RIIO-ED2, irrespective of the volume, type or location of low carbon technologies connecting to our network.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances (improvements funded by IIS in line with regulatory framework in this area).	Customers will benefit from an overall increase in the reliability of the service they receive, relative to RIIO-ED1. This will reduce the disruptive impact of power cuts in their lives.	Most customers take a reliable supply of electricity for granted. Interruption of supply is the most common cause of complaints and customers across our regions have a high willingness to pay to avoid a deterioration in service. (See key insights I-R1 and I-R2 in our Line of Sight – Reliability and Resilience document).

Commitment NR2

We will reduce 12 hour interruptions in normal weather conditions by 25% on average across RIIO-ED2 in each of our EPN, LPN and SPN regions, compared to the RIIO-ED1 average.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Customers will benefit from reduced disruption to their lives from interruptions lasting over 12 hours.	More than 40% of our customers who experienced an interruption felt a significant impact on their lives. Domestic customers in all regions are willing to pay to reduce the number of customers who experience longer power cuts. (See key insights I-R1 and I-R2 in our Line of Sight – Reliability and Resilience document).

Interruptions Incentive Scheme (IIS)

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Ofgem ODI(F).	Reduction in the impact of power cuts.	Not applicable (Ofgem mandated).

Chapter 10: Maintaining a safe & resilient network continued

Electricity Guaranteed Standards (EGS)			
Resource and expenditure	**Regulatory treatment**	**Customer benefit**	**Stakeholders / customers said**
No incremental increase in Totex expenditure.	Ofgem ODI(F).	Drives DNOs to improve performance (customers get a payment if DNOs fail in their obligations).	Not applicable (Ofgem mandated).

Reducing the number of short interruptions

Commitment NR3

We will achieve a 10% reduction in the number of short interruptions experienced per customer (excluding those which are as a result of avoiding a customer interruption and those relating to exceptional events) by the end of RIIO-ED2 when compared to that experienced by our customers in the last five years of RIIO-ED1.

We will also make an automatic compensation payment of £25 to customers who experience more than 25 high voltage short interruptions during a regulatory year (excluding those relating to exceptional events).

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure. Customers will receive improved service at no additional cost.	Voluntary standard reporting and compensation metric for repeat short interruptions.	Customers will benefit from reduced disruption to their lives from short interruptions. Automatic compensation payments will also ensure customers are paid with minimal fuss when significantly disrupted by short interruptions.	Our research suggested that while customers felt that we should be addressing the root cause of short interruptions, compensation for the inconvenience caused by short interruptions was an appropriate mechanism for holding the company to account. (See key insights I-R1, I-R2, I-R3, I-R4 and I-R5 in our Line of Sight – Reliability and Asset Resilience document).

Early in the RIIO-ED2 process we engaged with S&C Electric to provide an international perspective and insights including best practice on short interruptions and how they are managed and reported. Through the Ofgem RIIO-ED2 working groups we advocated more visibility on short interruptions and proposed a reporting template to achieve this. We recognise that for certain customers even very short power cuts can be disruptive, be that from the inconvenience of having to reset clocks on appliances, the loss of output from having to restart production processes, interrupted online learning and working from home, through to customers who are medically dependent on electricity.

In our research we have found that there is a small appetite for customers to pay to improve on the current levels of short interruptions. We quantitatively tested a range of options for the threshold of the number of short interruptions experienced by customers before a compensation payment would be due. The feedback was a low threshold was preferred, however through subsequent qualitative research some customers identified with an ethos of "prevention is better than cure" i.e. spend money on tackling the root cause instead of making compensation payments. With this in mind we have proposed a compensation mechanism coupled with a performance improvement target.

The compensation will be a bespoke voluntary mechanism for customers who experience more than 25[8] high voltage[9] short interruptions during a regulatory year (excluding those relating to exceptional events).

This will be an automatic compensation payment of £25. The payment level proposed is based on consideration of the cumulative length of time the supply is off for in comparison to the existing Electricity Guaranteed Standards[10].

The performance improvement will be a 10% reduction in the number of short interruptions experienced per customer (excluding those which are as a result of avoiding a customer interruption and those relating to exceptional events) by the end of RIIO-ED2, when compared to that experienced by our customers in the last five years of RIIO-ED1. As outlined above, this is ambitious in the circumstances and it is on par with the stretching CML improvement thresholds set for DNOs by Ofgem via their SSMD. Furthermore, this target has been set in the context of an increasing volume of short interruptions taking place due to the rollout of automation on our networks.

8 This is equivalent to an aggregate duration of up to one and a quarter hours.
9 Short interruptions caused by events on the high voltage (HV) network.
10 In particular the 12 hour EGS standard for long power cuts.

We believe we are the first DNO to make a commitment to reduce the number of short interruptions and also the first to make a commitment to a compensation payment. These are both enabled by the investment we have made to date in our control systems and associated technology providing a DNO leading rich and complete dataset.

Significantly improving the performance of our network for our Worst Served Customers (WSC)

Commitment NR4

We will invest up to £28m which will deliver at least a 25% improvement in reliability for eligible Worst Served Customers (WSC). We expect that the equivalent of 10,000 customers per annum will see an improvement in the reliability of their power supplies from this investment. We will also explore innovation solutions to improve the service received by WSC where costs of traditional solutions prohibit their implementation.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£16.82 in EPN and £11.22m in SPN based on an average expenditure of £555 per customer.	PCD.	Customers identified as WSC and targeted for support will experience significant improvements in the reliability of their service, reducing the disruptive impact that multiple power cuts may have on their lives.	Our research showed customers supporting small increases on their bills to ensure network performance is improved for WSC. We explored this further and approximately half of customers showed a strong preference for conducting work to resolve issues for all known worst served customers. (See key insights I-R1 and I-R5 in our Line of Sight – Reliability and Resilience document).

The regulatory framework for RIIO-ED2 has a strict definition of Worst Served Customers, namely: they must have experienced at least twelve power cuts (at high voltage) in a three-year period; with a minimum of two power cuts in each year. Through RIIO-ED2 we will work to ensure that there aren't pockets of customers who receive materially poorer levels of service than the wider community.

We estimate that over the RIIO-ED2 period there will be approximately 50,000 customers who will meet the qualifying criteria for being worst served. Having conducted customer research and had extensive engagement with our CEG in respect of worst served customers, our commitment is to deliver an improvement in reliability for all of these 50,000 customers that we forecast to be worst served up to an investment value of £28m. This represents a ten-fold increase on the number of WSC experiencing performance improvements when compared to RIIO-ED1 to date.

Our action plan draws on three approaches:

- Where economically appropriate **use existing engineering/ investment** solutions. Our plan does not restrict us to a specific expenditure cap per customer as this would restrict our ability to deliver schemes to improve performance for smaller groups of customers but instead we will look to deliver value for money across all schemes.
- We will **leverage our innovation skills to explore new solutions** to improve the service received by WSC where costs of traditional solutions prohibit their implementation so that alongside WSC schemes and general network improvement work we bring all WSC customers on the journey to better performance. As part of our innovation strategy (see Appendix 20: Our innovation strategy) we will seek to identify what those solutions might be and apply them as appropriate.
- We will **expand our existing customer engagement** in this space including engagement mechanisms to bring customers along the journey of the improvements being made to their network. This will include communications prior to work commencing, during the improvements (where the scheme duration warrants it) and post completion of the scheme. We will also enhance our IT systems to enable more information to be available to our advisors when communicating to worst served customers.

In summary we will deliver work to ensure that as many WSC as possible see at least a 25% improvement in their reliability[11] through work conducted under the WSC mechanism up to a total expenditure of £28m. More details on WSC can be found in the associated Engineering Justification Paper (EJP-RP-007).

11 Measured in the same way as in RIIO-ED1.

Chapter 10: Maintaining a safe & resilient network continued

Reporting Repeat Power Cuts

Commitment NR5

We will develop a bespoke reporting metric for multiple loss of power occurrences of three minutes or longer, covering all voltage levels. Subject to the penetration of smart metering to a high enough level to provide a robust dataset, by the end of 2024 we will propose an improvement target for this area in each of our networks to be delivered by the end of RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure. Customers will receive improved service at no additional cost.	Bespoke ODI-R metric.	Greater visibility of data from smart meters will enable us to better understand how interruptions impact our customers. Using this data, and considering customer views we will develop an improvement target so that customers benefit from a reduction in the disruption to their lives.	Repeat power cuts are a key driver of dissatisfaction. (See key insights I-R1 in our Line of Sight – Reliability and Resilience document).

The existing Guaranteed Standard of Performance relating to multiple interruptions to power supply relates specifically to the number lasting three or more hours in a given twelve-month period. At present, given data availability issues, customers need to make a claim to their network company to receive this compensation. Proactive reporting by the DNO is limited to volumes of multiple interruptions on the higher voltage networks.

In RIIO-ED2, as a result of increased smart meter penetration, coupled with the wider roll-out of LV network visibility we will develop a first of its kind bespoke reporting metric (ODI-R) which will track and give visibility regarding the number of customers experiencing multiple losses of supply of greater than three minutes at all voltages. Our intention is to use this quantitative analysis and combine it with a structured customer research programme to inform the design of future regulatory mechanisms related to reliability. This will help us identify how we can improve the experience for our customers by giving visibility of this area ready for RIIO-ED3.

UK Power Networks will develop a bespoke reporting metric for multiple loss of power occurrences of three minutes or longer, covering all voltage levels. Subject to the penetration of smart metering to a high enough level to provide a robust dataset, by the end of 2024 we will propose an improvement target for this area in each of our networks to be delivered by the end of RIIO-ED2.

Reporting Total Time Not Supplied (TTNS)

Commitment NR6

We will develop a bespoke reporting metric to track the Total Time Not Supplied for individual customers who have a smart meter. Subject to the penetration of smart metering to a high enough level to provide a robust dataset, by the end of 2024 we will propose an improvement target for this area.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure. Customers will receive improved service at no additional cost.	Bespoke ODI-R metric.	Greater visibility of data from smart meters will enable us to better understand how interruptions impact our customers. Using this data, and considering customer views on the impacts of interruptions, we will develop an improvement target so that customers benefit from a reduction in total time not supplied, reducing the disruption to their lives.	Frequency and duration of interruptions are a key driver of dissatisfaction amongst both domestic and business customers. They demonstrate a high willingness to pay for avoiding a deterioration in their service. (See key insights I-R1 and I-R5 in our Line of Sight – Reliability and Asset Resilience document).

Given the importance customers place on a reliable supply and in the absence of a common Ofgem metric, we will introduce a bespoke metric (ODI-R) to track the cumulative time that each customer is not able to receive power from our network or inject power onto our network. We see the introduction of this metric as a first for a DNO.

The TTNS metric is an enhancement to the existing IIS mechanism. It will make clearer the distribution impacts of power cuts across all our 8.4 million customers and identify areas for future focus/improvement. The TTNS metric will complement our Worst Served Customer PCD and will show customers that are experiencing materially poorer levels of reliability than the network average. Our aim is to use the information gathered in RIIO-ED2 so we are ready in RIIO-ED3 to enhance reliability as required.

Working with our Smart Metering and Digitalisation teams, we will develop a bespoke reporting metric to track the TTNS for individual customers who have a smart meter. Subject to the penetration of smart metering to a high enough level to provide a robust dataset, by the end of 2024 we will propose an improvement target for this area.

We believe this new metric coupled with the others highlighted earlier in this document demonstrates the ambition we have to provide frontier performance for our customers into RIIO-ED2 and beyond, but one that through our ongoing engagement programme is built on a solid understanding of their needs and expectations. For more information, see Section 7.3 Ongoing engagement.

10.4 Asset resilience

The asset resilience challenge and our ambition

Our ability to provide a long-term, reliable supply of electricity is, in part, a function of the condition of the assets that make up our networks. Every one of these assets, from cables to transformers to the buildings that house them, plays an important role in delivering electricity. By making appropriate judgements about when to refurbish or replace infrastructure, we ensure the homes and businesses of our customers continue to enjoy a reliable and affordable supply, today and in the future.

Ensuring our assets remain resilient and able to provide a reliable supply of electricity is one of our customers' top priorities. However, this customer ambition is placed within the context of a heightened need for affordability, with external research informing us that disposable income has dropped for around 38%[12] of our customers as a result of the COVID-19 pandemic.

In the remainder of this section we describe the commitments we are making in RIIO-ED2 for each aspect of asset resilience:

- Assets covered by Ofgem's NARMs[13] framework; and
- Assets not covered by Ofgem's NARMs framework.

NARMs and Non-NARMs assets

The need to facilitate more low carbon connections to support Net Zero, together with an aging asset base mean we have to invest more in our networks in RIIO-ED2 to deliver the same levels of network performance as seen in RIIO-ED1. In this context, between 2023 and 2028 we will:

- Take a targeted approach, replacing the assets that are most likely to fail whilst managing the condition and performance of aging assets carefully.
- Reduce leakage from our oil-filled cables by 15% across the RIIO-ED2 period.
- Ensure the replacement of assets considers the wider transition to Net Zero by upsizing equipment to accommodate increased demand from wider electrification where appropriate.

This approach is captured in our RIIO-ED2 commitment to maintain asset resilience at the lowest possible cost.

Assets covered by the NARMs framework

We have well-established inspection and maintenance routines to collect condition and performance data for all of our assets and use this, together with engineering decision making techniques, to determine the most efficient time to replace or refurbish an asset. While this general approach is common across our asset base, the way in which the overall condition of assets is monitored by Ofgem differs. For 61 different asset types, Ofgem monitor the condition of our assets by a metric called the Network Asset Risk Metric (NARM) which calculates the value of risk for NARM assets based on a number of factors. This risk[14] metric is consistent across the sector and provides an overall view of the long-term condition and health of a subset of the network's asset base such as transformers or switchgear.

In the run-up to RIIO-ED2, working with all of the DNOs, Ofgem has changed its risk modelling methodologies, moving from CNAIM V1.1 used in RIIO-ED1 to CNAIM V2.1. The difference between these two models is that CNAIM V1.1 calculated a value of risk at a given point in time, whereas CNAIM V2.1 utilises the concept of whole life risk and captures the value of long-term risk for assets in earlier stages of their lives. The result of the change in approach is that the value of total network asset risk is much higher than it was in RIIO-ED1 and this is particularly true for assets currently within the Health Index (HI) 1-4 bands[15].

12 https://savanta.com/coronavirus-data-tracker/

13 Network Asset Risk Metric.

14 A measure of monetised risk derived from a combination of the Probability of Failure of network assets and the Consequence of Failure of these network assets.

15 The Health Index (HI) categorises the condition of an asset. This is split into 5 bands, where HI1 represents a new or near new asset and HI5 represents those close to or at the end of their useful lives. Where an asset sits within these bands is calculated from a number of factors, such as age, location and observed condition data. This in turn generates a value for the probability of failure of that asset which can be used to assign it to one of the 5 HI bands.

Chapter 10: Maintaining a safe & resilient network continued

To illustrate the impact of the difference in methodologies, we modelled our networks' deterioration across RIIO-ED2 without any interventions using both the RIIO-ED1 and RIIO-ED2 models. The RIIO-ED2 model approach risks registered an additional 5% rise in risk points at the end of the period, with the most significant contribution being the value of risk attributed to assets deteriorating from the HI3 to HI4 band. This effect is compounded by the fact that a significant proportion of our network assets are now 60-70 years old due to the rapid expansion of electrification that took place across the nation in the 1950s and 1960s. As a result, our network is facing a significant age profile peak as assets approach the end of their useful lives and move from the HI3 to HI4 and HI5 bands.

Using the new CNAIM V2.1 methodology, we undertook modelling of network risk under different RIIO-ED2 non-load investment scenarios[16]. We found that:

- Whilst the level of investment in RIIO-ED1 leads to a minor and manageable rise in network risk, continuing with the same levels of replacement in RIIO-ED2 would lead to a rise of three to four times that seen in RIIO-ED1, particularly in those assets at the end of their useful lives.
- To keep risk levels flat from the start to the end of the period would require an increase in expenditure at almost double RIIO-ED1 levels, with the resulting increase in volumes causing deliverability issues.

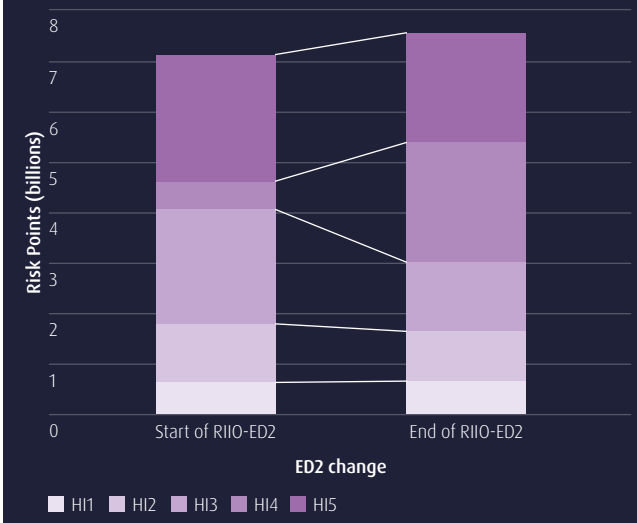
The above scenarios present two very clear trade-offs that we, as stewards of the networks, have to balance to reach an optimal solution between cost and performance.

To inform this trade-off, we used engineering judgement, built upon the intimate knowledge of our networks from our engineers' experience, supported by actual condition and performance data and the output from CNAIM v2.1. Applying this decision making process alongside the views from our customers on performance levels allowed us to strike a balance. Our optimal strategy will focus our investment on assets in the poorest condition and by continuing to monitor older assets in the period we will remain flexible in those we choose to intervene on whilst assembling the evidence that will inform decisions in RIIO-ED3 – helping to avoid a situation where we store up long-term problems. This is consistent with our customers' feedback on their desire to see at the very least a maintaining of current performance levels whilst also managing the impacts of investment on their bill.

As a result of these considerations, our RIIO-ED2 strategy is to:

- Protect customers today by prioritising work on the assets with the greatest risk of failure, resulting in a 17.6% risk reduction across all HI5 assets (see Figure 32).

Figure 32: RIIO-ED2 asset risk profiles (post investment) NARMs assets



- Protect future customers by proactively monitoring HI4 assets and continuing to gather actual condition and performance data in period. Although the CNAIM V2.1 model suggests network risk will rise by 4.7%, driven in the main from an increase from these HI4 assets, this needs to be carefully monitored in period, so as not to commit to replacing assets ahead of the end of their useful lives. Gathering actual condition data through our inspections will enable us to review interventions in period whilst developing robust justification for the likely investments in RIIO-ED3. This will ensure we protect the level of service our customers receive today and in the future.
- Ensure we deliver value for money for the work that is included in our plan by benchmarking our unit costs on a disaggregated basis.
- Produce a deliverable plan over RIIO-ED2 that supports an overall long-term asset strategy. Our expectation is that the volumes of work will continue to rise across both RIIO-ED3 and RIIO-ED4 before returning to the levels seen during RIIO-ED1 to address the profile of aging assets we face across the next 15-20 years. We have phased the work in RIIO-ED2 to ensure we can scale up delivery capabilities cost effectively and maintain flexibility to adapt to any scenario.

Based on these findings, our commitment for NARMs assets for RIIO-ED2 is as shown in the table overleaf. We have provided a robust justification of this investment within Appendix 10: Non-load overarching investment framework and our separate Engineering Justification Papers. Further cost information is also available in Chapter 17: Costs and Financial Information.

16 Note, all risk movements quoted only include asset replacement and refurbishment investment driven by assets in poor condition, it does not include the impact of other investment drivers such as environmental or load related expenditure. Including the impact of these other investments drivers would lower the overall network risk value quoted.

Delivering our commitments

Commitment AR 1

To manage the risk of disruption to our customers from failure of our assets, we will target the replacement of the poorest condition assets on our network, delivering a NARM monetised risk point delta of £1.57 billion by the end of RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£644.3m.	NARM methodology.	Our monetised risk target will deliver £1.57bn of benefit through £644.3m of expenditure. This will deliver three main benefits: • High levels of reliability. • Reduced risk of failure and any associated environmental impact; and • Increased capacity of replaced infrastructure to accommodate low-carbon technologies.	Asset resilience is one of our customers' key priorities and providing a reliable service is seen as a base requirement now and in the future. See our Line of Sight and Engagement Summary documents for more detail. (See key insights I-R1 and I-R2 in our Line of Sight – Reliability and Resilience document).

The table below provides a summary of our RIIO-ED2 NARMs investment strategy, with important metrics broken down across our three regions.

Figure 33: RIIO-ED2 NARMs Investment Strategy

NARMs Asset Replacement between 2023-2028 – Risk Impact							
	Absolute risk position					Relative risk position	
Licence	Start of RIIO-ED2	End of RIIO-ED2 (without intervention)	End of RIIO-ED2 (with intervention)	Risk Delta	NARMs Expenditure	Overall Risk Position (end of RIIO-ED2)	HI5 Risk Position (end of RIIO-ED2)
EPN	£3.66bn	£4.73bn	£3.83bn	£900.49m	£262.6m	4.6%	-18.2%
LPN	£1.41bn	£1.72bn	£1.53bn	£197.06m	£179.4m	8.2%	-3.2%[17]
SPN	£2.21bn	£2.74bn	£2.27bn	£474.33m	£202.3m	2.6%	-26.8%
UKPN	£7.28bn	£9.19bn	£7.62bn	£1.57bn	£644.3m	4.7%	-17.6%

NARMs Asset Replacement between 2023-2028 – Investment Highlights			
Investment in 61 asset classes	70,200 wood poles replaced	94 new 132 kV and EHV transformers installed	266 primary breakers installed
43 Non-load engineering justification papers	173km of fluid filled cables replaced with non-pressurised cables	8,000 link boxes replaced	2,100 ground mounted 6.6/11 kV transformers installed

17 Whilst our overall strategy is to target replacement of assets with the greatest risk of failure, resulting in a 17.6% risk reduction across all HI5 assets at a UK Power Networks level, LPN sees a much smaller reduction in risk across HI5 assets in comparison to our EPN and SPN licence areas. This is because at the start of RIIO-ED2, EPN and SPN customers will have a higher value of risk per customer across HI5 assets than seen in LPN and therefore we have focused investment and targeted reduction in those areas. This seeks to re-balance the level of risk across the three licence areas, whilst acknowledging the strong reliability levels LPN's customer receive today.

Chapter 10: Maintaining a safe & resilient network continued

Specific programmes of work will tackle assets which can have a detrimental impact on the environment, such as fluid filled cables. Additionally, all asset replacement will be made within the context of the transition to a low carbon economy and the nation's ambition to be carbon neutral by 2050. We will facilitate this by upsizing specific assets such as low voltage cables, transformers and conductors to accommodate new low-carbon technologies such as EVs and heat pumps, promoting a 'touch the network once' philosophy, reducing the cost and disruption to customers. For example see EJP-AS-006, Back Hill A where transformers have been uprated to accommodate future load growth.

Assets not covered by the NARMs framework

Whilst there is no mandated risk metric for Non-NARMs assets, we collect a wealth of data, and for certain high-expenditure assets we have built our own deterioration models similar to those developed in CNAIM V2.1. We use these techniques, along with sound engineering judgment to choose the right intervention at the right time to maintain network integrity. Through triangulation, which brought together evidence and professional judgement to inform decision making; we are comfortable that levels of investment are justified and efficient. For further information please see Appendix 10a: Non load overarching investment framework.

Significant assets included within this category are high and low voltage cables and equipment used to terminate supplies in a customer's premises. We will adopt a similar strategy for our Non-NARMs assets as we have for our NARMs assets, focussing our investments on those assets most likely to fail at a cost of £50.1m.

Cost efficiency and justification for NARMs and Non-NARMs investment

In order to maintain the most efficient asset replacement programme, the most appropriate intervention options have been chosen including the consideration of replacement, refurbishment, network reconfiguration, whole system or any available flexibility solution. Justification for interventions has been demonstrated through the submission of Engineering Justification Papers (EJPs) for every specific project in excess of £2m or where significant increases in asset replacement volumes have been put forward in comparison to RIIO-ED1. The EJPs provide detailed visibility into the underlying asset information and engineering and economic justification at a project by project level and are accompanied by supporting Cost Benefit Analysis (CBA) where appropriate. For high volume interventions such as wood pole replacement, EJPs are provided on a programme level as opposed to an asset by asset basis. A summary of non-load EJPs are provided below.

Figure 34: Summary of relevant EJPs

		Number of EJPs			
Type	**Category**	**EPN**	**SPN**	**LPN**	**Examples**
Non-Load NARM and Non NARM related EJPs	Project	8	12	9	EPN, ED2-EJP-AS-007 – Kings Lynn Grid – Replace GT1/GT2 LPN, ED2-EJP-AS-029 – Hackney Grid 66kV – Install 132kV Swg SPN, ED2-EJP-AS-046 – Chessington Grid 132 – Kingston Grid
	Asset class or programme	19			ED2-EJP-AS-023 – LV Switchgear, ED2-EJP-AS-052 Tower Painting, ED2-EJP-AS-077 – AEI Henley QA/QF Primary HV Switchgear Replacement

The combination of EJPs and CBAs ensure the asset resilience programme has detailed, well justified decision making as well as efficient costs. Our supporting document Appendix 10: Non load Overarching Investment Framework provides a useful overview of NARMs and Non-NARMs asset interventions along with detailing the investment drivers for other non-load works.

10.5 Environmental resilience

Globally, we face an increasing climate change challenge; greenhouse gas emissions are driving up temperatures, increasing the intensity of extreme weather events and changing our physical environment. These changes put the reliable supply of electricity to our customers at risk by reducing or disrupting network and operational performance.

We need to protect our assets and mitigate against these climate change hazards whilst continuing to facilitate the transition to Net Zero. Given the uncertainty around future climatic changes, our approach needs to be flexible and collaborative and needs to accommodate changing risks and customer and stakeholder priorities, today and into the future. To achieve this, we have developed our climate change adaptation strategy, built around gaining an improved understanding of both the risks and the opportunities by applying a whole system approach to climate change resilience within our business.

The results of this assessment identifies flooding and vegetation growth as presenting the greatest risk to our network resilience, both now and in the future. We know, through our RIIO-ED2 customer engagement, that customers expect a reliable service as a base requirement and flooding and vegetation growth have the potential to significantly impact on the delivery of this expectation.

We describe below our RIIO-ED2 plans relating to these two key risk areas and how we will ensure resilience of our network against them:

- **Flood Protection:** Flooding due to intense or prolonged rainfall can damage our substations or ground mounted transformers. By the end of 2028 all of our grid and primary substations that supply over 8,000 customers will be able to withstand a 1 in a 1000-year flood event and those that supply 8,000 or fewer properties will be capable of withstanding a 1 in 100-year flood event.
- **Tree Cutting:** Vegetation growth near our overhead lines can come in contact with conductors to disrupt energy supply during storm events or windy days. Climate change, in the context of a warmer and wetter climate, is increasing vegetation growth rates which means we need to enhance our tree cutting approach to avoid disruption to our networks.

Climate change resilience

To ensure we have comprehensively captured future potential risks and opportunities (and to contribute to wider sector thinking) we have worked closely with several partner organisations through the Energy Networks Association (ENA), including other DNOs and sectors. Our approach to climate change resilience is outlined below, the process facilitates a whole system approach that allows us to gain an improved understanding of climate change adaptation risks and opportunities within our business.

We have identified eight priority climate change hazards which result in 15 risks across our network assets for mitigation in RIIO-ED2

Identify climate change hazards

We based our analysis on projections from the Met Office's latest models ('UKCP18') under their highest emissions scenario called 'Representative Concentration Pathway 8.5' (RCP8.5). RCP8.5 represents a 'worst case scenario' and assumes a best estimate increase in global mean surface temperature of 4.3°C by 2081-2100[18].

We worked with the Met Office and members of the ENA to assess the impact of these climate change projections on the electricity network. Through a series of workshops, we identified and prioritised the weather and climate related hazards which need consideration both now and into the future.

Eight hazards have been prioritised as posing the greatest risk to our business in the future:

1. Extreme high temperatures
2. Drought cycles
3. Prolonged/heavy rainfall
4. Intense short-duration rainfall
5. Sea level rise
6. Wetter conditions coincident with warmer temperatures and/or strong winds
7. Wildfire
8. Lightning

Identify impacts on our network

As part of our work with the ENA, we produced a climate risk assessment which identified 15 key risks on the electrical distribution networks caused by the priority climate change hazards (these are described in detail in Appendix 14: Climate resilience strategy). The resulting report was prepared by the ENA Climate Change Adaptation Reporting Group (CCARG) of gas and electricity distribution and transmission network operators, and provides the basis for the opportunities, risks and mitigations identified as part of our climate change adaptation strategy.

Assess the risks and identify current mitigations

We updated the evaluation of our current and future resilience against the 15 risks, using the ENA scoring framework, by considering the ability of our network to:

- Prevent the risk from materialising (Resistance)
- Mitigate the damage or loss from an event (Reliability)
- Provide continued service in the event of a disruption (Redundancy)
- Enable the fast and effective response and recovery in the event of a disruption (Response & Recovery)

The results of this analysis are summarised in Appendix 14: Climate resilience strategy. Ten of the 15 risks were identified as 'minor' as of 2021. Examples of the mitigations applied against these risks include:

- Our asset management strategy, which includes decisions such as improving asset condition and capacity, replacing/upsizing overhead line (OHL) conductors, improving load planning and monitoring, improving the stability of high voltage/extra high voltage (HV/EHV) pole and installing increased ventilation/AC across substations and tunnels, among others.
- The fact that many of our assets operate under capacity and to appropriate standards ensure they perform safely, even in high temperatures.
- Investment in establishing a DSO will increase visibility of network capacity and load, data availability and allow flexible network operation. For example, we are increasing the automation and remote monitoring capability across our low voltage network to provide a better understanding of demand profiles, this will also help us monitor asset performance against temperature rises.
- Our innovation program, including projects on: geospatial weather tracking, lightning impact modelling, identifying the link between soil type and fluid filled cable (FFC) leaks and the roll out of active pressure control units on FFCs.

Five risks were identified as 'moderate/major' as of 2021. These risks relate to flooding and vegetation growth and are covered in detail later in this section.

Adaptation Pathways and our Climate Change Action Plan

The risks and mitigations discussed above represent a current view (a baseline) of the severity of risks today and into the future. However, in order to continue to provide our customers with a quality service, we need to continually monitor and evaluate climate change risks.

18 Energy Industry Specific Risk Assessment on Climate Change Impacts, Work Package 3 Report, Oct 2020.

Chapter 10: Maintaining a safe & resilient network continued

We will use Adaptation Pathways (based on the risk thresholds of 'Minor', 'Moderate – Major' and 'Severe' against the present baseline risk, see Figure 35) to monitor climate change risks across our business and determine the actions that need to be taken.

Figure 35: Adaptation Pathways and their associated high level actions

Risk Threshold	High Level Actions
Start	Quarterly engagement with ENA Climate Change Working Group to review and assess climate change hazards. Identify and assess priority risks across the electricity and gas networks and score with respect to our network systems against current and future timelines. Develop joint mitigation options and review standards and legislation. Report on climate change risks to the DEFRA Adaptation Committee.
Minor	Continuous monitoring and tracking of risks as part of ENA Climate Change Working Group and within our corporate risk framework.
Moderate Major	Implement detailed assessment of risks on the network and analyse mitigation options to select the most cost-effective option. Incorporate the measure(s) within the proceeding regulatory submission to deliver over the period and aim to maintain or reduce risk level over subsequent time periods.
Severe	Take immediate actions to mitigate and control risk through cost-effective measures in the short-term and incorporate long-term mitigations as part of the proceeding regulatory submission.

The implementation of our Climate Change Action Plan is driven by our risk-based Adaptation Pathways which will enable us to take a more agile approach to resilience as the effects of climate change are realised over time. To ensure that these actions are implemented, ahead of RIIO-ED2 we will create a UK Power Networks Climate Change Resilience Steering Group to own, deliver and report on our Climate Change Action Plan (see Commitment below). Our existing corporate risk management governance will be utilised to help assess and monitor identified risks going forward, this will also include the consideration of climate change hazards being assessed against business functions and our supply chain. Furthermore, we will continue to work in a co-ordinated approach with the ENA working group, our energy sector partners and external industry stakeholders to improve our understanding of evolving risks. More detail on how we monitor and mitigate these risks can be found in Appendix 14: Climate resilience strategy.

Delivering our commitments

Commitment CR1

We will establish a steering group with key internal stakeholders to own and monitor the risks identified as part of the Climate Change Adaptation Strategy. The steering group will report to UK Power Networks executives and publicly report on progress against identified risks throughout RIIO-ED2 using the Annual Environmental Report.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	By actively monitoring climate change risks, we will ensure we remain agile to emerging threats, deepen our understanding of the challenges climate change poses and ensure we continue to deliver the standard of services our customers expect.	Climate change is seen as a global crisis with asset resilience being one of our customers' key priorities and providing a reliable service is seen as a base requirement now and in the future.

Flood Protection – accelerating our programme to protect customers

Flooding has been identified as a priority risk area in the assessment of our climate change resilience described above. In this section we describe in detail the flood protection measures that we will be putting in place to protect our customers in RIIO-ED2 and beyond.

Flood protection for electrical infrastructure is defined through the National Planning Policy Framework and national standard 'ENA ETR 138 Resilience to Flooding of Grid and Primary Substations'. We have made significant progress towards compliance with this standard, providing protection at 41 substation sites during DPCR5 and a further 59 so far during RIIO-ED1. For RIIO-ED2, we are ramping up our efforts to meet and indeed go beyond this standard sooner, working to protect 85 sites and approximately 1m customers between 2023 and 2028 at a cost of £17.1m.

Whilst this standard sets out in broad terms that all grid and primary substations that feed over 10,000 customers must be defended to a 1 in 1000-year flood event, we are lowering this threshold to 8,000 customers, acting now at sites we believe will reach 10,000 customers in the future due to load growth. All remaining primary substations at risk will be defended to a 1 in 100-year level.

Commitment AR2

We will enhance our compliance with ETR138 across our network, protecting the electricity supplied to customers from 85 substation sites deemed at risk from flooding by the end of RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
A total cost of delivery of £17.1m.	Included in baseline allowances.	1m customers supplied via at risk primary and grid sites will have a higher level of protection from flooding, reducing the risk of disruption to the service that they receive.	Our customers told us to accelerate our efforts to improve flood risk protection. (See key insights I-R1, I-R2 and I-R6 in our Line of Sight – Reliability and Asset Resilience document).

Our accelerated and enhanced programme is as a direct result of our customers telling us to go faster to protect those customers we have identified as being at risk. Before Phase 4 Options Testing, our ambition was to reach compliance with ETR 138 by the end of RIIO-ED3. However, 76% of domestic customers and 81% of businesses told us to protect all those we deem to be at risk as soon as possible. This goes beyond the standard and ensures we reach compliance sooner, hence Commitment AR2.

Through triangulation, which considered the trade-off between customer needs and deliverability, we concluded there was an economic case to protect more customers, resulting in us exceeding the ETR 138 standard. Our supporting EJP (EJP-AS-016) and associated CBA provides further detail on the different options we considered and how we have identified the 85 sites.

When delivering our plan, we will ensure value for money and flexibility by conducting individual site assessments at all risk sites and identifying the most appropriate solution for that site, enabling us to invest appropriately to bring each site up to the required level of protection. We will also consider whether there is opportunity to align what we do with third-party flood protection works that could give further beneficial outcomes of reducing the overall flood risk in a chosen area.

Projects will be prioritised through consideration of the size and type of load at risk along with customer numbers and demographics (e.g. vulnerable). For sites that will be protected towards the end of the period, we also have 1,000m of rapidly deployable temporary flood barriers as a secondary means to offer protection.

Tree Cutting – Increasing our programme to address climate change and reduce shorter interruptions

During high winds and storm events trees, branches and associated vegetation debris can cause interruptions to customers' electricity supplies. Approximately 24% of overhead line faults in our licence areas are due to growing or falling trees. This could be a momentary disruption (for example, tree branches touching a nearby power cable during high winds) or a longer-term disruption resulting from a tree coming down and knocking over overhead lines. The percentage of faults from trees increases significantly during severe weather conditions, therefore it is essential that appropriate vegetation management is deployed, particularly around EHV and 132kV networks to ensure a resilient supply to customers during exceptional storm events.

Tree cutting around overhead electrical infrastructure to enhance resilience is defined through the National Planning Policy Framework and national standard *ENA ETR 132 – Improving resilience of overhead networks under abnormal weather conditions using a risk-based approach*, with which compliance must be met by 2034 and our plan is to deliver this requirement. To work toward this we are planning to spend £89.8m on tree cutting, an 11.3% increase on RIIO-ED1 levels. The two main reasons why increased expenditure is required to meet our customers' expectations are:

1. **Climate Change is contributing to a need to increase the volumes of tree cutting:**
   - **Climate change is increasing the vegetation growth** period each year. The Met Office's most recent 'State of the UK Climate' Report[19] indicates the future is expected to feature extended vegetation growth periods with evidence provided showing the leaf growing season in 2019 has extended by 12.2 days over the last decade. The effect of an increased growing seasons is already beginning to be evident on recent LiDAR surveys which have highlighted an increase in the percentage of our overhead lines at risk of encroachment from nearby vegetation (in 2014 39% of our HV lines were at risk of encroachment from vegetation while by 2019 this had increased to 42%.)
   - **The incidence of severe weather events such as strong winds together with heavy rainfall is predicted to increase**, indeed, the average rainfall in the UK has increased by 12% over 1991 to 2020 compared with the average for 1960 to 1990. The combination of wind and rain brings about an increased likelihood of trees being uprooted and vegetation impact on electricity infrastructure.
2. **Networks in the UK Power Networks area are particularly exposed to the effects of trees suffering from Ash dieback:** Ash dieback is a tree disease that is prevalent in our area. The Woodland Trust have predicted that it will kill around 80% of ash trees across the UK. We have the highest concentration of ash trees in the UK and in 2013 it was confirmed we also had the highest number of confirmed cases of Ash dieback in the UK. These trees pose a threat both to the public, whether on footpaths, highways or railways, and to our network due to the risk of them falling. Normal tree cutting techniques are not practical when a tree has Ash dieback disease and we need to use specialist clearance at up to three or four times the cost of cutting a healthy tree.

The above two factors contribute to a need to increase volumes of tree cutting activity and costs in RIIO-ED2.

19 State of the UK Climate – Met Office.

Chapter 10: Maintaining a safe & resilient network continued

10.6 Workforce resilience

A competent, motivated, and stable workforce is an essential pre-requisite to our provision of a highly reliable network and excellence in customer service. Our people have always been an important part of our performance. Some of our achievements in RIIO-ED1 are shown below:

Our workforce resilience performance in RIIO-ED1
We are among only 2% of organisations of our size to hold an Investors in People Platinum Award. Bruce MacRae, the IiP-licensed practitioner who carried out UK Power Networks' review, said: "I believe UK Power Networks are the first DNO and indeed major utility to achieve the prestigious Platinum award. This is an exceptional achievement given the disparate nature of the workforce and just reward for the entire organisation's persistent drive over the past ten years to become genuinely high performing."
Our employee engagement score placed us in the Sunday Times Best Employers list six years in a row – another DNO first.
We have secured the National Equality Standard (NES) accreditation for the second time, the only DNO to have achieved the award.
We received the Diversity Award at the 2019 Utility Week Awards and we placed third on the UK's Inclusive Employers Top 50 listing in 2020.
We received the highest score in Ofsted's assessment of our apprenticeships, placing us in the top 3% nationally with a 97% retention rate of apprentices.

In setting our workforce resilience strategy for RIIO-ED2 we have considered a wide range of factors, including what our people tell us, our overall strategic approach to the delivery of RIIO-ED2, customer engagement, input from our Trade Unions and our CEG, and the expected tightening landscape for digital and Net Zero related skills in the GB economy in the coming years.

Our assessment of these factors and how they have driven our workforce resilience strategy is detailed in the PESTLE analysis in Appendix 13: Workforce resilience strategy. In Appendix 13, we have also summarised how engagement with our CEG has been reflected in our plan.

Our RIIO-ED2 workforce planning is based on addressing a wide range of challenges, in particular:

- Our desire to reflect the highly diverse population we serve in a sector faced with an aging workforce and an under-representation of women and minorities (particularly at management level).
- The rapid change taking place in the energy industry and the uncertainty around the nature, volume and timing of the work and skills required to respond to any Net Zero scenario that materialises.
- The need to establish new teams tasked with tackling emergent data and cyber security challenges.
- Continuing to accommodate and address the stresses of modern working life and its impact on mental and physical health.
- The COVID-19 pandemic and how it has altered the future of work, flexible working and the balance between work and caring responsibilities.

We have organised our plans under three strategic pillars which are described further below.

Our strategy

Our PESTLE analysis and the challenges identified above, led us to base our workforce resilience strategy on the three strategic pillars shown below:

1. Continuing to be an employer of choice

Retain an exemplary safety record. Protect the health, safety and mental well-being of our team.

Maintain a motivated and engaged workforce that drives productivity and innovation.

Push forward with building a diverse workforce to reflect the communities we serve largely through improving equality of access across a range of groups.

Increase diversity in our management team.

2. Building the skills required for the DNO of the future

Ensure we source and develop the skills required to deliver our ambitious DSO plans.

Source and develop the digital, information and customer skills that support delivery of Net Zero through training, reskilling and the creation of a Digital Skills Academy.

3. Innovating for all

Deliver a flexible resourcing model that supports the scaling up of our delivery should the demand for LCTs and the Net Zero transition be greater than in our base plan.

Ensure the management capacity and skills are available to the business so we can deliver for our customers regardless of the level of demand for LCTs.

Continuing to be an employer of choice

Our ambition is informed by what the best employers are offering their employees – not just employers in the energy and utility sector. This mindset enables us to attract, develop and retain the skills we need. This will be important for retaining our existing staff but also attracting new team members.

We undertake extensive benchmarking of our performance as an employer and through this, we learned that there were some key opportunities for us to develop in RIIO-ED2 to maintain leading practice. Key findings from our research include:

- "When companies invest in diversity and inclusion, they are in a better position to create more adaptive, effective teams and more likely to recognise diversity as a competitive advantage." (McKinsey)
- The Living Wage Foundation reports that 75% of employers surveyed said paying the living wage increased motivation and retention rates for employees, while 58% said it improved relations between managers and their staff.
- Financial Services Company Aviva promotes volunteering to build resilience. They found that 96% of their volunteers felt that their action had increased their level of wellbeing, 87% agreed it helped their personal development and 94% agreed it had a positive impact on how they and their team behave.
- The Chartered Management Institute has published actions leaders can take to improve BAME diversity in the workplace. These include measuring, reporting and benchmarking diversity.
- The Government Equalities Office Gender Pay Gap Service identifies key actions employers can undertake to reduce the gender pay gap and improve gender equality in organisations.

Our workforce resilience strategy (Appendix 13) demonstrates in full how we will develop and maintain a healthy, modern, skilled and sustainable workforce fit to deliver our services safely for our customers. At the same time, we want to make sure that our workforce reflects the diverse communities we serve. Our employer of choice commitments (WR1 and WR2 below) focus on ensuring we have the healthy, engaged, diverse workforce we require for RIIO-ED2 and beyond. The cost of delivery of our plans will be funded from our baseline allowances.

Delivering our commitments

Commitment WR1

We will sustain high levels of employee engagement throughout RIIO-ED2, ensuring that the benefits of a motivated work force are passed onto our consumers. We will benchmark nationally and globally as a leader in the field and target retention of our Platinum Investors in People accreditation and Best Companies listing throughout RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	Engaged, healthy and satisfied employees are more motivated and productive; driving improvements that benefit customer service.	Conducted a broad study of best practice that engaged numerous stakeholders detailed in our Workforce resilience strategy Appendix 13. (See key insights I-WFR1, I-WFR2 and I-WFR3 in our Line of Sight – Workforce resilience).

Our commitment is backed with a clear action plan, based around eight factors of engagement: 'Leadership', 'My Company', 'My Team', 'My Manager', 'Fair Deal', 'Personal Growth', 'Giving Something Back' and 'Wellbeing'. Annual engagement strategies are driven by employee feedback and are designed to cover each of the factors.

Our action plan includes the following:

- **Enhancing our wellbeing programmes** – we understand the impacts that modern life (and the pandemic) can have on an individuals' mental and physical health, which is why we plan to:
  - Train our managers further in mental health awareness.
  - Encourage employees to complete their own wellness action plan to support their psychological wellbeing. This will be supported by delivering self-management and lifestyle advice.
  - Closely monitoring cases of mental health problems in the workplace, acting on any trends that emerge.
  - Work with Occupational Health Clinical governance to conduct a gap analysis to find key areas where we should focus our efforts. This will be supported by external benchmarking to achieve an independent accreditation for wellbeing.
- **Evolving our charity work** – While we are scored as a leading DNO for our Environmental Societal and Governance (ESG) work[20], our employees are always keen to do more to support our communities. In response, for RIIO-ED2, we are proposing to evolve our charitable work, with the launch of a UK Power Networks Employee Foundation and Social Pledge.

20 We participate in a weekly survey of ESG contributions by DNO prepared by Alva and we frequently are at the top of the Alva table of performance in this area.

Chapter 10: Maintaining a safe & resilient network continued

Commitment WR2

We will continue to build a diverse workforce to reflect and serve our communities by further improving equality of employment access, measuring continuous performance improvement. We will retain our NES accreditation and status as a Top 50 Inclusive Employer throughout RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in Totex expenditure.	Included in baseline allowances.	A diverse workforce enhances our ability to engage effectively with our customers, better understand their needs and deliver a service which fully reflects their requirements.	Conducted a broad study of best practice that engaged numerous stakeholders detailed in our workforce resilience strategy (Appendix 13). (See key insights I-WFR1, I-WFR2 and I-WFR3 in our Line of Sight – Workforce resilience).

It is important for our workforce to represent and relate to the communities that we serve. In addition to helping build a stronger relationship with our customers, a diverse and inclusive workforce also brings diversity of thought, challenge and opinion; this ultimately drives better decision making and therefore better performance. Our ongoing commitment to diversity will allow us to remain competitive, attract and retain the best talent, and create an inclusive environment that enables our workforce to continue to provide an excellent level of support to all our customers.

