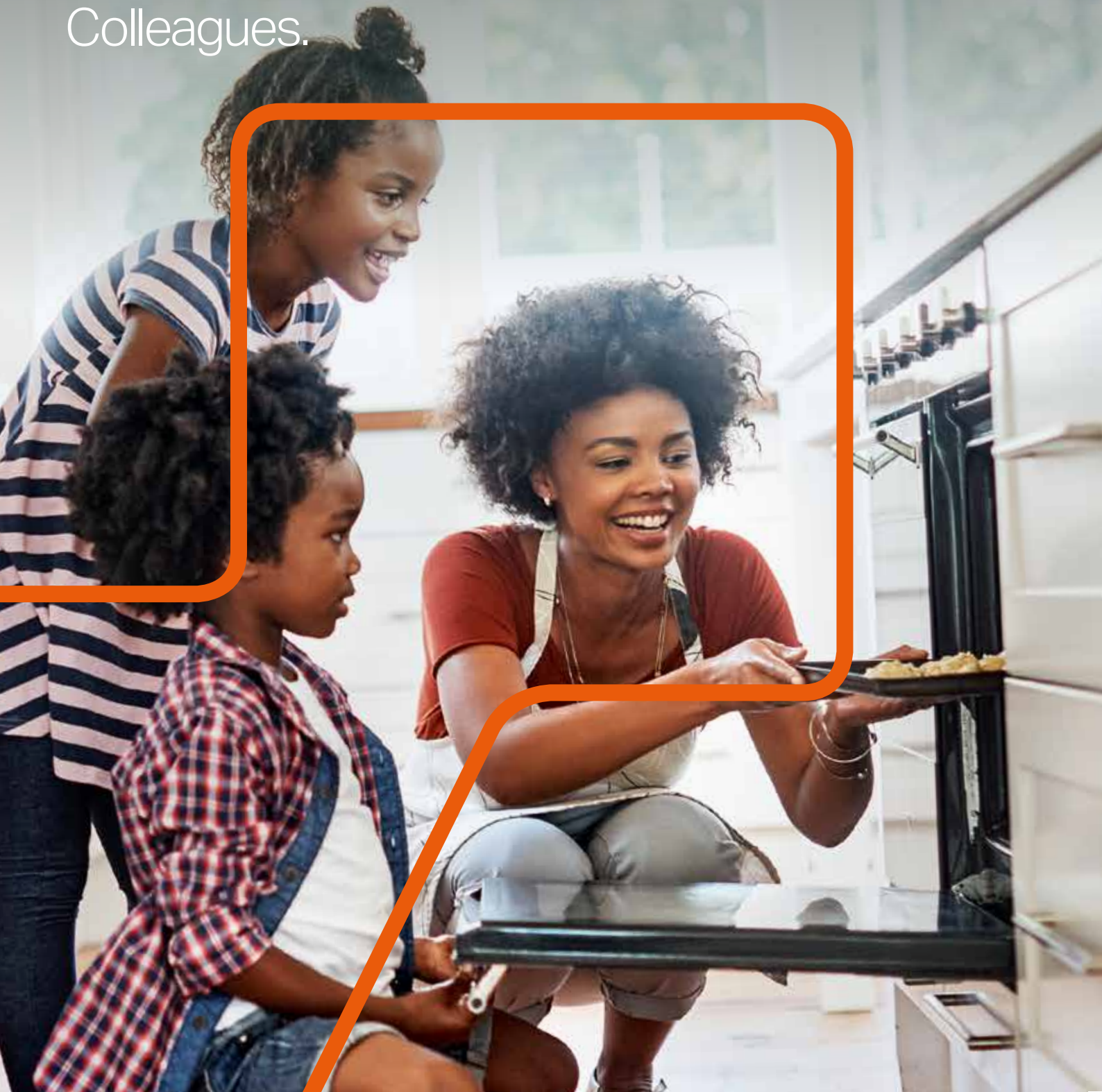
Cadent
Your Gas Network

Transforming experiences

Customers. Communities. Colleagues.

Our Plan for 2021-2026
December 2019



We are Cadent.
Your gas network.

A Plan which has been built on insight from the **most tailored and extensive customer and stakeholder engagement process** we have ever undertaken

A Plan which has innovation running through it with **a refreshed innovation strategy and competition plan** which leverages the skills and capabilities of our employees, our supply chain partners and ideas from multiple industries

Our most stretching and tailored output commitments ever

A Plan which builds **trust that we are acting in the best interests of our communities** and embracing **whole system thinking**

An Environmental Action Plan which **demonstrates our leadership on tackling climate change** by innovating and driving momentum to create pathways to decarbonisation

A Plan which focuses on **improving the experience for all our customers,** including targeted support through our vulnerability strategy

A Plan which maintains the **outstanding levels of safety and reliability** that our customers rely on

A Plan underpinned by a **cultural and operational transformation** designed around delivering for all our customers and creating an environment for our employees to thrive and be proud of the service they deliver

A Plan with value at its heart, delivering improved outputs, over £500m of cost savings and at least a 10% real reduction in annual customer bills to less than £120 (33p per day)

1 Finding key information

Navigating our Plan – How we have addressed Ofgem's requirements

Appendix 01.00 provides a mapping between the contents of our plan and Ofgem's requirements. In the table below, we outline how each chapter in the plan maps to Ofgem requirement areas.

Contents

Ofgem requirement area	Addressed in
Track record	Chapter 4
Business plan commitment	Chapter 2, 12
Giving consumers a stronger voice	Chapter 5
Meeting the needs of consumers and network users	Chapter 7
Modernising energy data	Chapter 7
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Managing uncertainty	Chapter 6, 10
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A consistent view of the future	Chapter 6, 9
Cost information	Chapter 9
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Ofgem requirements including on the presentation and structure of Plans	Appendix 01.00
Consumer value proposition	Chapter 7
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Vulnerable Customer Strategy	Chapter 7
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Cyber Security Plan	Chapter 7, 9
IT Security Plan	Chapter 7, 9
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2 Executive summary

This chapter summarises our ambitious plan to meet the priorities of, and transform experiences for, our customers, colleagues and stakeholders, and the communities we serve.

We have set out a Plan which:

- Keeps the energy flowing to 11 million homes and businesses safely and reliably through targeted investment and operational management of the gas network
- Will deliver enhanced experiences for all our customers with a specific strategy to support customers in vulnerable situations
- Facilitates the urgent actions to tackle the UK's Net Zero climate change ambition by creating a pathway to clean gas
- Delivers a Consumer Value Proposition with an estimated net social value of £537m for RIIO-2
- Delivers a real bill reduction of over 10% for an average customer to less than £120 p.a. underpinned by over £500m of efficiencies
- Improves services for less than 33p per day (per customer)

Steve Fraser
Chief Executive Officer

Executive summary

Transforming experiences for Customers, Communities and Colleagues

A new company with an essential role

We are now a standalone gas distribution business with new ownership and a brand-new identity. We are excited about the opportunity to significantly **transform and refocus** the long history of custom and practice to deliver more for our customers, communities, colleagues and other stakeholders. Our new shareholders and our Board bring a wealth of experience from wide-ranging business sectors and businesses from around the world.

Society's expectations of energy companies are constantly increasing. We are the largest gas distribution company in the UK and we relish our role in **providing an essential service** that keeps the energy flowing to over 11 million homes, offices and businesses from the Lake District to London and from the Welsh Borders to the East Coast. We help to keep society and our customers safe and warm. The key role that the gas network plays should not be underestimated, with **over 80% of UK homes relying on gas for heating** as well as large UK manufacturers, businesses and commerce all reliant on gas to fuel their operations. At peak times the gas network supplies over **four times more energy than the electricity network.**

It is critical that we address the urgent challenges of climate change action to deliver Net Zero emissions for the benefit of current and future consumers. The scale of investment and change needed to deliver this in an affordable, secure and sustainable way should not be understated. It is important that government, regulators and businesses strike the appropriate balance between delivering the critical long-term needs for future consumers with affordability for existing consumers. The need to stimulate and incentivise the necessary investment and commitment in both public and private sectors will be critical to delivery.