As an organisation with a high staff retention rate, whose open roles largely require highly specialist skills, it can be difficult to deliver rapid changes in diversity whilst ensuring job security. We believe that activities that empower minority candidates to attain specialist roles will prove more effective than an overarching minority recruitment target. We also consulted with our Trade Unions who advised that the approach of providing equality of access rather than quotas was a more sustainable way to deliver our diversity objectives.

Our plan for delivery of Commitment WR2 is to:

- **Increase BAME applications for early years roles** – we will work with local schools' BAME Communities to educate on engineering and seek to increase applications from the BAME community to these early career roles.
- **Establish a 'See it to be it' programme of work experience placements** – the programme will target candidates from disadvantaged/under-represented groups, targeting 100 students over RIIO-ED2.
- **Enhance internal recruitment candidate support** – delivered through pre-interview support for under-represented groups, including coaching for interviews and CV writing.
- **Continue to offer part-time and job-sharing roles –** We plan to offer 50% of leadership and management roles on a flexible working basis by 2028.
- **Reduce the gender pay gap –** achieve gender parity in non-direct roles by 2028.
- **Work closely with other DNOs on the development of workforce resilience metrics for RIIO-ED2.**
- **Provide industrial placement opportunities for students** (including those studying Electrical Engineering).
- **Deliver Equality, Diversity and Inclusion (EDI) Training** for all our employees by the end of the RIIO-ED2 period including unconscious bias training.

Building the skills required for the DNO of the future

We have identified a range of areas in which we will be driving change in our business including: DSO, cyber-security and our role as an important data provider for network users looking to make the Net Zero transition. We have undertaken detailed work to identify how these changes will impact our plans and the skills our business requires.

We have identified several new roles with specific skills requirements, including approximately:

- 110 roles in the newly established DSO.
- 45 digital roles in data analytics, DevOps, data engineering and specialist cyber defence.

We recognise that many of these skills are in high in demand and in short supply[21] which is why we have put together the range of sourcing strategies in Figure 36 and also made our commitment (WR3) to invest in training.

21 See for example 'Huge shortage' in digital skills says Apprentice winner – BBC News.

Figure 36: Sourcing strategies for the skills we will require for RIIO-ED2 and beyond

Skills	Sourcing strategies
DSO skills: network planning, operations and markets	• Use our innovation function to attract and incubate new talent and then transition them into business as usual roles in the wider business. • Recruit specialist skills such as in market operations and flexibility commercial contracts where these are not easily available in-house and we need external perspectives.
Digital skills: data engineering, Dev Ops, analytics	• We are investing now to recruit new skills in data analytics and stronger cyber capability. • We are establishing "communities of practice" to upskill wider business resources in these specialist areas.
Customer research and engagement	• Recruit externally to provide specialist customer research skills to be able to manage external research agencies and evolve the engagement strategies during RIIO-ED2 • We will supplement these resources with research agency contracts. We will build relationships with the agencies, so they invest in understanding our business and the sector.
Local authority engagement planning	• We will recruit new skills and merge them with existing planning teams that will sit under the DSO Network Planning function. They will work collaboratively with local authorities to enable network investment that supports delivery of local climate action plans.
Enhanced customer service and key account management	• Additional key account management roles – specifically in our connections team to manage increasing workloads and more complex solutions (e.g. multi technology connection requirements) as well as the DSO to manage ongoing commercial contracts and operational issues with connected DER. • Enhanced customer service roles that can manage and continually update digital configurations in IVR, Web and CRM applications. These are hybrid business/IT roles but will sit under Customer Services.

We did not engage deeply with our customers on workforce resilience – other areas of our plan, such as providing a reliable supply and protecting the environment, came higher up on their priority list. Moreover, the qualitative feedback that we received told us this should be an activity that we should consider to be business as usual.

To supplement the limited customer engagement, we utilised stakeholder engagement to uncover and build further insight. This reaffirmed the need to develop new talent, and confirmed that new talent will be attracted by a robust corporate social responsibility agenda, the opportunity to take part in innovation and the prospect of working for an organisation that demonstrates environmental leadership. Through ongoing engagement with our Trade Unions we know that they support our desire to ensure our workforce better represents the communities we serve.

Our Trade Unions welcomed our continuing commitment to provide secure long term employment, our continuing investment in training and apprenticeships, and our commitment to collaborative working with them.

Based on this feedback, our RIIO-ED2 commitment to skills development is shown below.

Commitment WR3

We will establish a Digital Skills Academy to provide DSO and digital future skills, deliver 510 accredited apprenticeship NVQs in Leadership and Management and 200 IET accredited technical or digital apprenticeships throughout RIIO-ED2. We will target the achievement of an "Outstanding" OFSTED rating for our training programmes in the period.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£12.0m	Included in baseline allowances.	We will be able to deliver service improvements and facilitate the low carbon technologies that our customers desire. A stable, competent, and well-trained workforce makes a direct contribution to network reliability and quality of supply, which in turn benefits our customers.	Conducted a broad study of best practice that engaged numerous stakeholders detailed in our Workforce resilience strategy (Appendix 13). (See key insights I-WFR1, I-WFR2 and I-WFR3 in our Line of Sight – Workforce resilience).

Chapter 10: Maintaining a safe & resilient network continued

We will:

- **Develop and roll out a Digital Skills Academy.** The academy will offer point of need training and provide best in class skills and operational competencies that facilitate 'digital first', DSO and a smarter network. We expect the development of the Academy to cost £12m.
- **Optimise the apprenticeship levy** to maintain high quality vocational programmes and deliver professionally accredited apprenticeships with a pass rate of 95% during RIIO-ED2.
- **Recognise our 'levelling up' agenda** by redistributing a proportion of our apprenticeship levy to training providers in LCT activities, including providing local offerings that reflect the needs and priorities of our communities.
- **Deliver flexible, intuitive, point of need self-directed learning,** empowering employees to take ownership of their personal and professional development (including by providing our employees and stakeholders with content, devices and software to learn anytime, anywhere).
- **Attract people to the energy sector** by continuing with successful initiatives such as attending careers fairs, insight days, and outreach to schools and universities. In 2019, over 17,000 people attended our stalls at schools and colleges. We also believe our first two workforce resilience commitments (WR1 and WR2) will support this objective.

Building a flexible agile workforce to deliver in RIIO-ED2 and beyond

We have responsibly developed our workforce planning for RIIO-ED2 to take into account:

- Managing the attrition of headcount that can naturally occur in our workforce as a result of retirement and staff turnover.
- Our changing skills requirement.
- Our approach to RIIO-ED2 with its focus on higher confidence investments combined with the capability to scale up our activities as the demand for LCTs increases. This requires us to have access to workforce flexibility to deliver the scale of activity that may be required.

As our workforce resilience strategy (Appendix 13) demonstrates, we have undertaken an assessment of the workload and staffing required for our ex-ante Business Plan and the different associated scenarios outlined in Figure 2. Transitioning to the base case scenario would require an additional:

- 250 operational staff
- 120 roles in DSO and digital
- 160 new roles in Connections, with specific skills required in quotations, project design and key account management

In response to our review of our workforce renewal plan, and taking feedback from key stakeholders, we have increased our planned apprentice intake from 20 to 40 per annum. This level of recruitment will continue throughout the RIIO-ED2 period.

Transitioning to the Net Zero highest scenario would require a further 215 roles and approximately 770 additional cable, line and substation engineers from our contractors and supply chain. This is summarised in Figure 37 below.

Figure 37: Workforce requirements for RIIO-ED2

Name of role	Total existing resource	Required resources to deliver base case	Additional employees to deliver Net Zero highest scenario	Additional contractors to deliver Net Zero highest scenario	Risks and mitigation measures
Operational staff (e.g. linesmen, jointers, fitters and engineers)	2,260	2,510	110	250	Increasing the number of apprenticeships, training and upskilling more multi-skilled staff.
DSO & Digital	60	180	35		
Connections	360	520	70		
Contractors				520	Supply chain preparations underway.
Total	**2,680**	**3,210**	**215**	**770**	

22 The 30% increase in contractors accounts for delivery of Net Zero, increased connections activity and the delivery of capital works relating to asset replacement programmes.

We have gained confidence we can deliver this resourcing plan within the timescales that will be required because:

- We have reviewed the potential risks that could manifest and have identified corresponding mitigating actions to address these.
- The additional recruitment (plus recruitment for business as usual staff turnover) is within our existing capacity to hire.
- Times to hire new staff tend to average 6 weeks and at peak times 10 weeks, so we can respond quickly to demand particularly as we monitor new connection enquiries as a leading indicator of upcoming work required on our networks.
- We have an application to vacancy ratio of 20:1 (40:1 for apprentices) so our strategy of being an employer of choice means we can access the applicants we need in the market.
- We are working with our alliance partners and supply chain contractors to put resourcing arrangements in place.
- We have experience of flexing our organisation and management to respond to customers' requirements, for example when we connected significant amounts of solar powered distributed generation to our networks.
- Our training programme (see commitment WR3 above) will also provide the skills we need.
- In 2019, we launched a new Level 4 Engineering Higher Apprenticeship which is an accelerated development programme, focused on upskilling individuals with existing operational experience to become high calibre qualified engineers. We will be expanding this to include specialist areas such as LCT, Design and Digital.
- We will continue to track the market, specifically for potential skills shortages and adapt our plans appropriately.

10.7 Supply chain resilience

The exact nature and speed of Net Zero uptake is inherently uncertain, therefore the ability of our supply chain to work with us and adapt manufacturing levels to facilitate the decarbonisation of the UK economy is crucial. We design resilience into our processes as a standard procedure – for example, we hold a minimum of four contracts for any key material and these contracts are split across different locations and transport routes. We have mapped the critical materials required to facilitate the Net Zero transition and have utilised our relationships to establish that even an increase in demand of 100% would be well within the current annual output capacity of our plant and cable suppliers.

Our Logistics team work closely with our suppliers to forecast demand and maintain high inbound performance levels. Our material contracts are long term, enabling suppliers to invest in manufacturing equipment and work in partnership with us. Typically, we purchase standard products, on set lead times against which we track delivery on an ongoing basis. We maintain a clear stock management policy, track global supply issues and material shortages to flag potential risks. This enables us to react ahead of issues arising.

We recognise that with the increased uncertainty in the external environment there is a need for greater confidence in those that support us in the delivery of services to our customers. To continue to invest in our assurance of our supply chain partners' standards, we are trialling an approach working with Signal AI – a specialist organisation – to provide near real time monitoring of the organisations we work with. This innovative method promises to pull data insight from various sources to allow for fast and effective intelligence which can be used to make cost-efficient business decisions.

We are mindful that decarbonisation is a global agenda. Therefore, should all DNOs increase volume requirements at the same time, we would need to work with our supply chain to enable more capacity for all.

Having experienced the macro-economic challenges of Brexit and COVID-19, our resilience and ability to react to global changes in demand have recently been tried and tested. Over this period, we have adjusted our inventory from £26m to £41m to ensure coverage in the event of material shortages, supply issues and adverse weather events. This was mobilised within a six month period whilst maintaining existing delivery levels. Effective engagement and utilisation of our supply chain meant that we were able to increase inbound deliveries with no major stock issues through this period. Should an increase in demand occur for future requirements we have a proven record and can react accordingly with a measured lead-in time. Our key materials, works and services suppliers have confirmed they can work with us over a 12 month period to increase and sustain workload by 30% with no material impact on performance. This 30% represents the increase in work we would expect between our baseline ex-ante position and the highest scenario we are forecasting under Uncertainty Mechanisms and the impact of Ofgem's SCR – demonstrating that alongside our supply chain, we can deliver under any decarbonisation scenario. Key to delivering on this is our continued dialogue and engagement with our suppliers as our plans adapt to meet the country's journey to Net Zero.

Chapter 10: Maintaining a safe & resilient network continued

10.8 Cyber resilience

We are committed to keeping our critical systems secure

Our Corporate IT and Industrial Control Systems are essential to the operation of our networks and the supply of electricity. Our increasing dependence on technology and devices also substantially increases the surfaces or entry points for cyber-attack. Our ability to detect and respond to a cyber-attack is therefore vital and our focus remains on continually improving our cyber resilience. Given that the region we serve includes the capital city, financial centre and home of the UK Government, we regard regulatory requirements as a minimum standard to manage the cyber threat.

Our strategy

To achieve our commitment, our strategy focuses on four key objectives:

1. Stay ahead of threats to keep the lights on

Strengthening our ability to proactively detect and manage advanced cyber threats.

2. Secure the Distribution System Operator

Upskilling our operational technology (OT) staff and using advanced techniques to protect our network assets.

3. Further strengthening our cyber resilience

Extending the security of our suppliers and systems and internalising high-value security capabilities to improve service and build organisational know-how.

4. Support innovation and regulatory advancements

Support innovation in the energy sector by using cutting edge projects and sharing the output with Ofgem, the NCSC and industry.

Commitment C1

We will continue to enhance our resilience to sophisticated cyber-attacks throughout RIIO-ED2 and comply with the Network and Information Systems Regulations 2018 through the National Cyber Security Centre (NCSC) Cyber Assessment Framework; in order to protect our networks, secure our customer data, and keep the public safe.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£52.3m, competitively tendered to ensure value for customers.	PCD.	We can continue to provide a high quality and reliable service to our customers. These protections also ensure we can distribute electricity whilst keeping the public safe and maintaining the security of customer data in the process.	Independent panel of cyber security experts from other sectors informed our initiatives and support the plan as presented.

We have developed carefully-considered action plans to support delivery of our strategic objectives. Key tasks include:

1. Enhanced monitoring, automation and control of our IT estate;
2. Focusing on training and education to modify risky behaviours of our staff; and
3. Working with our suppliers to enhance their security and enshrining "security by design" thinking in new services.

We are facing an ever-growing cyber threat

The cyber threat landscape is constantly changing, particularly as a result of the increasing use of technology in the operation of our electricity networks through our plans for flexibility, innovation and digitalisation. In its 2019 annual review, the NCSC identified the energy sector as a major target for disruption – and the utility sector has been responding to the challenge. We describe the evolving landscape of cyber threats faced by UK Power Networks in Appendix 12: Cyber resilience strategy.

We have assessed our exposure to a set of cyber security threat scenarios and created a quantified understanding of the associated business risks, which is the foundation of our plan. Our cyber threat and risk assessment is confidential. Further details will be shared with Ofgem as per the Business Plan guidance.

We have a proven track record in managing the cyber threat

We achieved important cyber security milestones during the RIIO-ED1 regulatory period and we have a consistent cyber security delivery record over the last nine years. Of particular note is that we were the first DNO to establish a 24/7 security monitoring capability, and we achieved full compliance with the NCSC Cyber Assessment Framework (CAF) Basic Profile for operators of essential services.

We have also taken a leadership role within our industry. This has included:

- Co-hosting a cyber best practice exchange with the Edison Electric Institute (EEI) in December 2018, attended by leading organisations from around the world.
- Participating in a series of cross-operator exercises with the UK NCSC, Department for Business, Energy & Industrial Strategy (BEIS) and three other DNOs to simulate a sophisticated national-level cyber-attack.
- Chairing the General Electric (GE) Cyber Security Forum and Energy Networks Association (ENA) Cyber Security Task Group.
- Collaborating with Ofgem and NCSC to share our security blueprint for a Digital Substation, which we understand from Ofgem may be used for future standards and guidance.

Our plan delivers value for customers

We have ensured value for money for our plan in a variety of ways. In particular we have:

- Ensured we have a robust evidence of need – we have used an Independent Expert Panel to review and challenge our risk assessments.
- Market tested the costs to reveal competitive market prices. We have received market estimates for our proposed activities, these have provided us with realistic budgets for the items that require investment. We worked with our procurement team to issue multiple requests for information by consolidating our cyber resilience plan into four lots. Up to three specialist suppliers per lot were selected. Following analysis of their responses, we assessed their proposals and costs – and looked for optimisations.
- Adopted a prototyping approach. Several aspects of our plan break new technological ground – and thus require preliminary studies and proofs of concept prior to implementation. This work may result in increased expenditure, which will be accessed via a re-opener.

Our work on costs is evidenced in Appendix 12: Cyber resilience strategy.

We have taken a comprehensive approach to develop our plan

We assessed the national and the industry context, our commitments for the RIIO-ED2 period and our level of alignment to Ofgem's RIIO-2 Cyber Resilience Guidelines.

We validated our strategy against future national standards and regulation including:

- The anticipated review of the NIS Regulations in 2022 and the potential future evolution of the CAF.
- The regulation for consumer Internet of Things (IoT) being created by the Department for Digital, Culture, Media & Sport.
- The increasing standardisation of products and systems.
- New product certification schemes.

We also organised thematic working groups within the business to identify dependencies and interfaces across our RIIO-ED2 plans. This ensures that our plan supports other business investments and aligns with UK Power Networks' overall strategy.

Our plan has been independently challenged by experts

As part of our preparation for RIIO-ED2, we assembled an independent expert panel (IEP) of world-leading cyber security experts drawn from a range of sectors including defence, finance, academia, and energy. The panel has challenged our plan and ambition based on wider UK – and global – cyber security innovations.

Our independent expert panel was clear that – since our area of operation includes London – we should be innovating and evolving to respond to the heightened threat exposure and increased impact of a cyber incident. Of particular note were our ambitions for a 'zero-trust' system – authenticating every device on the network, and a 'purple team' – continuously simulating attacks and defence against the electricity network. The IEP has noted that we are planning to deploy advanced cyber capabilities for an operational technology environment; applying concepts seen in the defence and finance industries.

The full view of the panel can be found in Appendix 12: Cyber resilience strategy.

Our plan is ambitious – but realistic

We know our plan for cyber resilience is ambitious because we are targeting the performance of leading companies, not just leading DNOs or leaders from the energy sector. We know we are targeting best practice because we have been advised by cyber security leaders from across the sector.

We know that achieving this plan is realistic because we have already delivered significant change throughout RIIO-ED1. We improved our cyber security and achieved compliance with the requirements of the EU Directive on security of network and information systems (NIS Directive). We also delivered significant projects over the RIIO-ED1 period that have successfully secured and strengthened our information technology and operational technology.

10.9 Electricity System Restoration (ESR)

Electricity System Restoration (ESR) is the process by which we would re-energise our networks after an incident involving the total loss of supply across the transmission network. Re-energising a network is a complex operation that requires parts of the network to be brought back on supply in a particular order. As a result, for network equipment that is off supply there has to be an inherent ability to remain operational throughout an ESR scenario through the means of battery power back-up. This ensures the network can be controlled and re-configured appropriately to support the re-energising of networks.

Chapter 10: Maintaining a safe & resilient network continued

BEIS has recently announced its intention to enhance the current ESR standard which defines the length of time network equipment needs to remain operational in the event of a total loss of electricity supply. The introduction of this standard would have implications across our network, with greater resources required across control room, contact centre, staff and maintenance processes, with substation batteries, protection and telecommunication systems all requiring enhancement. We will work together with BEIS to understand the new requirements in sufficient detail. Once these have been confirmed, any additional efficient costs will be subject to the appropriate regulatory re-opener as required.

10.10 Telecoms

Telecoms infrastructure investment is a priority for RIIO-ED2

We depend on a range of telecommunications systems to manage and operate our network; configuring and re-configuring the system to keep the network operating safely and reliably. To ensure that we can continue to do so effectively in the face of new challenges, we need to invest in our telecommunication infrastructure. This is a priority area for us because it is essential to delivering the reliability of electricity supplies. Telecommunications investment is also important for enabling our DSO capability development and, as such, our ability to facilitate the Net Zero transition expected by our customers.

Our telecoms strategy is focussed on resilience

We exclusively utilise Internet-Protocol (IP) communications to provide supervisory control and data acquisition (SCADA) and Operational Telecommunications (OT) to substation sites (from 132kV to LV). We are a global pioneer in the use of IP for operational telecoms, having commenced the migration of its platform to IP in 2010. Currently we utilise a suite of satellite, mobile, copper and fibre systems to provide SCADA communications to approximately 37,500 substations across our network.

Using IP gives us unparalleled capability to use a wide variety of communications systems (and to easily make use of any commercially available and private systems) to provide the most cost-efficient communications to any substation. It also allows us to easily change the communications to a substation if the site's requirement can no longer be met by the currently installed systems or if new technology becomes available.

We plan to invest in communications to support DSO functions and to replace retiring systems

Playing our full role in facilitating Net Zero means developing DSO functions to support the cost-effective deployment of low carbon technologies on our network. Establishing these functions requires us to have increased monitoring, automation and active network management capabilities. Over the course of RIIO-ED2 and beyond we will invest in our Operational Telecoms (OT) systems to provide:

- Higher geographic coverage of telecommunications (e.g. to reach rural DG sites).
- Coverage deeper in the network (e.g. to reach lower voltage, street level sites).
- Higher bandwidth requirements (due to more, and more frequent, data transfer).
- Higher resilience needs due to operational reliance on telemetry information.

In addition, two telecommunications solutions that we currently use are due to be decommissioned. We currently utilise the Airwave emergency communications network – shared with other services such as the police – for the provision of voice communications during emergency situations/power outages. This system is being terminated in approximately 2025. Similarly, the BT PSTN[23] is due to be switched off in 2025, meaning that the fixed phone lines to around 520 substations will no longer work. To ensure that we continue to have the communications capabilities we need in normal and emergency situations we need to invest in alternatives.

Our RIIO-ED2 plan enables us to enhance our telecommunications capabilities and resilience

To respond to the changing requirements of our system and address the gaps in our telecommunications capabilities created by the switch-off of Airwave and PSTN, we have identified four areas of investment which we plan to undertake during RIIO-ED2.

We have summarised these below:

- **Replace Remote Terminal Units (RTUs):** Replace approximately 900 Primary and 1,900 Secondary RTUs. These are currently not supported by equipment manufacturers and cannot accommodate the enhanced functionality required by the DSO. The new RTUs will allow increased flexibility and performance at reduced cost.
- **PSTN switch-off:** we will implement an alternative solution for the 520 secondary substations that will be affected by the PSTN switch off.
- **General Packet Radio System (GPRS) telecommunications replacement:** we will upgrade 11,000 substations across London from legacy GPRS communications to higher bandwidth and more resilient 4G communications.
- **Develop innovative Voice over IP (VoIP) technology:** we will continue our RIIO-ED1 activities on providing a resilient voice communications over IP technology that can be used during emergency situations/power outages.
- **Fibre network cost optimisation:** Upgrade the rented services elements of our fibre network serving 200 of our key primary and grid substations across EPN and SPN. This will move us into the next generation of rented services and deliver significant operating expenses (OPEX) savings.

Full details of the options, cost and benefits associated with our telecommunications investment plans are set out in our EJP documents: EJP-SG-001 to EJP-SG-006 and EJP-SG-010.

23 PSTN (Public Switched Telephone Network).

10.11 Physical security

The security of our assets is achieved by protecting vulnerable and remote substation sites from potential damage, either from vandalism, terrorism, or theft. This protection ensures that these remote sites maintain a level of resilience appropriate to their location and connected customers.

For sites that connect Critical National Infrastructure, this resilience is even more crucial. The Physical Security Upgrade Programme (PSUP), enforced by BEIS and Ofgem, defines levels of physical security, processes and procedures at any designated CNI site to ensure enhanced levels of protection.

As a result of the work we delivered in RIIO-ED1, all CNI sites within our three licence areas are physically protected at a level that meets the current set standards. However, BEIS are in the process of reviewing those standards. Any new designated CNI sites and associated costs that are identified will be sought using the appropriate regulatory re-opener as required.

10.12 Safety

Having an excellent Health & Safety record is fundamental to our vision to be an employer of choice, a respected corporate citizen and sustainably cost efficient. In our view, we can only claim great operational performance if we also achieve an exemplary safety record. UK Power Networks is proud of its class leading safety performance during the RIIO-ED1 period.

Our performance in numbers

#1
DNO for safety performance 7 years running

62%
reduction in LTIs since the start of RIIO-ED1 from 13 to five

72%
reduction in Total Recordable Incident Rate (TRIR) since the start of RIIO-ED1 from 0.18 to 0.05

64%
reduction in Member of Public injuries over RIIO-ED1

For RIIO-ED2 we are setting ourselves ambitious targets to further improve our sector-leading performance and to ensure the highest levels of safety for our staff, contractors and the public. We are therefore making the following commitments to our staff and customers in RIIO-ED2:

1. Reduce the Total Recordable Incident Rate to <0.05 by the end of the period.
2. We will reduce the number of third-party overhead line and underground cable strikes by at least 20% for each year over RIIO-ED2 (relative to the average of RIIO-ED1 actuals from 2015-2020).
3. Increase our commitment to engage with the public around safety, focusing on those who are at highest risk of injury from our networks (engaging with 300,000 people per year from 250,000 people per year during RIIO-ED1).

We describe our commitments below. In order to achieve these ambitions our focus needs to be relentless. By instilling a sense of passion and purpose about safety in each and every one of our employees and supply chain partners, we give ourselves the best chance of eradicating all injuries from our business.

Our safety initiatives will be funded from our baseline allowances – we are not seeking any additional allowances.

Our RIIO-ED1 Performance

Our RIIO-ED1 performance, including how we have applied innovative solutions to improve the safety of our networks, is described in detail in Appendix 15: Safety.

When benchmarked with other DNOs in Great Britain, we have the best and most consistent performance in terms of lost time injuries to both employees and contractors. When benchmarked with other similarly large companies operating in other sectors, we also lead in terms of lost time injury frequency rate and total recordable incident rate. We have also delivered excellent improvements in public safety and have led on national joint industry campaigns targeting high risk groups such as agriculture and construction.

Chapter 10: Maintaining a safe & resilient network continued

This level of sustained performance is not a coincidence, it is predicated on continuous improvement in all areas of the safety management system. Examples include:

- A rigorous approach to risk control.
- Effectively learning from incident data and root causes.
- Sharing best practice.
- Taking learning from behavioural science to develop and deliver a leading-edge behavioural culture change programme that we call 'Stay Safe'.
- Developing impactful communications that are widely recognised to challenge beliefs.
- Empowering people to speak up and look out for each other.
- Ensuring that effective support networks are in place to enable people to make good choices.

Our strong record is underpinned by a robust safety culture that is embedded through all levels of the organisation.

How we developed our commitments

Our safety initiatives were developed through a combination of market research, stakeholder engagement and horizon scanning.

Market research, customer and stakeholder engagement

We believe that regular engagement on safety (with the HSE, Trade Unions, other DNOs, and with customers and stakeholders) is fundamental for keeping up to speed on new and innovative ways to reduce harm. It also allows us to share learnings from our own experience.

Whilst not a heavy area of debate across our core RIIO-ED2 engagement programme some central themes were observed. Namely:

1. **Customers and stakeholders see safety as a core remit:** it is a basic expectation that any responsible company should keep their employees and the public safe.
2. **Stakeholders expect us to share relevant safety information:** this is particularly true as the electricity sector evolves and the public's interaction with the network changes (e.g. LCT adoption).
3. **Some groups of customers are more sensitive to safety issues:** for example customers in vulnerable situations may benefit from tailored safety advice (see commitment VS5 in Section 9.2: Consumer vulnerability).

Additionally, we have continued our work testing a number of initiatives around public safety awareness with expert stakeholders including the National Farmers Union (NFU), the Road Haulage Association (RHA), PelicanCorp, Eurovia, British Sugar, LineSearch BeforeUdig (LSBUD), Volker Fitzpatrick, EOS Contracting, The Scaffolding Association, and The Arboricultural Association. These stakeholders were chosen as they incorporated all of the key risk groups such as agriculture, construction, utilities and electricians, who are proven to be at higher risk of coming into contact with our network.

The key takeaways from this engagement were:

1. Targeted awareness campaigns are beneficial and we were encouraged to do more to target the key risk groups.
2. Collaboration and data were key to successful targeting.
3. The use of social media was the best way to raise the profile of electrical safety amongst younger audiences.

We have developed three commitments for RIIO-ED2:

- Targeting the safety of our staff and contractors – our approach will be similar to that which delivered successful performance during RIIO-ED1 – one of continuous year on year improvement in all areas of our safety management system with a focus on a wide range of performance indicators and evidence led decision making.
- Targeting the safety of our key risk groups – data from 2019/20 shows that over 1500 incidents occurred on our network as a result of third-party overhead line and underground cable strikes. This is a significant area of focus for us.
- Targeting the safety of members of the public – RIIO-ED1 has taught us that taking a risk based approach and working with partners to target specific sectors and 'at risk' groups is more beneficial and has a greater impact than mass targeting of the population. For RIIO-ED2, we will further build on that approach and innovate for greater impact. For example, we will also use social media platforms such as YouTube and TikTok to put focused advertising out there for our younger audiences.

Horizon scanning

We regularly conduct horizon scanning exercises; this allows us to promptly and effectively address emerging risks and opportunities as they arise. Some of the key emerging risks and opportunities identified are summarised below; we have ensured that these risks and opportunities are considered when designing our commitments.

- COVID-19:
  - long COVID effects are currently poorly understood.
  - Increase in distraction and anxiety leading to possible increase in poor mental health and resilience.
- Electrification of transport and heat:
  - The essential role electricity plays in the smooth operation of society will grow in significance as we move away from carbon-based energy.
  - New safety risks will emerge for both our own workforce and public/third parties – for example, charge point street furniture will be installed in close proximity to busy traffic.
  - Expected increase in new entrants for EV charge point installation – making it essential to maintain the current high standard of design and workmanship.

- Stakeholder engagement: the COVID-19 pandemic has strengthened existing solid working relationships with Trade Unions, trade associations and other companies and organisations. These relationships open up a range of opportunities to collaborate. Most notably, improving communications in relation to third party and public safety. But also improved sharing of best practice across sectors and also the opportunity to better identify and manage new emerging risks and threats as they arise.

RIIO-ED2 commitments on safety

We have a workforce of around 6,200 employees and hundreds more contractors engaged in potentially high-risk activities touching the electricity distribution network.

These key risks not only involve working with electricity, working at height and driving but include others such as lifting operations, movement of heavy plant, excavations, working with asbestos, fatigue and confined spaces. The workforce also works peripatetically, in all weather conditions and all times of the day.

Furthermore, with a local population in excess of 19 million, there are always risks that members of the public may come into proximity with the distribution network.

We are making the following commitments:

Delivering our commitments

Commitment S1

We will minimise injuries to our staff as measured by the Total Recordable Incident Rate, (accident rate per 100,000 hours worked) striving to be less than 0.05 by the end of the RIIO-ED2 period.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	We will reduce injuries to our employees and contractors, keeping both our employees and the public safe.	Customers and stakeholders see safety as a core remit: it's a basic expectation that any responsible company should work diligently to keep their employees and the public safe.

Over RIIO-ED1 thus far, we have reached a Total Recordable Incident Rate (TRIR) of 0.05 once in 2020, but we have not yet managed to reduce this further. This is therefore an ambitious target; a TRIR of 0.05 represents only 11 injuries for a workforce of over 6000 employees and several thousand more contractors. It is significantly below the typical injury rates in construction, utilities or manufacturing by a factor of 20-30 times[24]. The aim will be to achieve zero Lost Time Injuries and Medial Treatment Injuries (MTIs), but there is little margin for error.

To achieve this commitment, we will continually improve all elements of our safety management system:

- We will carefully monitor all aspects of our performance with a keen focus on LTI, MTI and TRIR indicators; we will continue to learn from injurious incidents and near misses; we will continually seek feedback from our stakeholders on how we can improve.
- Refresh our Stay Safe staff safety management programme: Stay Safe is a behavioural safety programme involving significant training for each employee. We have reached every one of our employees and the programme is embedded in our ways of working. This programme won the team of the year at the Utility Week awards in 2018. For RIIO-ED2, a new front-line coaching course is being developed specifically for our field engineers and the intention is to co-design a leading edge 3rd iteration of Stay Safe with employees and Trade Union representatives in 2022 with a view to rolling-out the programme soon afterwards.
- Keeping contractors safe: Contractors are a vital part of our workforce and we provide a wealth of information to their organisations to enable them to brief front-line staff about staying safe when they are working at UK Power Networks. We plan to increase our safety engagement even further through refreshing our contractor on-boarding, regular meetings, conference calls and on-site audits.

24 HSE construction in GB report, Nov 2020.

Chapter 10: Maintaining a safe & resilient network continued

Commitment S2

We will reduce the number of third-party overhead line and underground cable strikes by at least 20% for each over RIIO-ED2 (relative to the average of RIIO-ED1 actuals from 2015-2020).

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	Reduced injuries to the public and reduced network interruptions.	Our stakeholders think there is a role to share relevant safety information with key customer and stakeholder groups. As the electricity network evolves, stakeholders expect UK Power Networks to widely promote new, relevant safety information.

This is an ambitious target never set before. We typically experience about 1,500 underground cable strikes and 300 overhead line strikes every year. Under the Powering Improvement programme, all DNOs have committed to achieving a 10% reduction by 2025. We will seek year on year incremental improvement to double this reduction by the end of RIIO-ED2.

We are expanding the use of our Be Bright Stay Safe campaign. To date the campaign has reached the desired targeted audiences, such as farmers, children, haulage contractors, electricians and scaffolders and there has been a significant reduction in overall injuries across these high-risk groups. The initiative won campaign of the year at the Health & Safety Excellence Awards in 2019.

Commitment S3

We will increase our commitment to engage with the public on safety issues, focusing on those who are at highest risk of injury from contact with our networks by engaging with 300,000 people per year during RIIO-ED2 (vs. 250,000 people per year during RIIO-ED1).

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	Our engagement will increase awareness of safety issues and reduce the risk of harm to the public, particularly for those most likely to encounter our assets. This will help create safer communities across our networks.	Our stakeholders think there is a role to share relevant safety information with key customer and stakeholder groups. As the electricity network evolves, stakeholders expect UK Power Networks to widely promote new and relevant safety information.

We will:

- Refresh PowerUp: PowerUp is a learning website containing information about electricity and keeping safe for 7 – 14 year-olds, teachers and parents, which proved very successful for children at home during the 2020 lockdowns.
- Expand the use of apps for identification and management of incidents: In 2019, we were the first DNO to introduce the use of 'what3words', an app which allows us to accurately determine the location of any safety incident our customers report. This resulted in a 66% improvement in time to locate a customer incident in a hard to reach location. We are planning to increase the rate of use of apps and digital channels in RIIO-ED2. We are committed to continually look for opportunities to evolve and adopt new channels and this will be part of our calls for ideas in Appendix 20: Our innovation strategy.
- We will undertake local awareness raising campaigns and also use social media platforms such as YouTube and TikTok to put focused advertising out there for our younger audiences.
- Widely promote new and relevant safety information to third parties and the public as the network evolves to changing system requirements. We will ensure that we quickly identify any emergent new risks and effectively target these risk groups.

In addition to our three proposed RIIO-ED2 commitments, we are focused on maintaining our performance against two of the key measures we tracked in RIIO-ED1:

- Receive no formal notices or prosecutions from the Health and Safety Executive (HSE) under applicable legislation.
- Maintain the Lost Time Recordable Incident rate (accident rate per 100,000 hours worked) at less than 0.05.

We also introduced a new measure during RIIO-ED1 relating to 'internal' cause third party/public injuries. These are injuries to members of the public and third parties working close to our networks arising, at least in part, from an error or an omission by us. For the first time, zero was achieved during 2020.

Chapter 11:
Delivering an environmentally sustainable network

Climate change is one of the greatest challenges of our time and the RIIO-ED2 period will be crucial to make progress to address this challenge. Our customers and stakeholders have been clear – the environment is important to them. Our plan fully reflects this, and will ensure that we live up to the ambitions that our customers have set for us.

In this section we outline our plans for Achieving Net Zero (making our own business sustainable).

How this chapter links to our Keys to Success:

1. Delivering a brilliant service for all
2. Facilitating decarbonisation at the lowest cost
3. Investing to maintain a safe, reliable and resilient network
4. Delivering the lowest possible bills whilst enabling Net Zero
5. Being a force for good in the communities we serve
6. Being an employer of choice
7. Being a company that is worthy of your trust

Chapter 11: Delivering an environmentally sustainable network continued

Our customers, stakeholders and Ofgem have been clear that the environment is a priority. As you will have read in our executive summary, a key part of the vison is to be a "Respected Corporate Citizen." To achieve this vision, we have set an ambition to be the most socially and environmentally responsible in our sector and we are committed to playing a leading role in limiting irreversible change to our climate. We take this challenge very seriously and will apply the same performance focused mindset to our environmental impact as we do to every other part of our business. In line with our results driven culture, we have avoided making grand statements which are not supported by specific actions and where our success cannot be measured and reported on.

Nor are we hiding behind wider power generation decarbonisation that will naturally reduce the carbon intensity of losses, which are categorised as DNO scope 2 emissions, but which we do not directly control. Instead, we are making stretching and transparent commitments on the areas where we can directly control our environmental impact, as well as economically reducing losses, as part of our sustainability strategy that is described below. And we are committed to reporting on what we have achieved through RIIO-ED2 and to refining our plans in light of new customer and stakeholder insights, new legislation, standards and new information that emerges in this fast-changing area.

Our strategy

1. Decarbonisation in line with our verified Science Based Target (SBT).

We have set a leadership example for the sector by being the 1st DNO to achieve a verified Science Based Target for our full carbon footprint, including indirect scope 3 emissions.

We will reduce our full carbon footprint by 28% by the end of RIIO-ED2, aiming to exceed our carbon reduction target approved by the Science Based Targets initiative (SBTi) at well-below 2° C

We will exceed a 1.5° C trajectory for our directly controlled (scope 1 and 2, excl losses) emissions without resorting to carbon offsetting.

As the leading DNO, we will work in partnership with our suppliers to reduce our scope 3 supply chain carbon emissions by 25% by the end of RIIO-ED2.

We will move to the new verified Net Zero Standard by the end of RIIO-ED2.

2. Reducing our impact on the world's limited resources

We will embed Circular Economy principles, backed with robust measurement and data to improve the way in which we procure and use resources.

We will recycle 80% of office, depot and network waste and re-use 99.5% of street works material by the end of RIIO-ED2, with no recoverable waste to landfill by 2025.

We will reduce our use of water by 10% by 2028.

3. Increasing natural diversity

We will deliver stretching biodiversity improvements significantly greater than expected legislative requirements and publicly report our performance using independent measurement tools.

We will increase the biodiversity of new major substation developments by a net-gain of 10-20% and target a net-gain of 30% at 100 existing sites.

4. Reducing pollution produced by our business operations and network activity

We will reduce NOx emissions by 33% over the RIIO-ED2 period, improving air quality for our customers.

We will reduce annual leakage from Fluid Filled Cables by 15% over the RIIO-ED2 period.

We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines within AONB and National Parks, working closely with the relevant stakeholders to ensure that the full allowance is spent and benefits maximised within our protected landscapes.

We will review our Environmental Action Plan annually to ensure our work continues to meet our customers' evolving expectations, that our response is based on the latest science and that we incorporate any emerging best practice. We will establish a new sub-committee of the Board to monitor our performance and will report our progress through our Annual Environmental Report.

The context within which we have developed our strategy

The negative impact of human activity on the world's natural environment is becoming increasingly clear. The UK Government is showing international leadership in meeting the environmental challenge.

We are reflecting this leadership in the way we run our business. Moreover, we have responded to new information as our understanding of our landscape and our impact on it improves. In 2018, we worked with our employees and stakeholders to establish our Green Action Plan, going beyond the environmental commitments we made in our RIIO-ED1 business plan. Additionally, we partnered with the Carbon Trust to improve our understanding of our contribution to global greenhouse gas emissions. This knowledge shaped our long-term emission targets which are verified by the Science Based Targets initiative. We have certified our Environmental Management System (EMS) (in 2003) to the international standard ISO 14001:2015 and this has driven continual improvement. We achieved the Chartered Institute of Procurement and Supply (CIPS) ethical standard and externally benchmarked ourselves, achieving a CIPS Platinum award.

In short, we have not just discovered a greater appreciation for the environment through the business planning process. Our culture and ways of working have been evolving over RIIO-ED1, embedding sustainability principles into our day-to-day working practices, resulting in year-on-year stronger sustainability performance. Importantly, we have seen change being driven from people right across our business and at all levels taking ownership to improve their part of the business. We always say in our business that safety is everyone's responsibility. The same can be said and evidenced for sustainability. This is why we were the first DNO to achieve a verified science-based target, the only DNO to include scope 3 emissions in the verification to date, and have very specific and detailed proposals to justify our investments.

We will take a leading role in our sector in tackling the global environmental challenge

We have listened and responded to feedback received on our Initial Business Plan. In particular we have:

- Provided clearer explanations of our commitments and targets in both absolute and percentage terms and explained how they relate to performance achieved in RIIO-ED1.
- Updated our Losses Strategy and have published this alongside this Final Business Plan. Our Losses Strategy will result in a reduction in losses of 470,679 MWh over the lifetime of the assets that are being replaced during RIIO-ED2.
- Set a target for SF6 leakage to be no more than 0.1% of the quantity of SF6 on our network by the end of the RIIO-ED2 period, a reduction of 9% against our current industry-leading performance.

Our full Environmental Action Plan is provided in Appendix 16 and provides greater details on the actions we propose and covers further areas not addressed in this section such as our strategy for meeting our statutory environmental obligations to remove Persistent Organic Pollutants from our networks which we expect to cost £45.2m under a Price Control Deliverable (PCD) and our approach to noise pollution mitigation.

Our Environmental Action Plan sets stretching but achievable commitments

We have set ourselves stretching, achievable and measurable targets. We will report on our progress towards achieving those targets, to build trust and momentum.

We will help our customers to decarbonise and also respond to this challenge ourselves, reducing our own environmental footprint and helping our employees to do the same. This is demonstrated in our commitment to be Net Zero for our directly controllable emissions by 2028.

Behind each of our commitments is a set of costed, deliverable activities that demonstrate our commitment in response to customer priorities on the environment. In total, our Environmental Action Plan includes £31.5m of operational actions to reduce our carbon footprint and improve biodiversity. In addition, we will invest £214.6m[1] in the distribution network to achieve our overall environmental goals set out in our strategy.

Making the right trade-offs

We have a moral obligation to protect the natural environment, but we also need to protect current and future customers from unnecessary increases to their bills. Affordability has been brought into even sharper focus as the economic impacts of Covid-19 unfold and combine with wholesale gas and general price rises in the economy. In developing our proposals, we have explored alternative options for every action in our plan to determine what can deliver the largest improvement for every pound invested. We describe these in our Appendix 16 document.

We have also had to make trade-offs between doing more on the environment and balancing that with the associated costs that will flow through to customer bills and that may end up being regret investment given the pace of technological change. For our trade-offs, we have sought to deliver the best solutions and these have included:

- Minimising regret investment where technology could fundamentally change and offer new better and cheaper solutions in the future.
- Maximising impact whether it be carbon reduction or wider sustainability improvements.
- Delivering the overall lowest costs.

Applying this approach has led us to specific targets which we explain under each commitment within this chapter.

1 Investment comprises of £155m (fluid filled cable leakage reduction), £45.2 (PCB replacement) and £14.3 (improve visual amenity).

Chapter 11: Delivering an environmentally sustainable network continued

Our commitments to our customers are real and will be monitored

We are making a number of commitments as part of our Environmental Action Plan, which we outline below. Further information on the actions we plan to take and on our customer and stakeholder engagement and insights is provided in Appendix 16 and in our supporting documents Engagement Summary – EAP and Line of Sight – EAP.

We also commit to continuing to listen to our customers and stakeholders throughout the RIIO-ED2 period. The understanding of our environmental impact will develop over the period as will our knowledge of how to address it and the priorities of our customers. Therefore, we make a specific commitment to update our EAP annually to reflect the new ways in which we can meet our customers' changing needs with targets that keep up with new opportunities to reduce our impact on the environment.

Delivering our commitments

Commitment EAP1

We will review our Environmental Action Plan annually to ensure our work continues to meet our customers' evolving expectations, that our response is based on the latest science and that we incorporate any emerging best practice. We will establish a new sub-committee of the Board to monitor our performance and will report our progress though our Annual Environmental Report. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	This ensures that we have the latest evidence on customer expectations and best practice to ensure we are continuously stretching ourselves to deliver ambitious outcomes for customers on the environment.	Feedback from our engagement programme has given us a strong message that we should seek to be ambitious with our environmental targets. (See key insight I-EAP1 to I-EAP14 in our Line of Sight – EAP document).

Feedback from our engagement programme has given us a strong message – we should seek to be ambitious with our environmental targets in recognition of the urgency of the global climate and environmental crisis we all face. The environment is a clear, urgent and growing priority for the majority of our customers, and they believe that all businesses have a responsibility to play their part.

We have learnt from past experience, that environmental targets that feel ambitious at the time of setting, can be rapidly eclipsed by events. With the benefit of hindsight, the environmental targets that we set ourselves for RIIO-ED1 were not challenging enough. This prompted us to launch our Green Action Plan in 2019 with a new set of comprehensive and ambitious targets.

We have sought to be ambitious in shaping our RIIO-ED2 Business Plan, and we believe that all of our targets reflect that, including the target to achieve Net Zero in our controllable carbon emissions by 2028. However, in order to ensure that we continue to stretch and challenge ourselves, we will engage annually with our customers and stakeholders to shape our Environmental Action Plan and revisit our targets, as appropriate. We will use our Citizens' Assembly to gain customer insight and an Environmental Expert Panel to gather the views and expertise of our wider stakeholders to evolve our action plan on an annual basis and inform trade-offs that will need to be made in our transition to Net Zero (see Section 7.3: Ongoing engagement).

Following our Initial Business Plan in July, we have established a new sub-committee of the Board to set the right tone from the top. This sub-committee held its inaugural meeting on 3 December. The Board has set the strategic direction and will hold management to account to deliver the targets in line with this strategy. We will monitor our performance and will report our progress through our Annual Environmental Report. We are seeking to improve the quality of the environmental data that we collect and analyse. We are developing tools with partners in this area, specifically in relation to carbon reporting, circular economy and embodied carbon.

We are not requesting additional funding to enable us to fulfil this commitment, as it will be conducted as a "business as usual" activity.

Commitment EAP2

For our full carbon footprint, including losses and indirect scope 3 emissions, we will exceed our reduction target approved by the Science Based Targets initiative (SBTi) at Well Below 2 °C. We will commit to the Business Ambition for 1.5°C SBTi campaign. We will report our progress through our Annual Environmental Report and update our targets in line with SBTi protocols. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£30.3m.	Expenditure included in baseline forecast.	Customers will benefit from an overall reduction in our environmental impact, alongside improved air quality and associated health impacts.	Stakeholders believe that we should implement more ambitious carbon reduction targets that are science-based and aligned to at least a Well Below 2°C trajectory, for all emissions, including those relating to our supply chain. (See key insight I-EAP1, I-EAP2, I-EAP3, I-EAP4 and I-EAP9 in our Line of Sight – EAP document).

During RIIO-ED1 to date, we reduced our scope 1 and 2 carbon footprint by 1.4m tCO_2e[2], from a baseline of 2.8m tCO_2e (a 51% reduction). The decrease is largely due to the grid decarbonisation of losses. However, this baseline only includes a small fraction of our Scope 3 emissions as we only formed a robust baseline for these in 2018/19.

By the end of RIIO-ED2, we have committed to a 0.6m tCO_2e (28%) reduction in our Scope 1, 2 and 3 emissions, based on a 2018/19 baseline. This is the equivalent of taking over 200,000 medium diesel cars off the road.

A requirement of the Science Based Targets initiative (SBTi) is that any SBT should cover scope 1 (direct) and scope 2 (purchased electricity) emissions at a minimum. Given our role as an electricity distribution business, as well as including our direct electricity usage, network losses are also categorised as scope 2 emissions. Losses account for 96.7% of our scope 1 and 2 emissions. However, the carbon emissions associated with network losses are largely driven by the type of generation feeding into the system. As the electricity system decarbonises, the carbon intensity of losses will reduce. Whilst we have a critical role in facilitating the decarbonisation of the grid by connecting low carbon generation to the network, we cannot directly control the rate at which the grid decarbonises. As such, a significant proportion of our scope 2 emissions are beyond our direct control.

In order to make our SBT more meaningful and stretching, and reduce the dominance of losses in our SBT, we therefore opted to include our scope 3 (indirect) emissions (including embodied carbon), which represent 24% of our total business carbon footprint (scope 1, 2 and 3). We could, under SBTi rules, legitimately exclude them as they fall below the 40% threshold. However, without losses, scope 3 emissions would make up 84% of our footprint. We are committing to exceed our verified SBT of Well Below 2 Degrees for our full carbon footprint. At the time of verification, the BEIS 2019 projections for grid decarbonisation did not support a 1.5˚C trajectory target with losses included.

We have also sought to set specific stretching, but achievable, targets for those emissions that we can more directly control (scope 1 and 2 excluding losses). For these emissions, we will exceed a 1.5˚C trajectory without resorting to carbon offsetting. We will then offset any remaining residual emissions to achieve Net Zero by 2028 using high quality verified offsets.

We note that since verifying our SBT, the SBTi has revised its requirements such that all newly submitted plans must align with a 1.5˚C trajectory. We have signed the Business Ambition for 1.5˚C Campaign which commits us to re-verify our Science Based Target at 1.5˚C (ahead of the current re-verification cycle in 2026) and will also require us to move to the new verified Net Zero Standard.

As part of our co-creation stakeholder engagement, stakeholders said that we should include our scope 3 emissions in the "Well Below 2˚C trajectory" and set a more ambitious 1.5˚C trajectory for our directly controllable emissions (Scope 1 and 2 excluding losses). They agree that this is an appropriate target given the direct control we have on our business carbon footprint.

We have developed specific actions plans that will deliver early wins, including:

- **Decarbonising our business transport (£17.9m):** We will replace vehicles in our fleet with an electric vehicle alternative when they reach the end of their useful life, where suitable models are available. This will reduce our business fleet carbon emissions by 49% by the end of the RIIO-ED2 period.
- **Modernising our generators (£0.2m):** We use temporary generation to restore customer supplies in power cuts. We will use biofuels for our generation requirements and adopt hybrid generators where possible. This will reduce our generator emissions by 36%.

2 tonnes CO_2 equivalent. This reduction has been calculated for Scope 1 and 2 emissions including Losses and including the selected elements of Scope 3 emissions used in Ofgem's Annual Report.

Chapter 11: Delivering an environmentally sustainable network continued

- **Increasing the energy efficiency of our occupied buildings (no additional funding):** All of our electricity supplies are Renewable Energy Guarantee of Origin certified (REGO) and therefore zero emissions under market based reporting. We will look to rationalise our estate and then focus on building management controls, plant upgrades, building fabric, on site PV generation, lighting and insulation. This will achieve an emissions reduction of 26% under location based carbon reporting.
- **Improving energy efficiency at our substations (no additional funding):** All of our electricity supplies are REGO and therefore zero emissions under market based reporting. We will improve metering and monitoring, reducing the emissions associated with our unoccupied substation buildings by an estimated 20%.
- **Reducing our Sulphur Hexafluoride (SF6) emissions (£6.0m):** Throughout RIIO-ED1 we have consistently managed SF6 leaks below our target of 0.2% to deliver industry leading performance through the period. We will tighten our target to 0.15% of the quantity of SF6 on our network for the beginning of the RIIO-ED2 period, maintaining our leading position in the industry. We will then continue to tighten the target annually to reach our goal of reducing leakage to no more than 0.1% by the end of the period – a 9% improvement on our current performance.
- **Focusing on our supply chain (no additional funding):** Recognising that we can influence our supply chain to align with our ambition in this area, we chose to include our scope 3 emissions within our verified Science Based Target. This will incentivise us to work in partnership with our suppliers to reduce carbon emissions, as well as waste and resources.
- **Addressing embodied carbon (no additional funding):** We will create an industry-focused tool for measuring embodied carbon in electricity distribution, such that it is in place by the commencement of RIIO-ED2. We will then use this tool to baseline generic project types to identify improvements in design, materials and life span. We will set a target for embodied carbon reduction as soon as practicable and commit to this as part of our annual EAP review.
- **Reducing losses (£6.3m ex-ante):** Our new Losses Strategy contains a clear set of actions to reduce losses by 10,460 MWh annually by the end of RIIO-ED2. Cumulatively, this equates to a reduction of 470,679 MWh over the lifetime of the assets that are being replaced. Based on current forecasts for electricity system carbon intensity, this will reduce carbon emissions annually by 1,952 tCO_2e by the end of the RIIO-ED2 period.

Commitment EAP3

We will reduce our directly controllable emissions (scope 1 & 2, excluding losses) exceeding a 1.5°C reduction trajectory and offset any remaining residual emission to achieve Net Zero by 2028 using high quality verified offsets. We will report our progress through our Annual Environmental Report. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£0.70m.	Expenditure included in baseline forecast.	Customers will benefit from an overall reduction in our environmental impact, alongside improved air quality and associated health impacts. The remaining emissions will be mitigated by renewable energy contracts and UK-based offsets.	Customers and stakeholders believe caring for the environment is a priority and believe all businesses have a responsibility in playing that part. (See key insight I-EAP1, I-EAP2, I-EAP3, I-EAP4, I-EAP6, I-EAP8, and I-EAP13 in our Line of Sight – EAP document).

During RIIO-ED1, we reduced our scope 1 and scope 2 carbon footprint (excluding losses) by 14k tCO2e[3] or 24.4%.

By the end of RIIO-ED2, we have committed to a further 31k tCO2e (62%) reduction in our Scope 1 and Scope 2 emissions, based on a 2018/19 baseline. This is the equivalent of taking around 12,000 medium diesel cars off the road.

We do not want the dominance of losses in our total business carbon footprint to prevent us from setting even more ambitious targets for those direct emissions that we have greater direct control over, namely scope 1 and 2 emissions, excluding losses. As a result, we are making a further commitment to reduce this element of our emissions, exceeding a Science Based Target pathway of 1.5˚C (without the use of offsetting).

For the residual, difficult to shift emissions, we will work with trusted partners to purchase high quality offsets using UK-based schemes to achieve Net Zero by 2028 for our scope 1 and 2 emissions (excluding losses). We will also explore the potential to develop community-based carbon offsets linked to energy efficiency schemes that address fuel poverty and consider links to biodiversity net gain credits and natural capital carbon sinks. We are proposing to purchase offsets

3 This reduction has been calculated for Scope 1 and 2 emissions excluding Losses.

at a cost of £0.7m. This includes £0.54m expenditure in the final year of the RIIO-ED2 period to achieve Net Zero.

However, we have also budgeted for the purchase of offsets in the third and fourth years of the RIIO-ED2 period, of £0.06m and £0.1m respectively, so that we can gain experience in the offset market before our target date and stimulate the market. When we offset carbon emissions, we will apply the Oxford Offsetting Principles[4].

Domestic and business customers, as part of our phase 4 business options testing, opted for the most ambitious decarbonisation option: a pathway consistent with less than 1.5˚C with some carbon offsetting used as a last resort. Our stakeholders share this sense of urgency: at the November 2020 Sustainability Critical Friends Panel, Net Zero by 2050 was not considered a challenging target – 2030 was suggested as an alternative. In addition, while actions to reduce emissions must take priority, the panel felt that we needed to develop mechanisms for utilising offsets well before this target date to stimulate the market. These views were supported by our stakeholder co-creation engagement in November and December 2020.

Commitment EAP4

As part of our verified Science Based Target, we will work with our suppliers to reduce our supply chain carbon emissions (scope 3) by 25% by 2028, compared to a 2018/19 baseline. We will report our progress through our Annual Environmental Report. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	Customers will benefit from an overall reduction in the environmental impact of our supply chain, alongside improved air quality and associated health impacts.	Our stakeholders support addressing scope 3 emissions and setting targets for reduction in partnership with our suppliers. (See key insight I-EAP1, I-EAP2, I-EAP3, I-EAP4, I-EAP7 and I-EAP10 in our Line of Sight – EAP document).

We have already developed a scope 3 reporting methodology to baseline our supply chain emissions. During RIIO-ED2, we will reduce further emissions by 25%, based on a 2018/19 baseline. This is the equivalent of taking 45,000 average medium diesel cars off the road.

Our scope 3 emissions represent 24% of our total business carbon footprint. Therefore, whilst we are targeting Net Zero in our scope 1 and 2 emissions (excluding losses), our stakeholders also recognise the importance of seeking to address our scope 3 emissions i.e. those associated with our supply chain. For example, at the November 2020 Sustainability Critical Friends Panel, and as part of our wider stakeholder co-creation engagement, it was agreed that scope 3 carbon emission reductions should be targeted given their scale and impact. Our consideration of best practice has also taught us the importance of understanding and measuring our scope 3 emissions and collaborating with suppliers to address them in partnership.

We are now using our knowledge to identify and address high-impact activities in collaboration with our suppliers. This will be achieved by:

- Developing a code of practice and ensuring that in excess of 80% of our suppliers (measured by spend) are in line with this code by 2026.
- Working with the Carbon Trust through the Science Based Targets initiative to measure carbon value in the supply chain and identify carbon hot spots.
- Requiring high carbon suppliers to have a carbon reduction plan.
- Benchmarking suppliers against our code of conduct and incentivising lower embodied carbon and circular economy materials.

We believe that 25% is a stretching, but realistic target, but we will keep this under review, consistent with our first commitment discussed above.

By working efficiently with our supply chain, this reduction will be achieved at no extra cost to our customers; we are not requesting additional funding to enable us to fulfil this commitment.

4 https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf

Chapter 11: Delivering an environmentally sustainable network continued

Reducing our impact on the world's limited resources

Commitment EAP5

We will develop and implement a circular economy tool to address our high impact materials by the start of RIIO-ED2. We will subsequently set and monitor our reduction targets through our Annual Environmental Report. **New**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	We will reduce the amount of single-use packaging produced and also reduce the amount of plastic waste at risk of entering the wider environment, which would otherwise cause harm.	Stakeholders support a focus on, and engagement with, suppliers to address the environmental impact of our procurement and suppliers. (See key insight I-EAP1, I-EAP4, I-EAP10, and I-EAP14 in our Line of Sight – EAP document).

The development of our circular economy tool will allow us to set a baseline for the relevant areas of our businesses. We will then be able to set targets for improvements in the way we procure and use resources through our commitment to refresh our EAP annually.

We will address our high impact materials by the start of RIIO-ED2. The tool will help us to identify areas of our business where improvements in the way that we procure, use and dispose of resources can be improved through use of circular economy principles. We will subsequently set and monitor our reduction targets, committing to the recommendations of this baseline exercise once complete in our Annual Environmental Report.

A review of best practice in this area has taught us the importance of embedding circular economy principles within our business and seeking to minimise waste. We have considered trends towards plastic-free packaging in other sectors. For example: Aldi, Tesco, Diageo, Carlsberg and Waitrose have all introduced plastic free packaging for multi packs of food and drinks cans.

We have trialled reductions in single-use plastics and circular economy packaging for some of our operational materials. We have identified our top producers of packaging waste covering wood, plastics, steel, paper and cardboard and will be actively working with them to track re-use, design out waste and eliminate single use plastics where practicable. We will focus first on our highest impact suppliers, consistent with suggestions from stakeholders such as the Carbon Trust, the Institute of Environmental Management and participants at the embedded carbon surgery. We will partner with external groups to understand best practice in this area.

We will also improve the monitoring of our water consumption, leak detection and metering such that we reduce consumption by 10% over the RIIO-ED2 period.

These reductions will be managed within existing and new contracts at no extra cost to our customers; we are not requesting additional funding to enable us to fulfil this commitment.

Commitment EAP6

We will recycle 80% of office, depot and network waste and 99.5% of street works material by the end of RIIO-ED2, with no recoverable waste to landfill by 2025.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	By recycling we will reduce the demand on natural resources and simultaneously reduce waste being handled through landfill.	The majority of our customers feel strongly that we should be ambitious in reducing the impact of our day-to-day operations on the environment. (See key insight I-EAP1, I-EAP4, I-EAP10, and I-EAP14 in our Line of Sight – EAP document).

We are currently diverting 88%[5] of all office/depot waste from landfill. By the end of 2025, we will target zero recoverable waste to landfill. Furthermore, by the end of RIIO-ED2, we will recycle 80% of office, depot and network waste.

[5] 2020/21 performance

In partnership with the Carbon Trust in early 2020, we completed a detailed gap analysis assessment of our entire operational waste streams (excluding spoil from street works). This has provided a far more accurate picture of our waste performance:

- We are recycling 68% of our office, depot and network wastes, using energy for waste recovery for 27% and disposing of 5% via other methods such as landfill.
- Our street works waste (spoils) are currently removed from sites, screened, processed and then re-used as backfill material so we are already achieving very high recovery reuse rates at 99%.

As stated above, our phase 4 business options testing showed us that our domestic and business customers feel very strongly that we should be ambitious in this area: with over 50% of customers and over 65% of businesses favouring our most ambitious option, which included an 80% target for the recycling of office, depot and network waste. Our stakeholders also want to see ambition in this area: at the 3 November 2020 Sustainability Critical Friends Panel, it was noted a target of 90% of waste to landfill lacked ambition and zero recoverable waste to landfill was more appropriate.

These reductions will be managed within existing and new contracts at no extra cost to our customers; we are not requesting additional funding to enable us to fulfil this commitment.

Increasing natural diversity

Commitment EAP7

We will increase the biodiversity of new major substation developments by a net-gain of 10-20% and at 100 existing sites by a net-gain of 30% overall over the RIIO-ED2 period, compared to the beginning of the period, as measured by the DEFRA biodiversity tool.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£0.50m.	Expenditure included in baseline forecast.	Improved biodiversity increases the resilience of nature at our substation developments to external shocks. We will quantify benefits using the DEFRA tool to increase biodiversity by at least twice the legal requirements.	Increasing biodiversity at our sites is seen as important by customers. Stakeholders agree and believe that our proposed approach to biodiversity net gain across 100 sites is appropriate. (See key insight I-EAP1, I-EAP5, I-EAP12 and I-EAP14 in our Line of Sight – EAP document).

During RIIO-ED1 we have identified 100 sites for improving biodiversity and have started delivering schemes to achieve this. For RIIO-ED2 we will identify a further 100 sites for improvement, achieving a biodiversity net-gain of 30%.

Biodiversity is a major priority for our customers and stakeholders:

- **Customers.** The phase 3 willingness to pay research found that both domestic and business customers place a significant value on us improving our offering in this area. Furthermore, improving biodiversity at 150 of our sites was one of the elements of the most ambitious option presented to domestic and business customers as part of our phase 4 business options testing. This option was most favoured by domestic customers and businesses, demonstrating a desire for ambition in this area.
- **Stakeholders**. Stakeholders on our Critical Friends Panel, and as part of our co-creation work in November and December 2020, agreed that improving biodiversity should be a priority area within our plan. There was also broad agreement that improving biodiversity by 30% at 100 sites is a sensible short-term target.

We are committing to improving biodiversity at 100 of our existing sites and for all new major substation developments. Whilst this is not the 150 sites that customers suggested, the scale of improvement at each site was not discussed with customers.

Our proposed business plan actions include:

- Applying a "biodiversity bank" approach allowing us to make improvements at sites with the highest potential to increase the biodiversity across the sites we operate in.
- Adopting tools to assess net changes in natural capital from different options for new connections and network projects and to monitor the provision of ecosystem services from network sites.
- Working in partnership with stakeholders such as local Wildlife Trusts to deliver the greatest biodiversity benefits at the lowest cost.

Chapter 11: Delivering an environmentally sustainable network continued

Reducing pollution produced by our business operations and network activity

Commitment EAP8

We will reduce NOx emissions by 33% over the RIIO-ED2 period compared to the beginning of the period, improving air quality for our customers.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
Costs associated with fleet and generators included in Commitment EAP2.	N/A.	Reduced NOx emissions will improve air quality across our networks for our customers. We have calculated the social value of the improved health of the communities we serve to be £6.53m (undiscounted) from this commitment.	Air quality is a concern for members of the public and our stakeholders. (See key insight I-EAP1, I-EAP4, I-EAP11, and I-EAP14 in our Line of Sight – EAP document).

Our plans for reduction of NOx in RIIO-ED2 will be measured against a baseline set at the beginning of the period. We will adopt tools to measure our reduction of 33% against this baseline based on the reduction in fuel combustion.

Air quality is a concern for customers and stakeholders, and these concerns are likely to grow[6]:

- **Customers.** A May 2018 DEFRA research report to understand public attitudes to air quality found that when prompted about environmental concerns, air pollution was mentioned by over half of respondents. Air pollution was also selected by 57% of respondents as an environmental issue that they were concerned about, the third most frequently mentioned behind litter/plastics and pollution of the oceans. Our phase 4 research told us that our customers and businesses supported our highest package of sustainability initiatives which included the upgrading of all of our generators to clean fuels.
- **Stakeholders.** Stakeholders at our September 2019 CEO Panel and as part of our November and December 2020 co-creation work, confirmed the importance of addressing air quality.

The main source of NOx and air pollution from our operational activities is the burning of fuels in internal combustion engines. The two key activities that contribute to this are the road vehicle fleet and temporary generators. We estimate that the fleet accounts for 66% of our NOx emissions and the temporary generators the remaining 34%. Both of these activities are critical to our ability to continue to provide excellent reliability and continued service to customers when faults occur on the network.

They are both a significant source of our directly controllable carbon emissions and air pollution from NOx so our actions to reduce the carbon emissions will directly translate into a relative reduction in NOx.

As a result, we are committing to reduce our NOx emissions by 33% over the RIIO-ED2 period. This will involve the transition of approximately 60% of our fleet to electric vehicles, reducing our total NOx emissions by 25% overall and upgrading a minimum of 45% to a maximum of 95% of our generators to clean fuels (dependent on fuel availability) as well as exploring the use of hybrid generators, reducing our total NOx emissions by a further 8%.

We have considered best practice for fleet electrification and our ambition to replace a significant proportion of our fleet with EVs over the RIIO-ED2 period ahead of both need and market replacement – we estimate this to be approximately 60% of our entire vehicle fleet. For generators, we will work with providers of innovative technologies in this area to allow us to continue to restore power supplies in the most environmentally responsible way. Furthermore, consistent with best practice, we will also be cognisant of the local impact of our vehicle and generator deployment on air quality and will seek to deploy low emission alternatives in the places where they will have the greatest benefit. For example, we are using GPS data to target vehicles with the biggest impact on air quality for replacement.

We will keep our targets under review and revise them accordingly if we find that they are not sufficiently stretching. The costs associated with delivery of these actions are included under Commitment EAP2 above.

Commitment EAP9

We will reduce annual leakage from Fluid Filled Cables by 15% by the end of the RIIO-ED2 period compared to the beginning of the period.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£155.0m.	Expenditure included in baseline forecast.	Reductions in fluid leaks from our cables will reduce the negative impact of such events on the environment within our local area.	In general, customers show a willingness to pay for environmental improvements. (See key insight I-EAP1 and I-EAP4 in our Line of Sight – EAP document).

6 In December 2020, a coroner ruled that a failure to reduce pollution levels to legal limits was a factor in the death of nine year old Londoner, Ella Kissi-Debrah.

At higher voltages, our underground cables have been insulated with a mineral oil. Over time, the cable sheath can deteriorate and this oil can leak, negatively impacting both the surrounding environment, and reducing the performance of the cable, eventually causing it to fail. This could significantly impact our customers' reliability levels. Therefore, using established inspection and maintenance routines, we collect condition and performance data from these assets and use this, together with engineering decision making techniques, to determine the most efficient time to replace or refurbish these cables. Replacing and repairing cables is a very expensive exercise and thus we need to balance proactive replacement with maximising the useful lives of these aging assets. When incidents of leaks do occur we work to recover spilt oil and we comply with environmental regulations to ensure we do this in a responsible way.

We are forecasting to reduce annual leakage in RIIO-ED1 by 2.5% per annum. Our proposal is to set a more ambitious target to reduce leakage by 3% per annum in RIIO-ED2.

In making the trade-off between doing additional cable replacement which will improve resilience and reduce harmful environmental impacts against the additional investment and cost to customers we have considered several factors. In summary, our strategy to target an improved 15% reduction in leaks from fluid filled cables (up from 10% in our initial plan) enables us to:

- Manage network risk within our accepted tolerance – our aim is to keep overall increase to network risk below 5% by the end of RIIO-ED2. Cable replacements are a key part of achieving this target, particularly in our LPN and SPN regions (accounting for 42% and 31% of the risk reduction respectively). Our plans also enable us to deliver work over multiple price controls rather than back-end loading volumes into RIIO-ED3 and beyond at the expense of future customers.
- Set a target that is ambitious compared to prior performance and in line with industry proposals put forward by other DNOs.
- Deliver the investment of £155m within an overall totex programme that still results in lower customer bills.
- Ensure we can still deliver the overall programme of investment needed given the wider context of additional work related to Net Zero. Our workforce resilience planning has given us confidence that we can increase our resources (both directly and through our supply chain) to flex up to deliver the scale of potential investment.
- Deliver on customer priorities. Our engagement with customers taught us that our customers care about the environment and the proposed investment will deliver on this along with their view that a reliable supply is seen as a base requirement.

All of the above is underpinned by detailed EJPs, which provide a comprehensive suite of information to justify our enhanced level of ambition in this area.

Commitment EAP10

We will continue to facilitate the undergrounding of nominated schemes to remove overhead lines within AONB and National Parks, working closely with all relevant stakeholders to ensure that the full allowance is spent to maximise the benefits of works within our protected landscapes.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£14.3m	Use it or lose it allowance.	We will remove overhead lines that have the highest impact on natural spaces.	Scheme assessments are performed by stakeholders: a Steering Group of AONBs and National Parks, chaired by Natural England.

Our footprint covers an area with a rich diversity of landscapes from the urban landscapes of London through to the rolling chalk ridges of the South Downs and the idyllic wetland areas of the Broads.

Over the RIIO-ED1 period to date we have removed 26km metres of overhead lines from protected landscapes by investing £4.3m.

In RIIO-ED2 we will act on the lessons learned in RIIO-ED1 to use our full allowance of £14.3m to invest in schemes that maximise the visual amenity of these protected landscapes.

We will do this by:

- meeting quarterly with our dedicated under-grounding Steering Group, chaired and facilitated by Natural England.
- applying our learning from RIIO-ED1 to produce a smoother process of delivering schemes.
- working now to identify those areas that would deliver the greatest visual amenity benefit.

Adopting this process will mean we can hit the ground running at the start of RIIO-ED2. Additionally, if unforeseen circumstances should delay these works, any unspent allowances will be returned to customers, protecting them from unnecessary costs.

Chapter 12:
Enabling whole system solutions

In this chapter, we share our whole systems thinking which is fundamental to facilitating the achievement of Net Zero at the lowest whole system cost for society. We then explain how our independent DSO will act as the engine to deliver whole systems value; turning strategy into action.

In this section:

12.1	Whole systems	**129**
12.2	Establishing a DSO	**142**

How this chapter links to our Keys to Success:

1. Delivering a brilliant service for all
2. Facilitating decarbonisation at the lowest cost
3. Investing to maintain a safe, reliable and resilient network
4. Delivering the lowest possible bills whilst enabling Net Zero
5. Being a force for good in the communities we serve
6. Being an employer of choice
7. Being a company that is worthy of your trust

12.1 Whole systems

Overview

Government climate targets require a radical shift in the way that everyone in Britain consumes energy. In turn, this will require a significant increase in the volume of Low Carbon Technologies (LCTs). We have a comprehensive track record of enabling significant LCTs to connect to our networks thus far – from connecting 9.77GW of distributed generation, through to supporting the connection of battery storage and EVs with industry leading levels of customer satisfaction.

However, some of the vital challenges associated with the next phase of the Net Zero transition requires the resolution of interdependencies between the electricity distribution system and other adjacent systems. We must take a more holistic view of the energy transition to tackle these challenges.

We need to ensure our business is ready and fit for this new future and avoiding any complacency if we are to continue to lead our sector and ensure that we are a facilitator and not an impediment to decarbonisation within our regions.

The phrase 'whole systems' is very much in vogue, but through our ongoing engagement with stakeholders, we concluded that the term has no consistent and clear definition. In developing our strategy and in order to turn talk into action, we have kept it simple; our whole system strategy is constructed of four building blocks: Whole System Planning, Whole Electricity System, Whole Transport and Whole Heat.

Our whole systems approach recognises the much greater emphasis required on partnering with different organisations, as well as the multiple roles of customers in the future – as service providers and as bill payers – and the help they will need to ensure the transition is just and fair.

The context within which we have developed our plan

Defining whole systems thinking

Ofgem has defined whole systems thinking as "Solutions arising from energy network companies and system operators coordinating effectively, between each other and with broader areas, which deliver value for consumers."

We have a strong belief that whole systems should not preclude whole electricity system thinking on the basis that it is "business as usual" i.e. interactions across generation, transmission, distribution and system operation. On the contrary, there is still much to do. A simple example illustrates this point; the issue of how we monetise the value potential to society from avoiding costly build of new generation. Making better use of renewable power through flexible and smarter networks combined with compelling consumer propositions is crucial to unlock this value[1]. However, today there are no mechanisms to share some of this value with the organisations that are critical to realising it. This example alone shows there is much to do.

We are therefore pursuing a leading definition of whole systems thinking which encompasses Ofgem's definition, but goes further – we define whole systems thinking as:

> Solutions arising from working and coordinating collaboratively across the whole value chain (network companies, local authorities, consumers and consumer groups, retailers, technology firms, etc) to deliver wider societal benefits, as well as meeting core objectives of delivering low cost, secure electricity to our customers.

In other words, we will identify whole systems solutions to deliver overall benefits to society and accelerate the Net Zero transition. Our approach goes over and above our business as usual role in all areas. For example our work on providing capacity for major trunk road charging stations is facilitating the decarbonisation of the transport system. In this example, benefits do not directly accrue to energy consumers, but to the wider society as a whole. However, realisation of these benefits require an electricity system intervention.

The same could be said for our strategic interventions on off-gas grid properties, where we plan to provide coordinated energy efficiency support and advice working with partners. This would be ahead of rolling out capacity allowing rural customers to decarbonise their heating and transport and decades ahead of an uncoordinated passive approach; decarbonising the heat and transport sector faster than in a 'do nothing' option. None of these initiatives can be classed as business as usual electricity interventions.

However, in adopting this wider definition of whole systems thinking, we will not lose sight of the importance of ensuring electricity customers do not face unacceptably high bills. In fact, we believe that our whole systems strategy for facilitating Net Zero can deliver the transition at lowest whole system costs for our customers.

Our achievements during RIIO-ED1

We have demonstrated that we are both proactive and outcomes-focused. Our achievements in RIIO-ED1 include:

- Taking a leadership role in defining and procuring flexibility services.
- Being the first UK Distribution Network Operator to contract flexibility at the Low Voltage level and specifically from Electric Vehicle service providers. Our work in this area provides a blueprint for how we can potentially scale flexibility at domestic level to support the uptake of EVs.
- Unlocking 1.1GW of additional renewable network generation capacity through our pioneering Distributed Generation capacity programme.

Our work has been recognised internationally as being representative of leading practice. In 2019, we were awarded the prestigious International Award by the Edison Institute[2].

1 https://www.carbontrust.com/resources/flexibility-in-great-britain#:~:text=The%20Flexibility%20in%20Great%20Britain,in%20a%20net%20zero%20system.

Chapter 12: Enabling Whole System Solutions continued

Our approach to whole systems thinking

We are at a critical time in the Net Zero transition and have the privilege of a trusted position and central role in the industry. It is up to us to use this role effectively to facilitate broader and deeper decarbonisation.

We have worked extensively with our customers through our RIIO-ED2 customer and stakeholder engagement to understand their challenges. Overall, our stakeholders agree that our role in Net Zero is two-fold:

- **Achieving Net Zero:** We must lead by example and decarbonise our own activities.
- **Facilitating Net Zero:** We must proactively help our customers transition to achieve Net Zero.

Some of the most important challenges associated with the transition to Net Zero require the resolution of interdependencies between the electricity distribution system and other adjacent systems. To play a proactive role in the transition to Net Zero will require us to take a more holistic view of the energy transition. Our whole systems strategy is summarised in the diagram below.

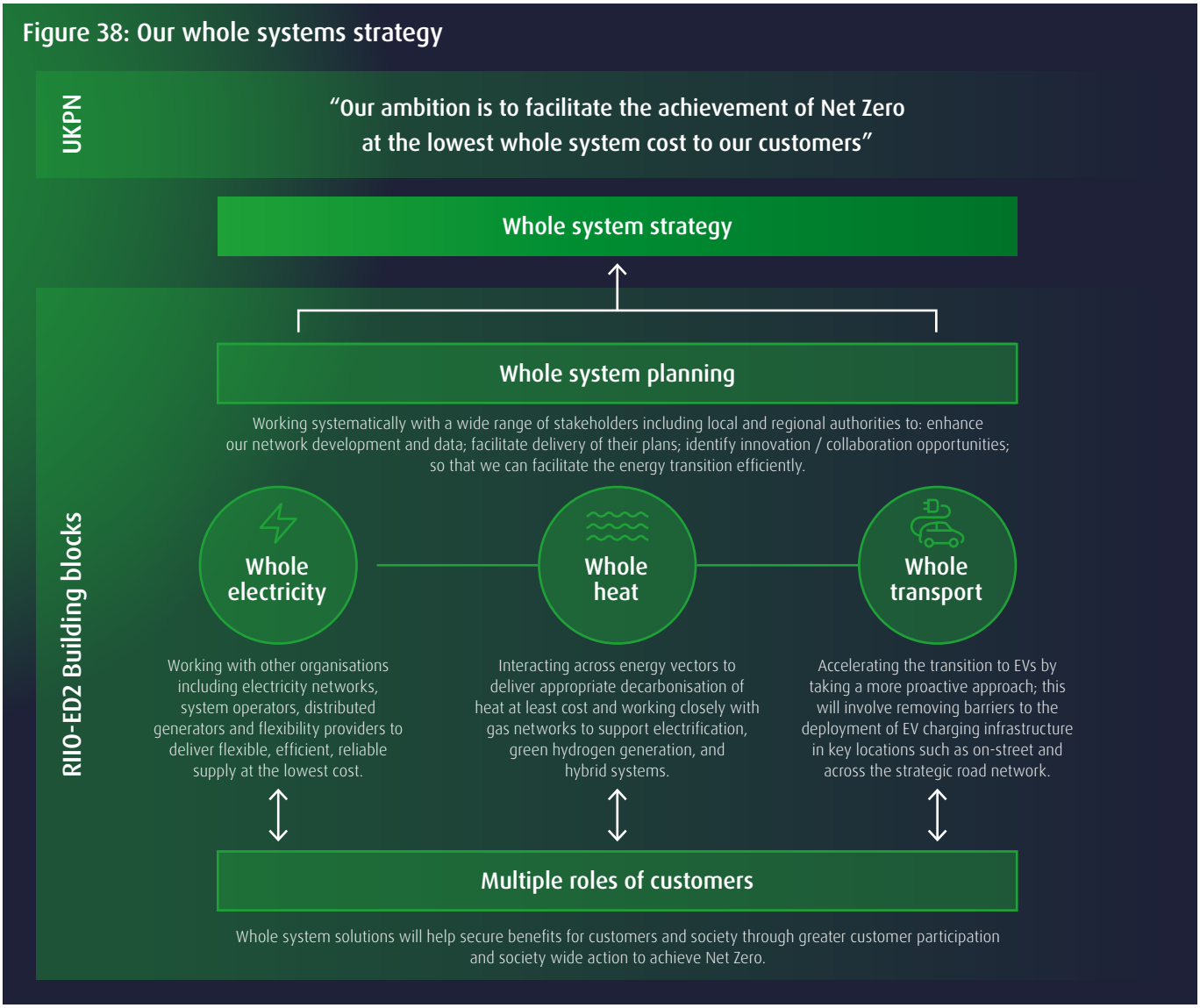
It should be noted that:

- Opportunities to derive consumer benefits from new ideas are covered by our innovation strategy (Appendix 20).
- We have not prioritised whole systems thinking with water and telecoms companies for RIIO-ED2 given the relative value. However, we will engage the water industry during RIIO-ED2 to identify opportunities that deliver greater value from taking a whole systems approach.
- Through engagement with our CEG we have considered how the flow of benefits / cashflows could operate across the multiple systems when regulated by multiple regulators. We expand our 4 step approach to manage this complexity in more detail in Appendix 19a – Whole systems strategy.

Building Block 1 – Whole System Planning

As explained in the next section, our DSO will be the driving force behind our whole systems strategy and further details of this role are set out in Appendix 18: Our DSO strategy.

Figure 38: Our whole systems strategy



2 UK Power Networks was awarded Edison Electric Institute's (EEI's) International Edison Award 2019 in recognition of its innovative work in smart grid development and for enabling Britain's low carbon transition.

Our DSO will be the engine room of whole systems thinking and understanding the interactions between all the relevant systems when determining the right way to address emerging customer needs. Our whole systems approach will identify all relevant systems and will employ Cost-Benefit Analysis, Societal Return on Investment, and other tools developed through the Energy Networks Association to assess whole systems value. We will employ horizon scanning and the inspection of leading (and lagging) indicators to capture when there may be changes in decarbonisation trends and pathways to maintain confidence in our plans. Where applicable, we will seek additional allowances through the uncertainty mechanisms backed by a robust CBA and investment justification.

We will ensure that our whole systems strategy is embedded across our business: from senior management accountability and support, to ensuring we have the support from our supply chain, and to our digital and IT capabilities supporting customer participation and open data exchange.

We will institutionalise whole systems thinking. Our Portfolio Board, which has responsibility for authorising major investments on our networks will require evidence that whole systems solutions have been considered before approving engineering schemes.

To improve confidence in our plans, we will collaborate widely with our customers and stakeholders to understand how their plans and ambitions are evolving with changes to the technology and policy landscape.

As we transition to Net Zero, we have a clear responsibility to leave no customer behind. Our customers and stakeholders are concerned about this, with stakeholders stressing our responsibility (jointly with other stakeholders such as government) to protect and support such customers. In our consumer vulnerability strategy we articulate our response to ensure no-one is left behind in this changing energy system, which is backed by a commitment to invest £11m of shareholder funding to support a fair and just transition for all.

Data and digitalisation are also key ingredients to unlock whole system value together with our DSO. We will share planning and other data through our open data strategy and new digital tools to enable robust joint development of plans. Further information on our digitalisation and data strategy are provided in Chapter 13: Unlocking the potential of digital and data.

Building Block 2 – Whole Electricity

We will deliver the benefits of whole systems thinking by fostering coordination and collaboration across three key interfaces:

1. Transmission to distribution – This is the best understood interface. During RIIO-ED1, the rise of distribution-connected generation has created a number of challenges requiring the electricity networks and system operator to work together. By way of example:

- Our Power Potential innovation project demonstrated a more economic and efficient way to access reactive power capability provision from distributed energy resources (DER). This is a world first.
- Our Regional Development Programmes accelerate the connection of additional DER by using innovative techniques, better sharing of data and collaborative problem solving with National Grid ESO (ESO). It also enables a common and consistent communication with DER customers.

2. Distribution to distribution – Collaborating with electricity distributors to address collectively the energy transition challenges and set common, national standards that make it easier and cheaper for our customers to connect and to participate in the electricity system (The Open Networks project is a prime example).

3. Distribution to DER / customers – This includes enabling more efficient connection of renewable generation and storage to the distribution network and the development and promotion of markets for flexibility and other services.

In RIIO-ED2, we will:

- Secure cost savings by building on our partnership with the ESO, extending Regional Development Programmes to other parts of our network area.
- Promote and develop markets for flexibility and reactive power.
- Defer network build by working with trusted intermediaries to promote energy efficiency. This will deliver consumer savings, a smaller carbon footprint, and lower peak demand.

Chapter 12: Enabling Whole System Solutions continued

Building Block 3 – Whole Transport

As EV ownership ramps-up, the energy used in transportation will be increasingly substituted by electricity. BEIS confirmed in the recent UK Hydrogen Strategy[3] that it expects no substantial use of hydrogen in car and van transport. Furthermore, it cited that strategic investment in EV charging infrastructure, where justified, can be considered low regrets.

We will continue our innovative work to understand and identify ways in which EVs can provide flexibility services which benefit the grid. We will take proactive steps to overcome barriers to the decarbonisation of transport. It will be essential for us to invest in new network capacity at the right pace to meet customers' needs while keeping costs down. Whilst the speed of uptake of EVs is uncertain, customers expect us to be ready to address capacity shortfalls. To meet this challenge we are adopting a flexible and scalable approach:

- We will create detailed plans for how we would flex-up to respond to increased demand through a combination of our direct workforce and supply chain partners. In Section 10.6: Workforce resilience, we explain our approach in more detail.
- We will respond to different levels of network demand through a combination of network build and flexibility and other SMART[4] solutions.
- We will work closely with Local Authorities and County Councils to develop investment plans to support their climate targets. Our focus will be to create a robust and consistent framework to unlock network investment when the need is sufficiently well-defined and certain. This will protect customers from paying for assets that are not required.
- We will deliver the necessary network upgrades such as fuse, service and network capacity upgrades for customers wishing to transition to EVs.
- We will invest to address areas of market failure, such as for on-street public charging, aligning with Ofgem's EV Strategy[5] – published 4 September 2021, where Ofgem states that DNOs should work with stakeholders to anticipate likely need for public charging infrastructure, so that network investment is timely and efficient.

Further information on our flexible and scalable approach is set out in Chapter 8: Decarbonising our communities.

Building Block 4 – Whole Heat

Heat is the single biggest source of greenhouse gas emissions in the UK. Over 85% of the population rely on natural gas to meet their heating requirements and there are a further four million off-gas grid customers who heat their homes by burning oil or solid fuels.

The transition to Net Zero will require that natural gas, oil and solid fuel heating is substituted by either (low carbon) electric heat pumps or green hydrogen heating (depending on the decarbonisation pathway selected locally and nationally). In the recent UK Hydrogen Strategy[6], BEIS confirmed it expects limited use of hydrogen for heat in buildings in the 2020s, with less than 1 TWh of annual demand met by Hydrogen in 2030.

Our RIIO-ED2 Whole Heat strategy is focused on delivering network capacity where the heat decarbonisation path is clear and addressing the barriers to transition where it is not:

- We will deliver fuse, service and network capacity upgrades for those on-gas grid customers wishing to transition their heating to electricity.
- We will deliver the required network capacity to allow a majority of off-gas grid customers (242,000 or 71%) to switch to low carbon heating.
- We will work with trusted intermediaries, to raise awareness of heat decarbonisation and the benefits of energy efficiency.
- We will engage with policy makers and decision makers, directly and via the ENA, to help chart the path to decarbonised heat.
- We will continue to explore potential low carbon solutions for the decarbonisation of heat through innovative projects.

We are proposing stretching commitments

Drawing on insights from our engagement with customers and stakeholders, and challenge from our CEG, we have developed a series of RIIO-ED2 commitments which are designed to unlock benefits from implementing whole system solutions.

3 https://www.gov.uk/government/publications/uk-hydrogen-strategy
4 https://www.gov.uk/government/publications/transitioning-to-a-net-zero-energy-system-smart-systems-and-flexibility-plan-2021
5 https://www.ofgem.gov.uk/publications/electric-vehicles-ofgems-priorities-green-fair-future
6 https://www.gov.uk/government/publications/uk-hydrogen-strategy

Delivering our commitments

Building Block 1 – Whole systems planning commitments

Commitment WS1

We will engage with all 127 regional local planning authorities on their climate plans each year of RIIO-ED2, offering a three-tiered support service utilising a framework to assess, develop action plans and deliver investments where a prescribed level of certainty is achieved in period. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£9.3m. Establish a local area planning team of 20 full time employees. They will work with local authorities to assess their energy plans and develop CBAs. Included in this team is dedicated resource focused on Community Energy progression. We will regularly review our approach to make sure it remains proportionate, transparent and appropriate.	Included in baseline DSO allowances.	Enables pro-active engagement with all local authorities whilst minimising unnecessary effort on both sides. Prioritises effort in areas where investment decisions are most needed to reduce delays. Provides clear guidance on the minimum requirements agreed across all parties to share knowledge and support the development of all local plans.	Our stakeholders proposed that we should carry out local energy planning and zoning. To support the transition to Net Zero, customers and stakeholders believe that we should focus on: information provision; and collaboration (particularly with local authorities). Stakeholders told us that this resource should also support capability and capacity building across local authorities. (See Insight I-FNZ1, I-FNZ5, I-FNZ7, I-FNZ8, I-FNZ13, I-DSO/WS8 in our supporting document Line of Sight – Whole systems)

We will not be passive bystanders in the transition to a Net Zero society. We appreciate the journey to a fully optimised set of whole systems will take time and require significant change to the status quo, this is why our approach to Local Area Energy Planning will remain agile, responding to changing policy as we continue along this journey. We will use our planning expertise, data, resources and convening power to help local authorities unlock required investment in support of well-justified Net Zero Local Area Energy Plans.

Local authorities have shared with us their own stretching targets for achieving Net Zero and have emphasised the importance of our role in helping them to achieve this goal. The Local Area Energy Planning (LAEP) methodology is extremely comprehensive however, it requires significant effort and detailed modelling that is challenging for many local authorities to follow (see "Look before you LAEP.", published by Citizens Advice[7]). We have worked with a number of regional planning bodies to develop an approach that is better suited to their capabilities.

We will offer three levels of support:

- Tier-1: We will work with local authorities to assess their plans and readiness against the framework.
- Tier-2: For the local authorities passing the Tier-1 assessment, we will "deep-dive" their climate action plans to agree optimum infrastructure requirements.
- Tier-3: For local authorities who have defined projects requiring bespoke strategic investments, we will work with them to remove any barriers to infrastructure investments.

The size of our local area planning team is based upon providing all 127 regional and local planning authorities and community energy groups with Tier-1 support, 40 to 50 with Tier-2 support and 10 with Tier-3 support.

Our three tiered approach, coupled with our dedicated resources and digital support tools will allow us to take a tailored approach to meeting the needs in our regions, responding directly to stakeholder feedback increasing the capacity and capability of our local authorities around energy planning.

7 https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/Local%20Energy%20Report.pdf

Chapter 12: Enabling Whole System Solutions continued

We do however recognise that the range of powers that local authorities possess may change through the RIIO-ED2 period. This change of powers is evident in the Transport and Decarbonisation Strategy where there is a growing focus on providing local authorities with the tools to drive decarbonisation in their region. We will therefore regularly review our framework to make sure it remains proportionate, transparent and appropriate.

Stakeholders have provided a strong message, through our co-creation work, that we should be ambitious in supporting local authorities and Local Area Energy Planning. This was one of the key themes at the Net Zero stakeholder webinar.

> While there is still work for UK Power Networks to do on the detailed mechanics of the framework, our view is that it represents a positive step in ensuring that the necessary investment can be transparently identified and undertaken. We also support UK Power Networks' proposal to establish a central team within their business to provide additional support to local authorities not only with undertaking the climate plan assessment process, but also to provide a range of technical support to help them achieve their climate action plans."
>
> **Rupert Clubb,**
> Director of Communities, Economy and Transport, East Sussex Council

Commitment WS2

By 2024, we will provide core planning datasets via an on-line, self-service energy planning tool to support the planning process for our local authorities, helping them make the best choices for their communities.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£2.02m.	Included in baseline allowances.	Improved customer experience by enabling local authorities to make the best choices for their communities. Improved support for local authorities. Increased participation in flexibility markets.	To support the transition to Net Zero, customers and stakeholders believe that we should focus on: information provision, collaboration (particularly with local authorities), and relieving capacity constraints to enable supporting infrastructure like EV charging points. (See Insight I-FNZ1, I-FNZ5, I-FNZ7, I-FNZ8, I-FNZ9, I-FNZ11 and I-FNZ13, I-DSO/WS6 in our supporting document Line of Sight – Whole systems)

We learned how valuable our DFES and strategic forecasting datasets could be to local energy planning teams. To ensure we deliver the best value at the lowest cost, we will develop a local area energy planning self-service tool, where local authorities can layer local input such as decarbonisation strategies and action plans, local market trends, social inclusion policies, transport plans and so forth upon our network infrastructure data to develop options for their communities. This will help level-up the gaps between local authorities in our area and reduce costs all round. The Local Area Energy Planning Team covered in the section above will support the various levels of resource and skill levels in the use of this tool, to ensure the local authorities have all the support they need.