Against this backdrop, we want to continue our leading role in driving and shaping practical ways to deliver clean gas to address the UK's Net Zero emissions climate change ambition. We have been at the forefront of developing practical pathways for clean gases such as biomethane, BioSNG and hydrogen through landmark innovation projects, working closely with our industry colleagues. We want to continue to invest in making this a reality as soon as possible, given the urgency for action on climate change and the wider societal benefits this will bring. We have set out how we will continue to facilitate and support clean gas resources to connect our networks. We have also set out how we plan to support Ofgem and national and local government in moving to Net Zero.

This ambition includes finding a solution to progressing with pioneering new projects such as HyNet where we are part of a consortium of different commercial, academic and entrepreneurial organisations working together. This will create and deliver a clean gas pathway using hydrogen, in order to decarbonise the North West region by the end of the next decade. This will create 5000 local jobs and stimulate industry whilst delivering significant carbon savings (1m tonnes) at a low cost, compared to alternatives.

Our new vision and a cultural and operational transformation

We have a new vision to **set standards that all of our customers love and others aspire to.** We appreciate the scale of the journey we must undertake to deliver this ambition. Our work to benchmark our current performance tells us we have **significant improvements to make**, both on cost, and on the quality and consistency of our services across our customer and stakeholder base. We want customers to feel the change that this will bring; that we are committed to understanding their needs and being courageous in changing our processes to make their lives easier. We will develop a real sense of community both within Cadent and with the regions that we serve by working more closely with them. We want to be **a company that is known for its forward thinking and leadership,** especially in rising to meet the challenges of a Net Zero emissions country, and one that delivers for all of its customers particularly those in vulnerable situations. A company that recognises that **without gas all of our customers can be vulnerable.**

Our plan for 2021-2026 is an important step on this journey. It will start to transform experiences and set stretching ambitions for the outputs we will deliver for our customers, whilst keeping a clear focus on managing affordability through reducing bills in real terms over the period.

"Efficient costs driving at least a 10% reduction in customer bills to less than £120 p.a. delivering a safe and reliable supply for less than 33p per day for customers, communities and colleagues."

"Enhanced services to make a real difference to customers in vulnerable situations driving a social value of £537m."

"Creating practical solutions to deliver clean gas to meet the UK's Net Zero emissions challenge."

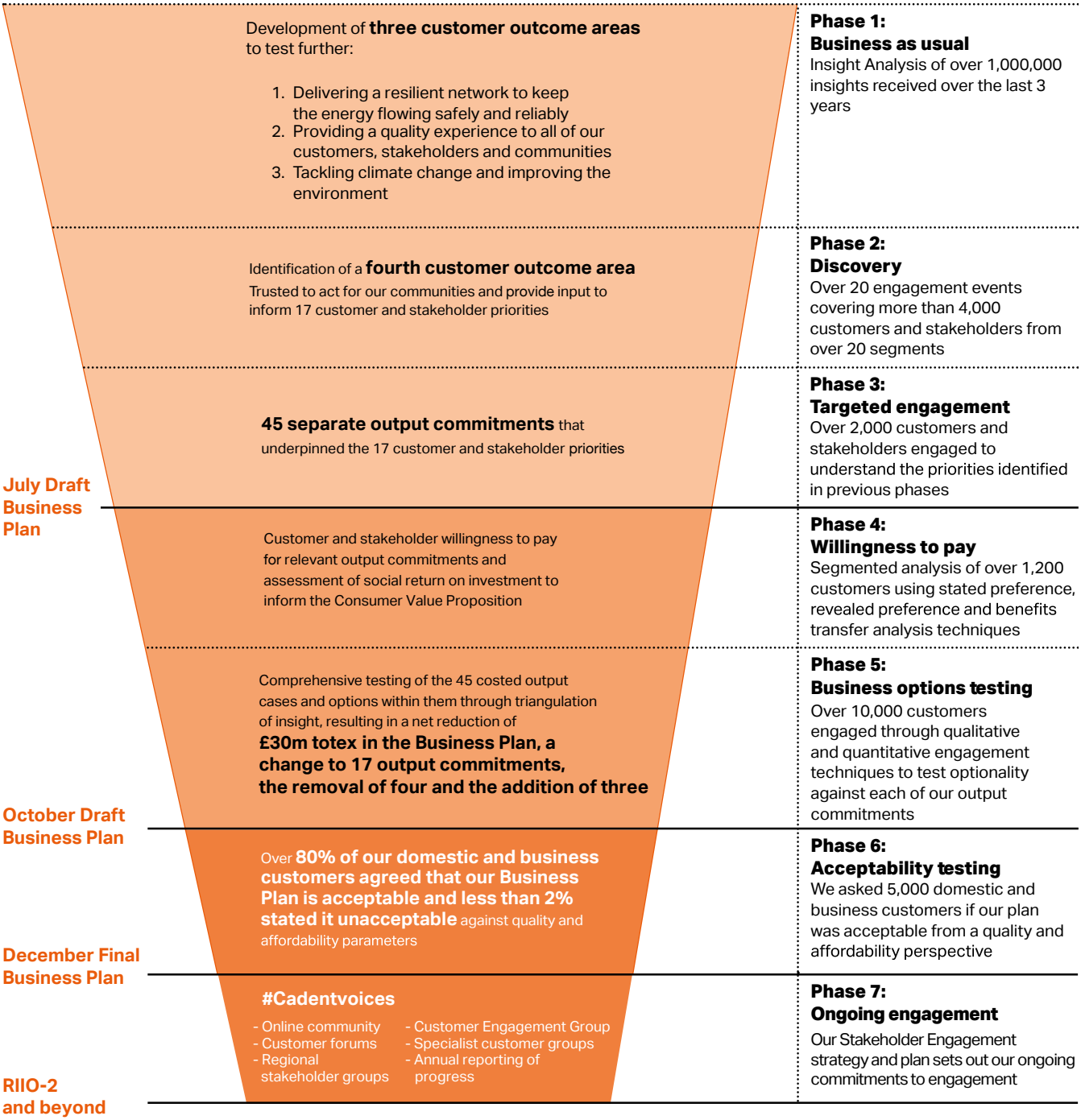
Executive summary continued

Our plans are built on our most tailored and extensive engagement process ever

Under our new ownership, we have undertaken an **unprecedented level of engagement** with our customers and stakeholders across our regions to understand their priorities and we are using this insight to develop a business, and a Plan, which will deliver on their priorities. Our comprehensive seven-stage process has used a variety of techniques and methods to gather and assess insight and test that our plans deliver what our customers desire. We have also established a **highly skilled, independent Customer Engagement Group** to challenge us on the ambition of our plans and bring experience from different sectors into our thinking. This group has set a high bar on its expectations for our plans, consistent with our and our Board's desire to transform our service.

We have followed a structured research and engagement programme to understand the needs and expectations of our customers and stakeholders to build these into our Plan.

Figure 02.01 Structured research and engagement programme



Transforming experiences

Customers. Communities. Colleagues.

Our gas network plays a critical role in delivering affordable, safe and reliable heating to over 80% of domestic homes and fuelling major industry, businesses, schools and hospitals in England. We will be at the forefront of shaping and delivering the road to Net Zero emissions through facilitating clean gas and demonstrating a hydrogen pathway for our current and future customers.