Commitment WS3

We will provide proactive services to our DER by expanding our digital outage planning and automatic restoration tools, to minimise disruption and maximise their system access throughout RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£0.6m	Included in baseline DSO allowances.	Increased system access for DER. Increased opportunity to access system services Increased satisfaction and maximised revenue opportunities for connected DER.	"If UKPN know about regular maintenance or planned outages then this information should be made public." DG focus group. (See Insight I-FNZ1, I-FNZ8, I-FNZ11, I-FNZ16, I-DSO/WS7 in our supporting document Line of Sight – Whole systems)

The energy sector is changing around us. "Connect and forget" is no longer an option as renewable generators are increasingly selecting distribution networks as their network of choice. We understand new types of interaction and participation for these system actors will be needed. DER operators have changing needs as the energy system becomes more reliant on them.

Based on our in-depth engagement during RIIO-ED1, we will scale innovative solutions such as our outage planning tool (Network Vision) to encompass 80% of all DER capacity over 1MW. This will minimise disruption to DER by ensuring they have influence on the planned outage schedule. Furthermore, we will build new functionality into our Distribution Energy Resource Management System to reduce the impact of abnormal network running arrangements, thus maximising network access.

Commitment WS4

We will embed a requirement to have explicitly considered whole system solutions as part of our investment planning and investment governance by the start of RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	Increased consideration of a wider number of stakeholders and number of options considered results in lower costs and wider benefits to consumers.	Customers and stakeholders expect us to enable smarter networks, and be transparent and coordinated in our planning. (See insight I-DSO/WS2 and I-DSO/WS8 in our supporting document Line of sight – Whole systems)

Each investment opportunity will be different. Nevertheless, we will embed whole systems thinking in our assessment of potential investments. When we consider the costs and benefits of an investment, we will assess both direct benefits as well as wider social value. To address the scenario where the allocation of costs to different parties does not match the benefits from the investment to them, we will:

- Establish a fair allocation of costs and benefits between the parties through use of the CBA tools and identify situations where this would result in one party receiving insufficient benefits to justify its costs.
- Utilise Ofgem's Coordinated Adjustment Mechanism (CAM) reopener, to transfer outputs and allowances where appropriate.
- Operate an inclusive process where external parties can propose solutions to issues that we highlight and similarly, for us to propose solutions to issues highlighted by others.
- Utilise our innovation programme to help identify approaches to transfer value to other unregulated parties where appropriate

Building Block 2 – Whole electricity commitments

Commitment WS5

We will expand the geographic area of our South East Regional Development Programme (RDP) in RIIO-ED2 and deliver a RDP in East Anglia by 2024, as agreed with the ESO. We will unlock up to £130m of whole system benefits during RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£3m IT CAPEX. £1.5m FTE costs during RIIO-ED2.	Included in baseline DSO allowances.	Up to £130m of whole system benefits.	Stakeholders want transparency to understand why decisions are being made and view this as critical for enabling market participation. (See Insight I-FNZ1, I-DSO/WS2, I-DSO/WS8 and I-DSO/WS9 in our supporting document Line of Sight – Whole systems)

Our ongoing partnership with the ESO on the Regional Development Programme (RDP) for the South East is an excellent example of whole systems collaboration to deliver lower costs for the consumer. The RDP has provided a blueprint for transmission-distribution coordination.

We have unlocked over 1GW of capacity on the transmission network to connect DERs faster, at the same time as avoiding the need for £1bn of transmission infrastructure spending. We will unlock the full value of RDP by further working with the ESO to expand the service offering across our network.

Chapter 12: Enabling Whole System Solutions continued

Commitment WS6

We will work with the ESO to expand the Power Potential trial to be a business as usual offering across our EPN and SPN regions by 2028. This will be a world-first large scale rollout of a whole system reactive power management solution. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
The costs included in WS5 also cover this commitment.	Included in baseline DSO allowances.	£29m of wider whole system benefits by 2040 in line with the Power Potential CBA. Reduced Active and Reactive power market costs.	Stakeholders and participants in the Power Potential project supported expansion of the project across our regions. Insight from Phase 2b supported this because ensuring ease of integrating renewables into the system without losing reliability, and sharing renewable knowledge, were seen as areas where we could support. (See Insight I-FNZ1, I-DSO/WS2, I-DSO/WS8, I-DSO/WS9 and I-DSO/WS16 in our supporting document Line of Sight – Whole systems)

Through Power Potential, we have developed a world-first regional reactive power market, showing how actions at the distribution level by the DSO can help DER to provide reactive power to efficiently meet transmission voltage needs.

We will unlock the full value of Power Potential by further working with the ESO to expand the service offering across our network. This whole system solution is a win for the electricity system by lowering operating costs, a win for DER by maximising market access, and a win for society by strengthening the business case for increased renewables.

Commitment WS7

Over RIIO-ED2 we will deliver 1GW of distributed energy resources (DER) capacity at no more than £8m, using smart interventions and new innovations, reporting progress in our annual business plan.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£7.6m capex for targeted distributed generation enhancements.	Included in baseline DSO allowances.	Greater volumes of local renewable energy provision. See ED2-EJP-NP-004. Reduced connections costs for DER. Increased market opportunity for DER.	Stakeholders think that we should ensure sufficient network capacity ahead of need, and coordinate network reinforcement so that we only "dig the road once". (See Insight I-FNZ1, I-FNZ7, I-FNZ8, I-FNZ15 and I-FNZ16, I-DSO/WS2, I-DSO/WS13 and I-DSO/WS16 in our supporting document Line of Sight – Whole systems)

We aim to facilitate 1.2GW of rapid connection of distributed generation and storage to our networks. We have targeted 1.2GW of connected capacity as this takes into account the volume of generation the access and charging review may unlock, and then places a further stretch to achieve the highest level of grid scale solar and battery uptake across our future energy scenarios. We will do this at lowest cost which will drive us to develop smart innovative solutions as opposed to simply building assets. To do this, we will make the most of our existing assets and use a mixture of least regret interventions and innovative solutions.

Commitment WS8

We will make our connections process faster and easier for our residential customers connecting low carbon technologies. We aim to instantaneously process 80% of general enquiries (GE) supply upgrades via self-service offerings, delivering a 9/10 experience over RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	ODI-F as part of BMCS.	Make it simple, easy, low cost and quick for customers.	Provide the data and methodology so customers can self-serve and notify UK Power Networks. Reducing engagement with UK Power Networks for small connections. DG Focus Group. (See Insight I-FNZ1, I-FNZ5, I-FNZ7, and I-FNZ9 in our supporting document Line of Sight – Whole systems. Also linked to connections engagement key insights I-C2 and I-C3)

The connections process is often the first interaction our customers have with us. The process for connecting LCTs to the network needs to be efficient and cost effective. With this in mind, we are committing to providing smart connection offers and self-serve tools for quotations and connections to reduce the time and cost to connect LCTs.

Commitment WS9

For each year of RIIO-ED2, we will develop high quality marketing information which can be used by third party intermediaries, to encourage an increase in customer use of low carbon technologies, unlocking greater participation in flexibility markets.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	Included in baseline allowances.	Help customers to make informed decisions and encourage participation in flexibility markets e.g. by explaining smart charging and the associated benefits to them.	Stakeholders think that we should play a central, collaborative, role in raising awareness and educating customers about LCTs. Customers' lack of awareness / knowledge and concerns about the difficulty and expense of installing low carbon heating solutions remain significant barriers to their adoption. (See Insight I-FNZ1, I-FNZ5, I-FNZ6, I-FNZ7, I-FNZ8, I-FNZ12, I-DSO/WS6, and I-DSO/WS10 in our supporting document Line of Sight – Whole systems)

Currently, our customers do not have the information they need to fully understand and transition to Net Zero transport and heating. We will do all we can to inform and share the benefits of adopting low carbon technologies. We will work in partnership with intermediaries to develop material which helps our customers close "the knowledge gap" and understand the benefits of LCTs. We will also partner with trusted third parties to help inform our customers on Net Zero.

Commitment WS10

We will develop an energy efficiency flexibility product, running tenders every 6 months, starting in 2023. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
Costs have been included in our DSO Cost build up.	Included in baseline DSO allowances.	Supports lower energy bills. Provides a revenue opportunity for customers that can provide energy efficiency services.	Customers support the need for smart technology and want us to support the roll out of energy efficient technology, and local authorities want to improve energy efficiency of housing stock and stakeholders want us to enable markets to be successful. (See insight I-DSO/WS11 and I-DSO/WS16 in our supporting document Line of sight – Whole systems)

Chapter 12: Enabling Whole System Solutions continued

Customers and stakeholders have told us that we should show leadership on energy efficiency. Recognising the value that energy efficiency can provide, both directly for our customers and in helping us to defer network reinforcement, we will create a new DSO product that we can include with our flexibility tenders to provide a revenue stream for parties who can offer either appliance or thermal energy efficiency. We have engaged with BEIS on an idea that they are developing, called the Reduced Electricity Demand Incentive (REDI) framework. Given the obvious synergies with our commitment, we will combine our work with REDI and aim to deliver a larger positive impact in our communities.

Building Block 3 – Whole transport commitments

The increasing use of EVs brings together the transport and electricity sectors. Our engagement and research have shown us that there is an increasingly positive attitude towards electric vehicles, but concerns about the availability of charging infrastructure and cost remains a barrier to consumer adoption.

Customers and stakeholders expect us to demonstrate leadership in the development the development of EV charging infrastructure. We will collaborate with other statutory bodies to minimise the disruptive impact that building EV charging infrastructure has on daily life.

According to Transport for London, congestion costs the London economy over £6bn per year[8]. The GLA has asked us and other utilities to collaborate to bring these costs down. Our customers have made it clear that we should adopt a "dig once" approach and seek economies of scale through forward planning and coordination.

Working with the Greater London Authority (GLA) and the gas networks covering Greater London, as part of a street-works coordination, we have contributed to savings of over £766,000 in RIIO-ED1. There remains further scope to unlock consumer value. For RIIO-GD2, Cadent, SGN and the GLA have quantified the social benefits of collaborating on street-works[8]. We have worked with these organisations to develop a new Output Delivery Incentive covering street works.

> "UK Power Networks has shown leadership by being the first DNO to join the collaborative street works partnership, which is already delivering significant value for London's residents and businesses by reducing disruption through joint working"
>
> Molly Strauss, Head of Infrastructure, the GLA

At present, the cost of upgrading the network for off-street charging points i.e. on people's driveways is socialised. However, public charge points are faced with a combination of low utilisation and significant upfront connection costs, which can act as a barrier to investment. This market failure results in fewer charge-points being installed than is needed to meet our customers' demand. Moreover, approximately 50% of our domestic customers do not have access to off-street charging and there is a risk that some customers are left behind in the transition to EVs.

The Public Accounts Committee in May 2021 warned that the government has a "mountain to climb" to make all cars and vans sold in the UK low emissions by 2030. The report urged the Department for Transport to address the remaining barriers to expanding the network and the availability of chargers where drivers do not have off-street parking. The Competition and Markets Authority review of the EV market also highlighted this as a key issue to be addressed. We want to tackle the risk of "charging deserts" highlighted by the CMA by taking a targeted approach.

We will work with local authorities to identify areas which exhibit high concentration of no off-street parking, coupled with poor air quality, social deprivation and high connection costs. Our research shows that is this combination of factors that risks disadvantaged communities being left behind.

Commitment WS11

We will reduce street-works costs and transport disruptions in London by collaborating with other statutory bodies on at least 40 collaboration projects in RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£1.26m.	ODI(F), in line with Ofgem's RIIO-GD2 final determination.	We estimate c£12m of social value from taking a co-ordinated approach across 40 projects. This is enabled by reduced traffic congestion and damage to trees, reduced noise levels and volume of excavated material.	Stakeholders think that we should ensure sufficient network capacity ahead of need, and coordinate network reinforcement so that we only "dig the road once". (See Insight I-FNZ13 and I-FNZ15, I-DSO/WS8 in our supporting document Line of Sight – Whole systems)

8 http://content.tfl.gov.uk/understanding-and-managing-congestion-in-london.pdf

Commitment WS12

We will run a process to identify and address market failures with respect to the provision of on-street charging, unlocking over 2,400 public charge points in areas of market failure by the end of RIIO-ED2. ** NEW **

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£7.3m.	Consumer Value Proposition (CVP).	Futureproofing and coordination leading to lower cost network investment which generates £15m of societal benefits. Reduction in CO_2 emissions and improvements in air quality. Focusing on areas with poor air quality also targets more disadvantaged customers and has greater positive impact from improvements in air quality.	"Most cities and towns will require significant provision of this charging to support EV transition". Net Zero Forum Customers and stakeholders believe that we should focus on: information provision; collaboration (particularly with local authorities); and relieving capacity constraints. Our engagement with local authorities highlighted very strong support for this commitment. (See Insight I-FNZ1, I-FNZ3, I-FNZ4, I-FNZ8, I-FNZ15 and I-FNZ17 in our supporting document Line of Sight – Whole systems)

The barrier created by the upfront capital hurdle to investment in public charge points can be addressed by socialising some of the cost of network upgrades in specific circumstances. We want to level up the situation by socialising a portion of the cost of network upgrades in these circumstances to get the market provision of charge points moving and to give consumers in these areas greater confidence to switch to EVs as costs continue to fall. **Importantly, we do not intend to own or operate charge points.**

We are confident that our approach will work, because we are already trialling it through an innovation project called "Charge Collective"[9]. Our intent is to scale our work from this trial, to combine it with our Local Area Energy Planning approach and realise £16m of value over 10 years.

We have considerable support from regional planning authorities on this proposal because it provides a practical and reasonable solution to address an issue that has been highlighted by many. This commitment also forms the basis of a Consumer Value Proposition (CVP) for Ofgem's consideration.

Commitment WS13

We will run a process to identify and deliver an additional 7-8MW of capacity in areas located near 14 motorway and trunk road service stations, by running a call to market in 2024 and 2025, ensuring a maximum of 30 miles between charging across our regions.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£70m.	Either the Capacity Volume Driver at the secondary level or the primary infrastructure re-opener.	Address barriers to enable additional rapid charging at 14 service areas in the East and South East of England. Improved range confidence leading to greater EV adoption.	Stakeholders think that we should be ambitious in relation to the delivery of en-route charging infrastructure. Stakeholders at our Net Zero Council also thought that we should ensure sufficient network capacity ahead of need, and coordinate network reinforcement so that we only "dig the road once". Cables should be as big as possible as the majority of cost is digging up the roads. We should take a strategic approach to network investment instead of an incremental approach. (See Insight I-FNZ1, I-FNZ3, I-FNZ8, I-FNZ14 and I-FNZ15 and I-FNZ17 in our supporting document Line of Sight – Whole systems)

In 2018, McKinsey reported that a lack of access to charging stations was the most significant barrier to EV purchasing after price and driving range. Since then, recharging concerns have come to the fore as a scarcity of charge points and time taken to recharge are perceived as some of the biggest disadvantages of EVs. Customers told us that the facilitation of EV charge points across the region and focusing on high-speed charging was our most important and ambitious initiative.

We aim to ensure that drivers will never be further than 30 miles from a charging location on a major trunk road in our patch matching the ambition of government and their rapid charging fund. To achieve this target, 40 sites on motorway and trunk road locations within UK Power Networks' licence areas will need support.

9 https://innovation.ukpowernetworks.co.uk/projects/charge-collective/

Chapter 12: Enabling Whole System Solutions continued

26 of these sites will be supported with sufficient capacity through our work on the Green Recovery Programme in RIIO-ED1. The remaining 14 sites will require our support due to lack of capacity and high connection costs. We propose a £70m RIIO-ED2 fund aligned to the learnings from the Green Recovery Programme. We will co-ordinate with Project Rapid[10] to ensure the most efficient roll-out of suitable capacity to kickstart this market segment and avoid duplication.

Our work will be subject to Ofgem's approval of the investments through our proposed uncertainty mechanisms. Our approach will be to run two calls for evidence similar to the Green Recovery programme. This will identify where demand is likely to create constraints and where necessary we will reinforce the network such that the demand can be satisfied. These reinforcements will be optimised based on existing secondary and primary level capacity and the relevant costs of different approaches.

Building Block 4 – Whole heat commitments

Our stakeholders have a clear view: we have a role to play in the transition to electric heating and the provision of energy efficiency measures (as a coordinator rather than a leader). Our stakeholders proposed that we should work with organisations to support those in fuel poverty or vulnerable circumstances. Our engagement and research also tells us that one size does not fit all for our customers. We have identified four key customer segments to categorise specific needs and the type of services that we need to develop proactively. We list these segments below:

- **Off-gas grid**, where our role is to help householders switch to electric heating in the most efficient way and to coordinate social support to ensure no one is left behind and in vulnerable circumstances.
- **On-gas grid**, where we will provide information, support, guidance and free supply upgrades when requested to do so. We will also work with local authorities and community groups to map pathways to Net Zero, and we will work to ensure no one is left behind.
- **Industrial and commercial**, where we will help customers to transition to electric heating, by providing information, support and guidance; by providing new connection products and by streamlining and simplifying the connections process. For SMEs we will provide free single phase service upgrades to their supply to decarbonise.
- **District heating and new housing builds**, where our role will be to provide information, support and guidance and provide simple, timely and cost-effective access to our network. We will also provide information to help our customers understand how they can engage with flexibility markets.

Commitment WS14

By 2028 we will proactively provide LCT and energy efficiency information to 1.4m of our customers located within zones earmarked for electrified heating.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£553k	Included in baseline allowances.	Lower ongoing heating costs for customers, improved wellbeing and health by ensuring homes are kept warm.	"DNOs should proactively identify these customers and support partners who are better equipped to deliver those measures", Heat Focus Group. Stakeholders think that we should play a central, collaborative, role in raising awareness and educating customers about LCTs. (See Insight I-FNZ1, I-FNZ2, I-FNZ7, I-FNZ8, I-FNZ10 and I-FNZ12 in our supporting document Line of Sight – Whole systems)

Our Whole Heat approach encompasses coordination with gas networks, local authorities, trusted community partners and the wider supply chain to mitigate any unintended consequences from the decarbonisation of heat. We will build on our work from RIIO-ED1 collaborating with key stakeholders including local authorities, trade associations and gas networks to develop and define frameworks to facilitate the decarbonisation of heat and energy efficiency uptake measures.

We worked with The Association for Decentralised Energy (ADE) to develop our Heat Street research project[11] that identified the most suitable energy efficiency measures & electric heating solutions for different localised 'zones'.

The data generated by the project was shared with over 60 local authorities to focus resources on those in vulnerable circumstances, for example, Hammersmith & Fulham Council used it to target their Green Homes Grant support to over 2000 residents.

We also worked with Wales & West Utilities on the HyCompact project[12], where we engaged with over 1000 customers from a variety of socio-economic demographics to explore their attitudes and barrier to the uptake of low carbon hybrid heating solutions; almost 60% of respondents indicated little to no understanding of heat pumps and even fewer understood other low carbon technologies.

10 https://www.gov.uk/guidance/rapid-charging-fund
11 https://innovation.ukpowernetworks.co.uk/projects/heat-street-local-system-planning/
12 https://innovation.ukpowernetworks.co.uk/projects/hycompact/.

In RIIO-ED2, we will support 1.4m customers by providing relevant LCT and energy efficiency information and playing a greater role in coordinating support for customers in vulnerable circumstances during the transition to electric heating as covered in our vulnerability strategy.

We will additionally include energy efficiency advice with every quote we provide to our heat related customers wanting to connect in RIIO-ED2.

Commitment WS15

We will ensure that 71% of off-gas grid homes in our regions have the suitable capacity to decarbonise their heating and transport by the end of RIIO-ED2. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£75.25m	Consumer value proposition (CVP).	Reduced heat load on the network. Improved wellbeing and health by ensuring homes are kept warm. Suitable capacity to decarbonise their heating and transport.	"DNOs should proactively identify these customers and support partners who are better equipped to deliver those measures", Heat Focus Group. Stakeholders think that we should play a central, collaborative, role in raising awareness and educating customers about LCTs. (See insight I-FNZ1, I-FNZ2, I-FNZ5, I-FNZ7, I-FNZ8, I-FNZ10, I-FNZ15, and I-FNZ18 in our supporting document Line of sight – Whole systems)

95% of stakeholders at our Local Authorities Forum identified off-gas grid customers and new builds as the most likely early adopters of low carbon heating. Across our regions we have identified 341,000 off-gas grid customers. To accelerate the drive to Net Zero, sufficient capacity must exist or be created in the network to support the uptake of heat pumps and other potential LCTs, such as EVs, for these customers. We will ensure 242,000 off-gas grid customers have suitable capacity to decarbonise their heat and transport by 2028, together with a proactive energy efficiency advice programme.

Our Business Options Testing (BOT) engagement highlighted the importance of proactive action to increase awareness and support households to switch to electric heating.

In RIIO-ED1, we are working with trusted local community partners and Local Area Energy Planning experts in the village of Barcombe in East Sussex to develop a blueprint to electrify off-gas grid communities using a coordinated approach. Additionally, through our innovative project "Heat Street" we developed a 'zoning' framework to identify the most cost-effective and least disruptive energy efficiency measures and low carbon heating solutions for our customers, considering their local dynamics and demographics. We will build on this work in RIIO-ED2 and strategically invest in off-gas grid areas.

This decision has not been made in isolation. Through our Whole heat approach, we engaged with gas distribution networks (GDNs) and collaborated with our regional GDNs SGN and Cadent to develop a consistent and scalable framework to determine the least disruptive and most cost-effective energy pathway to decarbonise these off-gas grid communities. We collectively undertook a whole systems analysis approach to produce a scalable blueprint to determine the most feasible pathway for various sized off-gas grid communities across our regions. We used the ENA's whole systems cost benefit analysis (CBA) tool to drive our investment plans. The outcome of this exercise validated that electrification is the most cost effective pathway for the majority of off-gas grid customers.

In the best interests of these off-gas grid customers we additionally worked with Openreach[13] and the Shared Rural Network[14] mobile network operator programme to identify opportunities to co-ordinate our programmes across telecoms and electricity in these common areas.

Please refer to our whole heat section in Appendix 19a, and the associated EJP-NP-102 Off-gas grid investment case for details on how will identify, engage, scope and efficiently deliver this programme along with local trusted intermediaries.

13 https://www.ispreview.co.uk/index.php/2021/05/openreach-boost-rural-fttp-broadband-build-to-6m-uk-premises.html
14 https://srn.org.uk/

Chapter 12: Enabling Whole System Solutions continued

12.2 Establishing a DSO

Turning whole systems strategy into action - facilitating the transition to Net Zero and supporting clean economic growth, at lowest cost

Our vision is of a dynamic distribution system, with electricity demand and supply flexing in response to distribution-level conditions and market signals. We will see market-based solutions which influence consumer behaviours, supplemented with traditional network investment that results in the lowest costs for consumers. This will lead to a smarter and more highly utilised distribution network, with faster and cheaper access for the LCTs we will need to achieve Net Zero.

This is a radical departure from the traditional thinking that has guided networks over the last 100 years – traditional thinking that has seen building capacity as the default solution. We will need to become a disrupter, thinking in new ways, being more dynamic and agile in line with changing market conditions and customer behaviour, and working in much stronger collaboration with others.

We know that flexibility can provide an alternative to investing in network assets and can reduce the costs associated with LCT growth. To realise these savings, potential providers of flexibility must have confidence that the market facilitator is credible and evaluates options with impartiality.

We will establish an independent and legally separate DSO business unit to bring this future into reality and we will set the benchmark for the rest of the industry.

Our independent and legally separate DSO business unit will engender trust in stakeholders by working hard to facilitate the Net Zero transition and support green economic growth, all at the lowest possible cost. And our DSO will provide a critical role in supporting stakeholders through the provision of data and support as they play their part in the Net Zero transition.

More than half of the emissions reductions required under the Sixth Carbon Budget rely on people and businesses taking up low carbon solutions[15]. In the main, these customers participate in the energy markets through their energy supplier or aggregator and only rarely contact their local network company. To play a full role in the transition to Net Zero, this means our DSO will need to work as part of an overall eco-system of partners that produce compelling propositions for customers, as well as protecting the most vulnerable in society from exclusion or exploitation.

In this section, we will explain:

- Why our DSO Strategy is ambitious and goes beyond Ofgem's baseline requirements.
- How we have struck the right balance between ambition and delivering value for money.
- The context in which we have developed our DSO strategy.
- The thinking behind our commitments and how we will deliver them.
- How our plan is supported by our customers and stakeholders.

Since our DSO will be responsible for delivering elements of our whole systems, vulnerability and Major Connections strategies, these other strategies should be considered alongside the content of this chapter.

Our ambition is to be the leading DSO

The way in which our DSO strategy meets Ofgem's baseline expectations is set out in detail in Appendix 18: Our DSO strategy. We have gone considerably further than Ofgem's expectations. Our DSO strategy builds on our strengths and our achievements in RIIO-ED1, yet it also recognises we now need a step change in capability. It is an ambitious plan through which we will continue to lead the way in establishing a DSO, both in the UK and globally:

1. **It will deliver the first independent DSO and set the benchmark in transparent decision-making.** We will deliver a clear separation of market development and network ownership roles by establishing the DSO as a separate legal entity within the UK Power Networks Group – a first in the UK market, designed to build confidence and trust in response to our stakeholder feedback.
2. **It is committing us to deliver significant cost savings whilst enabling unprecedented LCT growth.** We will deliver a £410m reduction in load related expenditure during RIIO-ED2. On top of this, we have estimated that the DSO can deliver between £780m-£2.6bn of wider system savings to 2040 for our regions.
3. **It will formalise a joint whole system planning approach that considers factors beyond our immediate control.** This will be achieved through partnership with key stakeholders such as the ESO, Gas Distribution Networks and local authorities, as well as institutionalising a "whole systems mind-set" by incorporating explicit consideration of whole systems solutions within the investment governance process for all investment schemes.
4. **It will facilitate an open marketplace for distribution flexibility services.** Our strategy sets out a vision for a digital, independent, coordinated-access platform on which DSO, ESO and DER participants can buy and sell flexibility services. Our vision is that the Distribution Market Platform will be integrated with the wider energy and Balancing Services markets via open application programming interface (APIs), providing market 'inter-operability' and coordination. This will allow our DER customers to maximise the value of the flexibility they can offer to the whole system. The Distribution Market Platform will be provided and operated by a third-party and will coordinate with initiatives such as the ESO Single Markets platform. We do not believe that DSOs should have "closed" digital monopoly platforms.

15 See https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf.

Our strategy

Our DSO strategy has been designed with all of this change in mind. It is built on four strategic pillars:

1. Building trust and confidence in independent distribution system operation

We will build trust and confidence by establishing a legally separate DSO business unit by 2023, creating an independent DSO Supervisory Board, and through our annual DSO forward plan of action.

We will deliver operational transparency by publishing our day-ahead operational plan and schedule of flexibility services and curtailment, and a monthly control room dispatch decision report from the start of RIIO-ED2.

2. Reducing customer bills through sector-leading DSO operations

Our DSO function will deliver at least a £410m reduction in load related expenditure during RIIO-ED2 through increased competition and use of LV flexibility, including at the domestic level.

We will keep our costs down by taking a "flexibility and energy efficiency first" approach over RIIO-ED2 and will "market test" all network needs before considering reinforcement. These needs will be procured through a range of long-term and short-term markets and products, which are inclusive by design and ensure no customer is left behind in the energy transition.

We will collect real time data through monitoring in all LV networks where we are forecasting constraints over RIIO-ED2, and will target 100% coverage of the rest of the network through advanced analytics using smart meter data, giving us better insight to defer reinforcement actions for as long as possible.

We will develop a new customer satisfaction survey to ensure we fully understand stakeholders' priorities, and will publish an annual DSO forward plan that will explain how we are responding to stakeholders' priorities.

3. Providing timely and affordable access to our network by accelerating the connection process

We will offer a range of firm and flexible connection products, from lowest cost through to highest access, with a maximum curtailment commitment from the start of RIIO-ED2, and will annually update our products based on stakeholder feedback.

4. Helping our customers play their part in Net Zero and supporting innovation in energy services

We will be the UK's leading DSO in network data provision through a best practice data service that opens data according to user priorities and customer value-add. Our ability to meet users' needs will be measured as part of an annual stakeholder survey from the start of RIIO-ED2.

5. **We will drive competition everywhere we feasibly can.** Our DSO's core role is to open new markets to competition to deliver best value for consumers. For the benefit of consumers, this is not limited to introducing flexibility services, but also to the construction of DNO assets. As we explain in Chapter 15: Competition, we have made a DNO-first commitment to tender construction of major load and connections-driven investment. Our independent DSO will facilitate the procurement process for these works. Our DNO can bid for these projects but will do so on a level playing field with other providers, and will only deliver the work if it is the successful bidder.
6. **Finally, we will establish a 20-strong Local Area Energy Planning (LAEP) team to provide expertise and data support to the 127 regional and local authorities in our areas.** We are not starting from scratch. To hit the ground running in RIIO-ED2, we have co-developed a framework with six regional planning authorities in our region that seeks to unlock the network investment required to support local Net Zero climate action plans with greater consistency and transparency. The LAEP team will not just be providing services to local authorities but more importantly supporting them in the capacity and capability building required to deliver their Net Zero plans. Ahead of RIIO-ED2 we will also deliver a new digital service to support and facilitate Local Authorities and other stakeholders in the co-development of local area plans.

Our strategy for establishing a DSO that delivers value for money for consumers

DSO Net Present Value (NPV) Benefits (to 2040):
High confidence benefits £560m – £670m
Total estimate benefits including wider system benefits £780m – £2.6bn

Our DSO strategy represents **an ambitious programme to facilitate a cost-effective transition to Net Zero over the next 20 years**. We are conscious that there is a huge weight of expectation on how concepts like the DSO, whole systems and digitalisation are going to move beyond hyperbole and deliver better and more tangible outcomes for consumers.

Chapter 12: Enabling Whole System Solutions continued

Our approach is to focus on value and what we need to do to unlock it both directly in terms of our capability and actions, as well as what we are dependent on others to do. Our strategy builds on the progress made by 'learning from doing', drawing on our industry leading work in RIIO-ED1. Our work to date has identified between £250m and £300m of potential value to consumers in our regions out to 2040 which will be enabled by our DSO investments. In this section, we explain the extensive work we have undertaken with other organisations to identify and deliver this value.

We have grouped the benefits into three categories:

1. **Direct network benefits (i.e. totex savings that we can realise for the benefit of consumers).**
2. **Higher confidence wider system benefits** based on delivering the relevant savings the ESO has identified and carbon savings from enabling additional distributed generation.
3. **Additional wider system benefits which the DSO helps enable on the system** such as avoided generation build due to optimal use of flexibility on the distribution networks.

We present benefits as a range as they are driven by the take-up of low carbon technologies and the extent to which heat is decarbonised through electrification. Put simply, the greater the demand and generation on the system, the more opportunity there is to save money through DSO solutions and actions.

Direct network benefits

In RIIO-ED2, our DSO will allow us to defer or avoid the following investment from our Business Plan, reducing costs to consumers:

1. **Deferred reinforcement on our primary and secondary networks due to the use of flexibility.** We will defer up to £410m of load related investment on the primary and secondary network in RIIO-ED2 by making greater use of flexibility. We assume that 5% of these costs are permanently avoided, but that 95% are simply deferred to a future point in time. This delivers benefits through the time value of money and we believe this is a prudent approach that does not overstate the benefits potential.
2. **Reduced costs of connecting Distributed Generation to our networks.** We are deferring £185m of capital investment that would have been required of customers to connect renewable distributed generation. We expect our actions to have a direct impact in improving the business case for renewable generation to connect to our networks under the current charging rules.
3. **Reduced investment due to better quality data.** We expect to save (conservatively) £6m of secondary reinforcement due to improved data leading to more informed and targeted investment decisions.

Our DSO will allow us to continue to help defer and avoid investment out to 2040. **Our analysis shows that under our core load scenario, these benefits are £250m (gross) out to 2040. This rises to £300m under a high load scenario.**

Higher confidence wider system savings – supporting the ESO and delivering carbon savings

In addition to our investment savings, our DSO strategy will deliver whole system benefits. The ESO has identified approximately £2bn of savings within its RIIO-2 business plan.[16]

Working closely with the ESO, we have identified the specific areas where the delivery of these benefits requires actions from us:

i. **Increased participation in ESO markets:** Our DSO will deliver this value by providing faster and cheaper network access to Distributed Energy Resources (DER) connected under flexible connections, and by co-ordinating the dispatch of DER in concert with the ESO. This unlocks the potential for greater levels of DER to provide national level services at lower cost to the ESO.

ii. **Regional Development Programmes (RDPs):** Our DSO will deliver value by taking a whole systems approach with the ESO, to connect greater levels of renewable generation than would otherwise be the case in constrained areas of the transmission network. These are distinct from the benefits above in that they also specifically relate to deferral of transmission investment.

We have carefully reviewed the ESO's analysis to assess our contribution out to 2040. We have also separately included the benefits of rolling out our Power Potential innovation project (a world first), already helping the ESO to avoid investment through implementing distribution level markets.

In addition to these ESO benefits, our DSO will help to deliver carbon savings to society by accelerating the connection of DG to our networks. We will deliver this benefit through using flexible connections or market-based solutions to connect DG and manage curtailment, rather than by reinforcing our assets. Since reinforcement takes longer, these smart solutions allow us to connect DG earlier. Where this DG is renewable, it delivers an accelerated carbon benefit by displacing more carbon intensive plant.

In combination, the ESO benefits and carbon savings we are delivering out to 2040, **will deliver an additional gross benefit of £510m under a core scenario (which rises to £610m under a high load scenario).**

Additional wider system benefits

There are other wider benefits which our DSO can help deliver, through the optimal use of flexibility. These include:

- Reducing the need for new low carbon generating plant by using flexibility to maximise the use of local renewable generation.

16 ESO RIIO-2 CBA report (nationalgrideso.com)

- Reducing the need to build the Transmission network to connect new renewables.
- Reducing losses associated with transporting new Transmission connected renewables to sources of demand on the distribution network.

We have worked with the Carbon Trust and Imperial College to use the analysis in their recent study "Flexibility in GB"[17] and understand what quantum of the £9.6-16.7bn benefits that they identified by 2050 are enabled by our DSO investments. This is designed to supplement our CBA analysis and highlight the contribution our DSO investments can make to these wider benefits.

Our initial analysis indicates that between £230m-£2.0bn of additional wider system savings (gross) are enabled by our DSO out to 2040. This range is driven first by the extent to which heat decarbonisation is met through electrification or hydrogen and secondly, by differences in the take-up of flexible technologies in 2040 between scenarios. Including these range of benefits within our CBA delivers an **overall NPV of between £780m and £2.6bn out to 2040.**

Figure 39 below provides a summary of our benefit areas and DSO costs, under both a core and high load scenario, and sets out how they combine to deliver overall net benefits to consumers.

Figure 39: Summary of DSO benefits out to 2040 under core and high load scenarios (rounded numbers)

Benefit area	Gross benefits per benefit area (PV) £m		Total costs (PV) £m		NPV £m	
	Core	High	Core	High	Core	High
Cost savings to our customers	250	300	210	250	45	55
High confidence wider system savings (incl. carbon savings)	510	610				
Subtotal	**760**	**910**			**560**	**670**
Other wider system savings (Imperial/Carbon Trust analysis)	230	1980				
Total including all wider system savings	**990**	**2890**			**780**	**2640**

We have worked with a range of external parties in assessing these benefits, including the ESO, Carbon Trust, Imperial College and Baringa Partners to challenge and stretch our thinking. We have been proactive, diligent and collaborative in exploring the true value potential of our DSO capabilities. The ESO and Carbon Trust have reviewed and endorsed our approach.

> "UKPN's collaborative approach has been of great benefit to ESO in developing whole electricity system solutions. We believe such an approach has enabled UKPN to enhance their work on assessing DSO benefits."
>
> Julian Leslie, Chief Engineer, Electricity System Operator

It is clear that there is significant value from DSO actions. That is why we believe an ambitious DSO programme with sharp incentives that actually reflect the value enabled in the wider system, coupled with adequate investment allowances for the technology, cyber and data pre-requisites – is crucial to enabling a cost-effective transition to Net Zero for consumers.

We acknowledge that to unlock this significant wider system value, more work is needed to develop the frameworks that compensate those that facilitate this additional value. We are encouraged by developments such as the introduction of wider social value analysis in the Green Book[18]. We are committed to work all the key stakeholders to develop these frameworks during RIIO-ED2. We believe this is the start of a process, not the end of the process.

The detailed cost benefit analysis is included in Appendix 18d: DSO cost benefit assessment. We also provide a full explanation of our DSO strategy in Appendix 18: DSO Strategy.

17 Flexibility_in_GB_report.pdf (storage.googleapis.com)
18 The Green Book (publishing.service.gov.uk)

Chapter 12: Enabling Whole System Solutions continued

The context within which we have developed our strategy

We are a global leader in DSO capabilities. This was publicly recognised in 2020 when we were ranked first globally in the international Smart Grid Index[19]:

- In 2017, we were the first DNO to tender for flexibility in the open market and we developed one of the world's first Low Voltage flexibility markets. Flexibility is the core of our DSO strategy. In RIIO-ED1 we pioneered the use of flexibility and we are the only DNO to have made available in excess of £75m for flexibility services payments. We awarded nearly £45m in flexibility contracts for the RIIO-ED1 and RIIO-ED2 periods. Moreover, our tenders are based on competitive bidding, rather than fixing prices. In order to ensure best value for consumers, we have awarded flexibility tailored to the identified network need.
- Flexibility is a new feature of the market and making meaningful comparisons between the level of activity carried out between different DNOs is challenging – for us and for stakeholders! We are taking a transparent approach to our reporting. Our post-tender reporting exceeds the requirements of the Clean Energy Package and the recent licence condition C31E. We are committed to working with other DNOs through ENA Open Networks to develop transparent reporting standards.
- Our Distribution Future Energy Scenarios (DFES) provide the most detailed picture yet on how our part of the energy system might evolve over the coming years – our forecasts go down to street-level.
- Through our Innovation Project Shift[20] we have demonstrated that, with the help of the appropriate information and control technology, consumers are willing to engage in smart charging in response to incentives, reducing the network capacity needed to accommodate electric vehicles.
- We have collaborated with a wide range of partners (including OVO energy and Octopus Energy), which has helped us to understand how we can encourage consumers to participate in delivering the flexibility that the system needs.
- We worked alongside Ofgem, leading the development of network utilisation measures. We have developed a capacity volume driver that we describe in more detail in Section 16.2: Managing external uncertainty.

However, we are not complacent. We recognise the need to go further. Our DSO will be at the heart of the energy system transformation, and of delivering our whole system strategy. In its Sector Specific Methodology Decision, Ofgem confirmed that a new DSO ODI will be developed for RIIO-ED2. The intention is to drive DNOs to develop ambitious DSO strategies that go beyond Ofgem's baseline requirements. Appendix 18: Our DSO strategy sets out the investments we will make to put these capabilities in place together with details of how we will meet Ofgem's baseline requirement.

How we will engage customers and stakeholders, and ensure no customer gets left behind

We will nurture a rich ecosystem of service providers that we will collaborate with to develop and procure our DSO flexibility services. We will seek to understand consumer behaviour, inform and adapt our propositions and bring them to market through third party intermediaries that have direct access to consumers and their homes. We will fulfil this role through actions, which include the following:

- Supporting adoption of minimum standards for aggregators such as ADE's Flex Assure Code and leading work to further tailor such codes to residential flexibility.
- Building data flows that allow interested parties to have a common view of the status of their customers. For example, we have started sharing power cut status with aggregators, allowing them to understand the impact of power cuts on their smart charging customers.
- Understanding customer feedback that our flexibility providers receive on their use of our flexibility products. We will work with flexibility providers to help them respond to emerging customer needs.
- Encouraging the flexibility service providers to score their experience of the service that we provide them as part of our DSO metrics, and acting on this feedback.
- Managing the service performance of flexibility providers in line with their contractual arrangements.

In addition, our DSO will have a key role in delivering our Vulnerability strategy, in particular supporting our **Social Delivery Programme** (see Section 9.2: Consumer vulnerability and the associated appendix (Appendix 8)). In doing so, our DSO will:

1. Engage with customers and communities to **provide education and support, and to gain insight** to shape our flexibility services.
2. Ensure our flexibility services incorporate **'Inclusion by Design'**.
3. Ensure our flexibility services programme has a dedicated focus on **hard-to-reach flexibility**, to ensure no one is left behind in the changing energy system.

Our commitments to our customers are real and will be monitored

We outline our DSO commitments below. For each commitment, we outline the customer benefit and the customer and stakeholder insights which have informed our thinking. Further details on our customer and stakeholder engagement and insights are provided in our supporting document Line of Sight – DSO/Whole Systems.

19 https://www.spgroup.com.sg/sp-powergrid/overview/smart-grid-index
20 https://innovation.ukpowernetworks.co.uk/projects/shift/

Delivering our commitments

Building trust and confidence in independent distribution system operation

Commitment DSO1

We will build trust and confidence by establishing a legally separate DSO business unit by 2023, creating an independent DSO Supervisory Board, and through our annual DSO forward plan of action. We will measure our compliance against the DNO:DSO Operational Agreement, targeting 100% compliance during RIIO-ED2 and reporting on this annually for transparency.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
DSO: DNO Operational Agreement and organisation unit to be established as part of DSO set-up activities.	Included in baseline allowances.	Ensuring transparent DSO processes will help address the perception of conflicts of interest, and promote competition and market participation, accelerating the benefits of the DSO.	Transparency in planning, operation and markets is critical to building trust, and driving participation and market liquidity. Stakeholders believe the ring-fencing of DSO functions is a requirement to achieve this. We heard that we should create an Supervisory Board to support the independent operation of the DSO unit. (See key insight I-DSO/WS1, I-DSO/WS2, I-DSO/WS3, I-DSO/WS13, I-DSO/WS16, I-FNZ11 in our Line of Sight – DSO and Line of Sight – Whole systems)

Our stakeholders have told us that whilst they see the benefits of DSO functions, they are unclear how these would interact with traditional DNO roles. To address these concerns, we are developing the UK's first operating model for the way a ring-fenced and legally separate DNO and DSO organisation can work in the best interests of customers. In our proposed approach, our DSO will take accountability for the cost of delivering network capacity (across both asset and service solutions), and the DNO will take accountability for reliability. Our operating model includes:

1. Organisational changes to create an agile, transparent, and legally separate DSO business unit.
2. A DSO unit set-up as a separate legal entity within UK Power Networks Group with appropriate governance and controls.
3. An independent DSO Supervisory Board, which will provide assurance of our compliance with the DSO:DNO Operational Agreement, represent the views of our customers and stakeholders, and ensure that customers get the best-value solutions. The independent DSO Supervisory Board will review and approve key DSO investment decisions to provide extra assurance that the best-value solutions for all customers are taken forward.
4. Development and publication of a DSO:DNO Operational Agreement setting out respective roles and responsibilities, decision making processes, operating and reporting procedures, and ongoing governance arrangements.

In combination, we believe this will address any conflicts of interest concerns, build confidence and support the fast-developing flexibility marketplace.

We have included a full assessment of conflict mitigation options setting out why we believe a legally separate DSO will deliver the best value for consumers. Our analysis is included in the Appendix 18c: DSO Operating Model.

In short, our proposals go further than anyone else. Merely ringfencing teams is not compatible with the requirements of customers and stakeholders, nor does it drive the culture change needed or reflect the longer-term direction and whole systems thinking. Therefore, we will continue to lead the sector in this area and we fully support the further work Ofgem will be undertaking on DSO arrangements in 2022.

We do not underestimate the challenges associated with establishing a legally separate DSO. We will need investments in new and enhanced capabilities and will need to deliver a more commercial and customer-focussed operation. Our track record demonstrates our ability to deliver a transformational programme of this nature, and in Appendix 18: Our DSO Strategy we provide an insight into the delivery work already underway, and our approach to transitioning to the new DSO organisation by April 2023.

To ensure success, by the end of RIIO-ED1 we will have set up the processes and structures of the DSO business unit, recruited 40 new people into key roles, and continued to deliver key foundational capabilities such as increased network visibility, enhancements to network modelling tools, and the evolution of our distributed energy resources management system (DERMS) platform and market operation capabilities.

Chapter 12: Enabling Whole System Solutions continued

Commitment DSO2

We will deliver operational transparency by publishing our day-ahead operational plan and schedule of flexibility services and curtailment, and a monthly control room dispatch decision report from the start of RIIO-ED2.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£5.7m investment in operational forecasting, scheduling support and dispatch tools. £22.1m IT operating costs and Indirects.	Included in baseline allowances.	Providing visibility of planned curtailment and flexibility services will enable customers to plan their operations, and wider system operators to coordinate dispatch. Transparency of dispatch will promote competition and market participation, thereby reducing the costs to operate the system for all customers.	Stakeholders support improvements in our operational planning and requested increased transparency of control room actions to build confidence in DSO actions. Stakeholders support ambitious options on outage planning, including further network sectionalisation to reduce outage impact. (See key insights in our Line of Sight – DSO and Line of Sight – Whole systems)

Stakeholders said: "Dispatch needs to be coordinated with the ESO and made clear to industry stakeholders. Transparency across the markets builds trust."

Our goal is to ensure that the flexible resources connected to our system are utilised where they can add most value – be that competing in the wholesale market, providing system services to the ESO, or delivering network services to us.

To ensure that these resources are optimised will require data, increasingly standardised market arrangements, and coordinated dispatch across system operators. To support this, network operations will become a much more dynamic activity. This will require a transformation in how we operate the network, with operational planning processes that integrate service options, visibility of network conditions, actions to address emerging constraints, and the ability to dispatch services in real-time.

Reducing customer bills through sector-leading DSO operations

Commitment DSO3

Our DSO function will deliver up to a £410m reduction in load related expenditure during RIIO-ED2 through increased competition and use of LV flexibility, including at the domestic level.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£13.2m investment in forecasting, decision support and control system tools. £34.3m IT operating costs and Indirects.	Included in baseline allowances.	An open and transparent network development process will promote competition and maximise the use of service, smart network and whole-system solutions thereby delivering the lowest cost network solutions.	Stakeholders told us that they see using flexibility markets and technology to deliver benefits for customers and flexibility as the core DSO role. (See key insight I-DSO/WS10, I-DSO/WS19, I-FNZ1 in our Line of Sight – DSO and Line of Sight – Whole systems)

In the next decade we will need to facilitate the rapid uptake of DER through the timely release of capacity and by maximising the use of existing capacity. Our DSO will run an open whole system investment planning process. We will consult on scenarios for system needs and will compare flexibility and whole system solutions sourced from the market with asset-based solutions provided by the DNO (and in future also by third party network operators). We will publish the rationale for our decisions.