Keeping the energy flowing safely and reliably

99.9%
Reliability keeping customers on gas

1,705km
Of old metallic mains replaced each year – a distance greater than John O'Groats to Land's End

35mins
World-class emergency response service with average arrival time of 35 minutes

>£500m
Cost efficiency savings for customers embedded in our Plan

A quality experience for all our customers and stakeholders

60%
Reduction in time interrupted for customers in multi-occupancy buildings

36,500
Interventions to support households in fuel poverty

2m
Direct conversations to raise awareness of the Priority Services Register

3m
Alarms issued and 200k customers educated on the dangers of carbon monoxide

Tackling climate change and improving the environment

14-17%
Reduction in leakage from our network

Road to Net Zero

~~CO_2~~
Carbon neutral in other operations by 2026 with zero emissions emergency response vehicles across our regions

HyNet
Innovation to decarbonise the North West with hydrogen

Clean gas
Enabling network capacity for greener resources

Trusted to act for our communities

£6m p.a.
>1% post-tax profit invested back into our communities through our charitable foundation – c. £6m p.a.

>10%
Saving p.a. in customer bills in real terms (excluding inflation)

£537m
Net social value delivered for our communities through our Consumer Value Proposition

60%
Of colleagues giving back to our communities through volunteering

Continuous engagement with our stakeholders and customers across all of our regions through **#Cadentvoices and multiple channels**

Executive summary continued

The outcomes we need to deliver in RIIO-2

Based on our insight and engagement we have set out our plans to deliver **four key outcomes** for our customers over RIIO-2 and beyond.

Providing a resilient network to keep the energy flowing

Our purpose is to keep the energy flowing to enable people to run their daily lives and keep safe and warm, keep industry functioning and support businesses and the economy. Our customers expect us to **maintain the exceptional levels of performance in safety and reliability** that we deliver today. This is against a backdrop of aged metallic assets which need to be replaced and supporting a network capable of delivering a hydrogen future. We are driving improvements in asset health that are required to keep the energy flowing safely and reliably whilst keeping investment at an affordable level.

Highlights from our plan commitments:

- Replacing 1,705km annually of old and higher risk iron and steel pipes **(a length greater than than the distance between John O'Groats and Land's End)** to meet our statutory obligations and additionally, reduce leakage of gas and prepare the network for transportation of hydrogen as part of the decarbonisation demands of society.
- An asset health programme to continue to deliver 99.9% reliability by managing an ageing network by interventions to keep overall risk levels from rising over RIIO-2. This includes proactive interventions which will see us **improve the asset health of high rise buildings.**
- Our **world class emergency service** delivering a 24/7 call centre and emergency response to public reported escapes
- A comprehensive Business IT Security Plan and a Cyber Resilience Plan to protect our physical and data assets and manage external threats.
- We detail in our plans our Data Strategy to provide improved and resilient data for the future and to modernise energy data through digitalisation.

Tackling climate change and improving the environment

Gas plays a critical role in heat and electricity sectors as well as an increasing role in heavy goods transport. We recognise that as we transport a fossil fuel, **the gas network will play a key role in supporting the energy transition** in the most secure, affordable and sustainable way. We will continue to play a leading role in creating the vision of the pathways to the energy systems transition through our **pioneering innovation projects.** It is a critical **time to maintain momentum, demonstrating practical pathways** for all regions of the UK and we are supporting policy makers and Ofgem in delivering this. Our gas network can play a pivotal role in facilitating a lower carbon future for heat and transport by **the use of clean gas such as hydrogen** and by **facilitating renewable resources** onto the network. We will also explore and develop the operational requirements and the commercial and regulatory frameworks that will need to underpin this decarbonisation pathway.

Our **Environmental Action Plan commits** to:

- Preparing to deliver clean gas at scale through the **HyNet North West project** following direction from government which will create **5,000 jobs and save 1 million tonnes of CO_2 p.a.**
- support customers on the clean gas transition, demonstrating the potential for the **transportation of a hydrogen blend of gas** through our HyDeploy and HyDeploy 2 projects and creating a commercial framework for how this could work in practice.
- Providing **flexible capacity on the network** to facilitate the connection of new clean gas resources such as biomethane plants, compressed natural gas filling stations and power stations.
- Creating a commercial regime to enable firm connection dates and maximum capacity for new clean gas resources by leading a charging and access review.

We will **reduce our own carbon footprint** and reduce our wider environmental footprint by:

- Becoming a **carbon neutral business by 2026 with zero avoidable waste to landfill.**
- Continuing to drive down leakage of methane from our networks (targeting between **14% to 17% by 2026**).
- Tackling the theft of gas through reshaped incentives with the aim of recovering £8m (creating more value to be returned to customers).
- Supporting our employees to reduce 5,000 tonnes from their carbon footprint.
- **Introducing zero emissions emergency response vehicles** across our networks.

Delivering a quality experience for all of our customers and stakeholders

Our customer strategy goes well beyond consolidating the customer satisfaction and complaints handling improvements we have made in the last two years. We are striving to identify and understand the needs of all of our customers and stakeholders better, and seek to add additional value by establishing benchmarks and improving their experiences of working with us. Our aim is to create accessible and inclusive services for all.

Our plan highlights:
- Establishing new benchmarks, improving and measuring **all our customer and stakeholder experiences.**
- Delivering a **step-change in the quality of our connections service.**
- Transforming our service for customers living in multi-occupancy buildings ('MOBs') including **reducing interruption times by 60%.**
- Providing **better roadworks information and communication** of progress of works.
- Coordinating with other utilities in planning works, **seeking to reduce congestion** due to roadworks and building on the use of robotics such as CISBOT in urban centres to reduce the need for excavations.

Our teams are passionate about meeting the needs of customers in vulnerable situations and we have set out a **multi-faceted Customer Vulnerability Strategy** around a goal of helping **keep all of our customers safe, warm and independent in their homes** and an ambition to never leave a customer vulnerable without gas.

This includes:
- **Two million conversations and over 80 strategic partnerships** to raise awareness of the Priority Services Register and help identify individual needs.
- Going beyond our traditional boundaries to create partnerships to **enable services beyond the boundary of our network** and linking to the support mechanisms available.
- Scaling up our carbon monoxide awareness initiatives, **partnering with every fire service and NHS service** in our footprint, distributing **three million CO alarms and educating 200,000 children** through our Safety Seymour education programme.
- **36,500 interventions to support households in fuel poverty** and pioneering a new funding approach to how we address fuel poverty in England.

Trusted to act for our communities

Through our engagement insight, we have identified a further outcome area that goes beyond the requirements set out by Ofgem that relates to building trust in how we operate, making a real and sustainable difference to the communities we support and demonstrating fairness in our approach. This is at the top of a customer's hierarchy of needs. For example, we will go beyond our traditional boundaries and embrace the **need for a wider social responsibility** that delivers **more sustainable outcomes** for all through collaboration and innovation. In addition, we will be transparent in our operational and financial performance.

Highlights from our newly established **Trust Charter** include:
- Through our **charitable foundation**, we will **invest over 1% of our post-tax profits (c.£6m p.a.)** to offer support to the communities we serve, focusing on protecting customers in the most vulnerable situations and addressing environmental challenges. This will be underpinned by ongoing stakeholder engagement and our public Safety & Sustainability Strategy.
- A **detailed ongoing stakeholder engagement plan** using a range of channels to continue to share progress against our plans. These include an ongoing role for an independent Customer Engagement Group, an ongoing online forum, enduring regional stakeholder engagement groups across each of our networks and dedicated customer groups on multi-occupancy buildings, new gas connectees and our internal customer insights group.

Whole System Solutions

Across all of the four customer outcome areas and through our investment plan we have taken a whole system solution approach and looked to deliver the best outcomes for customers and stakeholders wider than just the gas network. We have made some specific commitments to:
- Develop joint planning offices with electricity networks to support regional authorities on their energy plans.
- Optimise capacity between transmission and distribution including use of flexible capacity.
- Enhance engagement on whole system thinking.

Executive summary continued

Pushing the boundaries on efficiency

We are setting our toughest challenge ever on efficiency and are putting forward a transformational plan which will deliver **over £500m of efficiencies** over the eight-year period (from the cost of service in Cadent's first year of operation in 2017/18 to the end of the RIIO-2 period in 2026). This equates to a saving of c.**£100m p.a. in RIIO-2.** We have already made progress on this journey with significant efficiencies generated in the first two years of our life as a separate business and our Plan takes us much further through the remainder of RIIO-1 and further still in RIIO-2. This should take us to the frontier benchmark. Our standalone RIIO-2 efficiencies represent a **0.94% p.a ongoing efficiency**, ahead of Bank of England estimates of total productivity factor and the RIIO-1 benchmarks. We have benchmarked our plans against industry costs and other external costs. Based on our assessment, our plan is **2.2% ahead of our forecast of an upper quartile efficient level** over the RIIO-2 period.

Our Plan and efficiencies are also underpinned by a **clear and ambitious innovation strategy** which builds on the learning from RIIO-1 and the creation of business as usual innovation through our performance excellence programme. We will continue our landmark innovation projects to support policy makers in solving the UK climate change challenges at the lowest cost and disruption for future consumers. We will also continue to drive innovations which reduce disruption and congestion on our streets as well as embrace the benefits of machine learning and satellite technology to protect our assets.

We are using **competitive processes to drive the best contracting and procurement approaches** and delivery mechanisms for our services. Having identified a lack of competition in the Tier 1 contracting market, our plans look to reach into the Tier 2 market (smaller, more locally based suppliers) to stimulate more activity and maximise competitive pressures in our major expenditure areas of mains replacement and capital investment work to drive value. We will also continue to build on the successes we have made in **facilitating competition in the connection market,** particularly with enabling third parties to construct and self-lay connections for new resources such as biomethane plants and compressed natural gas fillings stations. In addition, we have reviewed all of our work types to assess the extent of competition already present and what further options we may be able to use, and **identified some new areas we could stretch contestability** to drive further potential efficiency in RIIO-2 and beyond.

Appropriately managing risk and uncertainty

We have reflected on the uncertainty over the multiple pathways that could be followed to deliver decarbonisation between 2030 and 2050 and considered how our RIIO-2 plans manage this. We have scrutinised discretionary spend and ensured any investments are underpinned by robust cost benefit analysis that **determines 'no regrets' actions.** Where we are less certain on volumes of work required, we have **proposed mechanisms to protect both customers and companies from windfall gains or losses.** In addition, we have identified the key uncertainties associated with work volumes, legislative or policy change, cost confidence and heat policy changes that may impact on RIIO-2 output delivery. We have undertaken **Monte Carlo analysis** to assess the potential distribution of these uncertainties and used this to develop the fairest mechanism to share risk between ourselves and consumers.

Effectively financing this plan

We have undertaken initial analysis of the **financeability of both the actual and the notional company** using the assumptions Ofgem have prescribed (namely using their working assumption of the expected equity returns of 4.8% (CPIH-real), cost of debt indexation using the 11-15 year trombone IBoxx index and a full move to CPIH indexation). Our analysis suggests **we are financeable on a notional company basis with returns to equity at 4.8%.** We **do not support the concept or the assumed value of the 'outperformance wedge'** and hence have not included this in our analysis. At this equity return level, the **notional company will face reduced financial headroom and significant deterioration in the risk-return balance.** In addition, due to the step-change required in our transformational plans, we will face a greater operational performance challenge compared to other GDNs in RIIO-2.

Our **actual company financial position is sector-leading following support from shareholders** to refinance debt and our continued success in diversifying our source of debt across currencies, maturities and markets. Due to the mitigations already implemented by shareholders and as a result of the transition to CPIH indexation, **we are confident we will be able to ensure financeability for the actual company in RIIO-2 (assuming a fair settlement on incentives, totex and outputs at Final Determination).** This is despite the reduction in key credit metrics driven by a significant reduction in the allowed rate of return and the challenge to maintain a comfortable investment-grade credit rating. However, we have **concerns over the transition to CPIH indexation** and its impact on networks' long-term sustainability and level of headroom (as CPIH indexation masks underlying pressures on the notional company in RIIO-2) as well as its intergenerational impacts on our customers.

We continue to work on **assessing the robustness of the overall RIIO-2 framework,** including the underlying cost of capital parameters as we move towards Final Determination. **Being financeable is not a reflection of earning fair returns** and we have set out our evidence which suggests that **5.6% CPIH is a fairer return position**, to underpin delivery of the long-term outputs our customers rely upon and will increasingly depend on, as we deal with the cost to deliver decarbonisation. In addition, the **Cadent Foundation**, which is funded by our shareholders, will divert profits to make a positive difference to the communities we serve. It is a long-term commitment funded in part through our financial performance.

Our value proposition: much more for less

The Plan we have set out delivers enhanced outputs that our customers desire and provides greater efficiency with effective and efficient financing which leads to lower overall bills for our customers.

We have estimated, through assessing the social return on investment and willingness-to-pay analysis, that **our Plan will deliver a net value of £537m to consumers over RIIO-2.** This is delivered through the commitments which stretch beyond business as usual activities. In particular this includes greater support for customers in vulnerable situations, improving the environment, driving bill reductions through enhanced efficiency and making a positive difference to the communities we serve through the reinvestment of profits through our charitable foundation. We have estimated the customer bill impact reflecting Ofgem's latest guidance for the key financial parameters including cost of equity and debt and based on a full conversion to CPIH indexation, and hence bills are higher than they would have been under an RPI indexation.