Our DSO will take accountability for the cost of delivering network capacity (across both asset and service solutions), and the DNO will take accountability for reliability. This will create a tension to reveal the trade-off between cost and reliability. In support of this aim, we will set up the right mechanisms such as, for example, our DNO could have the right to appeal decisions made by the DSO that the DNO believes will compromise its obligation and ability to operate a safe and reliable system.

Commitment DSO4

We will keep our costs down by taking a "flexibility and energy efficiency first" approach over RIIO-ED2 and will "market test" all network needs before considering reinforcement. These needs will be procured through a range of long-term and short-term markets and products, which are inclusive by design and ensure no customer is left behind in the energy transition.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£9.5m investment in control systems and market operations capabilities (via third parties). £12m IT operating costs and Indirects (including third party platform support).	Included in baseline allowances.	Delivering real-time market operations will enable the most efficient use of the network. Focusing on inclusive design will ensure all customers are able to experience the benefits of the energy transition.	Stakeholders have said that we must demonstrate flexibility is on a level playing field with all other options, promote greater use of flexibility at lower voltage levels, and enable 3rd party platforms to flourish and deliver benefits. (See key insight I-DSO/WS4, I-DSO/WS9, I-DSO/WS10, I-DSO/WS11, I-DSO/WS14, I-DSO/WS16, I-FNZ9, I-FNZ10 in our Line of Sight – DSO and Line of Sight – Whole systems)

Our DER customers have told us that they want to see us creating new markets for network flexibility services at the distribution level, to procure more of our needs closer to real-time, and to ensure integration of markets so that they can easily sell their flexibility where it is most valued in the whole system. The need for transparency is coming through loud and clear.

We have identified PJM's State of the Market[21] as the gold standard of how a system operator should disseminate market information. We therefore intend to build on PJM's approach to provide world-class transparency around our procurement approach. This will build trust in our DSO function, which will increase liquidity in our future market tenders.

For RIIO-ED2, we plan to give our DSO responsibility for all aspects of access product and flexibility services design. Subject to feedback from our customers, we plan to host secondary trading of certain DSO products and services on the Distribution Market Platform. As we explain in Section 12.1, our DSO will also create new flexibility products that can be used to fund energy efficiency spend.

Commitment DSO5

We will collect real time data through monitoring in all LV networks where we are forecasting constraints over RIIO-ED2, and will target 100% coverage of the rest of the network through advanced analytics using smart meter data. This will give us better insight to run the network at higher utilisation and to defer reinforcement actions for as long as possible.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£38.6m in network monitoring costs and software based network data. £4.4m of indirect costs.	Included in baseline allowances.	Provision of improved visibility of network constraints will provide customers and stakeholders valuable insight to help plan and manage their operations. It will also enable us to maximise utilisation of the existing network and keep bills as low as possible for consumers.	Stakeholders say that developing proactive LV network monitoring that goes beyond the traditional peak power demand management approach is key to preparing for a smarter network. Participants want market data to be provided in a useable manner, and strongly support as much being provided as possible. (See key insight I-DSO/WS12, I-DSO/WS15, I-DSO/WS17, I-DSO/WS18, I-FNZ11 in our Line of Sight – DSO and Line of Sight – Whole systems)

To enable the use of flexibility, it is critical to deploy smart sensors which enable us to engage the right innovative services to manage network impacts and avoid reinforcement. To minimise costs to consumers, we will utilise a hybrid approach in which we first model our network using advanced analytics using smart meter (and other third party) data to predict the load across all our substations, and then only install physical monitoring where we know constraints are emerging. We have trialled this approach through our innovation project Envision, and working with our partners CK Delta we have already delivered a proof of concept that has built our confidence in this method.

21 https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2021.shtml.

Chapter 12: Enabling Whole System Solutions continued

Commitment DSO6

We will develop a new DSO stakeholder satisfaction survey. Once we establish a baseline at the start of RIIO-ED2 we commit to improving our score by at least 10% over the period and publishing an annual DSO forward plan that will explain how we are responding to stakeholders' priorities.

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
Maintaining the DSO forward plan will be a core duty of our DSO leadership team.	ODI-F.	A transparent annual customer and stakeholder engagement process will provide valuable insight to shape the direction of DSO development to best suit customer and stakeholder needs. This will allow us to increase participation in flexibility services, helping to deliver network requirements at a lower cost and thereby reducing customer needs.	Stakeholders told us that performance reporting including customer satisfaction needs to be in place to measure progress. (See key insight I-DSO/WS5 in our Line of Sight – DSO and Line if Sight – Whole systems)

Engagement has taught us the importance of ensuring the DSO transition delivers benefits, and stakeholders expect us to develop a clear set of metrics to measure our progress. Alongside operational measures, such as the extent of network monitoring or the provision of network data to stakeholders, our engagement showed the importance of delivering for our customers. We have therefore committed to developing a satisfaction measure focused on the performance of the DSO function.

Providing timely and affordable access to our network by accelerating the connection process

Commitment DSO7

We will make a range of firm and flexible connection products available to all customers, from lowest cost through to highest access, with a maximum curtailment commitment from the start of RIIO-ED2, and will annually update our products based on stakeholder feedback. Where customers can't choose such products, we will explain the reasons why to those affected. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£6.5m investment in control systems support and market facilitation. £5.1m IT operating costs and Indirects.	Included in baseline allowances.	Provision of a range of connections products will provide customer choice, reduce time to connect and reduce the cost of connections, whilst maximising network access where economic, and enabling DER access to wider market opportunities.	Connections customers have asked us to continually evolve our flexible products, deliver higher certainty in curtailment for flexible connections and increased utilisation of flexibility markets as an alternative to curtailment. (See key insight I-DSO/WS6, I-DSO/WS9, I-DSO/WS11, I-FNZ7, I-FNZ9 in our Line of Sight – DSO and Line of Sight – Whole systems)

In Section 9.3: Connections, we have set out our plans to deliver an enhanced connections experience. We believe that these activities will be best delivered if managed in close proximity to DSO capabilities. The DSO will be responsible for supporting the development of flexibility solutions, including flexible access rights that could benefit the customers. This will ensure that the use of flexibility solutions is fully integrated with the connections offering, to deliver best value for customers in the thriving connections market. Furthermore, it will accelerate the shift from reactive to proactive – rather than simply responding to connection requests on a case-by-case basis, we would look to anticipate future needs, working with a range of customers and other stakeholders to identify common solutions, where we can identify opportunities for cost savings through synergies.

Helping our customers play their part in Net Zero and supporting innovation in energy services

Commitment DSO8

We will be the UK's leading DSO in network data provision through a best practice service that opens data according to user priorities and customer value-add. Our ability to meet users' needs will be measured as part of an annual stakeholder survey from the start of RIIO-ED2. **NEW**

Resource and expenditure	Regulatory treatment	Customer benefit	Stakeholders / customers said
£1.7m investment in data portal reporting and customer self-serve tool. £4.6m IT operating costs and Indirects.	Included in baseline allowances.	Provision of data with valuable insight to help customers and stakeholders plan and manage their operations and understand when and where to connect to the network.	Stakeholders told us that data provision is a high priority for RIIO-ED2. In line with Energy Data Taskforce (EDTF), standardising formats with other DNOs to save time and investment for participants, and focusing on making data available, including via APIs in machine readable formats is important. (See key insight I-DSO/WS6, I-DSO/WS15, I-DSO/WS17, I-FNZ11, in our Line of Sight – DSO and Line of Sight – Whole systems)

Our Connections customers and stakeholders told us that they want open, accessible and accurate information, and as much of it as possible, proactively shared in formats they find most useful. This year we have launched our DSO Dashboard[22], providing detailed, real-time data on multiple parts of our network. Our plan is to progressively enhance the dashboard, adding more data streams and features based on user feedback. We have continuously worked to improve the quality and transparency of our open data in RIIO-ED1 and will continue to further improve our data publication standards throughout RIIO-ED2.

Using our DSO to enhance system-wide resilience

Our DSO will contribute to system-wide resilience. Operating as a DSO will mean that we are dynamically coordinating generation and demand to run the network at higher utilisation, as our customers become more dependent on the network whilst we seek to decarbonise transport and heat. This task will become more complicated with the increase in small and intermittent generators connected to our networks – we will need to work harder and in collaboration with the ESO to avoid power outages. In collaboration with local stakeholders, we are also considering how flexibility from distributed generation can support the resilience of the network. Our DSO will ensure the resilience of its systems and markets by establishing an operational infrastructure with 99.99% reliability, procuring flexibility through a mix of long-term and short-term products (to ensure that we have access to sufficient flexibility to secure the network, and that consumers and businesses have the ultimate choice as to when and how they participate in flexibility). Our Cyber resilience strategy also sets out our approach to 'Securing the transition to DSO' as one of the four key strategic pillars for RIIO-ED2. Further information on the way that our DSO will contribute to system resilience is set out in Appendix 18: Our DSO strategy.

In our next chapter we explore how data and digitalisation will help realise our whole systems and DSO strategies.

Relevant appendices

For additional information please refer to the following appendices:

Appendix 18: Our DSO strategy.

Appendix 19a: Whole systems strategy.

Appendix 8: Vulnerability strategy.

Appendix 9: Major connections strategy.

22 https://innovation.ukpowernetworks.co.uk/open-data/.

Chapter 13:
Unlocking the potential of digital and data

Trends in digitalisation, digital access and data are transforming how a wide variety of companies operate. The energy sector is no exception and – based on feedback from our customers and stakeholders – it is clear that we will be a key facilitator for enabling the benefits of digitalisation in the future energy system.

We are embracing the digital revolution, deploying data and digital solutions to unlock new opportunities to deliver decarbonisation at lowest cost, to drive better services and outcomes for our customers and stakeholders, and radically changing the way we do business.

How this chapter links to our Keys to Success:

1. Delivering a brilliant service for all
2. Facilitating decarbonisation at the lowest cost
3. Investing to maintain a safe, reliable and resilient network
4. Delivering the lowest possible bills whilst enabling Net Zero
5. Being a force for good in the communities we serve
6. Being an employer of choice
7. Being a company that is worthy of your trust

Unlocking the potential of digital and data

As described in the Executive Summary, we define seven 'Keys to Success' in delivering on our customer and stakeholder priorities, each backed-up with tangible commitments. Digital and data enabled technologies and capabilities are intrinsic to their delivery. Our plans for digitalisation and data are integral to everything we aim to achieve in RIIO-ED2.

Digitalisation and data enable us to deliver exceptional service for all, ensuring we will always be there when our customers need us, particularly for those in vulnerable circumstances. It enables us to enhance our services to meet customers' individual expectations with ease, choice, and convenience. Digitally enabled solutions help us to proactively identify network issues before they become faults, optimising our response when issues arise and ensuring we prioritise network investments appropriately. They allow us to maintain a reliable network whilst facilitating decarbonisation at the lowest cost and with minimal impact to customer bills.

We will develop specific digitally enabled services and solutions, along with expanded open data provision, making information readily available to support market participation and innovation. We will be a leading figure in the collaborative drive towards standardisation and interoperability that the modern energy ecosystem demands.

In this chapter we explain how we will unlock the full power of digitalisation and data to the benefit of customers, the environment, our business, and the wider energy sector.

We will be leaders in the use of data and digital

The transformation that digitalisation is accelerating within the energy industry will extend far beyond the way we interact with customers. It will drive advancement in how we provide an efficient and resilient electricity distribution network in our roles as a network operator and a system operator. We will see the development of smarter networks, where advanced forecasting capabilities will deliver optimised investment and utilisation, coupled with compelling consumer propositions and price signals. These have the potential to maximise efficiency of the energy system and deliver Net Zero at the lowest cost for society. Digitalisation and data are key to unlocking this.

Trends in digitalisation, digital access and data are driving rapid change across the whole of society and our economy. Many aspects of life are moving online and becoming connected. Customers' expectations of good products and services are being set by experiences we receive in our everyday lives – from how we bank, to how we shop. COVID-19 has accelerated digitalisation and this will have a lasting impact on the way businesses serve their customers. We must ensure we have foundational systems and capabilities that allow us to continually develop and evolve throughout RIIO-ED2 and beyond. We must keep pace with these advancements and the evolving needs and expectations of our customers.

> "Many customers have extended their use of digital and online services through the pandemic, often for the first time. Over a fifth of customers used a mobile banking app or ordered groceries from a supermarket online for the first time during the pandemic."
>
> Jo Causon, CEO, Institute of Customer Service.

Our vision of leadership is based on being a data and digital disrupter. This starts with a complete reimagination of how to meet customer demands and expectations. It has been informed by what we have learnt from other digital leaders.

We will be curious and tireless in striving to understand the needs and preferences of our customers – impressing them with digital solutions that meet and then go beyond their expectations. Our customers understand and expect excellent technology-based experiences, yet not everything has to be a massive change. Sometimes it is just listening to customers and making small changes that make a real difference. We understand that success often comes from continual refinement and we need to accommodate those less prepared for the transition to a digital world.

We have engaged with and learnt from leading digital organisations. We have remodelled the way our business and technology teams work together in a more product-centric manner. We have seen first-hand how this strengthens a collaborative culture, promotes innovation and delivers solutions faster. This approach is supported by a 2019 Gartner CIO survey[1] - half of organisations are seeking to continuously integrate and deliver new features and capabilities to the business. Like us, these organisations are making the shift by recruiting new talent, defining new architectures and tools, and investing in agile practices (termed as "Data and Dev-Ops") designed to increase the ability to deliver flexible solutions and services faster.

Evidence of this approach in action can be seen through feedback we received as part of the DNO wide Ofgem Incentive on Connections Engagement:

> "My colleagues were impressed by the speed and usability of UKPN's Smart Connect portal and tool, which provides an automated assessment for EV charge point installation. They noted that this could provide approval within 1 second, compared with waiting several weeks for a response from other DNOs."
>
> Helen Stark, Centrica 2021 open letter consultation on the Incentive on Connections Engagement 30 July 2021.

We will continue to invest in our core IT systems and infrastructure. This will form the backbone of our digital capabilities. We will adopt platforms that can be changed and enhanced quickly, offering flexibility at lower cost. This approach has been informed from leading organisations outside of the energy sector – including the likes of Rolls Royce, Google and AO.com.

1 https://www.gartner.com/en/newsroom/press-releases/2019-02-19-gartner-survey-finds-85-percent-of-organizations-favor-a-product

Chapter 13: Unlocking the potential of digital and data continued

They use digital platforms to transform user experiences and build uniquely strong connections with customers. We have also looked at what has been successful within our sector, for example; Octopus Energy and their Kraken proprietary technology platform.

A strategic imperative for us and the sector

Our approach to data and digitalisation responds to the following challenges:

1. DSO, whole system & Net Zero

The smart energy future and the target of Net Zero necessitates the development and implementation of digital-enabled, data-driven capabilities that allow the whole system to readily share data and communicate in a common language so as to maximise performance. Data is vital to enable all players in this increasingly complex energy ecosystem to communicate with each other. Without speaking a common language and having the appropriate channels established, our collective ability to deliver whole system operation will be compromised. This reinforces the importance of the standardisation of data, governance and processes, all of which requires sustained coordination and collaboration for it to be successful.

2. Rising expectations

Customer, stakeholder and employee expectations of how they access, consume and have choice in the services they utilise continues to change in line with their everyday experiences in other areas of their personal and working lives. We need to ensure we can develop our own services and products to at least meet, if not exceed, these expectations. Equally, customer participation in the definition, development and implementation of our services ensures we get this right.

3. Exploiting the potential of digitalisation

Exploiting the rapid evolution of digitally enabled technologies demands transformation which extends far beyond data and technology. This requires us to develop and extend the capabilities of our people and embed cultural change. Effective implementation and utilisation of digital opportunities needs the right resource base from which we can expediently implement new, and enhance existing, services and capabilities to ensure our network is as reliable and resilient as possible.

4. Open Data

We have fully embraced the recommendations of the Energy Data Taskforce. These establish corresponding Data Best Practice Guidance and the principle of 'Presumed Open' – establishing the need for energy sector participants to openly publish and share network and asset data. This is to drive open innovation, enable Open Energy and to facilitate interoperability of systems and processes. We describe how we have met and gone beyond this guidance in Appendix 17c: Data best practice strategy.

5. Cost reduction

There is constant demand to deliver new and improved services that are cheaper, faster, greener and better. The development of digitally enabled services is key to achieving this.

6. Digital exclusion

The rapid evolution of digital approaches to services and communications will raise the prospect of people being excluded. Finding ways to include customers, enabling them to participate in new opportunities, requires new approaches and partnerships.

What this means for our customers

We have reflected on feedback from the CG and CEG and our stakeholders on what our digitalisation plans mean for customers. In part, we did this to address the incorrect perception that our work is inwardly focused. All of our investments underpin the commitments in our Business Plan and provide tangible benefits. We explain below how we achieve this in the context of our seven Keys to Success.

Key to Success 1: Delivering a brilliant service for all

Our Customer Service strategy, as described in chapter 9, is heavily dependent on digitally enabled capabilities. An example of this is our Priority Services Register (PSR). We have committed to establishing automated PSR data links with other utility companies so that customers will be automatically registered to receive enhanced service from us, alongside other essential service providers. This requires investment in our Customer Relationship Management (CRM) platform and contemporary data services like Application Programming Interfaces (APIs).

Application of advanced analytical techniques will allow us to understand the 'intersectionality' of factors that contribute to vulnerability. This further informs the provision of the most appropriate, targeted support.

Similarly, targeted digitally-enabled customer solutions such as chat-bots and video updates will deliver ease and convenience to our customers seeking new connections. It will allow them to access our services via a choice of channels, facilitating self-service. By utilising Machine Learning, Artificial Intelligence and Robotic Process Automation techniques we will provide a more seamless and relevant experience.

Key to Success 2: Facilitating decarbonisation at the lowest cost

Our ambitious commitment to support the transition to Net Zero at the lowest cost to consumers is dependent on our ability to use digitally enabled capabilities. This is so we can maximise the utilisation of the existing network, facilitating customer participation through flexibility and removing barriers to the connection of low carbon technologies. This necessitates visibility of our entire network and the ability to understand and forecast long, medium and short-term consumer behaviours and demand.

Chapter 12 describes our commitment DS05 to exploiting the value of investment in state-of-the-art digital technology. We are extending the use of sensors to 30% of our substations, alongside the deployment of smart meters, and by applying Artificial Intelligence techniques on the resultant data, we will be able to obtain a granular and accurate view of our low voltage networks. The insight gained will allow us to run the network at higher utilisation, deferring a target of £410m of reinforcement expenditure.

Key to Success 3: Investing to maintain a safe, reliable and resilient network

The provision of a safe, reliable and resilient network sits at the heart of what we do. This is a key priority for our customers, with their reliance on electricity set to increase as a result of electric vehicles and heat pumps.

We recognise the need to continually advance our capabilities in maintaining system resilience, particularly in the context of whole-system and the increasing interdependence between infrastructure systems. With this in mind, we will continue to collaborate in the development of innovative and lower cost solutions to technical issues arising from greater levels of interoperability, expanding the use of digital and data resources to maintain the supply of electricity to our customers. By applying increasingly advanced data analytics techniques alongside the utilisation of digitally-enabled automation to control and operate our network, we will enhance our forecasting capabilities and improve our response to unexpected and extreme events.

Key to Success 4: Delivering the lowest possible bills whilst enabling Net Zero

Our ability to incorporate savings of approximately £130m into our RIIO-ED2 baseline costs is enabled by the development and deployment of innovative digital and data enabled solutions and services across our business. This is also the case for the £410m of deferred load related investment targeted through development of our DSO capabilities, as detailed in Chapter 12.

An example of this is our commitment to minimise cost to our customers by taking a "flexibility and energy efficiency first" approach, market testing network needs that will be procured through a range of long-term and short-term markets and products, via a third-party market platform. Central to this platform will be the integration of network, customer and market data.

Key to Success 5: Being a force for good in the communities we serve

In Chapter 12 we explain the role our data will play in bringing together local communities to deliver on their climate emergency plans. We also explain our direct response to calls for support from local authorities to provide data to underpin and help develop actionable decarbonisation plans.

Open data is crucial to enable true whole system solutions to be provided by external parties. We are committed to continuing to push the boundary in the open publication of asset and network datasets via our advanced open data portal. We will supplement this with on-line self-service tools, tailored to meet the needs of key stakeholder groups. An example of this is our commitment WS2 to provide core planning datasets via an on-line self-service energy planning tool, to support local authorities' planning processes, helping them make the best choices for their communities.

Underlying these services is the need to invest in flexible applications, founded on a stable IT infrastructure.

Key to Success 6: Being an employer of choice

Our digitalisation strategy is founded on three key pillars – technology, data and people. It is the latter that is most critical in the provision of the contemporary digital capabilities that will ensure we are able to deliver a highly reliable network and excellence in customer service.

Being recognised as an 'Employer of Choice' requires the provision of a workplace experience that is equal to the experience that our staff have in their personal lives. This demands the provision of digitally-enabled tools and processes which allow them to focus on their core role in providing excellent service to our customers and maintaining the integrity of the electricity network.

Advances in the digital competence and literacy of our entire workforce are required to ensure they can maximise the potential of digital and data enabled systems. We will invest in upskilling our staff. This will be supplemented by targeted recruitment in key skill areas whilst establishing a Digital Skills Academy to provide DSO and digital future skills.

Key to Success 7: Being a company that is worthy of your trust

Chapter 12 describes how we will be the UK's leading DSO in network data provision.

Our customers and stakeholders have told us that they require open, accessible and accurate information. They want as much of it as possible, proactively shared in the formats they can consume. Our plan is to progressively enhance the advanced open data portal we launched this year, adding more data streams and features based on user feedback.

We will maintain robust data governance that ensures we do not compromise customer data privacy or expose information that may compromise critical national infrastructure. We will work together in the development of standardised digital services such as the Open Energy platform being developed by Ice Breaker One. This will help meet the demands of opening up energy data to facilitate the smart grid and open innovation. The corresponding benefits to the end customer are choice of service, further opening of energy markets and decarbonisation at lowest cost.

Our approach to delivery

> "The ability to take data – to be able to understand it, to process it, to extract value from it, to visualise it, to communicate it – is going to be a hugely important skill in the next decades."
>
> Hal Varian, Chief Economist, Google.

We are custodians of a wealth of data and information of various types: customer, asset and network, operational, financial, employee, etc. In total, we hold data equivalent to 11,000 4K movies. The key is to turn this data into useful information to use ourselves or share with others.

Chapter 13: Unlocking the potential of digital and data continued

Additionally, some of our datasets remain locked up in a non-digital form and we must invest to convert these so that they can be utilised across both internal and external processes and services.

Realising the potential offered by digitalisation and data depends on a whole range of people and organisational factors and capabilities: culture, meaningful collaboration, prioritisation of resources, effective communication and management capability, to name a few. At the same time there is a need to recognise and tackle the risks and concerns raised, including those related to trust, privacy or compliance.

The absence of standardisation is a barrier to success. Without data and supporting information being made available in common, readily usable and recognisable forms, the interoperability of a digitally enabled smart energy system cannot be achieved.

If two people try to speak to each other in different languages, the message is likely to be confused and misunderstood. The same applies to machines, and it is for this reason that we must invest in the standardisation of data and metadata (contextual information about data), ensuring we collaborate and align with our peers in doing so. Quite simply, standardisation needs all network operators to cooperate and coordinate, targeting implementation of the same standards.

We are eager to realise the full potential presented by using third-party data, blending it with our own data to gain new insights and develop enhanced services. We have a strong track record of this in areas such as strategic forecasting of load growth and climate resilience. We will expand this to include utilisation of aggregated consumer data to gain insight into the behaviours and needs of our customers. An example of this is the utilisation of data feeds from car buying websites, which will help provide us with early trigger signs of our customers' sentiment to purchasing electric vehicles, allowing us to target our investment to support the decarbonisation of transport in an efficient manner.

Making informed choices

Our plan is purposeful and led by the objective of addressing real stakeholder needs – we will not target digitalisation for digitalisation's sake.

We have listened to our customers in developing our digital and data investment plans. We have engaged with our stakeholders to understand their wants and needs. We have taken learning from others within and outside of the energy sector. And we have actively collaborated with others, leading and participating in working groups and initiatives including the ICG's Digitalisation Transformation Task Group, the ENA's Digitalisation & Data Steering Group and the corresponding National Energy Map project.

Insight gained from our engagement activities, supplemented by third-party research, has been used to inform the definition of our external stakeholder ecosystem and the corresponding demand for data. We validated these insights with our stakeholders and used them in informing subsequent co-creation, design and testing activities.

Through our engagement with stakeholders, we have established that directly asking what digital and data services they need rarely drives a meaningful and insightful discussion – some simply don't know what they want or need; others have very niche and specific requirements and others have very broad, undefined, and nebulous needs. It is however apparent that both domestic and business customers, including those wanting to connect, all have high expectations that we will capitalise on the digital revolution and provide data that they can access and share with partners.

Building on this, our customers, particularly businesses, clearly expect innovation and adaptation or tailoring of services and communications, with engagement indicating a growing preference for digital communications. However, through our engagements as a founding member of the Scope UK Utility group, we recognise the need to maintain traditional channels to avoid the risk of Digital Exclusion, which is why we will provide secure, transparent and efficient products and services to improve outcomes and secure demonstrable benefits for vulnerable customers (Insight DD3).

Our Plan

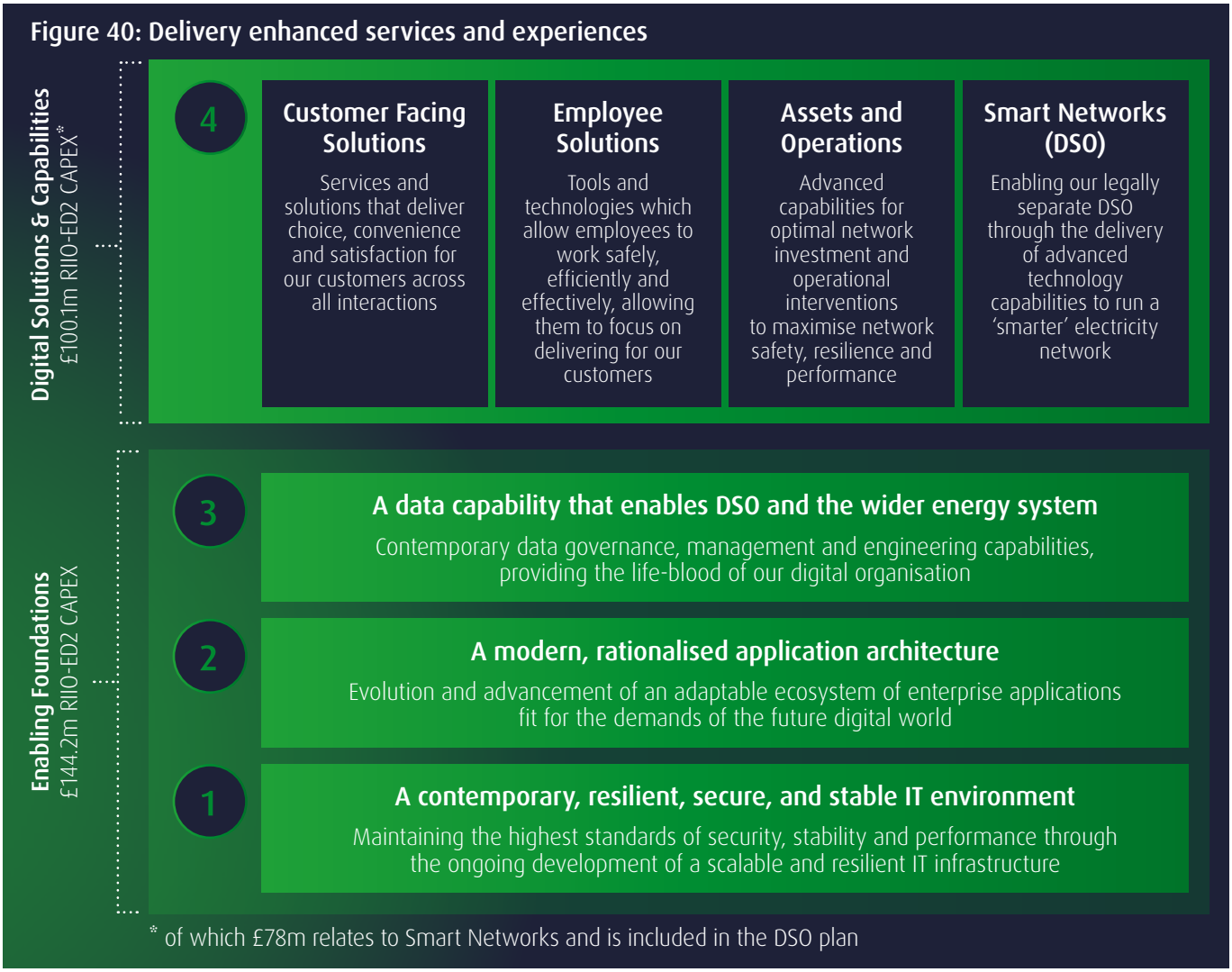
Feedback from stakeholders and the Challenge Group highlighted a need to provide clarity on how our digitalisation and data portfolio work together. In response, we have compiled a simple infographic overleaf, which illustrates how investment in foundational IT and data related services underpin the development of specific digital capabilities across four strategic business areas.

Every single one of our investments delivers both direct and indirect benefits for customers. The infographic and supporting commentary summarise the digital and data investments that are required to deliver upon our seven keys to success and the commitments given in this overall plan.

Although the focus of our plan remains on the new services and capabilities that we will develop, we need to ensure the right technological foundations are in place, for RIIO-ED2 and beyond. These aren't transformational, but rather necessary steps we must take to ensure our ongoing digitalisation journey is a success and truly delivers to customer expectations.

In simple terms, we will invest in exciting, high-quality, contemporary end-user and customer facing solutions and services. This in turn necessitates investment in the less glamorous enterprise applications and infrastructure – all the stuff below the waterline that may not be visible but is of utmost importance.

Figure 40: Delivery enhanced services and experiences



1. A contemporary, resilient, secure, and stable IT environment

No. of investments	Capex:	4 yr payback
5	£48.3m	NPV: £110.5m

We need to maintain our IT estate to ensure we support day-to-day business operations. This includes refreshing hardware as it reaches end of life, modernising infrastructure and telecoms to meet changing standards, upgrading software to newer versions, and remaining compliant with regulations and licence agreements. Investment is vital to maintain the foundations of our digital landscape.

2. A modern, rationalised application architecture

No. of investments	Capex:	7 yr payback
5	£66.4m	NPV: £94.5m

To unlock the full potential of digitalisation, we need modern, scalable and flexible core platforms. Strong foundations ensure we can quickly develop solutions without retrofitting technology or needing to implement and maintain cumbersome and inflexible integrations. In addition, we need business resilience by maintaining our application architecture, ensuring it is vendor supported and reducing downtime. We will exploit Cloud technologies to deliver increased value and agility.

3. A data capability that enables DSO and the wider energy system

No. of investments	Capex:	5 yr payback
1	£29.5m	NPV: £196.6m

We will develop the data governance, management and engineering capabilities necessary in opening up asset and network infrastructure data. We will move to a more efficient, secure and integrated data architecture, capable of supporting future business processes and analytical capabilities to our RIIO-ED2 commitments to customers and stakeholders by driving consistent digital capabilities across the energy sector.

4. Enhanced digital solutions and services

Once we have built the strong foundations from the previous three enablers, we can deliver enhancements that meet increasing expectations and exploit technology enhancements that we can embed into our operations.

Chapter 13: Unlocking the potential of digital and data continued

4a. Customer facing solutions (DNO)

No. of investments	Capex:	4yr payback
1	£7.2m	NPV: £14.9m

Directly responding to customer feedback and building tools and solutions for them to better interact and work with UK Power Networks, including portals and additional channels to communicate with us. We will also look at automating processes so customers can receive instant quotes for work, schedule and pay through simple flows without the need for human interaction.

4b. Employees (DNO)

No. of investments	Capex:	3yr payback
1	£2.6m	NPV: £15.6m

Equipping our employees to be more efficient and effective by providing them enhanced tools and capabilities, enabling us to be more responsive to customers, delivering more meaningful and satisfying interactions. Our field-based workforce will also be safer and better trained, resulting in more effective delivery of work for customers.

4c. Assets and Operations (DNO)

No. of investments	Capex:	10yr payback
1	£12.2m	NPV: £12.5m

Targeted investments which ensure we have leading modelling and forecasting capabilities to ensure we make optimal network investment decisions to maximise network safety, resilience and performance. We will also look to increase the use of automated and enhanced digital technologies to predict and prevent interruptions before they occur and respond faster and more effectively when they do to reduce if not prevent customer impact.

4d. Smart Networks (DSO)

No. of investments	Capex:	See DSO Benefits
1	£78.0m	(Chapter 12)

Technology, digital skills and processes are at the heart of our DSO Operations. The DSO core role is to deliver best value for consumers through competition and new markets. To enable those, we need to enhance our capabilities in operational technologies such as forecasting, modelling and DER management. We will collaborate with best-in-class partners in new areas that are not our core expertise such as flexibility markets platforms. Investment will be critical to enable benefits for our customers but also maximise participation in these new markets, for example, for flexibility providers and their participants.

NB – It is necessary to highlight the intentional exclusion of Cyber from this section of our plan. This is of course an important component of digitalisation and is covered within a separate section due to the sensitive nature of the information it contains.

For more information across these areas, please see Appendices 17a: Digitalisation strategy, 17b: IT&T strategy, 17c: Data best practice strategy and 18: Our DSO strategy.

Confidence that we are making the right choices

To ensure we deliver on our commitments, we have produced comprehensive papers for each of the proposed investments which address the plan, bottom-up costs, resourcing and risks. We have worked with experts at Ernst & Young, KPMG and Baringa Partners to ensure our investments are proportionate and deliverable.

Our proposals have been independently benchmarked by Gartner. Gartner has reviewed the level of investment for each of our proposed initiatives considering against industry trends and peers. At an aggregate level, total in-scope investments is within the Gartner range.

This has provided further confidence that we are delivering the right cost-efficient investments, in the right way, and have the capability to successfully deliver.

Delivering our commitments

Commitment DBP1

We will fulfil and exceed the recommendations outlined by the Energy Data Taskforce through the active open publication of our data across the RIIO-ED2 period, prioritised based on stakeholder engagement and an understanding of value to consumers. Our data will be appropriately licensed to enable third party use to support the development of an Open Energy System, facilitating Open Innovation and creating data services that deliver wider benefits to energy customers.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
£29.5m (to enhance data-related capabilities, establish data management and governance, deliver interoperability and implement enabling technology).	Included in baseline allowances.	Openly publishing reliable, accessible and interoperable network and asset data is instrumental in facilitating digitalisation, enabling the Open Energy System and realisation of the broad range of associated benefits.	Stakeholders want UK Power Networks to provide direct, frictionless access to interoperable network and asset data to enable development of their own digital processes and services. (Engagement Summary Insight I-DD3 and I-DD4)

Chapter 14:
Innovation

Innovation is part of our DNA, central to our corporate vision and values and a driving force behind our performance. It is key to ensuring we are the safest, most reliable and cost-efficient electricity network in the UK, leading the way in tackling the Net Zero challenge and consumer vulnerability.

How this chapter links to our Keys to Success:

1. Delivering a brilliant service for all
2. Facilitating decarbonisation at the lowest cost
3. Investing to maintain a safe, reliable and resilient network
4. Delivering the lowest possible bills whilst enabling Net Zero
5. Being a force for good in the communities we serve
6. Being an employer of choice
7. Being a company that is worthy of your trust

Chapter 14: Innovation continued

We aim to maintain our position as the most innovative DNO in the UK

Our plan for RIIO-ED2 is based upon a strong track record of innovation. It is part of our DNA, central to our corporate vision and values and a driving force behind our performance. We have made the deployment of innovation a Business as Usual (BAU) activity. It is key to ensuring we are the safest, most reliable and cost-efficient electricity network in the UK, leading the way in tackling the Net Zero challenge and consumer vulnerability. From our CEO to our front-line staff we are committed to continuing to be the most innovative DNO.

Our strategy

Our RIIO-ED2 Strategy for Innovation contains four strategic pillars summarised below

1. Deliver value to customers from proven innovation

Incorporate £137m of savings for customers within our RIIO-ED2 baseline allowances by rolling out proven innovation solutions as business as usual.

2. Embed innovation deeper into our business

Ring-fence £25m Totex and £25m of our own money for innovation in RIIO-ED2.

Publish key business challenges quarterly whilst remaining open to innovative ideas at any time.

3. Collaborate to unlock industry challenges

Actively participate in the Strategic Innovation Fund (SIF) challenges issued during RIIO-ED2 in collaboration with relevant third parties, other utilities and local stakeholders.

4. Target greater societal good through innovation

Invest £25m NIA funding, of which £20m will be allocated to third parties, ensuring broader market participation.

Target Net Zero and vulnerability ideas that deliver 4 times wider societal return on investment for every pound invested.

Innovators said: "Work with innovators in early development stages rather than waiting to see finished products"

We have a clear innovation strategy with priority areas, but we also appreciate the need to be able to adapt our approach in a rapidly changing and uncertain environment. That's why we will continue to refresh our innovation strategy at least every two years or in the event of a material change in our external environment (e.g. a government policy change). We will be guided by feedback from our customers, stakeholders, and local and central government to inform an analysis of our external environment and associated implications for our innovation strategy.

Through our engagement, we learned that stakeholders want us to spend more on innovation in RIIO-ED2. We propose to increase our financial commitment to innovation by 53% from £15m per annum in RIIO-ED1 to £23m per annum in RIIO-ED2. This will support our work to increase focus on vulnerability, continue to incorporate innovation into BAU activities, and use innovation to facilitate the Net Zero transition.

Innovation at UK Power Networks

We define innovation as "the development and implementation of any approach which enables us and our stakeholders to achieve our objectives faster, more affordably, safer, or to a higher standard, and uses unconventional methods in the context of our business." More simply put, to innovate is to deliver value to our customers and stakeholders by developing and testing new solutions that are inherently riskier than our traditional methods, and deploying at pace those solutions that work and can demonstrate benefits to customers and our business.

Our innovation portfolio includes both:

- **Incremental innovation** – continuous evaluation to achieve gradual improvements of our business efficiency, such as trialling LineVue, a new technology to help us better understand the condition of our overhead line assets.
- **Disruptive or transformational innovation** – redefining the way we run our business or network, such as interacting with the transmission network to offer reactive power support from DER connected to our network (a world first).

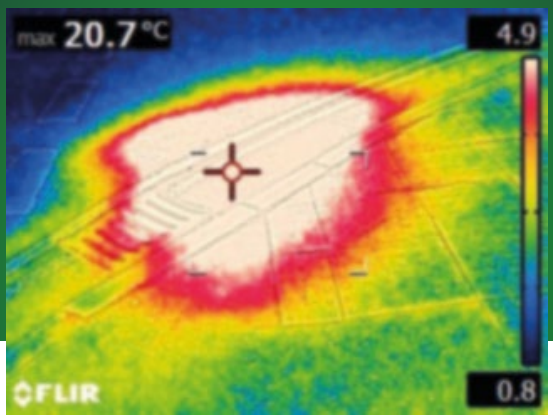
We have nurtured a culture of continuous innovation over many years. Our employees are empowered and encouraged to challenge the status quo and take ownership of business improvements derived from innovation. On the front line, we operate weekly Mission Directed Work Team sessions to improve performance, including through business-funded innovation.

We have structures, systems, processes and governance in place to ensure our employees deliver innovative solutions that produce the best possible outcome for our customers and stakeholders. We have teams in place to stimulate and nurture ideas and take the best of those forward; our focus on continuous improvement is evident in the establishment of our Business Improvement team in 2018 (driving digital adoption in asset and work management processes) and our Analytics team in 2019 (adopting new techniques to gather performance improvement insights from data).

Figure 41: Innovation Case Study
Infrared imaging camera

Background
LV short circuit faults on underground cables can release a lot of energy, which can cause the ground surface temperature to rise. Scottish & Southern Energy Networks proved how this relationship can be used to locate faults. We have learnt from their experience and "fast followed" to implement this solution at pace.

How does it make a difference?
An operative in some cases is able to walk along the cable route with a thermal (infrared) imaging camera following a recent fault and identify the location. This speeds up the fault repair, getting customers back on supply more quickly, delivering a benefit of £1.1m over 2016-2020.



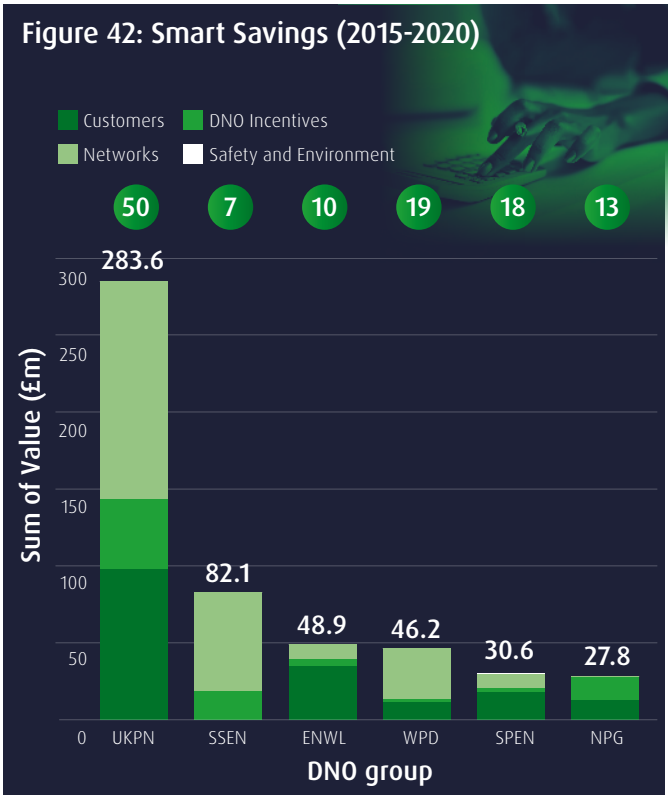
Innovation extends beyond a central team focused on regulatory innovation funding. The activities we undertake span from lower-risk, near-term innovation such as developing and implementing initiatives submitted in our "MyIdeas" platform, through to the higher-risk, longer-term innovation aimed at developing highly novel and potentially transformative new technologies or business practices such as the projects we deliver through the NIA and, in RIIO-ED2, through the SIF.

Innovation is fundamental to delivering our best in class performance

Our performance is recognised internationally with over 39 industry awards, including Edison Electric Institute's "International Edison Award", considered the "World Cup" of Network Awards, and achieving first place in the 2020 Smart Grid Index – which recognised UK Power Networks as having the smartest grid in the world.

Since 2017, we have aimed to be the most innovative DNO. This has led to over 1300 innovation ideas and 100 innovation projects, approximately 40 of which are live at any time. All projects focus on BAU deployment from the start with clear senior leadership accountability. We now have 50 innovative solutions embedded as BAU, saving a total of **£284m in RIIO-ED1**[1], £33.93 per customer, more than any other GB network by some margin.

Figure 42: Smart Savings (2015-2020)



Source: Data from the annual DNO regulatory data sharing initiative

1 UK Power Networks Network Innovation Allowance Annual Report 2019/20, page 3

Chapter 14: Innovation continued

We have consistently demonstrated our ability to identify and deliver innovations in RIIO-ED1 by delivering more than double the number of smart solutions or quantified benefits of any other network, evidenced through "best in class" regulatory reporting. We commit to continue both this dedication to deliver value to our customers but also to continue to report on that value using the new common framework we helped develop through the Energy Innovation Centre (EIC) and the Energy Networks Association (ENA).

We understand and have demonstrated that collaboration and partnerships are key to successful innovation.

We have signed up to the EIC Industry and Innovators Charter to demonstrate our commitment to collaborate across energy vectors and to continually improve how we engage with innovators from ideation through co-developed trials, and into possible business as usual deployment. In addition, we have formed strategic collaborations with neighbouring network SSEN, and our regional Gas Distribution Network (GDN) SGN to pool our resources to solve common challenges, holding each other to account through signed charters. Please refer to our innovation strategy for more detail on our partnerships.

In RIIO-ED2 we will ensure that at least 50% of NIA / SIF projects are delivered in partnership with another Licensed Network Operator. We will continue to collaborate with other utilities in our region on innovation, for example the Mayor of London EV Taskforce and Octopus Energy called us out specifically for our leading support and collaboration around innovation in smart charging.

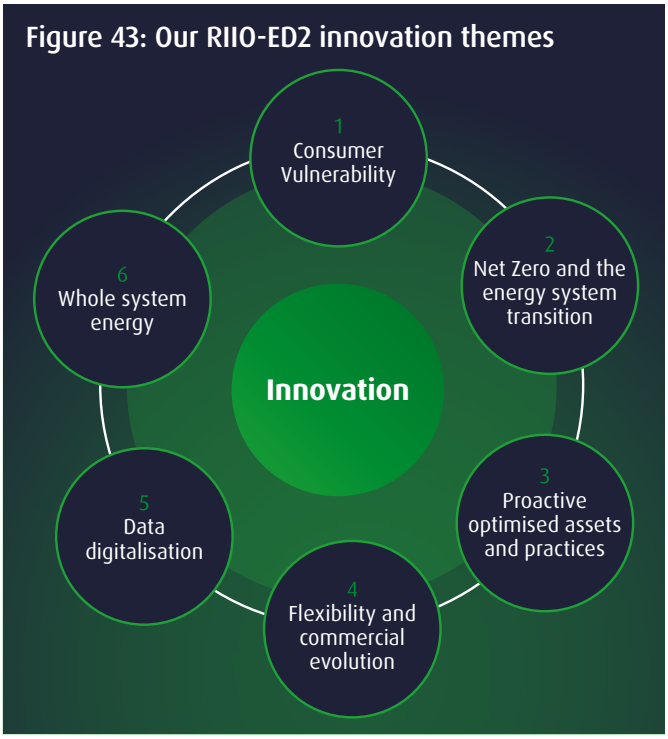
Delivering value where it counts

One key area of interest for our stakeholders was our innovation themes. Stakeholders endorsed the ENA Innovation themes of 1) consumer vulnerability, 2) Net Zero and the energy system transition, 3) optimised assets and practices, 4) flexibility and commercial evolution, and 5) whole energy system. Strong direction from our co-creation event and Innovation Council led us to add an additional theme of data and digitalisation, seen as a strategic theme in its own right. While these new themes are common across our three licence areas, the topics and projects will reflect regional differences. For example, Powerful-CB is needed to enable more low carbon generation in high fault level areas of central London, while Communiheat is helping us plan to electrify off-gas communities such as Barcombe in East Sussex. Different innovative solutions are needed to support the journey to Net Zero in all areas.