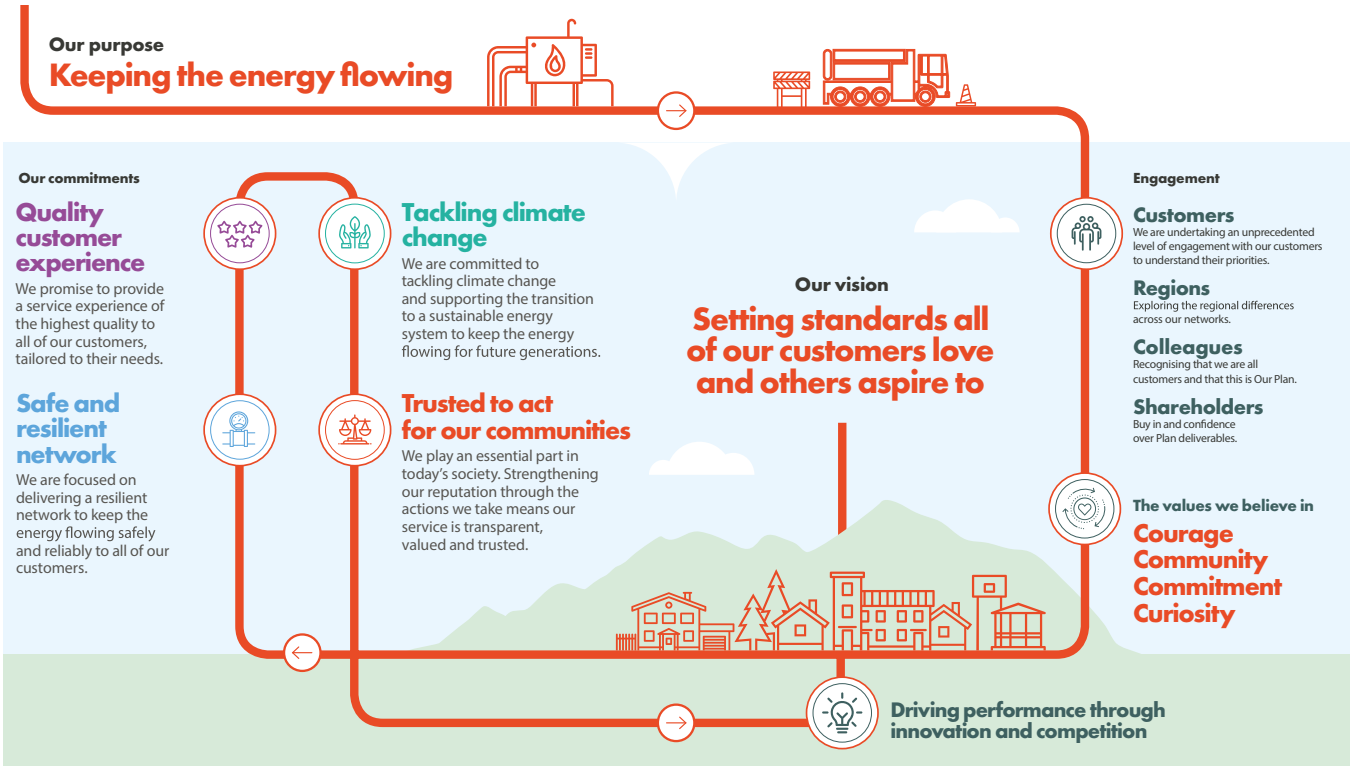
Taking these assumptions together and combined with the efficient spending plans we are committing to, this scenario suggests we will be able to deliver the improved outputs and additional consumer value proposition whilst driving **at least a 10% real reduction in customer bills to less than £120 p.a. (or 33p per day) based on Ofgem's cost of capital assumptions.** This is primarily a result of totex and other efficiencies, which contributes the majority of the reduction.

Our commitment

Our **Board has reviewed and tested the development of our plan** through their direct engagement with the company and a multi-faceted assurance framework has provided confidence in the accuracy of the data underpinning our plan and tested the analysis that is the foundation to our proposals. Our **Board has provided an assurance statement** to this effect. It has enshrined its commitment to the plan both through **linking executive and staff reward directly to delivering the output commitments to our customers** as well as committing to ongoing investment of **at least 1% of post-tax profits to the Cadent Foundation** to make a positive difference to the communities we serve.

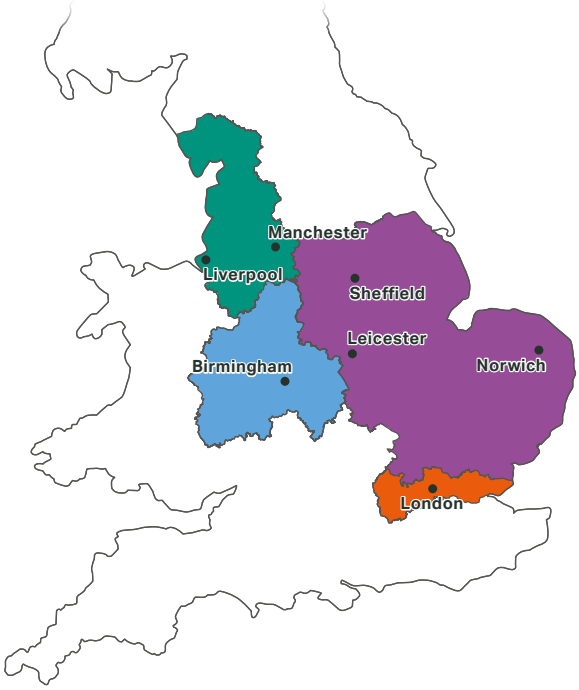
We have **acceptability tested and developed our plans with our customers** and stakeholders throughout as well as responding to **over 200 challenges from our Customer Engagement Group.** We have set out commitments to ongoing engagement through a variety of different channels to share and report progress on our plans. This will be delivered through ongoing oversight from a continued customer engagement group, an online community and regional stakeholder communities.

We appreciate the scale of the challenge to deliver this ambitious plan over RIIO-2. We recognise that actions speak louder than words and we look forward to continuing to build on the progress we are already making in **transforming experiences for our customers, colleagues and the communities we serve.**



3 Our communities

We operate across four gas distribution networks: East of England, North London, North West and West Midlands, providing services to a diverse range of customer and stakeholder groups. Almost 50% of UK gas customers are served by our pipelines and we provide them with the energy they need to stay safe and warm. Each area has its own geographical and social requirements and we are committed to improving our levels of service by creating a more localised customer-centric operating model that is able to respond to the specific needs of the communities we serve. This approach is described in **Chapter 9, Costs and Efficiency**.



North West

Our North West network covers around 2.7m customers in the third most populated region of England. It consists of the five counties of Cheshire, Cumbria, Greater Manchester, Lancashire and Merseyside, and has a mix of rural and urban landscape.

The south of the region is mainly centred on the cities of Liverpool and Manchester. The north of the region, comprising Cumbria and northern Lancashire, is largely rural, as is the far south which encompasses parts of the Cheshire Plain and Peak District. Focusing the workforce and depot locations around the major conurbations, with smaller supporting depots throughout the rural areas, supports our customer service across the network. Around 40% of the gas distributed into the North West network is used for business and industrial purposes; far higher than any other gas distribution network in the UK.

Making a difference: HyNet North West could save over 1 million tonnes of CO_2 emissions every year. HyNet North West is a hydrogen energy and Carbon Capture, Usage and Storage ('CCUS') project. It aims to reduce carbon emissions from industry, homes and transport, whilst supporting economic growth in the region.

East of England

East of England is our largest network serving 4m customers across East Midlands and East Anglia, having significant levels of customers in rural locations from Humberside down through Lincolnshire, Norfolk and Suffolk.

The network also serves customers in the relatively high density cities of Sheffield in the north of the network, Derby, Nottingham and Leicester and Cambridge in the south, as well as customers in the north of London, including the Tottenham area.

Depots have been positioned in close proximity to all main population groups and the spread of engineers' home locations is closely aligned to the general population. The combination of these factors enables the network to operate effectively across the regions.

Making a difference: Innovating in the field with green gas. Our field trials involve installing temporary monitoring equipment 'green cabinets' across our Cambridgeshire network. The equipment tells us how much green gas is coming through the pipes, and how far it is travelling all through the year.

West Midlands

Our West Midlands network is centred on the UK's second largest metropolitan area of Birmingham and includes a number of smaller urban areas that effectively constitute local sub-networks within the network. It serves around 1.96m customers.

Although the network is relatively small, it covers some rural areas outside of the major towns, which dictate strategic depot locations to enable the supply of materials to these areas.

The individual nature of each urban area ranges from towns like Telford, a fairly new town with relatively new network assets, to Stoke-on-Trent, which has a significant proportion of steel mains to negate the effects of ground movement due to historical mining activities. This level of new infrastructure means the resourcing model is less focused on reactive workload and focuses more on maintenance activities.

Making a difference: We are enabling CNG Fuels to build a public access filling station at our National Distribution Centre in Birmingham, which is due to be complete in early 2020. Using renewable biomethane instead of fossil fuel delivers an 80% saving in carbon dioxide emissions.

North London

Our North London network, serving around 2.3m customers, extends from Central London, covering north of the River Thames, to High Wycombe in the west and Southend-on-Sea in the east.

North London, with the highest urban density in the UK, has additional operational challenges to our other networks, including the highest concentration of multi-occupancy buildings in the UK, more severe road congestion, greater 24-hour-life, and a higher number of emergency jobs per customer (based upon requests from customers associated with gas escapes within their buildings).

Making a difference: Using robotics to keep the energy flowing in the capital. 'CISBOT' undertakes pipeline rehabilitation from inside the pipe. Through a single entry point, the CISBOT can travel up to 240 metres in each direction, eliminating the need for lengthy large-scale excavation work and so reducing road congestion caused by our work.

4

Learning from past performance

In this chapter we take stock of our past to provide context to the rest of the Plan. The performance we have delivered during RIIO-1 is summarised and the key lessons that we have learned are highlighted. The chapter concludes by looking forward to RIIO-2: how we are seeking to deliver for all of our customers, how we are applying our learning from the past, and the transformation that we are undergoing to reach our clear vision of setting standards that all of our customers love and others aspire to.

This chapter has the following structure:

Key messages

- We understand our relative performance, what we do well and where we need to improve to deliver consistently for our customers.
- RIIO-1 has fundamentally changed our business. We have improved customer service, driven efficiency, delivered bill reductions and made real progress in support of the vital role we will play in helping the UK tackle climate change.
- Under new ownership, we have recast our vision and are in the process of transforming our business to deliver our Plan for RIIO-2. We recognise that this transformation will not be easy, but we are committed to creating an organisation that will set the standards for the industry.

Learning from past performance

4.1 The background to RIIO-1

In 2005, ownership of the UK GDNs changed fundamentally, creating for the first time different control and ownership of the eight UK regional gas networks. The four networks that today comprise Cadent were retained by their original owner ('National Grid') and as a consequence underwent less change than networks that entered new ownership in the years immediately after the sale. In 2017, midway through the RIIO-1 period, National Grid sold its four GDNs to new owners who created Cadent.

The regulatory landscape changed in 2013/14 when the networks moved to the RIIO framework. The RIIO framework amplifies the voice of the customer and creates an environment which incentivises companies to innovate and to deliver 'outputs' that are valued by their customers and other stakeholders. This prompted network companies to make fundamental changes to their operations. There is still a strong incentive on companies to reduce costs but the RIIO framework has also orientated companies to deliver customer outcomes.

In response to the introduction of RIIO, our strategy was to organise the business around process lines, and to centralise the operational support, network strategy, HR, IS and legal functions. This centralisation left the four regional network teams with operational responsibilities only. The RIIO-1 contract strategy created significant partnerships with tier one contractors and handed those partners the prime responsibility for and control of the delivery of significant parts of our investment programmes.

4.2 Our delivery in RIIO-1

Our engagement with customers during the development of our RIIO-1 Business Plan taught us that they wanted us to prioritise:

Safety, including Carbon Monoxide ('CO') awareness

Running a **reliable network** with minimal incidents and interruptions

Tackling climate change by reducing emissions and innovating

Improving **customer service** by focusing on quality and convenience

Reducing **fuel poverty** and supporting vulnerable customers

These insights were reflected in our RIIO-1 commitments and what we have delivered for customers throughout the period. A summary of our performance over the RIIO-1 period is provided in **Table 04.01**.

We have delivered improvements in safety, reliability, customer service, social and environmental outputs and a step-change in stakeholder engagement over the period. The level of expectation around customer engagement activities has risen significantly over the period; we need to continually extend and refine our engagement plan to ensure we meet the level of expectation in this area.

There are also areas where our performance has been off the pace compared to other networks – notably in the strength and consistency of our customer satisfaction scores, the duration of interruptions in multi-occupancy buildings in London and the relative cost efficiency of our networks.

The key areas of our performance are detailed in the remainder of this chapter, covering: customer service and social obligations; safety and reliability of our network; environment; and Multi-occupancy buildings. We also set out financial performance measures.

LESSON LEARNED

Customer engagement is critical to our success and, with expectations in this area constantly rising, this must form a key part of our ongoing business strategy.

HOW WE ARE APPLYING THIS LEARNING

We are establishing a comprehensive programme for perpetual and iterative engagement throughout RIIO-2. See Appendix 05.01 - Stakeholder Engagement Strategy for more details.

4.2.1 During RIIO-1 we have improved our services to customers

Table 04.01 below shows our performance against the key regulatory targets in relation to customer service and delivery of social obligations. (Our performance against our commitments is summarised below.)

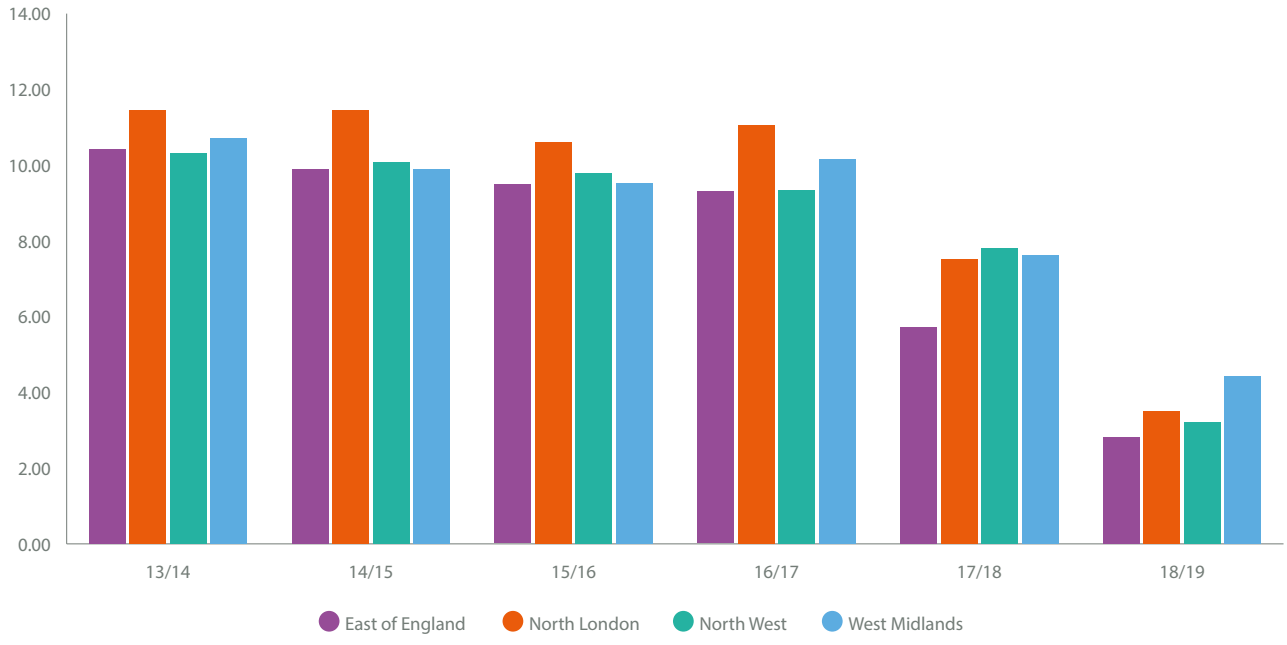
Table 04.01: Customer service and social commitments

Output Category	Output Measure	Unit	East of England	North London	North West	West Midlands
Connections	Guaranteed Standards Performance	N/A	✓	✓	✓	✓
Customer Service	Planned Work C-Sat	Out of Ten	✓	✓	✓	✗
	Connections C-Sat		✓	✗	✓	✓
	Emergency Response and Repair C-Sat		✓	✓	✓	✓
	Complaints Handling	Metric Score	✓	✓	✓	✓
	Stakeholder Engagement	Out of Ten	✓	✓	✓	✓
Connections	Introduce Distributed Gas Entry Standards	Connections	✓	✓	✓	✓
Social Obligation	Fuel Poor Connections	Number	✓	✓	✓	✓
	CO Awareness		✓	✓	✓	✓

Learning from past performance continued

Our customer service, as measured by Customer Satisfaction ('C-Sat'), Stakeholder Engagement and Complaints Handling output measures, has improved during RIIO-1. Stakeholder Engagement has been an area of focus and we have achieved some of the top scores and best feedback during RIIO-1 amongst all GDNs. Cadent has also made a step-change in Complaints Handling, having learned a lesson about local control; one of the first stages of our transformation plan involved moving the handling of complaints away from the central team and into the four regional networks. This showed us that more value can be created by empowering local teams and giving them the responsibility to provide a consistent service, instead of having centrally run consistent processes that do not necessarily leave customers with the positive experience that was intended. **Figure 04.01** below shows the step-change in complaints handling performance during 17/18 and 18/19.