The relevant importance of innovation across the themes will vary through RIIO-ED2 depending on many external factors and the pathway taken towards Net Zero. Where appropriate, we will adapt our strategy to provide additional focus on the most relevant themes – as per our stakeholders' guidance. Only our minimum investment in customer vulnerability is fixed. We will use our continuing internal and external engagement to guide us through RIIO-ED2.

Further information on how we translate our themes into projects is set out in our innovation strategy (Appendix 20).

Figure 43: Our RIIO-ED2 innovation themes



1 2 3 4 5 6

Consumer vulnerability

We understand that consumer vulnerability can come in many forms and we are determined that no customer is left behind during the energy system transition. Innovation focused on consumer vulnerability is critical for us as we strive to serve our customers to the best of our ability, evidenced by our previous Energywise flagship project and ongoing Stakeholder Engagement and Consumer Vulnerability (SECV) performance. In RIIO-ED2, customer vulnerability is included as a key area of focus for NIA funding. In 2020, we embedded both a SROI toolkit, based on guidance from the UK Cabinet Office, and a vulnerability impact assessment into all innovation governance decisions. This enables us to ensure our projects are inclusive by design and additionally supports us to quantify the combined financial and social benefits per pound spent for each innovation project, therefore demonstrating the highest possible benefit to customers and society versus costs.

Our "Urban Energy Club" project showed how vulnerable and disadvantaged consumer groups can engage in domestic flexibility, ensuring the smart grid is accessible to all.

Based on stakeholder feedback, we have ring-fenced a minimum of **20%** of the RIIO-ED2 NIA funding for this theme. In the interest of greater third-party access, as described in our Vulnerability strategy Appendix 8, our Innovation and Consumer Vulnerability Councils will inform our focus and co-create our initiatives each year. Stakeholders have shaped and defined the following initial vulnerability topics:

Understanding vulnerability through innovative data analytics

Using the power of data and analytics to understand the intersectionality of different types of vulnerability and be able to really improve our services.

Digital inclusion

We will work with third parties, trusted partners and communities to proactively provide innovative solutions to reach our hard to reach and digitally excluded customers.

Making Net Zero inclusive

We will collaborate to make sure our vulnerable and fuel poor customers will have the best opportunity to participate in the evolving flexibility and DSO market.

Policy

We will proactively participate in regulatory initiatives to influence fairer access to the network, reduce the cost of electricity, and enable local energy markets to work for all.

1 2 3 4 5 6

Net Zero & energy system transition

The energy system is undergoing unprecedented change as a result of decentralisation of renewable generation, decarbonisation of the energy, transport and heating sectors, and the digitisation of operations to deliver a highly utilised and optimised system. This change has been a disrupting force in the energy industry for over a decade, however through innovative solutions, we have managed to achieve some notable successes. The next decade will see yet more change, precipitating levels of uncertainty not yet experienced in this industry, thereby creating an environment ripe for innovation.

Our Net Zero plan describes three key areas under the Net Zero & energy system transition theme – distributed generation, electric vehicles and heat. In RIIO-ED1, we invested on average £6.9m a year on innovation related to Net Zero, a major part of which is focused on developing commercial and technical solutions to facilitate EVs and laying the groundwork for decarbonising heat.

Our "Timed Connections development" project enabled customers to have higher import capacity at off peak times, allowing customers to transition to EVs sooner and at a lower cost.

Heating is the single biggest source of carbon emissions in the UK and there is a high degree of uncertainty about the future pathway to decarbonising heat. While hydrogen may be suitable in some locations, heat pumps and heat networks will be more suitable in others. Due to technological, geographic and timing considerations, among others, there is a huge uncertainty over which technology will be most suitable for any given property. As such, we will be flexible and innovate to develop solutions that can work across a wide variety of customer segments and heating technology types.

1 2 3 4 5 6

Proactive optimised asset and practices

Stakeholders: "Asset based innovation is still the most important as it's the DNO's core business and if that's done right it could benefit everything else".

Our existing asset-focused innovation portfolio in RIIO-ED1 has delivered significant benefits including improved understanding of assets such as underground cable condition and smarter equipment to optimise our operation of the network.

We will continue to innovate in this area funded directly from our shareholders and totex allowance whilst committing to learnings being open and transparent, a view reinforced in our engagement with our stakeholders. We will develop and implement industry-leading techniques for optimising assets and practices for energy networks. Our key topics for this theme in RIIO-ED2 are as follows:

Reliability/Resilience

Our "licence to operate" means keeping the lights on at the lowest cost while reducing the number and duration of interruptions – see Section 10.3.

Inspection and maintenance

Improve processes to target those assets likely to become the highest risk as their age profile increases – see Section 10.4

Asset life extension / understanding failure

Maintain the networks' asset health risk – see Section 10.4

Increase capacity / maximise utilisation

Explore alternative options to get the most out of our existing asset base – see Section 12.2

Our "OHL fault location" project developed and demonstrated new sensors and optimised deployment methods, reducing fault location times by 30min on targeted feeders.

Chapter 14: Innovation continued

1 2 3 **4** 5 6

Flexibility & commercial evolution (DSO)

Our DSO Strategy (Appendix 18) sets out our ambition to continue as a world-leading DSO and to deliver the best value for consumers. Our DSO philosophy is flexibility first, delivering affordable capacity through competition and choice; and maximising the utilisation of the network through the use of service solutions.

We have demonstrated a track record of incorporating innovation into DSO BAU, e.g. via our Flexibility Roadmap, our Regional Development Programme, and our recent world-first procuring flexibility from aggregated domestic electric vehicles at scale.

In RIIO-ED2, we will be investing in our DSO capabilities to deliver Ofgem's baseline requirements and therefore elements of innovation in flexibility and commercial evolution will be delivered via our core allowance.

However, our stakeholders tell us to continue driving innovation in key areas that go beyond Ofgem's baseline expectations, and as such we intend to continue to focus innovation in key areas such as:

Driving forward market platform development
Building and trialling capabilities with third parties to test approaches to market development, such as through our Optimise Prime and Energy Exchange projects.

Innovating new flexibility product design
Continuing to develop new products to expand the breadth of network needs and customer technologies that we can leverage to enhance network efficiency and capacity, such as energy efficiency and heat technologies.

Testing and proving the case for real-time and Net Zero operations
Investigating the benefits of closer-to-real time operations and leading on the development of a dispatch framework for Net Zero system operations.

1 2 3 4 **5** 6

Data and digitalisation

Data and digitalisation is a key area of innovation in RIIO-ED2. This was identified as a top priority in our stakeholder engagement during the co-creation exercise. Although the solutions developed would enable other themes, the scale of both the challenge and the opportunity justifies the priority given.

There are numerous opportunities for further innovation which we will explore, including edge computing, AI, machine learning, gamification, digital twinning, enhanced visualisation, augmented reality and state estimation. See Chapter 13: Unlocking the potential of digital and data for more detail.

1 2 3 4 5 **6**

Whole energy system

A whole energy system approach requires us to look beyond our own networks and develop our understanding of how we interact with, and impact on, the wider energy system. It recognises the much greater emphasis required on partnering with different organisations, as well as the multiple roles of customers in the future – as service providers and as bill payers.

Whole System Planning
Innovating to embed a whole systems approach in everything we do, and to promote the alignment of regulation, incentives and money flows.

Whole Electricity
Innovating to benefit customers through improved interactions across the electricity system.

Whole Heat
Innovating to find most suitable whole system solutions for heat, focusing on District, Industrial & Commercial, On-gas grid and energy efficiency

Whole Transport
Innovating to overcome barriers to decarbonising road, rail, water and air transport, including essential services

Our Commitments are ambitious, but deliverable

Our strategy is ambitious because we are targeting to deliver 21% higher totex benefits to customers compared to RIIO-ED1. This equates to savings of £137m that will be realised by scaling innovations that we have trialled and by fast following other networks' innovations from RIIO-ED1.

We will publicly report on our progress each year using the ENA framework.

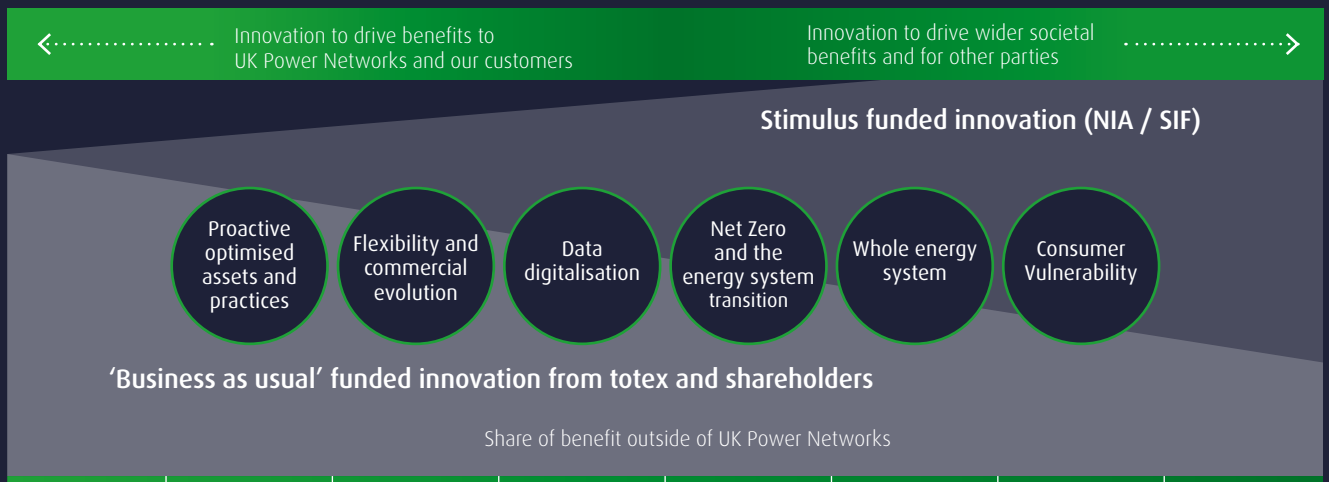
As the leading and most innovative DNO in RIIO-ED1, we are not resting on our laurels. Our intention is to do more, to do it better and to do it faster.

Figure 44: Projected totex benefits from innovation RIIO-ED2 vs RIIO-ED1

Area	RIIO-ED1 average annual benefits delivered	RIIO-ED1 benefits delivered to 2019/20 (5 years)	RIIO-ED2 forecast annual benefits	RIIO-ED2 total forecast benefits (5 years)
Totex savings	£22.1m	£113m	£27.3m	£136.6m

Figure 45 below shows our proposed innovation funding in RIIO-ED2. Innovation which returns benefits to customers' bills will be funded principally through BAU means. We will utilise innovation stimulus funding for innovation ideas which return a wider social benefit to society.

Figure 45: Innovation themes and proposed funding



Split of funding	Proactive optimised assets and practices	Flexibility and commercial evolution	Data digitalisation	Net Zero and the energy system transition	Whole system energy	Consumer vulnerability	Total per fund
SIF funded	–	–	£5m	£25m	£5m	£5m	£40m
NIA funded	–	£2.5m	£2.5m	£12.5m	£2.5m	£5m	£25m
BAU funded	£27.5m	£7.5m	£10m	£5m	–	–	£50m
Total	**£27.5m**	**£10m**	**£17.5m**	**£42.5m**	**£7.5m**	**£10m**	**£115m**

Delivering our commitments

Commitment INN01

We will ring-fence £25m of our Totex allowance and allocate a further £25m for investment of our own money over RIIO-ED2 to improve network performance for our customers through innovation projects. We will publish key business challenges quarterly in a structured process as well as remaining open to innovation ideas at any time.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
Totex and shareholder funding.	Totex and shareholder funding.	Additional innovations from projects focused in areas not already covered by SIF and NIA. These projects will focus on improving network performance for our customers.	Our stakeholders have fed back that we should continue to innovate in all areas of our business, and not to forget asset based innovation with a focus on our core business of keeping the lights on (Engagement Summary insights I-IN3, I-IN4 and I-IN5).

Chapter 14: Innovation continued

Phase 4 Options testing: Several customers felt innovation should come from us reinvesting profits.

We commit to invest £10m per year, totalling £50m across RIIO-ED2, ring-fencing £5m a year of our totex allowance to focus on innovation plus £5m a year funded from shareholders to focus on BAU innovation. This is a significant increase on the RIIO-ED1 £4m per year investment on projects in our "Efficient and Effective" theme during RIIO-ED1. We will publicly report on this innovation and its benefits.

Our proposal maintains the current highest level of project delivery in the industry, but rebalances how it is funded. We are preparing our business already for this change, as alongside the work of our Innovation team we have numerous business-funded activities to improve performance through innovation. We already have teams set up to deliver innovation and a MyIdeas platform in place to capture ideas from across the business and enable innovations and improvements at all levels and implement them.

Commitment INN02

We will allocate £25m Network Innovation Allowance (NIA) funding over the RIIO-ED2 period, of which £20m will go to third parties, targeted to ideas that deliver 4x wider societal return on investment.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	NIA funding.	At least £20m of our NIA funding will go to third parties, ensuring learning and benefits are shared across the industry. We will also deliver a 4x wider societal return on investment (vs.3.5x return achieved in RIIO-ED1).	Stakeholders fed back that we should seek more NIA funding to achieve Net Zero, but reduce our overall dependence on it for innovation. (Engagement Summary insights I-IN1, I-IN3 and I-IN4).

Energy Innovation Centre survey: 85% said we should request for the same or more NIA than RIIO-ED1.

We are requesting £25 million of Network Innovation Allowance funding over the duration of RIIO-ED2 to continue to innovate across Energy System Transition and Customer Vulnerability. At £5 million per year this is lower than our current allowance, but with our asset-focused innovation portfolio being funded from BAU, we will spend more than our RIIO-ED1 per-year spend on the remaining themes. This reflects our stakeholder feedback that we should reduce our overall dependence on the NIA for innovation (by using BAU funding) and that the challenges we face in Net Zero and consumer vulnerability are greater than ever before so we should seek to do more innovation in these areas.

We will continue to contribute 10% towards the costs of NIA projects to demonstrate our commitment to their success. We will continue our strong track record in collaboration, with at least £20m (75%) going to third parties and will aim to undertake approximately 50% of projects in collaboration with other networks.

Commitment INN03

We will actively participate in the Strategic Innovation Fund (SIF) challenges issued during RIIO-ED2 in collaboration with relevant third parties, other utilities and our local stakeholders.

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
No incremental increase in totex expenditure.	SIF funding.	We will deliver a significant benefit through flagship projects successful in SIF challenges.	67% would like to collaborate with DNOs on SIF bids (Engagement Summary Insight I-IN4)

We have a strong track record of securing industry funding – in RIIO-ED1 we have secured more NIC funding than any other DNO and have collaborated on most projects. As the NIC transitions to the Strategic Innovation Fund, we expect the role of the DNO in this competition may change slightly. We commit to actively participate in all relevant challenges, in collaboration with other networks and third parties, while reducing the barriers for SMEs to participate by providing bid support function via our partners.

We have strategic partnerships with SSEN to collaborate on faults and network reliability and with SGN on whole systems continuing into RIIO-ED2. We have benefited greatly through collaborating and sharing what we have learned.

Over RIIO-ED2 we will actively seek other external funding for our higher risk innovation activities, to continue to reduce any reliance on NIA. This will include partnering with other organisations and participating in other funding competitions such as those from TfL Lane Rental Fund and UK Research and Innovation (UKRI).

Relevant appendices

For additional information please refer to the following appendices:

Appendix 20: Our innovation strategy.

Chapter 15:
Competition

We use a large number of third party suppliers. Our approach to procurement and managing our supply chain is critical not only for delivery of an excellent service, but also to ensure we keep customer bills as low as possible.

In this section we explain our approach to:

15.1	Competition	**168**
15.2	Early and late competition models	**168**
15.3	Native competition	**168**

Chapter 15: Competition continued

15.1 Competition

We recognise that more can be done to realise the benefits of greater competition. We have built this principle into the relevant parts of our Business Plan for RIIO-ED2, including:

- Our DSO strategy (Section 12.2), we have committed to competitively test reinforcement requirements.
- Our Connections strategy (Section 9.3), through which we continue to facilitate an effective competitive market for providing new connections to the distribution network.
- Our whole system approach (Section 12.1), which explains how we work with other energy system participants to ensure customers' needs are met in the most efficient way.

Ofgem's Access Significant Code Review (SCR)[1] means that DNOs will be responsible for a larger proportion of the work associated with connections. This has the potential to reduce the scope of work available for delivery by independent, competitive providers. So our customers continue to benefit from increasing competition, we will build on our plans for opening more connections-related work to competitive providers and we are extending our approach to cover large load-related reinforcement schemes in addition to currently non-contestable connections work and customer-driven diversions. This increases the scope of work covered by the commitment set out in our Initial Business Plan (as part of Our major connections strategy) to at least £100m over the RIIO-ED2 period. This will include elements of work previously considered non-contestable. Our DSO will ensure that the competition for this work is open to all qualifying potential bidders. We will monitor value and performance to ensure our new approach is delivering additional benefits for our customers.

By creating new routes for competitors to work on our network, we are encouraging more market players to come forward, increasing the pool of resources we can draw on to support us in delivering increased volumes of LCT connections. It also allows our delivery to be more agile, responding more quickly to our customers' needs.

Commitment COMP1

We will bring at least £100m of our RIIO-ED2 project delivery to market for scope drawn from connections-driven reinforcement, diversions of our assets and load related reinforcement. We will work with stakeholders such as ICPs and utility contractors to encourage them to compete for and deliver this work. **NEW**

Resource and expenditure	Regulatory Treatment	Customer benefit	Stakeholders / customers said
At least £100m	Included in baseline allowances to be competed out to competent market players.	Lower costs of delivering this work, resulting in lower bills. Fosters a diverse portfolio of providers to deliver Net Zero.	Providers and customers want to see further areas of work opened-up to competition. 60% of major connections customers indicated a preference for us to further increase the categories of work scope that is deemed contestable. (See key insight C1 in our Line of Sight – Major Connections document). 50% of ICP customers who attended our Spring 2021 forum stated that promoting further competition is their top priority.

15.2 Early and late competition models

We have not identified any projects or programmes of work that meet Ofgem's current criteria and financial thresholds for application of the early (£>50m) or late (£>100m) competition models. However, we will ensure competition continues to drive value for customers and we will identify any projects meeting Ofgem's criteria and adopt the relevant model as appropriate during RIIO-ED2.

15.3 Native competition

Our supply chain is crucial to the successful delivery of our corporate vision and obligations. It accounts for approximately 60% of our expenditure and approximately 84% of our carbon emissions (excluding losses).

Native competition covers our approach to procurement and managing our supply chain. Our objective is to deliver best value solutions in support of our customers' needs through robust engagement and management of our suppliers.

Our strategy is focused on 3 key pillars: delivering value for our customers, sourcing sustainably and driving continuous improvement. We describe our strategy in more detail below.

Our Track Record

Throughout RIIO-ED1, we have been driving value from our third-party arrangements whilst maintaining quality and promoting innovation. The table overleaf summarises information on our competitive tenders.

1 Ofgem's Access SCR is considering the forward-looking charges which send signals to network users about the effect of their behaviour on the network.

Figure 46: Summary of forecast annual financial savings through application of competitive tenders[2]

Maintaining high levels of market competition	2015 – 2020
Number of full market tenders undertaken	208
Total annual contract value tendered (£million)[3]	£558.4
Total benefits secured (£million)[4]	£109.0
Savings as % of tendered value	20%

Key achievements in RIIO-ED1:

Some of our key achievements in RIIO-ED1 include:

- Delivering £799m of infrastructure works through our Major Capital Delivery Alliance, including the Battersea Programme, which is the most complex work undertaken by any DNO.
- Establishing collaborative contract management communities to better align our supply chain to the needs of our customers.
- Becoming only one of 16 global companies, and the only DNO, to achieve the Advanced Platinum accreditation from the Chartered Institute of Procurement and Supply.
- Playing a leading role in the Infrastructure Client Group and the Construction Leadership Council, to learn best practice from other sectors.

How we work with our supply chain to deliver for our customers:

Our company values are embedded in everything we do and this extends to the way that we work with our supply chain. While we work hard with our suppliers to achieve sustainable cost efficiency, this is balanced by our vision to be a respected and trusted corporate citizen – delivering our outputs to meet customer and stakeholder expectations.

We deploy a range of methods to manage our suppliers and contracts to deliver value and efficiency for our customers. The table below provides further details.

	High value complex works	Routine, repetitive works	Innovative works
Examples	· Substation construction & modification · Long cable routes inc. tunnelling & directional drilling · OHL steel towers	· Tree cutting · Ground works · Temporary generators	· Smart products to improve network performance e.g. Automatic re-closers to improve CMLs
Delivery model	We set up a major capital delivery alliance in 2015, aligning UK Power Networks' vision and values to those of our partners, with a Pain/ Gain performance incentive.	Delivered through strong contract management with agreed KPI mechanisms based on Service Level Agreements (SLAs) and performance incentives.	Delivered through bespoke contract arrangements, reflecting the risk and reward, with incentives based on the value delivered from the project.
Contract term	Long term	Long term	One-off with opportunities for long-term frameworks if successful
Benefits	Collaborative working, sharing of key resources and early warnings of risks and issues	Appropriate resourcing in order to achieve SLAs and secure incentive payments	Suppliers are incentivised to ensure proposed innovation delivers value to customers.

We will continue to build on our position through RIIO-ED2 by investing in our people, systems and processes as well as engaging with our supply chain partners to seek innovative approaches to delivery, extracting the best value on behalf of our customers.

Enabling cost effective decarbonisation into RIIO-ED2

Effective management of our supply chain will be particularly important in RIIO-ED2. As discussed in Chapter 10: Maintaining a safe and resilient network, and Chapter 16: Managing uncertainty, we need to be able to respond to a range of different scenarios for the take-up of LCTs.

We will also build on our performance in RIIO-ED1 to maintain and support the delivery of our environmental commitments to achieve cost effective decarbonisation. We will do this by continuing to deliver against our three strategic procurement pillars – delivering value, sourcing sustainably and driving continuous improvement.

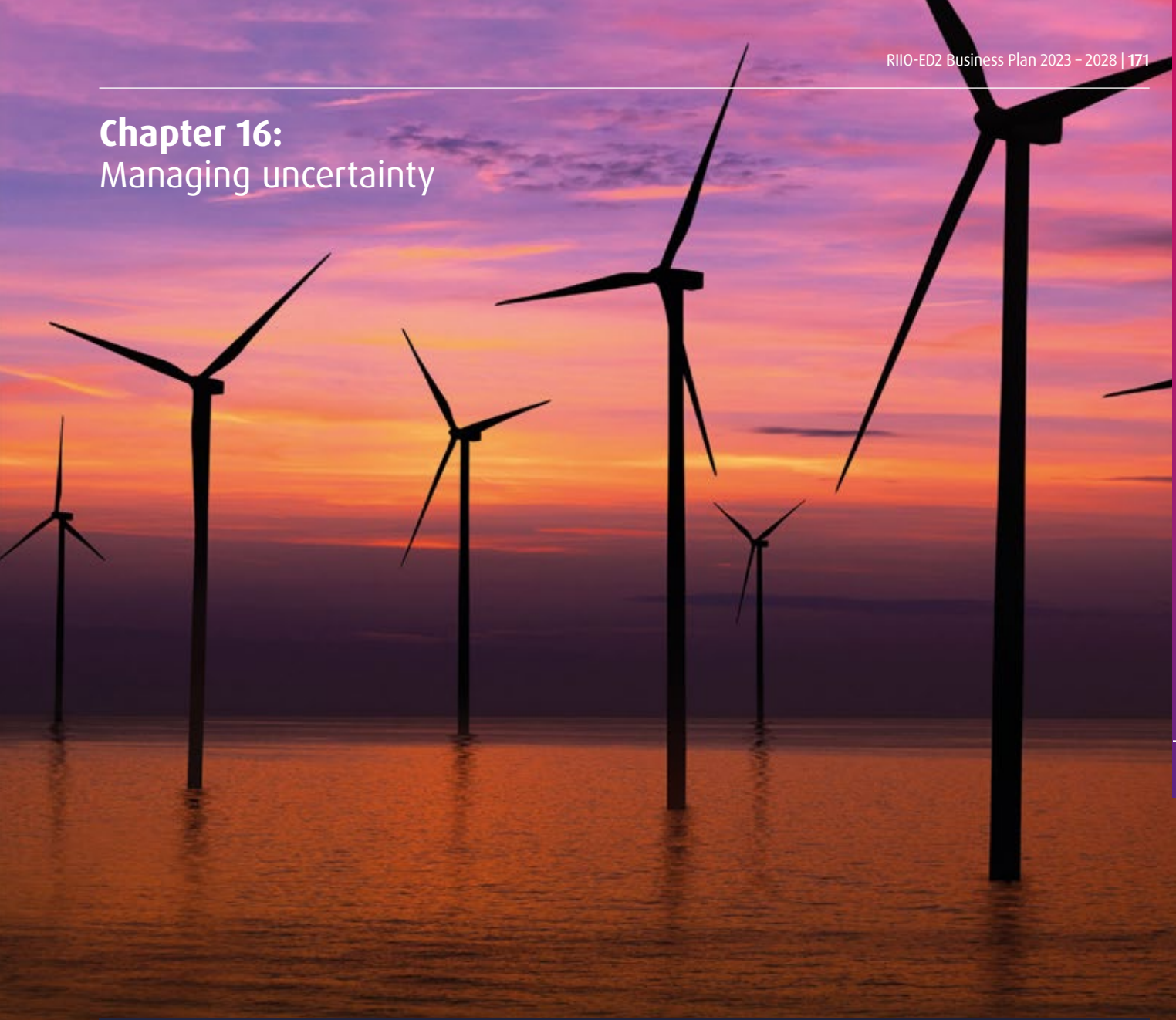
2 These values are calculated on the estimated annual savings of the new contracts resulting from competitive tenders based on the known scope and scale of the contract at the time.
3 Addressable annual value of the tenders undertaken in that year.
4 Total benefits approved from tenders concluded in the year plus any procurement negotiated cost reductions.

Chapter 15: Competition continued

The key actions against each of our strategic pillars are outlined below.

Delivering value for our customers	**· Further drive benefits and maintain commercial tension through continuing high levels of market competition.** **· Continue to ensure commercial models and management of the supply chain to drive performance.**	**· Ensure supply chain resilience via robust risk management and undertake proactive interventions driven by market intelligence and performance analytics.** **· Maintain world class Procurement and commercial services.**
	Our ongoing actions will include: · Continuing to drive resilience through the introduction of supply and value mapping, and robust performance, relationship and commercial management.	· Ensuring our supply chain is agile in response to disruptive events such as storms by maintaining access to skilled resources and utilising technology to improve resource deployment. · Setting up a supply chain engagement and innovation hub to capture improvement opportunities and provide a platform for new ideas.
Sourcing sustainably	**· Embed our Supplier Code committing 80% of supply chain to social and sustainable measures.** **· Implement a Carbon Calculation tool to measure and help reduce supply chain emissions.**	**· Assess waste management and apply circular economy methodology.** **· Introduce an Annual Supply Chain Sustainability report.** **· Map supply chain carbon (Scope 3) Science Based Targets.** **· Support the utilisation of the Supply Chain Sustainability School amongst our supply chain.**
	Our supply chain accounts for 84% of our total carbon footprint (excluding network losses) and also plays a role in many of the other ways in which we can improve our environmental performance. We will be increasing the focus on sourcing materials and services sustainably, as set out in our Environmental Action Plan, Appendix 16.	We are developing our Social Contract (outlined in Section 5) to align the commitments we make in this plan to the way in which our customers want us to do business. To embed this within the supply chain we have also developed a Supplier Code (Appendix 22) which is mapped to the UN's Sustainable Development Goals. Crucially these will allow us to report year on year on performance which we will publish.
Continuous improvement	**· Continue to emphasise and improve safety in every aspect of our business.** **· Promote smart solutions and innovation through the supplier engagement and innovation hub.**	**· Prompt payment across the supply chain.** **· Enhance digital procurement platforms, adopting intelligent process automation where practical.**
	We have performed well in RIIO-ED1, but we will need to continue to evolve and improve the performance of our supply chain and support increasing operational efficiency across our organisations.	The key enablers to this are: · Innovation in process efficiency and identifying through analytics. · Prompt payment and electronically enabled transactions. · Continuing to promote behaviours and performance in alignment with corporate and customer expectations.

Chapter 16:
Managing uncertainty



The United Kingdom's energy system is undergoing rapid transformation to accommodate the target of reaching Net Zero emissions by 2050. The recently announced Net Zero Strategy highlights the Government's ambition to reach the Net Zero target, while the Climate Change Committee (CCC's) sixth carbon budget sets out five pathways to Net Zero by 2050.

In this section:

16.1	Forecasting and scenarios	**172**
16.2	Managing external uncertainty	**178**
16.3	Real price effects	**182**
16.4	Ongoing efficiency	**184**
16.5	Regional factors	**184**

Chapter 16: Managing Uncertainty continued

16.1 Forecasting and scenarios

Introduction

The United Kingdom's energy system is undergoing rapid transformation to accommodate the target of reaching Net Zero emissions by 2050. However, no-one is clear which path to Net Zero will be followed. There are enormous uncertainties which will only resolve with the finalisation of government policy, the clarification of local government's responses, and a better understanding of the way consumers and businesses will respond to the Net Zero challenge.

What is clear is that energy networks will have a central role in whatever future plays out. Distribution Networks must be able to deal with that uncertainty, but crucially they can and should contribute to steering the UK onto better paths to Net Zero. Our plan is built to do just that.

In this section we:

- Set out our ambition.
- Describe the main sources of uncertainty.
- Explain how we have developed regional future energy scenarios using insight from our engagement.
- Set out how we see the key strategic choice: how much we should plan to invest up front to meet the challenges presented by these uncertainties and how much we should rely on uncertainty mechanisms.
- Explain why our strategy – to request a relatively low level of upfront funding – is the right approach.
- Set out the expected costs of our preferred strategy in RIIO-ED2 and how the likely outturn costs compare to other potential choices.

Then, in Section 16.2 we explain our proposed suite of uncertainty mechanisms, how each one operates, and how together they will enable our preferred strategy.

Our ambition

We aim to be the leading DNO, including in supporting the transition to Net Zero. We will make our networks ready to accommodate low carbon technologies, and we will facilitate this transition. We will do this in a way that protects customers from higher costs over RIIO-ED2, while maximising the scope for customer participation through flexibility. Our business plan delivers an optimised investment plan which is resilient across a broad range of future scenarios.

Sources of uncertainty

The major sources of uncertainty make planning for the next price control period challenging. The most important uncertainties can be grouped under three main headings.

Policy

There remains uncertainty about some policy decisions. These decisions will strongly influence the role that different energy sources will play and the emergence of new technologies.

Local implementation

In its report "Local Government and the Sixth Carbon Budget", the CCC highlights that national policy on its own will not be sufficient to deliver Net Zero and that local government has a key role to play. Over 80% of the UK's carbon emissions can be influenced by local authorities.

However, there are challenges that must be overcome for local government to lead the Net Zero agenda and there remains uncertainty as to how arrangements will evolve going forward. In our whole systems chapter (Section 12.1) we explain the work we are doing with regional planning authorities to unlock network investment.

Demand and take up

As the CCC notes, the delivery of carbon reductions to date has not required significant behaviour changes. However, over 40% of the abatement in the CCC's scenarios to 2035 involves at least some degree of change from consumers. The policies to deliver this level of change are not yet in place. Our experience from RIIO-ED1, where the forecasts for decarbonised heating did not materialise, is that without the requisite policy support there is substantial doubt over whether consumers will change their behaviour, or embrace the need for expensive and disruptive change. Our engagement suggests that most consumers are not focused on what is coming. This creates uncertainty about the rate of LCT deployment. To protect customers from unnecessary bill increases in case LCT deployment does not materialise, the correct balance must be struck between baseline funding and funding that is released via uncertainty mechanisms.

Developing our Distribution Future Energy Scenarios

As part of the Open Networks Project, all DNOs agreed to standardise their DFES on a single set of scenario frameworks based on the National Grid ESO Future Energy Scenarios[1]. By doing this, all companies will present the information in a common framework. The DFES we published in January 2021[2] is based on this agreed framework and this approach will form the basis of the annual update of our DFES through the RIIO-ED2 period.

To understand the variation between potential pathways to a Net Zero economy, we have developed four broad scenarios describing the possible evolution of demand and generation across our licence areas out to 2050. Figure 47 shows key assumptions under each of the scenarios. We have worked with a specialist energy consultancy, Element Energy, to produce regionally specific uptake scenarios which draw on the models they have developed for the Department for Transport, Climate Change Committee and the Greater London Authority.

1 https://www.nationalgrideso.com/future-energy/future-energy-scenarios
2 https://innovation.ukpowernetworks.co.uk/2021/01/11/distribution-future-energy-scenarios-2021/

Figure 47: Key characteristics of DFES

Distribution Future Energy Scenarios				
Driver	**Steady Progression**	**System Transformation**	**Consumer Transformation**	**Leading the Way**
Supports the transition to Net Zero?	No	Yes	Yes	Yes
Electricity demand	Consumers buy similar appliances to today. UK targets for energy efficiency missed.	Good progress in electrical efficiency, but missing the UK assumed level of 30%. Consumers move towards smaller appliances.	Good progress in electrical efficiency, meeting the UK assumed level of 30%. Heat and transport mostly electrified.	UK residential electrical efficiency targets enhanced. Consumers rapidly move towards smaller appliances.
Transport including Electric Vehicles	Slow EV uptake. Low growth in public transport. EV charging at home is limited.	Relatively low growth in public transport. More rapid and fast public charging is demanded.	Accelerated private EV adoption. Buses are predominantly electric. Charging predominantly happens at home.	Targets to end sale of petrol, diesel and hybrid cars and vans in 2032. High demand for autonomous, shared mobility and public transport.
Heat	Heat networks not decarbonised. Pilots of clean heat solutions don't scale.	Heat networks switch to mainly hydrogen. Electricity-based solutions adopted in mainly new builds and off gas grid.	Heating largely electrified using a combination of building level technologies and district heating.	Solutions are a mix of electrification and hydrogen for heating.
Generation	Slow transition to decarbonisation.	High development of renewable and low-carbon technologies. Geared towards larger, more centralised projects.	High development of renewable and low-carbon technologies. Geared towards smaller more decentralised projects.	Highest level to support hydrogen from electrolysis. New projects include carbon capture and storage (CCS).

Our DFES technical document is provided in Appendix 21b. This document details all of the key assumptions that underpin our DFES. As set out in Appendix 21b, the assumptions underpinning our scenarios are consistent with the scenarios developed by the ESO. It should be noted that only three of the four scenarios are consistent with the achievement of Net Zero by 2050 as the fourth ("Steady Progression") would not result in the UK achieving this goal.

Stakeholder engagement on our DFES

In February 2020, we published our first DFES. All of the associated data was made publicly available via our Open Data Portal. We undertook extensive stakeholder engagement. We held three technology-focused workshops: on EVs, decarbonised heating and generation and storage.

At these workshops, we presented our approach to industry experts such as BP Pulse, the Association of Decentralised Energy and British Solar Renewables. The output of these workshops is included in Appendix 21c. In addition to seeking views on the assumptions underpinning our scenarios, we also asked how we could make the data as useful as possible for our stakeholders.

Drawing on what we heard in our engagement, we published the majority of our forecasts at Lower Layer Super Output area, a standard Office of National Statistics classification, which allows the regional bodies to aggregate the forecasts to use them to inform their own climate action plans.

Regional authorities (County Councils, local and unitary authorities and Local Enterprise Partnerships) have a key role to play in meeting the UK's Net Zero target. Of the 116 local authorities in our area, over 75% have declared climate emergencies. The majority of regional authorities we consulted have put in place some targets to reach specific climate ambitions. To better understand regional ambitions, we organised 14 sessions across our network, which were broadly based on County Council boundaries. We followed this approach because, in a number of the regions, the County Councils are working with their respective local authorities to develop a regional decarbonisation strategy. We also tested our DFES approach with a range of regional planning stakeholders such as the Greater London Assembly and relevant Local Enterprise Partnerships.

Chapter 16: Managing Uncertainty continued

These sessions focused on discussing the ambition of each region, plans for achieving those ambitions and whether the authorities considered that they had all the levers to deliver their plans. We introduced our scenario framework, and then sought views on which scenario was most likely to occur in their region. We focused on gathering feedback in areas that will impact our networks the most: low carbon transport, decarbonised heating, distributed generation and battery storage. After each session we sent out a questionnaire to allow the attendees to provide further feedback.

What we learned from engagement

Initial expert stakeholder sessions suggested exercising caution about forecasting take-up of some LCTs, particularly:

- Near-term uptake of EVs, considering likely manufacturing constraints.
- Take-up of thermal efficiency measures in the domestic sector.
- Uptake of onshore wind generation due to planning issues.

When we consulted with regional authorities, we learned that:

- **Solar PV is likely to remain the dominant new source of renewable generation.**
- **Electric cars and vans are likely to be the dominant form of Net Zero transport.** The majority of local authorities are installing public EV charging infrastructure, although the scale, scope and development of plans varies considerably. In the case of heavy-duty vehicles, the pathway is more uncertain, with a number of authorities seeing a possible role for hydrogen particularly for buses (but not in London where the electrification of the bus fleet is already underway).
- **Heat was generally seen as the most difficult area to decarbonise.** Regional stakeholders have minimal ability to influence the heating in the current housing stock beyond building regulations. While heat pumps are seen as a key LCT, local authorities also saw a role for district heating and resistive heating in certain circumstances. Whilst local authorities have more control over their own social housing, for a number of them, the cost differential of a zero-carbon form of heating compared to a gas boiler is restricting deployment in this sector.
- **A number of authorities plan to focus on decarbonising council or district owned estates first** and then on incentivising the rest of the region to do the same. In many cases, this means aiming for decarbonisation of their own estates by 2030, and Net Zero in the whole region by 2050.
- **Authorities do not have all the necessary resources to achieve Net Zero.** Lack of funding, particularly long-term funding, is an issue for all regional authorities. Furthermore, the majority of regional authorities highlighted there was a lack of technical capability and resources to both understand the implications of and hence develop delivery plans to achieve their Net Zero target. This finding is also consistent with those in reports by both the Green Alliance[3] and the Climate Change Committee.[4]

Acting on the engagement

Through our engagement, we continued to refine our thinking about the assumptions that underpin our scenarios and how we will respond to different energy pathways. For example we moderated our assumptions about take up of electric vehicles, energy efficiency and onshore wind.

Where regional authorities have agreed policies and funding for specific initiatives, these have been reflected in our scenarios. For example, we have taken account of the impact of the Ultra-Low Emission Zone in London and the faster uptake of EVs in London (which has 9% of the stock of GB vehicles, but 13% of the stock of electric vehicles).

We worked with a number of regional planning authorities to develop an evidence-based framework to determine when local plans are sufficiently mature to include within our DFES forecasts. We have co-developed this framework and have sought to simplify it to minimise the burden on local authorities. In addition, we are proposing to establish a team within our DSO function specifically to help local authorities develop their climate action plans and ultimately their Local Area Energy Plans. Further details on this team can be found in our Whole system section (12.1). The Local Area Energy Planning Framework process would be one of the key activities of our DSO local planning team.

The scenarios we have considered

Each of our four DFES scenarios forecasts a path of growth in the uptake of EVs and decarbonised heating (heat pumps and district heat).

Figures 48 and 49 show how our forecasts of EV and decarbonised heating uptake compare to the figures attributable to UK Power Networks' areas in three of the scenarios developed by the CCC and National Grid's 2021 Consumer Transformation scenario. Our DFES scenarios span a wider range than the CCC scenarios but there is a significant overlap between the two sets of scenarios. Translating national scenarios to the regional level requires us to ensure that regional network characteristics are reflected appropriately. We provide more detail and consider the alignment between regional and national scenarios in Appendix 24.

3 https://www.green-alliance.org.uk/resources/The_local_climate_challenge.pdf
4 https://www.theccc.org.uk/publication/local-authorities-and-the-sixth-carbon-budget/

Figure 48: Comparison of our DFES EV forecasts with the CCC scenarios and National Grid's 2021 Consumer Transformation scenario

Electric vehicles[5]	2022/23	2027/28	2030/31	2035/36
CCC high – Widespread Engagement	0.43m	2.73m	4.83m	8.30m
CCC preferred – Balanced Pathway	0.43m	2.53m	4.63m	8.13m
CCC low – Headwinds	0.35m	2.10m	3.70m	7.14m
National Grid 2021 Consumer Transformation Scenario	0.37m	1.72m	3.53m	7.56m
DFES – Consumer Transformation	0.56m	2.64m	4.73m	8.31m
DFES – Leading the Way	0.59m	2.56m	4.27m	6.77m
DFES – System Transformation	0.55m	2.63m	4.73m	8.29m
DFES – Steady Progression	0.41m	1.64m	2.75m	4.79m

Figure 49: Comparison of our DFES decarbonised heating forecasts with the CCC scenarios and National Grid's 2021 Consumer Transformation scenario

Decarbonised heating[6]	2022/23	2027/28	2030/31	2035/36
CCC high – Widespread Engagement	0.12m	0.77m	1.77m	4.06m
CCC preferred – Balanced Pathway	0.13m	0.73m	1.69m	3.6m
CCC low – Headwinds	0.12m	0.71m	1.43m	2.92m
National Grid 2021 Consumer Transformation Scenario	0.32m	0.69m	1.43m	3.39m
DFES – Consumer Transformation	0.24m	0.87m	1.40m	2.70m
DFES – Leading the Way	0.26m	1.02m	1.95m	4.75m
DFES – System Transformation	0.22m	0.60m	0.90m	1.67m
DFES – Steady Progression	0.20m	0.39m	0.57m	0.89m

The principal reason for the difference between our EV forecast and the ESO's relates to future car stock projections. From 2020 to 2030, the ESO assumes car stock grows by 2% whereas we and the Climate Change Committee assume car stock grows by 10% and 9% respectively. Our forecasts are based on the latest Department for Transport forecasts whereas the ESO assumes significant increase in the use of public transport which restricts car stock growth. Another reason for the difference is that we have not assumed a linear relationship between EV growth and our share of the customer base, as EVs are being adopted in our regions faster than other parts of the country and we expect that trend to continue in the near term.

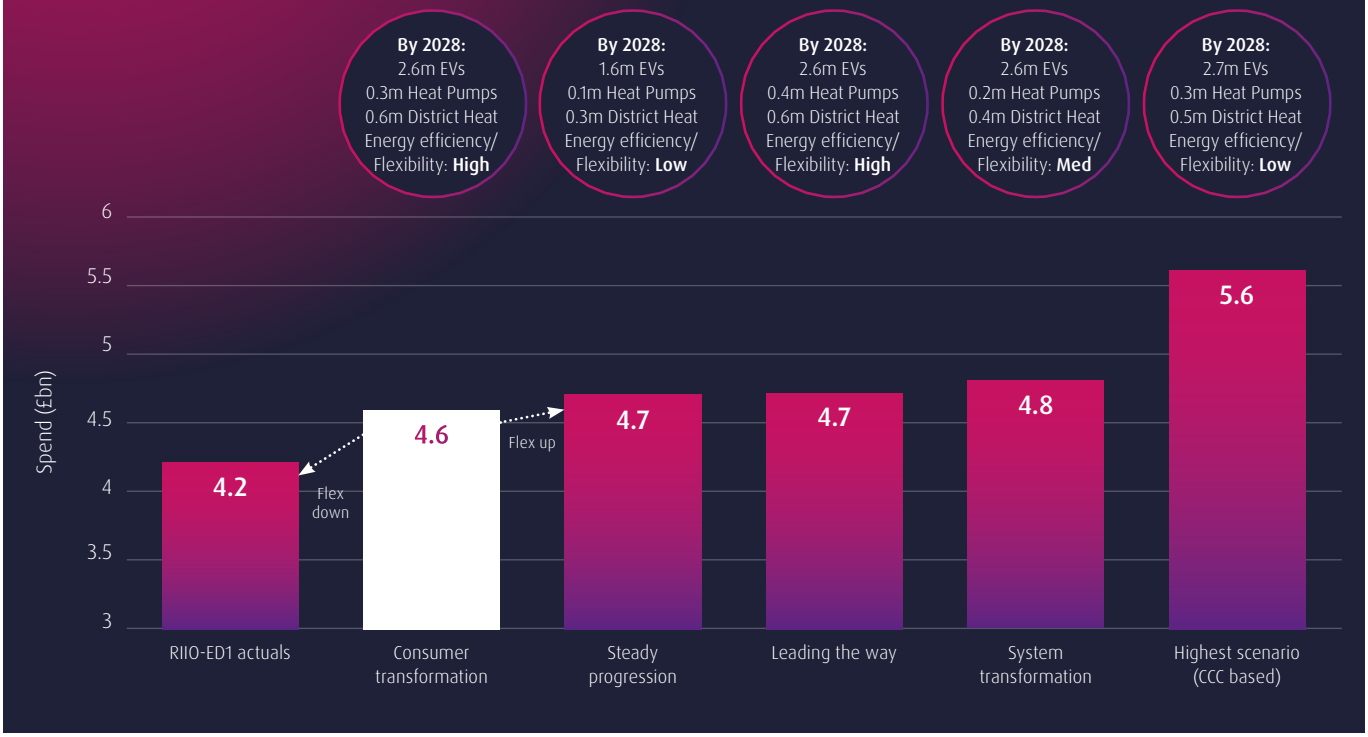
On decarbonised heating, the principal difference between our view and the ESO's is the split between zero carbon heating technology types. The ESO is forecasting that domestic level heat pumps will be the dominant technology whereas we are forecasting a significant role for district heat. In developing our forecast, we have assumed that areas with high heat density, such as Greater London, will see an increase in district heating deployment. This is based on work that Element Energy had previously undertaken for the GLA in 2018 and is covered in more detail in our DFES technical report (Appendix 21b). We have also assumed that on larger new build sites district heat will also be a viable option. There is a significant amount of work ongoing in the area of decarbonised heat, including the recent BEIS publication on opportunity areas for district heating[7]. However, there remains significantly uncertainty with regard to which technology will most suitable for each area. This uncertainty is demonstrated in the ESO's 2021 FES forecast of heat pump deployment in Consumer Transformation, which is half of the volumes forecasted in the 2020 FES. As such we would expect to refine our forecasts as more information becomes available through the RIIO-ED2 period.