Figure 04.01: Complaints scores



LESSON LEARNED

Local control enables service quality to be prioritised over process rigidity to deliver on all our customers' needs.

HOW WE ARE APPLYING THIS LEARNING

We are transforming to a decentralised, depot-centric operating model.

However, we recognise that there is more to do to provide all of our customers with a consistently good service. Whilst positive, the rate of performance improvement that we have delivered on C-Sat has been slower than that delivered by other GDNs and we recognise that we have a gap to close in this area. In particular, the satisfaction of customers with our planned work and connections processes are behind the best in the industry. We have identified some aspects of our contracting strategy that do not connect customers' interests with our contract partners. These aspects must be fully aligned with mechanisms that adjust if we are off-target.

LESSON LEARNED

All incentives – those for our employees and those built into contracts – must be aligned with our customers' priorities.

HOW WE ARE APPLYING THIS LEARNING

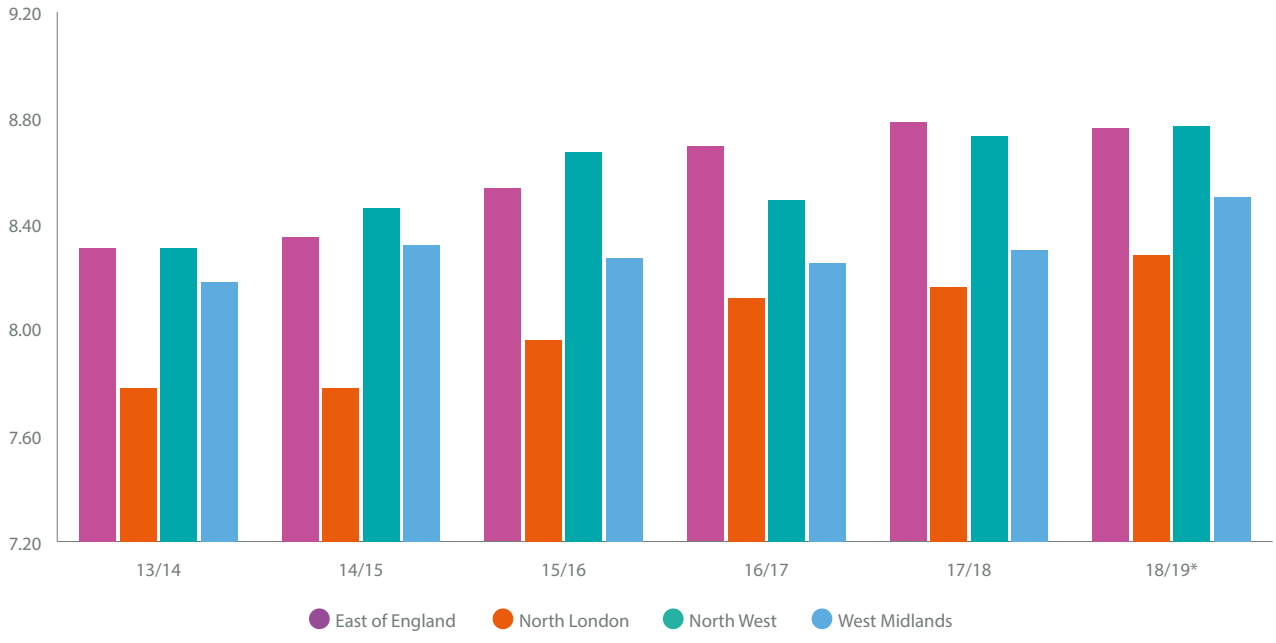
We will create strong connections between our customers' priorities and contracts with external suppliers, and the incentives that apply to staff and management.

Table 04.02 Measures taken to improve customer satisfaction in RIIO-1

The list below provides examples of some of the measures we took:

Improvement	Description
Fast Customer Feedback	Enabling customers to feed back to us via a simple text message during and after our works.
Customer Liaison Officers	Local customer specialists to support communities during our more complex work.
Clearer Literature	Simplified leaflets, letters and information cards making our services clear and accessible.
Social Media	Advance notice of planned works and keeping communities up-to-date during gas supply incidents.
Supply Reconnections	Dispatch system optimisation on reactive work and 6pm reconnection deadlines on planned works to get customers back on gas faster.
Advance Notifications	Providing advance notification on more work types than ever.
Reduced Road Disruption	Increased use of keyhole technology, the deployment of robotic technology ('CISBOT') and night-time working to reduce our impact on the busiest roads.
Improved Welfare Provisions	Better welfare provisions to reduce the inconvenience suffered by those off gas.
Locking Cooker Valves	To improve safety for customers in vulnerable situations who want to remain safe and independent in their own home.

Figure 04.02: Average overall C-Sat scores by Cadent region



Learning from past performance continued

4.2.2 We need to improve the consistency of our performance

We have improved the satisfaction of customer groups across our regions and services. Against this background, there are highlights and lowlights to our RIIO-1 performance. We are focusing on improving consistency and creating more accountability.

London network stands out as an area where our customers are less satisfied. By comparing the C-Sat returns on identical service offerings we can see that expectations in London are higher than in other areas. A number of factors add complexity to delivering work in London - our customers are more likely to live in Multi-occupancy buildings, speak English as a second language, be at home during the day and live in rented accommodation. These factors complicate access, communication and delivery of our work. However, we know that we have to reach a higher bar in London to be successful.

In our Emergency Response and Repair service we have achieved some C-Sat scores that we and our teams are really proud of (some regions have achieved scores that are consistently above 9.5). Our planned work attracts poorer scores. In the West Midlands we need to improve our mains replacement and connections service and we believe the contractual agreements we established were insufficiently customer focused. This is a point of learning we take towards RIIO-2.

4.2.3 We continue to work to protect customers and in particular vulnerable customers

Cadent has improved safety and social wellbeing through an extensive carbon monoxide (CO) awareness programme, being at the forefront of improvements in the Priority Services Register and helping thousands of fuel-poor homes with gas network connections and energy efficiency.

Our CO awareness programme has gone beyond the commitment embedded in the RIIO-1 framework – we have worked hard to raise awareness of Carbon Monoxide and to issue CO alarms. We are proud of the work we have done focusing on groups of customers who are most at risk by going into schools to educate early Key Stage children through our pioneering Safety Seymour campaign. The sessions are designed to be fun, engaging and to be accessible to children whose first language may not be English. At the end of each session, the children take home a CO alarm, an information pack and a treasure hunt (identifying the signs and symptoms of carbon monoxide) to complete with their family and friends. Over the last four years we have reached around 9,000 school children and their families and in doing so we have confirmed the importance of this work, having seen the scale of the opportunity to raise awareness of carbon monoxide risks. Our Safety Seymour initiative has now been adopted by all the GDNs.