These tables illustrate the substantial level of uncertainty we face about the future pathway to Net Zero generally and the take up of LCTs in particular. This level of uncertainty is unprecedented and of a different order to any previous DNO price control.

5 The CCC EV forecast attributable to the UKPN licence area has been derived by using the current percentage of EVs within the UKPN area.
6 The decarbonised heating forecasts are based on an updated version of our published DFES 2020 forecasts that factor in the government's Ten Point Plan. The CCC forecast attributable to the UKPN licence area has been derived by using actual heat pump and district heating uptake in the UKPN area.
7 BEIS, Opportunity areas for district heat, September 2021.

Chapter 16: Managing Uncertainty continued

Figure 50: Impact on totex of different scenarios



Each of our DFES scenarios has a different implication in terms of cost. This is illustrated in Figure 50. We have evaluated the investment required under each pathway. The differences in RIIO-ED2 between scenarios is very large. The lowest cost, in the Consumer Transformation scenario, relies on behavioural change to meet a Net Zero compliant path. Steady progression reflects a more pessimistic view of such behavioural change but is not Net Zero compliant. Leading the way supports higher LCT take up and ambitious expectations of changed attitudes to heat and transport. The Highest scenario reflects the CCC's most aggressive LCT take-up assumptions but when simulating this we have included cautious assumptions about some aspects of consumer behaviour, particularly take-up of energy efficiency measures. This scenario is therefore deliberately calibrated to be a credible "high sensitivity" scenario in terms of cost.

The strategic options

Given the level of uncertainty, we do not think it is feasible to plan on the basis of a single scenario. We need an approach that can respond with speed to different outcomes. In this context, a critical question is the extent of guaranteed (ex-ante) load related funding in our plan and hence the proportion of funding that will be covered by uncertainty mechanisms. There are three broad options for funding our investment in our RIIO-ED2 plan. They are:

Figure 51: Our approach

Option 1 "Go all-in ex-ante"	Option 2 "Go smart and flex up"	Option 3 "Go for all-out re-electrification"
Set the baseline allowance to include all investment forecasts to be required based on regional targets and uptake scenarios (and national scenarios). Deliver investment based on evidence of demand materialising.	Set the baseline allowance to include only 'high confidence' investments and use uncertainty mechanisms to flex up / down as the pathways to Net Zero become clearer – both regionally and nationally. Utilise smart solutions and consumer flexibility to maximise network utilisation before reinforcing.	Set the baseline allowance to include all investment forecasts to be required based on regional targets and uptake scenarios (and national scenarios). Deliver a "mains replacement" type programme – street by street – to provide capacity for heat and transport.

Each of the options has different consequences for consumers and stakeholders in delivering the capacity to support growth in take-up of LCTs and in their impact on bills.

Option	Implications for consumers / society
Option 1 – "Go all-in ex-ante"	• Greater certainty on consumer energy bills but they will be higher earlier than in Option 2 because prices reflect investment set at a level to deliver a high expected uptake scenario. • Less requirement for subsequent change (via UMs) so more straightforward compared to Option 2. • Consumers may bear some risk, potentially paying unnecessary cost should take-up of LCTs not materialise[8]. • Compared to Option 2, there is less incentive to find better ways to manage increases in LCT uptake by means of consumer participation (e.g. via action to improve energy efficiency or via flexibility markets). • The option retains flexibility in delivery so is less likely to incur stranded investment than Option 3.
Option 2 – "Go smart and flex up"	• Lower certainty on consumer energy bills – but bills will be lower compared to Options 1 and 3. • Lower investment funded in advance means it is more likely that an adjustment to the regulatory settlement will be needed due to additional demand materialising. • There is greater emphasis on the need for effective regulatory mechanisms to deal with uncertainty but because these would be conducted transparently they provide a strong market signal. • Customers would only pay for demand that materialises and translates to outputs so there is much lower risk of customers paying too much. • There is greater scope for consumer participation and behaviour change to reduce demand on the networks by adjusting consumption patterns and bringing forward energy storage and generation – enabled by markets, competition and LV monitoring – and more incentive for a DNO to encourage such action because of the need to justify a change to the regulatory settlement.
Option 3 – "Go for all-out re-electrification"	• Greater certainty on consumer energy bills during RIIO-ED2 compared to Option 2. • However, Option 3 carries the highest risk that investment will be mistargeted – consumers will thus bear a greater risk of asset stranding / low utilisation if demand does not materialise as forecast in the locations expected. This in turn could lead to a higher overall cost. • A planned programme of investment in electrification would likely stifle the incentive to find innovative ways to encourage consumer participation and behaviour change to avoid investment in capacity. It would essentially close off other more efficient options. • Option 3 might result in efficiency savings associated with planned programme delivery compared to a more responsive flexible delivery programmes in Options 1 and 2. • Potentially unnecessary street works disruption as major programmes implemented.

Strategy options considered

Our strategy is all about putting our networks on a path to Net Zero which helps consumers unlock the value of changing their behaviours and in which the cost on the bill is as low as possible. It therefore aligns best with option 2 above, because we are focused on taking actions that will encourage energy efficiency and flexibility. Our totex expenditure is based on us identifying high confidence investments that are well-justified given the uncertainty we describe. In undertaking our analysis – in which we have considered all DFES and CCC scenarios – we found that our totex strategy most closely aligned to the Consumer Transformation scenario. This is the lowest cost scenario that will deliver the transition to Net Zero. The thrust of our whole business plan is to enable the transformational change implicit in that scenario. Achieving this would enable take up of around 3m LCTs by the end of RIIO-ED2, which is aligned to meeting the 2050 Net Zero target. To achieve this we will enable, influence and lead in our region. However, this does not mean that we are planning on the basis of a single scenario. If government, regulators and consumers respond differently we will be on a different path. Our plan is designed to be able to respond to this: it has to, because we need to be able to meet demand whatever scenario plays out. If we do need to spend more for required network capacity, then the uncertainty mechanisms in our plan allow for this and ensure that there is a clear and transparent process around the need for consumers to pay more.

Our plan includes a package of uncertainty mechanisms which will flex allowances to facilitate the delivery of investment under any emerging scenario. This package of uncertainty mechanisms is consistent with Ofgem's RIIO-ED2 guidance:

- **Volume drivers** for high volume, repeatable, low cost, activities where a credible unit cost can be established.
- **Re-opener mechanisms** for uncertainties driven by factors outside of our control, or where there is higher materiality.
- **Price control deliverables** (PCDs) for relatively certain activities linked to a specific requirement.
- **Ex-ante funding** for activities required in RIIO-ED2, with strong justification and certainty.

8 This depends on the regulatory treatment, If the ED1 mechanism applied consumers would bear 50% of the underspend up to a cap of 20% of total investment.

Chapter 16: Managing Uncertainty continued

Why is this the right approach?

It is in line with expectations for the transformational impact of Net Zero

Our whole plan aims to ensure we play our role in enabling the UK's Net Zero ambition. Many of our commitments are aimed at helping to produce the required behavioural change. Our approach to load-related investment maximises the flexibility in our plan to enable this and also provides us with a powerful incentive to make it happen.

It will most protect consumers from bill rises and maintain service under any of the scenarios that emerge.

Any of the DFES and CCC scenarios could emerge but we have an obligation to plan for all of the scenarios. This uncertainty creates a significant risk of over-investment or mistargeted investment that would result in consumers bearing more costs than necessary. This applies in any scenario with spending greater than that implied by Consumer Transformation.

Moreover, targeting the lowest cost Net Zero scenario is consistent with the lessons from other jurisdictions. For example, the risk of over-investment has been highlighted by recent experience in Australia. In that instance, capacity was built to meet a forecast increase in demand, but subsequent unanticipated and widespread deployment of solar PV and batteries made some of that investment redundant. As a consequence customers' bills are higher than was necessary[9].

It plans for a Net Zero pathway whilst appropriately aligning risk and reward between us and our customers

The Consumer Transformation pathway is compatible with meeting Net Zero by 2050 and it is within the envelope of the CCC's 6th carbon budget recommendations[10]. Our strategy ensures this risk is fairly balanced between us and customers. For example, if LCT volumes materialise but flexibility markets grow more slowly and energy efficiency levels are lower than expected, then load related costs will inevitably be higher. For our part, if we do not ensure our networks are suitably ready for any demand changes that occur, we risk lost incentive revenue or penalties through both IIS and BMCS.

Our demand and cost estimates are robust

Our DFES are translated into peak demand by our Strategic Load Forecasting System (SFS). The SFS has been developed by Element Energy and Imperial College London who have world-leading expertise in load forecasting. This has enabled us to analyse the demand requirements in a range of scenarios right down to the individual distribution transformer and feeder level. By understanding the demand levels we need to satisfy in 2050, we have built in logic that upsizes reinforcements to meet this demand through a 'touch it once' philosophy where appropriate. This will save future customers significant money and will only marginally increase short-term costs due to the difference in asset costs.

To ensure our demand forecasts and intervention strategy meet the highest quality standards, we have been independently audited by GHD (formerly known as Gutteridge Haskins & Davey) who have a track record of auditing network related data being submitted via the Load Index. GHD have validated the end-to-end process of how we have sourced network utilisation data and translated it into costs being reported in Ofgem's templates. We would also be open to Ofgem auditing our forecasts to ensure confidence and full transparency in our asset utilisation level and calculations.

Any benefits of pre-emptive investment are likely to be outweighed by future opportunities

A potential argument against our approach is that pre-emptive investment would enable a long-term programme of work to be planned over several regulatory cycles which will be more efficient than reacting to needs as they emerge. We do not believe this argument holds water.

Our view, which is shared by key stakeholders such as Citizens Advice, is that the level of uncertainty is so great and the likely pace of change and innovation so pervasive that the opportunities lost by taking a pre-emptive approach would far outweigh any efficiency savings derived from running a long-term programme. In other words there is a very significant value in not investing in advance. Examples of some of the risks include:

- The likelihood that flexibility will become significantly cheaper as new products and new participants emerge to take advantage of the market opportunities. Our ambition is to be able to quickly adapt and keep costs low by using markets and, crucially, not to foreclose them.
- Uncertainty on where LCTs will cluster and therefore trigger intervention together with the level of offsetting from energy efficiency. This is particularly important as we have over 120,000 substations, many of which only serve a handful of customers.
- Future policy decisions which will substantially affect the technology mix and pace of change.

Further information about our approach to load related expenditure is set out in Appendix 21a.

16.2 Managing external uncertainty

Introduction

In this section we set out more details about the package of uncertainty mechanisms (UMs) that both support the strategy towards achieving Net Zero outlined in the previous section and deal more generally with other uncertainties we face.

In developing UMs, our priority has been to reduce the risks our customers face. These risks stem from the fact that we cannot predict with 100% accuracy what work we will need to undertake out to 2028. The greatest uncertainty we face is around the pace and mix of LCT uptake, which is why we

9 Down to the wire A sustainable electricity network for Australia, Grattan Institute
10 https://www.theccc.org.uk/publication/sixth-carbon-budget/

have focused our package of UMs on adjusting load related expenditure. Our proposed UMs share the same following three principles to ensure they are in our customers' interests:

1. The UM reduces the impact of forecasting errors by enabling more up to date information to be used to re-calibrate allowances during the RIIO-ED2 period; this will ensure we only get funded for work we need to do.
2. The UM uses benchmarked unit costs to ensure that there is symmetrical risk and reward between customers and us.
3. The UM is based on capacity that we create in response to the external environment as it becomes clearer, and investment is well justified. It is not based on funding us on the number of EVs or heat pumps in our regions as these are not within our control.

We have identified four key areas of uncertainty, and in Figure 52 below we have linked the areas of uncertainty with categories of price control uncertainty mechanisms.

Figure 52: Key areas of uncertainty in our plan

Area of uncertainty	Cause of uncertainty	Uncertainty mechanisms that could apply
Demand	We face uncertainty over the future growth in demand across our networks	Reopener, Volume driver and PCD
Policy	We must respond to any future policy or legislative changes that impact our operations	Reopener, Volume driver, Use it or lose it and PCD
Financial	We face financial uncertainty relating to cost changes outside of our control	Indexation, pass-through costs
Project based	There are specific uncertainties associated with the timings and requirements of individual projects	Reopener

To manage external uncertainties in RIIO-ED2, we will:

- Develop new DSO capabilities to take on more risk where we are best placed to manage it for our customers. This will involve enhancing our forecasting systems and deploying LV visibility technologies so that we maximise the utilisation of the existing network.
- Take a flexibility first approach that translates into maximising the use of existing network capacity. This will mean that we will only reinforce our grid when market-based flexibility options have been exhausted or ruled out.
- Ensure that we can facilitate any level of demand change across our networks by being able to flex our resources and supply chain accordingly. More information is provided on this in the Workforce Resilience chapter in Section 10.6.
- Work closely with local and regional authorities to unlock network investment consistently, transparently and quickly through uncertainty mechanisms.

This section focuses on our approach to managing demand and project-based uncertainty through the use of uncertainty mechanisms.

RIIO-ED2 uncertainty mechanisms

Following feedback from stakeholders, including the RIIO-2 Challenge Group, we have simplified our proposals down to a package of four new UMs.

This section summarises these new and material UMs and how they will enable us to adapt to external uncertainties in RIIO-ED2. In Figure 53 we demonstrate that 80% of the additional costs we could require via UMs is due to demand related uncertainty. The other 20% is linked to Diversions, which is also a highly uncertain requirement as this is dependent on customer requests for us to move our assets. Further detailed information is provided in Appendix 23.

Our proposed UMs are a vital part of our overall strategy of minimising ex-ante allowances and ensuring that we only invest when the need is clear. In the face of extraordinary volatility in demand projections, necessary adaptation of policy and major market changes, it is important that we can respond to demand in an agile fashion. In the last few months alone, we have seen a fuel delivery crisis which could significantly speed up the switchover to electric vehicles as well as speculation around the removal of policy related costs from electricity bills, together with a new heat and buildings strategy and a spike in gas prices which, if sustained, could transform the speed and scale of the switch to electric heat.

Without our proposed UMs, additional risk would be placed onto customers. Firstly, there would be a greater risk of over-investment or mis-targeted investment as DNOs would be encouraged to front load requirements without clarity of where and when demand changes will occur. Secondly, there would be less agility for DNOs to respond to changes in customer behaviour, which increases the risk of delays in facilitating the low carbon transition. The UMs we propose would encourage DNOs to better detect hot spots in demand and then receive allowances where there is a high confidence of need. Furthermore, unpredictable events such as Covid-19 could lead to a drop in demand and justified underspend, which would be returned much more quickly to customers via the UMs than would otherwise be the case.

Chapter 16: Managing Uncertainty continued

Figure 53: Our uncertainty mechanisms

Uncertainty mechanism	Additional spend under the High Scenario	Type of mechanism	Type	Unit
Connections within Price Control and service alterations	£131m	Fuse upgrades, service upgrades and unlooping	Volume driver	£/unit
		Connections within Price Control	Re-opener	£
Capacity volume driver	£333m	Distribution pole mounted transformer capacity and distribution ground mounted transformer capacity	Volume driver	£/MVA
		HV and LV circuit capacity	Volume driver	£/km
Investment in Primary infrastructure	£283m	Schemes above £10m	Reopener	£
		Schemes below £10m	Reopener	£
Diversions	£181m	Non-Load Capex (EHV)	Reopener	£/unit
Total	£928m			

Service alterations

Many properties require service alterations to enable connection of low carbon technologies. These alterations comprise upgrading service cables, unlooping services[11] and replacing cut outs that contain fuses to ensure that customers receive a safe and reliable supply. We are forecasting around three million LCTs to connect to our customers' domestic properties by the end of RIIO-ED2, if we are to stay on track to meet Net Zero. Our proposed volume driver on service alterations will ensure we can deal with the high volume of interventions we will need to make at the same time as minimising the impact of forecasting errors.

In RIIO-ED1, we established a process for making these interventions, which has helped remove a key barrier to the deployment of electric vehicles and heat pumps. The volumes of interventions associated with our ex-ante allowances are based on our experience to date and we have a high confidence these will be required. The volume driver we are proposing would work in a similar way to the current one applied to smart meter interventions by flexing revenue using updated forecast data every year. We have benchmarked our costs and we will ensure all of the service alterations we undertake are regularly reported to Ofgem for transparency. Due to the high materiality of this, we propose allowances to be flexed in advance by using an updated annual forecast of interventions. To further protect customers, we propose to give back any funding associated with interventions we did not deliver on an annual basis. We also expect the volume driver to stop being automatic if the additional spend is greater than the expenditure set in our High Scenario.

Connections within price control

Under current network access arrangements, typically a proportion of connection costs are paid for by the connecting party and the remaining costs are recovered through Price Control charges. As part of our Business Plan submission we must forecast the contribution from connecting customers towards reinforcement costs and therefore the proportion that we must fund via Price Control allowances. This uncertainty mechanism would ensure that allowances are adjusted if our forecasts are inaccurate, subject to a materiality threshold. In the event that Ofgem progresses its planned reforms to network access arrangements, then this uncertainty mechanism may no longer be required.

Capacity volume driver

To ensure we can react to demand changes in time whilst keeping cost increases to a minimum, we have led the development of a Capacity Volume Driver, which we believe is the key innovation in RIIO-ED2. As this is a GB-wide issue with important implications, we have worked with Ofgem and the other DNOs to embed this new uncertainty mechanism into RIIO-ED2 and beyond.

We will use the Capacity Volume Driver to help manage the risk that demand is higher or lower than our baseline forecast across our LV and HV network, which is where forecasting uptake is most challenging as this is where the vast majority of LCTs will connect.

The Capacity Volume Driver covers the substation assets at a local street level and the cables that deliver power to homes and businesses. Traditionally, capacity is released by reinforcing substations and circuits, however, flexibility also has a role to play in deferring reinforcement by helping us to utilise existing network capacity. As part of our DSO strategy we will market test for flexibility ahead of reinforcing, which will help us to manage demand uncertainty whilst reducing costs for customers and stimulating competition.

Once upfront allowances are set, the Capacity Volume Driver enables additional funding to be allocated where higher demand creates capacity constraints and requires the DNO to release more capacity. Conversely, it will return revenue

11 When two properties share a single electricity service it is called a "looped service". It can be necessary to "unloop" the provision of power to the properties to provide the capacity for LCTs.

to customers under a lower outturn demand scenario, compared to that forecast, if the new capacity is not needed. This ability to flex allowances up and down will help ensure protection for customers.

Network utilisation is a measure of the loading on an asset[12] and is already used at the primary level via the Load Index mechanism as a way of justifying intervention; its proposed use at secondary level is an extension of this. All of the utilisation data that has informed our investment plan has been subject to external assessment to provide assurance and greater transparency.

Application of the mechanism involves a three-stage process:

1. **Set utilisation bandings** – these are common across DNOs for comparability.
2. **A £/MVA fixed unit cost for capacity released at substations and a £/km for LV and HV circuits** – this is informed by historical costs and ongoing efficiencies.
3. **A binary unit cost scalar linked to utilisation bands –** this is informed using our baseline forecast of demand and the level of utilisation used to trigger reinforcement.

The scalar ensures that a DNO will only receive the full unit cost allowance associated with reinforcement when it can demonstrate that a transformer's utilisation has reached the relevant trigger.

The Capacity Volume Driver is a vital part of delivering our load related strategy, which can be summarised as:

1. **Enhanced and more regular forecasting** – this gives us a forward view of utilisation levels.
2. **Increased visibility of utilisation levels through improved monitoring and analysis** – this both validates our forecasts and can be deployed strategically to sites that reach a given level of utilisation. Ultimately this enables us to increase network utilisation.
3. **Flexibility and energy efficiency first** – by procuring market based capacity we can manage load uncertainty.
4. **Reinforce when necessary** – where justified we will uprate transformers & circuits and we will futureproof to 2050 needs.

Through stakeholder engagement, we know that there is a strong desire for us to show greater transparency on how we will ensure our networks avoid being a blocker to decarbonisation, whilst also enabling market-based flexibility to defer or avoid network reinforcement. Stakeholders have told us that network utilisation should be a key metric to base our decisions on. Recognising this dependency, we have sought independent assurance on the utilisation data we have used to inform our ex-ante allowances.

> Having performed a detailed independent audit, GHD is of the opinion that the submitted utilisation data is of the required quality and accuracy to support the decisions made on smart interventions and LV secondary substation reinforcement."
>
> **Richard Clark, Principal at GHD**

Due to the nascent nature of the utilisation mechanism and the Capacity Volume Driver we have tested our proposals with Citizens Advice and OVO who have been supportive of our strategy. To give further confidence we also welcome Ofgem undertaking an independent audit that could cover the four following parameters:

1. The accuracy of the network utilisation data we have submitted as our start point;
2. The efficiency of the unit costs we have used;
3. The appropriateness of the utilisation intervention triggers we have used for different asset types; and
4. That there is a sufficient evidence trail behind any intervention carried out to release capacity.

We are committing to maintaining network utilisation on key assets within certain parameters. We will report our network utilisation and capacity released annually through the regulatory reporting process. Our annual DSO report will summarise our network utilisation data and will be subject to auditor sign-off, providing independent assurance of the data we submit. This will hold us to our commitments and protect customers from over investment.

In Appendix 23: Uncertainty mechanisms we describe in greater detail how the uncertainty mechanisms we have proposed are designed to protect customers and are aligned to Ofgem's required criteria.

Appendix 23 explains the rationale for our chosen approach, including our evaluation of alternative mechanisms.

Investment in primary infrastructure

Unlike the Capacity Volume Driver, which will automatically flex allowances for high volume activities at the secondary network level, interventions at the primary and grid level are typically low volume and high value. Therefore it is more appropriate to evaluate these investments on a scheme-by-scheme basis. We propose that schemes that are below £10m in value can be evaluated in a more streamlined manner than is currently the case with the RIIO-ED1 High Value Project reopener. Our proposed expedited process for investments below £10m aligns with the positive experience of the Green Recovery programme utilised in RIIO-ED1.

12 It is calculated as the peak demand divided by the rated capacity of the asset.

Chapter 16: Managing Uncertainty continued

The volume of individual case assessments may otherwise make the process for reopener approvals too slow.

Investments above £10m will be individually justified and supported by detailed scheme papers.

Project Specific – Diversions

Diversions occur when we are required to move and re-route our network. This is typically driven by third parties. Whilst costs associated with diversions are often funded by the third party requiring them, this is not always the case and sometimes we must pay part or all of the diversion cost. Our ex-ante request on Diversions is high confidence as it is based on the current levels we are undertaking.

We have identified £181m of additional spend on Diversions in RIIO-ED2 that we propose a re-opener mechanism should cover if necessary. We envisage this re-opener working in a similar manner to the existing UM in place for diversions due to Rail Electrification. To ensure customers are appropriately protected, we propose this UM to be symmetrical so that if our requirements are lower than expected we will flex allowances down. Furthermore, we propose to set an upper cap that means any additional allowances will not exceed the £181m we have forecasted in our High Scenario.

Supporting local climate plans

Our networks supply power to most of London, where the Greater London Authority (GLA) run by the Mayor of London has legislative power. This has led to the creation of leading initiatives such as Ultra Low Emission Zones and a more rapid roll out of EV charge points for both public and private transport than in the rest of the UK.

Through our close engagement with the GLA, we know they have an ambition to deliver a Net Zero target in London as quickly as possible, which will mean going above and beyond the UK's 2050 target. To this end, we have provided an initial view of what an accelerated decarbonisation pathway for our London network would entail and how barriers could be overcome. This exercise has confirmed that the materiality of any accelerated target is very high and would require us to undertake a large programme of supporting work.

Following the recent pledge by the Mayor of London for London to be Net Zero by 2030 we understand that the GLA is now developing a plan of how this target will be met and analysis is expected to be published in due course. However, because of uncertainties over scale and timing, we have not included any costs relating to these investments in our proposed ex-ante allowance.

Once the GLA has firmed up its policies we will need the flexibility to respond. We will respond with an Infrastructure Action Plan, which will translate any resulting increased electricity demand into expectations of capacity constraints and will propose cost effective solutions. Our Plan will thererefore depend on our Capacity Volume Driver and Primary Infrastructure Re-opener facilitating an agile response.

In addition, we are proposing a bespoke re-opener mechanism to deal with a situation in which the GLA develops a plan that would then require us to put forward a major programme of works as a single package to Ofgem. This re-opener would only apply if the additional allowances required were above £25m.

> At COP26 it was clear we need to accelerate action. This makes the period 2023-2028 crucial for our ambitions and we appreciate that this poses particular challenges for Ofgem's price control regime. We are therefore particularly grateful to UKPN for including a specific mechanism to unlock additional investment to ensure their networks enable a 2030 target as the Mayor's plans firm up.
>
> I am particularly pleased by UKPN's intention to establish a dedicated team to help Local Authorities, including GLA, to work with them. This is a welcome development, given the need to bridge the gap between the different worlds of local authorities and electricity networks and also the resource constraints on local government".
>
> **Shirley Rodrigues, Deputy Mayor for Environment and Energy**

As mentioned earlier in this chapter, we have co-developed a Local Area Energy Planning framework with regional planning authorities. This framework, which we believe is a DNO-first, will focus on translating local climate ambitions into plans that we can objectively assess to release network investment quickly and consistently. Importantly, the framework has been co-developed with six Councils and its effectiveness has been tested with a further 85 regional planning authorities via an engagement programme. The feedback that we received is that this is both valuable and necessary to realise local ambitions. We evidence letters of support from 15 regional planning authorities in our Appendix 27.

16.3 Real price effects

It has been accepted in previous price controls that certain cost categories, such as specialist engineering labour, experience price movements which do not match inflation – these are known as Real Price Effects (RPEs).

For RIIO-ED1, Ofgem provided a fixed ex-ante allowance for these costs. However, this exposes both companies and customers to the risk that actual RPEs may turn out to be different to Ofgem's assumptions. To address this issue, Ofgem is proposing to set a baseline RPE allowance for each year of the price control and then recalculate the RPE allowance each year to reflect the actual movement in the RPE indices. We support this approach and it aligns with the indexation methodology we proposed for RIIO-ED1. Our view is that RPEs will be constant across the RIIO-ED2 period at 1% per annum.

Ofgem has asked us to estimate an RPE factor. Our choice is at the bottom end of the range proposed by our consultants, NERA. NERA has noted the long run average of a number of the proposed RPE indices is lower than observed historical increases in DNO costs. However, it is difficult to determine what is driving these differentials and to know whether the difference will be sustained in the future. Hence we have decided to adopt a lower RPE index and bear this risk rather than transferring it to customers. The value of this risk transfer to our customers would be ~£199m over the RIIO-ED2 period.

Figure 54 and Figure 55 set out analysis of the financial impact of both RPEs and ongoing efficiency across the Business Plan forecast period i.e.2023/24 to 2027/28.

Figure 54: RPE financial impacts (£m)

	2023/24	2024/25	2025/26	2026/27	2027/28
EPN	12.88	17.50	20.69	23.87	27.72
LPN	7.40	10.08	13.03	14.21	15.55
SPN	8.34	11.76	13.65	15.76	18.15

Figure 55: Ongoing efficiency financial impacts (£m)

	2023/24	2024/25	2025/26	2026/27	2027/28
EPN	-13.06	-17.73	-20.95	-24.16	-28.00
LPN	-7.50	-10.21	-13.18	-14.38	-15.71
SPN	-8.47	-11.91	-13.83	-15.96	-18.37

Real Price Effects

In RIIO-ED1, Ofgem split costs into four distinct categories: general labour, specialist labour, materials and plant and equipment, and identified externally published indices that could be used to track price movements. For most of our costs, these indices remain relevant for RIIO-ED2. Figure 56 below sets out our view of the appropriate indices selected for RIIO-ED2.

Figure 56: Index selection for RPEs in RIIO-ED2

RPE category	Index name	RPE category	Index name	RPE category	Index name
General labour	Private Sector AWE (K54V)	Materials capex (Poles)	Wood, Sawn and Planed	Materials opex	RCI Infrastructure materials (FOCOS)
	Median Hourly Earnings for All Employees	Materials capex (Cables)	PAFI Pipes and Accessories: Aluminium (3/59)	Plant and Equipment	PAFI plant and road vehicles (90/2)
Specialist labour	Electrical Engineering Labour (BEL)		PAFI Pipes and Accessories: Copper (3/58)	Transport	PAFI plant and road vehicles (90/2)
	PAFI Civil Engineering (4/CE/01)	Materials capex (Transformers)	PAFI Pipes and Accessories: Copper (3/58)	Materials capex (other)	RCI Infrastructure materials (FOCOS)
	Electrical Installations – Cost of Labour (2/E1)		Electrical – Materials (3/E2)		
	Electrical Engineering Labour (4/CE/EL/01)				

Source: NERA[13]

The source of all indices will be the Building Cost Information Service, except: Private Sector AWE and Materials Capex (which will be sourced from the Office for National Statistics) Median hourly earnings (which will be sourced from the Annual Survey of Hours and Earnings), and Electrical Engineering Labour (which will be sourced from BEAMA).

According to NERA's analysis, all the indices show a material variation to CPIH and hence should be allowed for in RIIO-ED2. In RIIO-ED1, Ofgem developed a notional cost structure analysis to weight the RPE indices. Our view is that this approach is still relevant and Figure 57 sets out the revised weighting for RIIO-ED2.

Figure 57: Notional Cost structure for RIIO-ED2[14]

Cost category	Share of Totex in RIIO-ED2	Share of Totex in RIIO-ED1
General labour (capex and opex)	30.2%	35.6%
Specialist labour (capex and opex)	36.5%	30.5%
Materials (capex)	18.1%	16.3%
Materials (opex)	3.3%	4.0%
Equipment/Plant	4.3%	5.7%
Transport	2.8%	–
Other	4.8%	–
Other (incl. Transport)	–	7.9%

13 NERA, Price effects for the RIIO-ED2 Price Control Review – Addendum, October 2021
14 NERA, Price effects for the RIIO-ED2 price control review, June 2021

Chapter 16: Managing Uncertainty continued

16.4 Ongoing efficiency

To determine our proposed ongoing efficiency assumption, we have looked at a range of approaches. As detailed in the accompanying report by NERA[18], these include:

- Estimates of growth in total factor productivity in comparator sectors, available from the EU KLEMS database for the years 1970-2007 using the Gross Output measure.
- Modelling of the efficiency improvements that DNOs have achieved from 2010/11 to 2019/20, estimated using a Törnqvist approach. NERA estimated this Törnqvist index directly from information provided by the DNOs.
- Estimates of economy-wide productivity growth, published by economic research institutions based on growth accounting approaches (GAA). NERA considered long-term historical estimates and estimates based on data since 2010 separately to account for the reduction in productivity growth observed globally since the Global Financial Crisis (GFC) of 2007-2008.
- Forecasts of productivity growth, available from the Bank of England and the Office for Budget Responsibility.

We believe that it is appropriate to look at a range of approaches because, as NERA's analysis demonstrates, each approach has strengths and weaknesses. Based on its analysis NERA found that historic ongoing efficiency ranged from approximately 0% to 0.8% per annum.

Our ongoing efficiency assumption for RIIO-ED2

In addition to the analysis undertaken by NERA we have also considered the Competition and Markets Authority decision on ongoing efficiency for the gas distribution and transmission sectors. In their review, the CMA found that Ofgem had not erred in determining an ongoing efficiency assumption of 0.95% for capex and repex and 1.05% for opex but had erred in its addition of 0.2% to those figures for assumed innovation savings. Taking this into account, we have assumed an overall totex ongoing efficiency rate of 1% which is significantly above the level derived from the historic evidence.

16.5 Regional factors

The cost of operating and delivering works in London and the South East is higher than that in the rest of the country. This statement is supported by substantial evidence and is in line with the position taken by Ofgem and other regulators. The following section sets out our view of regional factors, based on expert review and input. In total, these costs account for 5% of our totex for RIIO-ED2.

As part of our detailed preparation for RIIO-ED2 we have thoroughly reviewed Ofgem's RIIO-ED1 benchmarking models as well as developments in the wider regulatory landscape. An output of this work is an alternative cost model, which through its specification already caters for regional variations. We believe Ofgem could use this model for totex benchmarking which would eliminate the need for separate adjustments to control for regional factors.

For further information please refer to Appendix 24: Regional factors.

The table below summarises the value of regional factors per annum for our distribution areas:

Figure 58: Regional factor adjustment per annum detailed cost breakdown

UK Power Networks' Regional Factor costs uplift per annum (£m 2020/21 prices)				
Item	**LPN**	**EPN**	**SPN**	**UKPN**
Labour costs	19.60	4.46	7.95	32.02
Nature of streets	7.90			7.90
Network-specific factors costs	10.72		2.87	13.59
Permitting and traffic management	3.19			3.19
Total regional factor cost uplift per annum	41.42	4.46	10.82	56.70

Since the RIIO-ED1 price control, we (in a partnership with Thames Water, Cadent Gas and SGN) have worked with NERA and Arcadis to evaluate the higher costs or environment related productivity impacts of running a network in the London region. The report titled, 'Understanding the Baseline Level of Efficiency in London', has identified key factors affecting the cost of performing utility services in London, as compared to other parts of the country, providing an expert view quantifying the effect of these differences on overall costs.

Regional wage differentials

A high proportion of a network operator's costs are wages, either paid to their own staff or to contractors and their sub-contractors. The nature of the work, and the requirement to provide a 24/7 response capability, means that much of the works need to be done where the assets are located and cannot be moved to lower wage locations.

Ofgem recognises that there are labour cost differentials between London, the South East, and elsewhere in Great Britain. For RIIO-ED1, Ofgem used data provided by the Office of National Statistics (ONS) Annual Survey of Hourly Earnings (ASHE) to calculate labour indices for the three regions noted above. The proportion of work delivered in each region is then used to determine a reasonable adjustment for each DNO. While regional wage levels per se are not within management control, there may be a range of strategies network operators can deploy to manage the level, such as locating staff away from the region served by the assets or adopting a shift system that mitigates the risk of exposure to higher wages in certain areas.

18 NERA Ongoing efficiency improvements at RIIO-ED2, April 2021.

In RIIO-ED1, Ofgem assumed that 88% of the labour cost directly on the network would need to be employed locally. However, Ofgem also assumed that some indirect labour could be located elsewhere resulting in 40% of closely associated indirect costs, and no business support costs, being subject to regional labour adjustments.

We have used 5-years of historical data (2016-2020) from the ONS ASHE dataset to undertake our analysis, covering the first five years of RIIO-ED1. This is consistent with Ofgem's choice at RIIO-ED1 and RIIO-GD2 final determination where the most recent five years of wage data from the ONS have been used to estimate a wage index. Following the approach Ofgem used at RIIO-ED1, we apply regional labour adjustments (RLAs) in comparative benchmarking by increasing the costs of companies operating in relatively low wage areas and decreasing the costs of DNOs (like LPN) operating in relatively high wage areas. The off-model adjustments, applied to our three licence areas, scale labour costs down by £32m per annum in order to improve the comparability across DNOs before conducting benchmarking.

London specific factors

Network specific factors

The high proportion of underground network in London creates a number of additional costs. LPN has a network of tunnels containing EHV cables running between grid and primary substations that drive additional costs for ventilation, confined space regulation compliance, and additional inspection and maintenance. Similarly, London has a more extensively connected LV feeder network compared to other regions. This higher density of link boxes results in a higher proportion of costs for condition-based replacement, and inspection & maintenance.

For RIIO-ED2, network specific factors result in a company specific adjustment of £24.7m per annum across two of our three licence areas.

Nature of the streets

A significant fraction of utilities' work requires the excavation and reinstatement of the street surface. The nature of that surface and its surroundings drives costs which are materially different in London than they are elsewhere in the country. The density of network assets under London's streets and the presence of coal cellars and other basement structures under many London streets leads to a greater percentage of assets in London being under the carriageway, which affects excavation, traffic management, and other costs.

For RIIO-ED2, we have applied a productivity adjustment of 15.5% to factor the additional cost for works carried out under the street surface in London. This has been applied to all London-based reinstatement spend, spend on underground cables, and fault spend relating to underground cable assets. The impact of this results in an overall company specific factor adjustment of £10m per annum for RIIO-ED2.

Permitting and traffic management

Local procedures, and charges associated with lane rental, traffic management and parking bay suspensions impact our network operator costs. The nature of these costs are materially different in London than they are elsewhere in the country.

Only LPN is materially impacted by a London premium for permitting and traffic management costs resulting in an overall company specific factor adjustment of £3.24m per annum for RIIO-ED2.

Transport and Logistics

We have excluded any company specific claim for transport and logistics costs on the grounds of immateriality of the London premium in RIIO-ED2.

Alternative cost assessment models that cater for Regional Factors

Ofgem have used a range of different methods at recent price controls to capture the effect on efficient costs of the specific factors faced by London utilities.

To some extent, regulators have controlled for London factors "in model", i.e. using benchmarking models which capture London-specific factors by including drivers which reflect differences between London companies and those serving other regions. However, in practice, regulators' aggregated (e.g. totex) models have included a relatively small number of cost drivers.

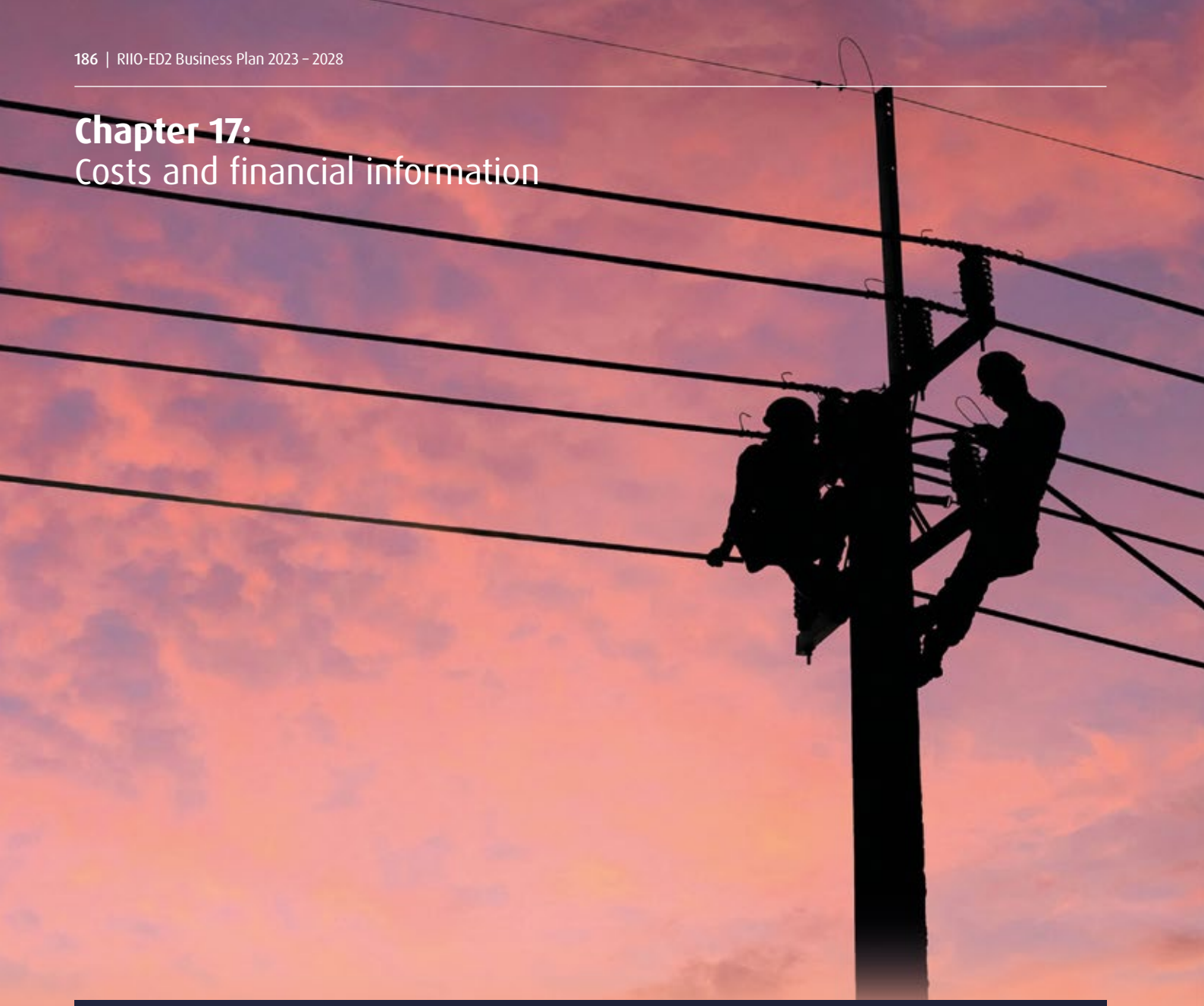
Data limitations mean that econometric benchmarking models, if used without other adjustments, might not capture the drivers of London utilities' efficient costs, causing cost assessment modelling to incorrectly conflate inefficiency and London-specific factors.

We agree that regional factors can be controlled for using pre-modelling adjustments as at RIIO-ED1. However, we also believe that there are drivers that can control for company specific factors using econometric benchmarking.

As noted in our response to the RIIO-ED2 Sector Specific Methodology Consultation dated 1 October 2020, we have run a number of alternative totex models that attempt to control for regional factors. Our preferred model, which is set out in full in Appendix 26: Cost assessment and benchmarking, combines density and scale measures, and removes the need for separate regional factor adjustments for totex modelling. This model replaces a composite scale variable (CSV) dominated by modern equivalent asset valuation (MEAV) with customer numbers and network length and captures customer numbers over a particular area using density and Gini Index ("Gini"). By controlling for density and Gini, this totex model does not need separate adjustments for regional factors for density/sparsity, which not only improves the model's statistical robustness, but helps to simplify the overall process.

We believe Ofgem should consider including this additional model in its toolkit to improve the reliability of its cost assessment for RIIO-ED2.

Chapter 17:
Costs and financial information



In this section:

17.1	Overall totex summary	**187**
17.2	Totex forecast	**187**
17.3	Direct cost information	**190**
17.4	Indirect cost information	**195**
17.5	Access and charging reforms	**196**
17.6	Financial information	**197**

17.1 Overall totex summary

This chapter should be read alongside:

- Section 16.2: Managing external uncertainty which describes the scenarios underpinning our plan.
- The Business Plan Data Tables (BPDTs) and supporting commentary which provide the detailed information behind the costs presented in the BPDTs.
- Our EJPs which set out the scope, costs and benefits for the major projects and programmes, and
- The overarching investment strategy papers (Appendix 10a and 21a).

The expenditure included in this section is:

- Stated in £m in 2020/21 prices.
- Updated from our Initial Business Plan to reflect the feedback received from Ofgem, the Challenge Group, our CEG, our further customer and stakeholder engagement and additional refinement of our thinking.
- Consistent with the current RIIO-ED2 Business Plan Guidance.
- In line with Ofgem's current position on the use of volume drivers and reopener mechanisms, recognising that Ofgem's thinking is evolving.
- Inclusive of pension costs and based on current actuarial estimates.

Expenditure areas that are incurred outside of the price control and not assessed through Ofgem's cost assessment are not included in this section. We have not provided forecasts of costs in areas where government/ regulatory policy is evolving too much to provide meaningful projections, such as Enhanced System Restoration (previously known as Black Start Resilience).

17.2 Totex forecast

RIIO-ED2 was an eight-year price control, whereas RIIO-ED1 is a five-year control. To compare figures, we have calculated an equivalent five-year spend for RIIO-ED1. The table below compares RIIO-ED1 expenditure with our forecast expenditure for RIIO-ED2 (for both our Initial and Final Business Plans).

Figure 59: Totex comparison

Expenditure item	RIIO-ED1 Actuals & Forecast	RIIO-ED2 Initial Business Plan	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	£m	%
Load related costs	385	527	**583**	198	52%
Asset replacement and refurbishment	522	605	**740**	219	42%
Other non-load related expenditure	485	556	**656**	171	35%
Non-operational capex	184	291	**292**	108	59%
Network operating costs	1,071	997	**1,006**	-65	-6%
Closely associated indirect costs	1,025	1,024	**1,073**	48	5%
Business support costs	446	464	**483**	36	8%
Other costs	116	39	**39**	-77	-67%
Total costs (before ongoing efficiency)	4,234	4,502	**4,872**	638	15%
Ongoing efficiency		-109	**-233**	-233	
Total costs (after ongoing efficiency)	**4,234**	**4,393**	**4,639**	**404**	**9.6%**

Note 2020/21 prices.

Chapter 17: Costs and Financial Information continued

We are projecting an ex-ante totex expenditure of £4.6bn (post ongoing efficiency). This expenditure will provide the additional network capacity to accommodate growth in low carbon technologies and enhanced DSO functionality. We will deliver a 99.99% network reliability, operate a 24/7 emergency service for all of our 8.4m customers, as well as deliver a range of enhanced outputs set out within this plan.

Comparing our totex in RIIO-ED2 with RIIO-ED1, we are proposing:

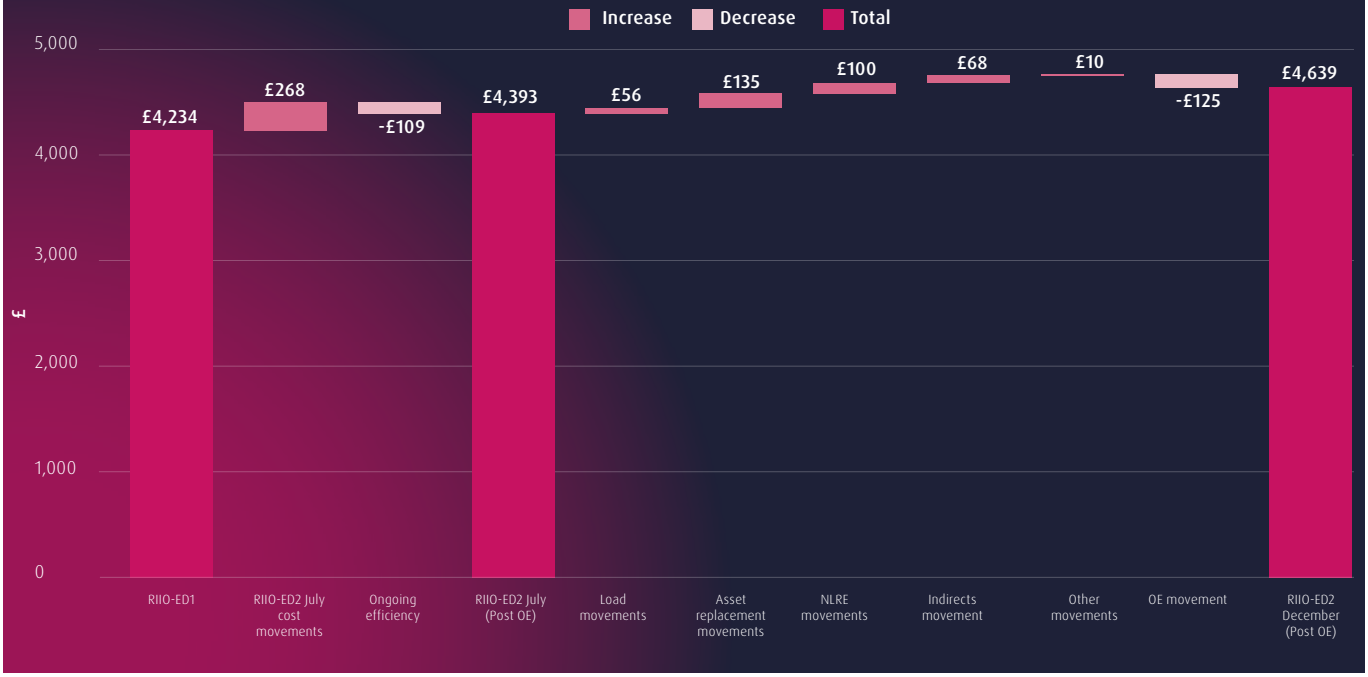
- An increase of 52% in our load related costs, which will allow our networks to accommodate background load growth from LCTs and make individual premises LCT ready.
- An increase of 42% in our spend on asset replacement and refurbishment, which will allow us to hold the increase in asset risk to less than 5% across our regions. This increase includes £155m of dedicated expenditure focused on the removal of poorer performing sections of our fluid-filled cables.
- An increase of 35% in our other non-load related expenditure. This includes £28m to improve the service that we provide to Worst Served Customers (this expenditure is in direct response to the views of our customers, stakeholders and CEG and will allow us to deliver improved reliability to around 50,000 customers). It also includes £17m to improve the resilience of our network in the face of greater flooding risks.
- An increase of 59% in our non operational capex costs, reflecting increased investment in data and digital capabilities, cyber resilience and the electrification of approximately 60% of our existing fleet by 2028.
- A decrease of 67% in other costs reflecting an updated innovation plan for RIIO-ED2 and the cessation of atypical costs incurred during the RIIO-ED1 period.

We discuss our assumptions on ongoing efficiency in Section 16.4: Ongoing efficiency. We have adopted the assumption for ongoing efficiency (1% per annum) that was judged appropriate by the Competition and Markets Authority in the recent appeals by gas distribution and transmission businesses. This assumption is consistent with our unremitting focus on business efficiency through the productivity and cost improvements that we initiated during RIIO-ED1 and are now building on for RIIO-ED2.

Incorporating feedback on our Initial Business Plan

We have carefully considered the feedback on our Initial Business Plan provided by the Challenge Group, our CEG, Citizens Advice and by Ofgem. The Challenge Group asked us to reconsider our use of uncertainty mechanisms and to be more ambitious in some areas of our plan. Our Final Plan reflects these challenges. We have reduced the proportion of our costs covered by uncertainty mechanisms, which has led to an increase in our base costs. We have also been more ambitious in our environmental commitments regarding fluid-filled cable leakage reduction. We have also updated our analysis and forecasts in light of new information. The Figure below highlights the main movements between our Initial and Final Business Plans.

Figure 60: Movements between our Initial and Final Business Plans



The movements between our Initial and Final Business Plans reflect:

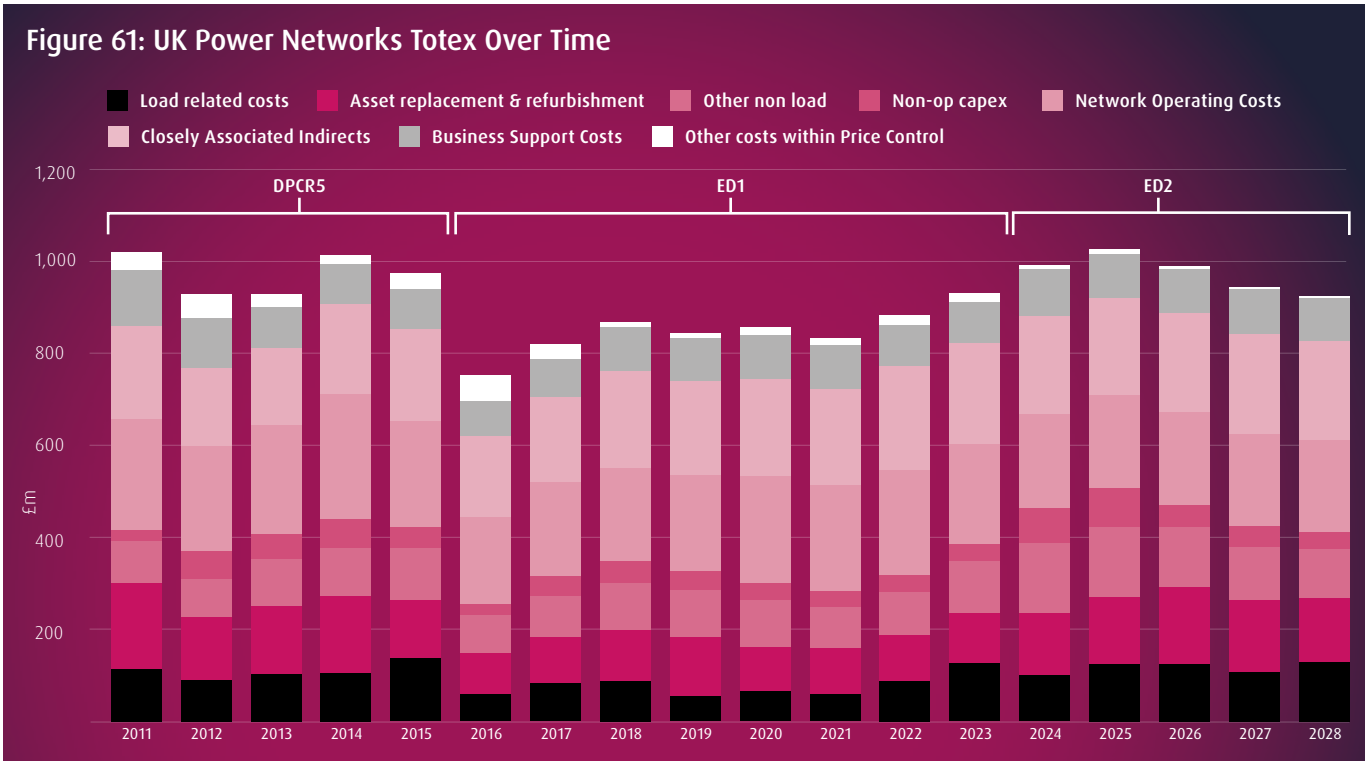
- Load related costs – These have increased by £56m. We have refreshed our load forecasts which led us to conclude that we need to spend £44m more on secondary network reinforcement to release additional capacity. We identified the need for additional Primary schemes, which increased our spend by £16m. Based on updated information from National Grid, we have reduced our forecast spend on New Transmission Capacity Charges by £4m. We have advanced some of our proposed interventions to ensure we do not stand in the way of the transition to Net Zero – these interventions include an additional £52m on proactive secondary work (such as unlooping). Finally, we have removed £40m spend on off-gas grid customers as we propose that these costs are now covered by the CVP mechanism, as well as £12m of voltage related work which is now catered for by our wider secondary reinforcement work.
- Asset replacement and refurbishment costs – These have increased by £135m. £90m of this increase reflects our ambition to replace more fluid-filled cables to provide better protection for the environment and keep network risk within acceptable levels for the period. We have also increased our expenditure on non-SF6 switchgear, fire retardant transformers and have reassessed the level of our civils expenditure associated with the volume of planned work.
- Other non-load related expenditure – This has increased by £100m. We have included our entire proposed PCB removal programme in ex-ante costs (covered by a bespoke PCD, see EJP-AS-093), resulting in an increase of £25m, and our proposed expenditure on network Operational IT and Telecoms by £33m, which includes additional monitoring (reflecting feedback that we received from Ofgem). We also now have better information on the contribution that we will need to make to customer driven diversions, resulting in an additional spend of £24m.
- Indirect costs – These categories of expenditure have increased by £68m, primarily reflecting higher levels of underlying capex, additional DSO costs and increased spend on cyber resilience.
- We have updated our assumption on ongoing efficiency to align our Final Business Plan with the CMA's view.

Expenditure over time

The RIIO-2 Challenge Group asked us to explain the profile of our projected expenditure in RIIO-ED2 and in particular in the early years of the next price control period. They were concerned that we might be holding back necessary work from RIIO-ED1, resulting in an artificial increase in spend for RIIO-ED2.

The Figure below provides a long-term perspective on our expenditure. As can be seen from Figure 61, our projected totex for RIIO-ED2 is comparable with historical levels of expenditure.

Figure 61: UK Power Networks Totex Over Time



Chapter 17: Costs and Financial Information continued

The Challenge Group also pointed out that we are projecting higher non-load related capex at the start of RIIO-ED2 than at the end of the period. This is because of two factors which are outside of our control. First, we need to replace equipment which contain PCBs, reflecting a legal requirement to complete this work by the end of 2025. Second, we need to respond to the profile of customer-driven diversion work.

In response to the Challenge Group's comment on our asset replacement expenditure, we compared the average rate of spend in the last two price controls (DPCR5 and RIIO-ED1) with the projected rate of spend in RIIO-ED2. On average over DPCR5 and RIIO-ED1, expenditure in this area has amounted to £114m per annum. For RIIO-ED2, average underlying expenditure amounts to £110m (when we adjust for our proposed £31m per annum programme of work to replace fluid-filled cables).

We are not deferring investment into RIIO-ED2 and we believe that pegging asset replacement to the average level observed in RIIO-ED1 would not be appropriate given that the mix of asset interventions between periods is significantly different.

17.3 Direct cost information

Figure 62: Load related expenditure

Item	RIIO-ED1 Actuals & Forecast	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	%
Connections within the price control	92	199	106	115%
Reinforcement (Primary Network)	210	171	-39	-19%
Reinforcement (Secondary Network)	66	177	111	168%
Fault Level Reinforcement	8	19	10	124%
New Transmission Capacity Charges	8	18	10	120%
Total load related costs	**385**	**583**	**198**	**52%**

Note 2020/21 prices.

Load-related expenditure is incurred when we create additional capacity on the network to facilitate new connections and load-related growth.

With the exception of primary reinforcement, load-related expenditure is projected to increase across all categories of expenditure. This reflects significant customer-driven growth in low carbon technologies, such as electric vehicles, storage, distributed generation, and heat pumps as the UK realises its commitment to achieving its Net Zero emission targets.

In comparison with our totex in RIIO-ED1, we would highlight:

- **Connections –** When new connections are made to the network, there can be a requirement to increase existing network capacity. Connecting consumers fund the assets that will be used for their sole use and a proportion of the reinforcement costs. The remaining reinforcement costs are funded by all network users. The forecast increase in connections is driven by demand. For example, our connections expenditure includes over £35m to help make individual premises ready for LCTs. We are confident of our forecasts because these are based on careful modelling and because we have tested our views with stakeholders including local authorities. (We comment on the impact of Ofgem's review of Access arrangements, which will have implications for the level of costs borne by connecting customers, below in Section 17.5).
- **Primary reinforcement –** This results in additional capacity on the parts of our network that operate at 132kV and EHV. We forecast a reduction in this expenditure because we do not envisage the same increase in demand in RIIO-ED2 at these voltage levels. In addition, we have added significant primary network capacity in RIIO-ED1.
- **Secondary reinforcement –** This results in capacity on the parts of our network that operate at voltage levels which are below 22kV – our high voltage (HV) and low voltage (LV) networks. We expect the majority of LCTs to connect to our HV and LV networks and therefore to give rise to the need for secondary reinforcement. We have used a combination of LV monitoring and modelling to identify reinforcement requirements. The forecast spend relates to substations where we have a high degree of confidence that we will need to make an intervention. We have been transparent in the way that we have identified these interventions and we have benchmarked our costs to be sure that our expenditure is efficient. Moreover, if the anticipated demand does not materialise, we will not spend in this area – and our proposed uncertainty mechanisms will protect customers from paying for unnecessary investments. We also plan to spend over £50m to remove potential network barriers to the adoption of LCTs across our regions.

- **Fault-level reinforcement –** Certain faults on the network can temporarily cause very high electric currents. Our network is designed to withstand these fault levels, however the increasing number of generators and large induction motors connected to our network can create problems which could result in catastrophic failure to overhead lines, cables and switchgear. The increase in spend from the level seen during RIIO-ED2 is driven by a small number of specific schemes.
- **New transmission capacity charges –** Our network interconnects with the transmission network at Grid Supply Points (GSPs). National Grid charges us for the capacity we use at these GSPs. Through extensive engagement with National Grid and evaluation of the connections pipeline we have identified the need for three new GSPs together with the reinforcement of six existing GSPs, at a cost of £18m.

We are confident that these expenditures are efficient because we have assessed the scope for flexibility to address network requirements, are proposing the use of uncertainty mechanisms so that customers do not pay for unnecessary investment, and have benchmarked our costs.

For further information on the proposed Reinforcement Schemes see Appendix 21a: Load related expenditure and our separate EJP and CBA documents for specific projects.

Asset replacement and refurbishment

Figure 63: Asset replacement and refurbishment

Item	RIIO-ED1 Actuals & Forecast	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	%
Asset Replacement	488	708	220	45%
Refurbishment non NARM	15	6	-9	-60%
Refurbishment NARM	18	27	8	45%
Total asset replacement & refurb costs	**522**	**740**	**219**	**42%**

Note 2020/21 prices.

A significant proportion of our assets were installed in the late 1950s to early 1970s. Asset replacement activity is increasing as these assets approach the end of their useful lives.

Our investment programme seeks to deliver an appropriate balance between: managing the health and condition of the networks; the impact on customers' bills; and the deliverability of an expanded programme.

We use a range of models to inform the volume and nature of work that needs to be undertaken to maintain network risk and performance, including: Ofgem's NARM approach, statistical age-based modelling and run-rate analysis. NARM modelling has highlighted the need to increase spend on asset replacement to keep asset risk within acceptable levels. According to our NARM modelling, even with our proposed level of spend, asset risk increases by almost 5% over the course of RIIO-ED2. We consider this modest increase in risk strikes the right balance between maintaining the health of our assets and minimising the impact of higher expenditure on customers' bills.

We are confident our costs are efficient. Our plan ensures a large proportion of the costs associated with increased volumes will be offset by improvements in unit costs through targeted cost interventions delivered through the remainder of RIIO-ED1 and further efficiencies during RIIO-ED2.

Further detail on our RIIO-ED2 investment for asset replacement can be found in Section 10.4: Asset resilience.

The principal drivers behind increased expenditure in this category relate to:

- A significant programme of replacing fluid filled cables, resulting in a net change of £140m in expenditure on EHV and 132kV cables in RIIO-ED1. The focus in RIIO-ED1 had been on replacement of gas filled cables and the attention for RIIO-ED2 is in taking off the network poor performing fluid-filled cables, which will deliver environmental and network health benefits.
- Almost £90m more on overhead lines across all voltages and the structures that support them.
- Over £40m more on EHV and 132kV transformers and switchgear, in line with our Asset Replacement Strategy, where we have focused on the removal of HI5 assets as described in Section 10.4 Asset resilience and the supporting EJPs.

There are a number of categories where expenditure is falling:

- Spend on replacing underground cables at LV and HV is reducing by over £10m, in recognition of the increased activity forecast as part of our load related expenditure.
- A reduction of over £20m on spend relating to secondary transformers and switchgear. This category includes LV link boxes, where we will have invested close to £100m over RIIO-ED1 (on an equivalent basis to RIIO-ED2). Given the extensive work done to date we do not need to continue spending as much on this category of asset in RIIO-ED2.

Chapter 17: Costs and Financial Information continued

Other non-load related

Figure 64: Other non-load related

Item	RIIO-ED1 Actuals & Forecast	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	%
Diversions (Excluding Rail Electrification)	143	164	22	15%
Civil Works Condition Driven	30	39	10	32%
Operational IT and telecoms	94	220	126	134%
Legal & Safety & ESQCR	121	113	-7	-6%
Flood Mitigation	4	17	13	286%
Worst Served Customers	5	28	23	496%
Other	89	74	-15	-17%
Total NLRE Other	**485**	**656**	**171**	**35%**

Note 2020/21 prices.

Diversions

Non chargeable diversion activity is predominantly driven by third party requirements. Public perceptions towards overhead electric lines have shifted. Drivers including continued urbanisation to meet Government targets on housing, major national infrastructure projects such as HS2 and Lower Thames Crossing and an increase in claims for compensation for assets on private land, have placed additional pressures to balance the rights of landowners with operating requirements.

We are forecasting higher expenditure on diversions for RIIO-ED2 than in RIIO-ED1. In part, this is because of an increase in claim activity on our LV network that we have observed in RIIO-ED1 as well as specific contributions we are required to make under New Roads and Streetworks Act legislation for a number of major infrastructure projects.

Our plan includes a proposal to make use of an uncertainty mechanism if external factors give rise to additional requirements.

Operational IT and Telecoms

The developments of enhanced DSO capabilities and smart grids have the potential to unlock new sources of value for our consumers and will be essential to driving performance and greater efficiency from our network. Operational IT and Telecoms is an area where we anticipate additional ex-ante investment compared to RIIO-ED1. Our forecast anticipates additional expenditure:

- £21m on control systems, contributing to the development of our enhanced DSO capabilities.
- £54m on switching and monitoring functionality including power quality and distributed energy monitoring.
- £86m on replacement of existing Remote Terminal Units (RTUs) with Internet Protocol enabled RTUs.
- £25m on cyber resilience for Operational IT and Telecoms.
- £34m on the installation of monitoring equipment on the secondary network to improve network visibility and enable efficient, targeted interventions to be undertaken in a timely manner.

Further details on our RIIO-ED2 investment for DSO, Digitalisation and Cyber can be found in Sections 12.2, 13 and 10.8 respectively.

Legal, safety and ESQCR

We have an obligation to ensure overhead lines have sufficient clearance from passing vehicles, buildings, trees and the ground. Our plan envisages that we will remove all Electricity Safety, Quality and Continuity Regulations (ESQCR) compliance issues over the RIIO-ED2 and RIIO-ED3 periods, taking a risk-based approach. As we have found during the RIIO-ED1 period, and despite spending significantly on clearing backlogs that pre-date the formation of UK Power Networks, we continue to identify instances of ESQCR non-compliance across our EPN and SPN networks. In part, this reflects the evolving nature of land use in the more populated and economically active regions of the country we serve.

We anticipate overhead line clearance expenditure for RIIO-ED2 reducing from RIIO-ED1 levels given the increased level of expenditure contained in our asset replacement plans.

Flood mitigation

Having tested different approaches with our customers, we are investing £13m more than in RIIO-ED1, to deliver a higher level of flood protection. We will add protection to 85 sites which will mitigate the impact of flooding where the flood risk is greatest. By the end of 2028 this will mean that all of our grid and primary substations that supply over 8,000 customers will be able to withstand a 1 in a 1000-year flood event and those that supply 8,000 or fewer properties will be capable of withstanding a 1 in 100-year flood event.

Worst Served Consumers

Worst Served Customers are customers who experience 12 or more higher voltage unplanned Interruptions over a three-year period, with a minimum of two higher voltage unplanned Interruptions each year. Our engagement programme demonstrated strong customer support for improving the service received by Worst Served Customers. Our CEG thought the same. We have made a commitment to deliver improved reliability for around 50,000 customers. A significant increase in annual investment (compared to RIIO-ED1 levels) will be required in order that this target is achieved. We have capped the level of expenditure at £28m to ensure that our spend is both proportionate and efficient.

Non-operational capex

Figure 65: Non-operational capex

Item	RIIO-ED1 Actuals & Forecast	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	%
IT and Telecoms (Non-Op)	114	192	78	68%
Property (Non-Op)	25	43	18	75%
Vehicles and Transport (Non-Op)	43	67	25	58%
Small Tools and Equipment	33	40	7	21%
Total non-op capex (Gross)	**215**	**342**	**128**	**59%**
Total non-op capex (Net)	**184**	**292**	**108**	**59%**

Note 2020/21 prices.

Non-operational capex is expenditure on new and replacement assets which are non-core system assets, including: non-operational IT systems and equipment; non-operational property such as depots and corporate offices; vehicles and operational fleet; and small tools, equipment, plant, and machinery.

Non-operational IT and Telecoms

We are planning to invest further in our information technology and telecoms services, to renew and modernise our IS infrastructure, including a major migration to SAP S/4 HANA. In doing so, we will embrace the latest cloud computing technology which will enable our consumers to benefit from new value-adding capability in artificial intelligence, machine learning, and advanced analytics. Our plans have been validated with SAP, Gartner and EY and have been shown to be proportionate and deliverable within the proposed timeframes. Further details on our data and digitalisation strategy can be found in Chapter 13 of our plan.

Investing in the security of our information technology and operational technology infrastructure remains high on the agenda for RIIO-ED2. Enhanced DSO capabilities and the increase in availability and importance of data means that we need to ensure continued investment is made to protect all our systems and data from cyber threats. Our plan includes an increase in cyber security costs compared with RIIO-ED1 levels. Further details on our cyber resilience strategy can be found in Appendix 12: Cyber resilience strategy.

Property

Our non-operational property costs consist of capital expenditure on a new logistics warehouse and enhancement of the existing property portfolio. We are re-organising our existing properties to accommodate employees transferring from our Head Office, which we plan to vacate. We are also investing in charging infrastructure at our properties as part of the move to electrifying our vehicle fleet. Our property costs are net of the downward cost pressures arising from the changing role of the office in the wake of the COVID-19 pandemic and the upward effects of the greater capital delivery requirements to facilitate Net Zero over RIIO-ED2.

Chapter 17: Costs and Financial Information continued

Operational vehicle fleet

As part of our Net Zero commitments, we will replace approximately 60% of our existing fleet with electric equivalent vehicles by 2028. While the market prices for electric vehicles are higher than existing internal combustion engine models, anticipated cost reductions over the next five years, clear environmental benefits, and lower running costs underpin the business rationale for this investment in RIIO-ED2. Further details on our Environmental Action Plan and Net Zero commitments can be found in Chapter 11 of our plan.

Network Operating Costs

Figure 66: Network operating costs

Item	RIIO-ED1 Actuals & Forecast	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	%
Faults & ONIs	728	664	-64	-9%
Tree Cutting	81	90	9	11%
Inspections & Maintenance	188	209	22	11%
Smart Metering	41	10	-31	-76%
NOCs Other	33	33	0	0%
Network Operating Costs	**1,071**	**1,006**	**-65**	**-6%**

Note 2020/21 prices.

Network operating costs cover a diverse set of activities, including our emergency response and repair processes, tree cutting and inspection & maintenance activities.

We are forecasting to spend less in this area than we did during RIIO-ED1. We are forecasting these reductions whilst stretching ourselves to deliver more for our customers through higher levels of utilisation and productivity.

Faults, Severe-weather, and Occurrences Not Incentivised (ONIs)

Our emergency response faults function operates 24 hours a day, 7 days a week to ensure customer supply is restored as quickly as possible when there is a fault on the network.

For RIIO-ED2, we have set ourselves a very stretching target. We aim to reduce average expenditure across faults and ONIs by 9% (£64m) when compared with RIIO-ED1. We will achieve this by: optimised resource planning; improved productivity driven by better work management; utilising increased data to better target fault location and further innovation.

Tree Cutting

We have invested in innovative Light Detection and Ranging (LiDAR) technology that has enabled us to improve the effectiveness of tree-cutting. Outside of London, we take a targeted, risk-based approach on the high voltage networks, leading to lower overall expenditure in RIIO-ED1.

We will spend £90m on Tree Cutting. We will manage a steady state position – clearances will remain compliant, subject to consents, across the period. This approach is based on the continued use of LiDAR surveys every two to three years to allow targeting of tree cutting particularly for HV lines and above, and a combination of LiDAR and ground route patrolling for LV lines. Tree cutting will be managed through the deployment of contractors and in-house staff to maintain cutting to ENA Technical Specification 43-8 (horizontal and vertical clearances) and to achieve a more resilient network as required by ENA Technical Recommendation ETR132 (Network Resilience) and the ESQCR.

Our anticipated increase in volumes of activity for RIIO-ED2 will be off-set by improvements in unit cost efficiency as tree-cutting programmes will benefit from economies of scale given the increased volume of activity.

Inspections & maintenance

We inspect and maintain our network to minimise the expected whole life costs of our assets. We have developed an inspection and maintenance policy based upon a combination of real time information and studies of asset condition. This ensures that the life of an asset is maximised by identifying and fixing asset problems before they occur.

The primary investment driver of this programme is to reduce health and safety risk to our employees, contractors and the general public by complying with various acts and regulations. Our plan for RIIO-ED2 includes an increase of 11% on RIIO-ED1 levels of expenditure resulting from new activities such as inspecting cut-outs and carrying out fixed wiring testing at substations, as well as expanding requirements such as the maintenance of forced ventilation systems in tunnels and at Primary and Secondary substations. Our plan includes dedicated funding for the repair of fluid filled cables to continue our commitment for decreasing leakage rates.

This reflects that our overall fluid cable network is extensive and the planned £155m asset replacement programme is only the beginning of a multi-price control period programme.

Smart metering

Given the extension of the smart meter roll-out programme and continued impacts of COVID-19, we have taken a prudent view of these costs. We have taken account of the extended timeline the Government has mandated for smart meter roll-out and Ofgem's Strategy Decision to continue with a volume driver smart metering uncertainty mechanism. Our forecasts are based on the assumption that we will need to intervene only until June 2025, rather than the entire control period. Our forecast represents an overall reduction on an annualised basis of over 70%.

17.4 Indirect cost information

Closely Associated Indirects (CAI)

Figure 67: Closely associated indirect costs

Item	RIIO-ED1 Actuals & Forecast	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	%
Core CAI	1,165	1,240	75	6%
Wayleaves	68	91	24	35%
Operational Training	75	99	24	32%
Vehicles and Transport (CAI)	112	105	-7	-7%
Closely Associated Indirects (Gross)	**1,420**	**1,535**	**115**	**8%**
Closely Associated Indirects (Net)	**1,025**	**1,073**	**48**	**5%**

Note 2020/21 prices.

Closely associated indirect costs are activities that are required to support our operational activities (capital investment and network operating costs). The physical work carried out on the network could not go ahead without the support of indirect activities such as network planning, project management, call centre, control centre, system records and stores. Closely associated indirect costs also includes wayleave payments made to landowners for losses associated with our assets being located on their private land.

The 35% increase in gross wayleaves expenditure reflects continued activity of agents working on behalf of landowners and recognises our desire to be responsive in negotiating claims in a timely and efficient manner.

The 32% increase in operational training expenditure reflects the additional training requirements of the workforce we will require in RIIO-ED2 to deliver increased levels of capex expenditure. In addition, we continue to invest in the skills and capabilities needed to ensure our people can fully exploit the whole suite of tools and techniques we are deploying to deliver excellent customer service, reliability and safety performance at the lowest possible cost to customers.

We will deliver a significant ramp-up in capex, with a less than proportionate increase in closely associated indirect costs. We are able to do this as a result of targeted efficiency improvements.

Chapter 17: Costs and Financial Information continued

Business support

Figure 68: Business support costs

Item	RIIO-ED1 Actuals & Forecast	Final Business Plan	Change between RIIO-ED1 and our Final Business plan	
	£m	£m	£m	%
Core BS	278	310	32	12%
IT & Telecoms (Business Support)	166	209	43	26%
Property Management	78	67	-11	-15%
Total Business Support Costs (Gross)	**522**	**586**	**64**	**12%**
Total Business Support Costs (Net)	**446**	**483**	**36**	**8%**

Note 2020/21 prices.

Business support costs are associated with our corporate functions.

At the outset of RIIO-ED1, we engaged external support to benchmark our business support costs. This work identified a number of cost reductions that were subsequently realised. We continue to seek further operational efficiency improvements. We will do this whilst investing in the people and technologies that are needed to deliver the energy transition at the lowest overall cost to current and future customers.

Our plan includes significant investment in IT & Telecoms, with gross expenditure increasing by 26% on the level seen in RIIO-ED1. The primary drivers behind this increase are investments in cyber resilience and DSO capabilities. Our investment in IT & Telecoms reflects the need for greater automation and digitalisation, to enable us to respond to the evolving needs of our consumers, external stakeholders and employees. As our digital and IT related capabilities expand, we need to ensure our cyber security remains comprehensive and reflective of the increased dependency we and our customers place on continuity of supply.

17.5 Access and charging reforms

Ofgem has asked us to provide a forecast of the potential impact of its 'minded to' decision on Access and Charging reforms. We have been asked to provide this forecast separately to the main Business Plan.

This section sets out our 'Best View' and 'High Case' forecasts of the potential impact of Ofgem's Access and Charging reforms, based on the information currently available to us.

Our assessment considers five impacts:

- **Reduction in customer contributions** – Under Ofgem's 'minded to' proposals, newly connecting demand customers will no longer contribute to reinforcement costs, and generation customers will only have to contribute to reinforcement at the voltage level of their connection. In other words, customer contributions will be lower. Connection costs that would have been paid by connectees under the existing rules will now be borne by all network users (through distribution use of system charges). Thus, we are forecasting the removal of the bulk of customer contributions from our "inside price control" connections forecast.

  We have high confidence in this forecast impact should the Access and Charging reforms be enacted, given the anticipated level of connections activity.

- **Additional reinforcement spend to provide firm connections** – We expect some generation customers who currently have a "non-firm" connection (which allows us to interrupt their activities when there are network constraints) to request reinforcement, to minimise the risk that they will be prevented from operating as they wish. The costs of this reinforcement will be borne by all network users and not just the connectees.

  We have low confidence in the level of these costs. At this point in time; it is neither clear how many schemes will request reinforcement, nor the timing and potential costs of these reinforcements. Our estimate of costs is indicative, based on an initial analysis of the costs of reinforcing the currently operating Active Network Management schemes on our networks.

- **Additional connections activity** – Ofgem's 'minded to' proposals would reduce the level of up-front costs for new connections. We anticipate that this will result in more connections requests.

  We expect that the level of connections activity will increase, however the magnitude and timing of this increase is unclear.

- **Displacement of RIIO-ED1 activity into RIIO-ED2** – Ofgem have currently stated that their 'final decision' would take effect from 1 April 2023. From this date, connectees would pay lower upfront costs, should the 'minded to' proposals be enacted. We expect that some connectees will respond to this change by delaying works until after 31 March 2023. This will have the effect of moving connection activity from RIIO-ED1 (when connectees will contribute to reinforcement) into RIIO-ED2 (when their contributions will cease, or become lower).

  Whilst it is realistic to expect that this will occur, individual connections customers will have their own priorities and wider project timelines to consider. Given these factors, we have low confidence in the overall size of this potential movement.

- **New contractual payments** – Under the proposed new arrangements, DNOs will be required to compensate connectees if the levels of availability fall outside agreed tolerances. This is an area of reform which needs further development.

  At this stage, there is considerable uncertainty about how these costs will be calculated and levied. In order to provide an estimate, we have formed a high-level view based on an initial desktop assessment of the costs that could be required to compensate current Active Network Management schemes and those in our connections pipeline for an estimated period of time until they are made firm.

Figure 69 sets out our view of the potential costs of the above areas over the five years of RIIO-ED2.

Figure 69: Impact of Access 'minded to' decision

Area	Forecast costs (£'m)	
	Best view	High case
Reduction in customer contributions	160	160
Additional reinforcement spend to provide firm connections		150
Additional connections activity		20
Displacement of RIIO-ED1 activity into RIIO-ED2		20
New contractual payments		30
Total	160	380

Implementation of Ofgem's 'minded to' decision will have an impact on customer bills, although this impact is relatively limited. Ignoring the impact of the 'minded to' position, we were expecting average bills across our regions to fall by 15% in our base case and by 12% in our high case. The implementation of the 'minded to' decision would limit the bill decreases slightly. For the base case, average bills fall by the same amount of 15% and by 10% in the High Case.

17.6 Financial Information

Introduction

It is vital that we can attract the necessary debt and equity funding. This requires that:

- Our allowed cost of debt is set at a level that remunerates both efficiently incurred embedded and new debt.
- Our allowed cost of equity is set at a sufficient level to attract the necessary investment and compensates investors for the risks they are bearing.

The table below sets out Ofgem's working assumptions for the cost of capital for RIIO-ED2. Ofgem propose that both the cost of debt and the cost of equity are subject to indexation mechanisms over the RIIO-ED2 period. The values shown in the table, for both of these parameters, reflect the forecast average value over the period 2023/24 to 2027/28.

Parameter (RIIO-ED2 average)	Value
Cost of equity (RIIO-ED2 average)	4.65%
Expected outperformance	0.25%
Allowed cost of equity	4.40%
Cost of debt (RIIO-ED2 average)	2.09%
Gearing	60%
Allowed cost of capital	3.01%
Cost of capital for financeability purposes	3.11%

Our view on the appropriate cost of debt and cost of equity

In line with Ofgem's business plan guidelines, we have adopted Ofgem's working assumptions when assessing financeability. However, we do not consider that Ofgem's working assumptions properly reflect our cost of capital. Appendices 25b, 25c and 25f set out our views on our cost of debt and on our cost of equity together with supporting evidence. In summary:

- We remain of the view that the cost of equity that Ofgem has determined is too low. In particular, we believe that the proposed cost of equity does not adequately reflect the change in risk facing electricity DNOs from both the uncertainty associated with the low carbon transition and the impact of new roles such as the Distribution System Operator. We also agree with the CMA (in its determination for the gas distribution and transmission company appeals) that the application of an outperformance wedge is inappropriate.
- We believe that Ofgem should calibrate the RIIO-ED2 cost of debt index to provide similar levels of headroom to that provided to the gas distribution and transmission sectors. We also believe that Ofgem has underestimated the additional costs of borrowing and in particular the new issuance premium.

Chapter 17: Costs and Financial Information continued

Moreover, Ofgem has asked us to assume that licenced networks will have 25% index linked debt. Our analysis of the sector's index linked debt (excluding derivatives) is that the actual percentage is 10%. In our view if the cost of debt is set relative to the sector's average debt costs then the notional capital structure should more accurately reflect the actual level of index linked debt in the sector.

Assessing financeability

The majority of our investment in the network is added to Regulated Asset Value (RAV) and then recovered from customers over the life of the asset. This approach requires us to fund the investment upfront. It is vital that the revenues Ofgem allow are sufficient to cover both the interest payments to our debt holders and dividend payments to our shareholders. Ofgem have a duty to ensure that an efficient company can finance its functions and UK Power Networks has a duty to ensure that it maintains an investment grade credit rating.

Consequently, the choice of target credit rating is key to overall financial resilience. The lowest investment grade rating is BBB-/Baa3. Historically, regulators have targeted a strong investment grade credit rating, typically BBB+/Baa1, to ensure that companies had sufficient financial headroom to cope with a range of possible financial downsides. This target credit rating is in line with values from previous price controls and we believe it remains the appropriate level to target to ensure that sufficient future financial resilience is maintained.

We are rated by both Moody's and Standard and Poor's (S&P). Figure 70 sets out the rating thresholds for the key credit metrics for both rating agencies in relation to both Baa1/BBB+ and Baa2/BBB rating. Additionally, we have a pension trustee covenant that requires us to maintain Debt/RAV below 75%.

Figure 70: Rating agency key credit metric thresholds

Rating agency	Credit metric	Baa1/ BBB+ threshold	Baa2/BBB threshold
Moody's	Adjusted Interest Cover Ratio (Adjusted ICR)	>=1.4x	>=1.2x
	Net debt/RAV	<=75%	<=85%
Standard and Poors	FFO/net debt	>=9%	>=6%

We have undertaken financeability analysis for both the notional company and actual company financial structures. In line with the Ofgem guidance the notional company gearing level is set at 60%. The additional key modelling assumptions and the output from our modelling are set out in Appendix 25a: Financial Information.

In summary:

- For the notional company, all of the key credit metrics are in line with a Baa1/BBB+ rating agency thresholds over the RIIO-ED2 period. However, in the case of Moody's Adjusted Interest Cover Ratio (AICR) there is minimal headroom to absorb any downside shocks for any of our separate DNO entities.
- For the actual capital structure, the weakest ratio is also the AICR. While on average over RIIO-ED2 this is broadly in line with the Baa2 rating, it weakens significantly towards the end of the period.

Stress testing the RIIO-ED2 settlement

Ofgem requires each network company to have a robust financial plan over the RIIO-ED2 period that is stress-tested and proven to be financeable under a range of future outcomes. The prescribed stress tests are shown below.

Ofgem stress tests		
1.	High interest rates	(+1%)
2.	Low interest rates	(-1%)
3.	High inflation	(+1%)
4.	Low inflation	(-1%)
5.	High CPIH-RPI divergence	(+0.5%)
6.	Low CPIH-RPI divergence	(-0.5%)
7.	High ILD proportion	(+5%)
8.	Low ILD proportion	(-5%)
9.	Totex outperformance	(+10%)
10.	Totex underperformance	(-10%)
11.	Zero RoRE outperformance	
12.	RoRE outperformance	(+2%)
13.	RoRE underperformance	(-2%)

In the financial information appendix (Appendix 25a: Financial Information) we have included the results of all of the stress tests.

For the notional company, under the majority of scenarios, the credit metrics remain broadly in line with the Baa1/BBB+ thresholds. However:

- Under the RoRE underperformance scenarios the Moody's AICR ratio drops to Baa3 levels, and under this scenario management action would be required to maintain an investment grade credit rating.
- The zero outperformance scenario demonstrates that the Ofgem assumption on the outperformance wedge is essential to achieve an AICR at the BBB+/Baa1 level[2].

1 A more detailed breakdown of credit metric analysis and associated financial projections can be found in Appendix 25a: Financial information.
2 Ofgem's assertion that it would true up a company who did not earn the expected outperformance wedge in RIIO-ED3 is irrelevant for financeability analysis as the ratings agencies will not consider that as part of their financeability assessment. We remain of the opinion that financeability assessment should be undertaken based on the allowed cost of capital not Ofgem's expected cost of capital.

For the actual company structure, and in common with the notional company, the most onerous stress tests are RoRE underperformance, totex overspend and zero outperformance. As with the notional company, the most onerous condition is the RoRE underperformance scenario, where the AICR ratio again falls to Baa3 (the lowest investment grade credit rating) levels before management intervention.

In addition to the stress tests that Ofgem require, we have also tested our financeability against the scenario where the take-up of LCT requires the maximum possible use of the relevant uncertainty mechanisms. The results of this additional stress test are set out below:

High investment case (max use of uncertainty mechanisms)

Average RIIO-ED2	AICR			Net debt to RAV (Moodys)			FFO to net debt			Net Debt to RAV		
	EPN	LPN	SPN	EPN	LPN	SPN	EPN	LPN	SPN	EPN	LPN	SPN
Notional company	1.38x	1.40x	1.39x	63.2%	63.1%	63.1%	11.2%	11.2%	11.4%	63.2%	63.1%	63.1%
Actual company	1.35x	1.26x	1.37x	72.8%	72.9%	74.6%	10.1%	9.1%	10.2%	71.0%	72.7%	70.1%

At the notional company level, the AICR is at the bottom end or marginally below Baa1 level across our three licenced networks. This issue would be addressed if the cost of equity was set at a level in line with our view of an appropriate cost of equity. This scenario further reinforces the point that the cost of equity must be set at a level which can attract the necessary investment into the sector to deliver Net Zero under all credible scenarios.

The negative impact of this additional stress test also highlights the importance of minimising the impact of the uncertainty mechanisms on our cash flow. Where uncertainty mechanisms involve regulatory oversight, we are keen for Ofgem to ensure that the process of approving uncertainty mechanisms is as streamlined as possible and takes no longer than a year. For the same reason, we are keen that uncertainty mechanisms can utilise forecasts revenue drivers, rather than waiting to use outturn data.

We have identified a range of actions that management can take to improve the credit metrics, these include:

- Issuing more index linked debt: The accretion associated with index linked debt is excluded from the AICR calculation. However, it is more expensive to issue index linked debt compared to fixed rate debt which negates some of the benefit.
- Taking a dividend holiday: This is a short term solution as a prolonged period without cash dividends will increase the equity risk perception in the sector and ultimately the cost of capital.
- Making an equity injection: Our equity issuance policy is set out below, but in summary we regard this as a last resort intervention.
- Liability management: This will improve the AICR but will worsen the net debt to RAV ratio as existing debt holders require a premium to sell existing high interest rate coupon debt.

In the advent of a downside scenario, we would seek to deploy the most cost-effective mix of solutions to ensure that an investment grade rating can be maintained and our analysis, detailed in Appendix 25a: Financial Information, shows that this can be achieved.

For the avoidance of doubt, we do not regard changes in depreciation periods or capitalisation rates as acceptable solutions to financeability issues. The credit rating agencies do not regard either approach as a valid financeability lever and we note that the CMA came to a similar view in the recent PR19 determination.

RIIO-ED2 dividend policy

Since our inception in 2010, our shareholders have operated a flexible dividend policy which adjusts the dividend in light of external factors and/or business performance. An example of this was in 2020/21, when in response to the impacts of the COVID-19 pandemic the company reduced its dividend from its regulated businesses by 44% (£125m) compared to 2019/20.

In determining the level of dividend to pay, the Board considers the following factors:

- Maintaining our investment grade credit rating including raising external borrowings at an appropriate credit rating.
- Availability of resources for operating in the coming 12 months.
- Planned and committed capital investment.
- The required return by shareholders.

We do not expect our RIIO-ED2 dividend policy to deviate from that followed in RIIO-ED1.

Chapter 17: Costs and Financial Information continued

RIIO-ED2 equity issuance policy

As there is a cost to customers in raising additional equity this option is only considered when alternative means of funding are considered inappropriate. Other options include management of annual cashflows and restricting dividends where appropriate.

Our licence requires us to annually inform our Ultimate Controller of its obligations to the company. Under this obligation, if equity investment is required then we would request this from our Ultimate Controller including the cost of raising equity for investment.

The regulatory cost allowance for issuing equity in RIIO-ED1 is 5% and Ofgem propose to retain that value in RIIO-ED2. We do not propose any alternative values but will continue to review market evidence up to RIIO-ED2 Final Determinations in late 2022.

Regulatory depreciation and capitalisation rates

The regulatory depreciation period for our network assets is set at 45 years, for assets installed during RIIO-ED2. The RIIO-ED2 Challenge Group had raised the option of increasing the regulatory depreciation period. We do not think this is appropriate as it would move more of the cost of delivering the Net Zero transition onto future customers. This is an area that will require future review, as companies move towards installing more shorter life information technology based assets, to ensure that there is a fair allocation of costs between current and future customers. Regulatory capitalisation has been set at 69% reflecting the balance between capital and operating expenditure. This rate is marginally higher than the 68% utilised in RIIO-ED1. Ofgem asked whether there is a need to modify our capitalisation or depreciation policies to address financeability concerns. As we have stated above the credit rating agencies do not regard either approach as valid financeability levers and therefore we have not engaged with customers and stakeholders on our capitalisation and depreciation policies.

Board assurance

As set out in Chapter 4: Business Plan Assurance our Board has assured itself that our plan is financeable under both the notional and actual financial structure.

Bill impact

Affordability has always been a key issue for customers and its importance has been underlined as a consequence of the COVID-19 pandemic. That said, our customers have told us the environment is a priority for them, and thus facilitating the delivery of Net Zero is a key focus for us in RIIO-ED2. We believe that our plan supports the delivery of Net Zero at the lowest possible cost to our customers.

The level of average domestic bills depends on the extent to which uncertainty mechanisms are used to provide capacity for and respond to the uptake in LCTs and to cater for new demand. In addition it will also depend on the impact of the Significant Code Review. If the uncertainty mechanisms are not used, the average domestic bill across our licence area decreases by an average of 15% compared to the average RIIO-ED1 domestic bill. If our assessment of the impact of the Significant Code Review materialises then the bill reduction would reduce marginally.

In our high investment case the average domestic bill across our licence is 12% lower than the average RIIO-ED1 domestic bill excluding the impact of the Significant Code Review or 10% if it is included. The tables below set out the average domestic bill comparison between RIIO-ED1 and RIIO-ED2, at both the licence network and UK Power Networks level, for both our ex-ante plan and our high investment case scenario.

Figure 71: Comparison of average RIIO-ED2 domestic customer bill with the average RIIO-ED1 average bill

Ex-ante plan

£ (20/21 prices)	Average RIIO-ED1	Ex-ante incl SCR (Average RIIO-ED2)	% movement	Ex-ante excl SCR (Average RIIO-ED2)	% movement
	£m	£m			
EPN	94	82	-12%	82	-13%
LPN	76	59	-22%	59	-23%
SPN	108	94	-13%	94	-13%
UKPN	93	79	-15%	79	-15%

High investment case

£ (20/21 prices)	Average RIIO-ED1	High case incl SCR (Average RIIO-ED2)	% movement	High case excl SCR (Average RIIO-ED2)	% movement
	£m	£m			
EPN	94	87	-8%	85	-10%
LPN	76	62	-18%	61	-20%
SPN	108	99	-8%	98	-9%
UKPN	93	83	-10%	82	-12%

This Report has been printed in the UK. Our printers are a Carbon / Neutral® printing company. They are FSC®-certified and ISO 14001-accredited and Forest Stewardship Council® (FSC®) chain of custody-certified. This paper is recycled and acid-free.

UK Power Networks
Delivering your electricity

RIIO-ED2 Business Plan 2023 – 2028