LESSON LEARNED

We can play a key role in promoting awareness of carbon monoxide. We will expand our work in this area during RIIO-2.

HOW WE ARE APPLYING THIS LEARNING

We will increase the level of CO awareness work we will deliver for our customers.

We have been at the forefront of improving the Priority Services Register by leading a cross-industry group which has developed a common set of 'needs codes' that can help network companies to better target their services towards customers' individual needs. In addition, we have trialled and developed referral schemes through which we connect customers to appropriate sources of support that may not be known by or easily accessible to customers in vulnerable situations (examples include Local Authority support services and our partnership with National Energy Action).

LESSON LEARNED

Effective partnerships are a catalyst for improving the circumstances of customers in vulnerable situations and delivering great outcomes.

HOW WE ARE APPLYING THIS LEARNING

We will foster partnerships across our activities, including to support innovation, improved customer service and to tackle vulnerability and fuel poverty.

In the first five years of RIIO-1 we have connected over 23,000 properties under the Fuel Poor Network Extension Scheme. Through the Community Interest Company we created (Affordable Warmth Solutions), we have helped customers to secure 'whole-house solutions' that leverage all available forms of funding, ensuring that heating and other energy efficiency measures are installed alongside the gas connection. Our partnership approach has drawn on expert input from National Energy Action and has been developed with input from the departmental fuel poverty policy committees. We have learned that we need to tailor our approach to ensure that customers receive the best outcome possible and that a revised approach in RIIO-2 is needed.

LESSON LEARNED

Tackling fuel poverty as a GDN in isolation has delivered positive outcomes in RIIO-1. However, a new joined-up approach to Fuel Poor Schemes is required in England in order to deliver even greater value.

HOW WE ARE APPLYING THIS LEARNING

We will facilitate a combined funding model to deliver the best results for Fuel-poor customers.

For more detail on our RIIO-2 Customer Vulnerability Strategy, see **Appendix 07.03.00**.

4.2.4 During RIIO-1 we have improved network safety and reliability

Our networks have provided world class levels of performance to our customers, and this has been underpinned by our focus on the safety and wellbeing of our customers, employees, contractors and members of the public. Table 04.03 below shows our performance against the key regulatory targets in relation to safety and network reliability.

Table 04.03: Safety and network reliability commitments

Output Category	Output Measure	Unit	East of England	North London	North West	West Midlands
Safety – Emergency Response	97% Controlled Gas Escapes	%	✓	✓	✓	✓
	97% Uncontrolled Gas Escapes	%	✓	✓	✓	✓
Safety – Management of Repairs	GS(M)R 12 Hour Escape Repair Requirement		✓	✓	✓	✓
	Repair Risk		✓	✓	✓	✓
Safety – Major Incident Hazard Prevention	GS(M)R Safety Case Acceptance by HSE		✓	✓	✓	✓
Management	COMAH Safety Report Reviewed by HSE		✓	✓	✓	✓
Reliability – Loss of Supply	Number of Planned Supply Interruptions		✓	✓	✓	✓
	Duration of Planned Supply Interruptions		✓	✓	✓	✓
	Duration of Unplanned Supply Interruptions		✓	✗	✓	✓
	Number of Unplanned Supply Interruptions		✓	✓	✓	✓
Reliability – Network Capacity	Achieving 1 in 20 Obligation		✓	✓	✓	✓
Reliability – Network Reliability	Maintaining Operational Performance		✓	✓	✓	✓
Safety – Mains Replacement	Iron Mains Risk Reduction (based on MRPS)		✓	✓	✓	✓
	Sub-Deducts Network Off-Risk		✓	✓	✓	✓

We continue to reduce network risk through the replacement of iron mains and we have consistently exceeded the Emergency Response standards to keep customers safe from gas escapes from the network or their gas installation.

Society has a lower appetite for risk than ever before and we have to continuously improve to keep up with the expectations of our customers and other stakeholders. Regrettably, we recognise that in RIIO-1 we have not always done this and there have been occasions where the Health and Safety Executive has intervened – for instance, with asset record keeping on Multi-occupancy buildings, and with our approach to Cathodic Protection. Our plans reflect how we are addressing these learnings.

LESSON LEARNED

Societal risk appetite is at an all-time low and we must work hard to maintain and improve our performance.

HOW WE ARE APPLYING THIS LEARNING

We have developed our asset investment plan in consultation with customers and other stakeholders.

Having set ourselves ambitious commitments for the management of Repair Risk, we struggled to deliver this output in the early years of RIIO-1. The way we organised ourselves spreaded accountability for delivery and reduced flexibility, preventing us from fully meeting our customers' needs. In RIIO-1 we committed to completing our repair work faster than our counterparts and this stretched the resources in our repair teams at significant cost. We now deliver on this challenging output area, having worked hard to increase efficiency and performance.

LESSON LEARNED

Segregation of resources can reduce our flexibility to deliver our customers' needs.

HOW WE ARE APPLYING THIS LEARNING

We are transforming to a depot-centric model which will reduce the risk of a silo mentality.

During RIIO-1 there have been 12 large failure of supply incidents, mainly caused by third parties damaging our networks. We have put a lot of effort into improving how we manage such incidents and how we engage with the affected customers. Two material improvements have been made during RIIO-1:

- We have upgraded our mobile incident command unit, which provides mobile office facilities supporting operational teams in the field and providing up-to-date communication (shown in the photo in figure 04.03).
- We have deployed an incident app for real-time data capture, specifically tailored to supply failures. This allows our operational teams to record data at incidents and provides incident managers with better insight into the state of the incident (a screenshot of this is included in figure 04.03).

We continue to explore innovative ways to improve how we manage this risk area.

LESSON LEARNED

Third party damage to our network is the biggest cause of large supply failures – we need an innovative solution to reduce risk.

HOW WE ARE APPLYING THIS LEARNING

We are innovating with satellite technology and machine learning to make a step-change in the avoidance of incidents.

Learning from past performance continued

Figure 04.03: Incident management app for real-time data capture

4.2.5 Improving the environment and tackling climate change

We have taken a leadership role in exploring how gas networks can help tackle climate change through innovation projects, and have worked with our stakeholders to help policymakers understand the opportunities they provide. Our work was evidenced in the series of leadership papers we produced on the Future of Gas. These papers considered the different pathways that could be followed to improve energy efficiency and decarbonise gas for heat and transport. Flagship work in this area includes the HyDeploy project which we are pursuing jointly with Keele University and the proposed HyNet project in the North West. We have engaged with stakeholders at both regional and national levels, reflecting that energy and transport policy is being developed at all levels. Our experience has emphasised the importance of demonstrating decarbonisation options at scale and supporting policy makers as they develop the legal, policy and regulatory frameworks to support the pathway towards a low carbon energy future.

LESSON LEARNED

Demonstrating viability of hydrogen at scale is critical to moving forward UK plans to tackle climate change.

HOW WE ARE APPLYING THIS LEARNING

Our plan includes flagship projects which will pave the way forward and demonstrate hydrogen blending and a pure hydrogen network.

Over 95% of our business carbon footprint results from gas leaks from our network. We expect to have delivered a reduction of over 400,000t of gas leakage – equivalent to taking 210,000 cars off the road – by the end of RIIO-1.

Whilst the majority of this output has been underpinned by the iron mains replacement programme, additional reductions have been incentivised under the shrinkage and leakage regulatory incentives. We have led the industry in using average system pressure management to reduce leakage and have innovated to provide a basis to increase Monoethylene Glycol ('MEG') saturation levels which helps reduce leakage from joints. **Figure 04.04** below demonstrates the progress we have made and plan to make in reducing leakage over RIIO-1.

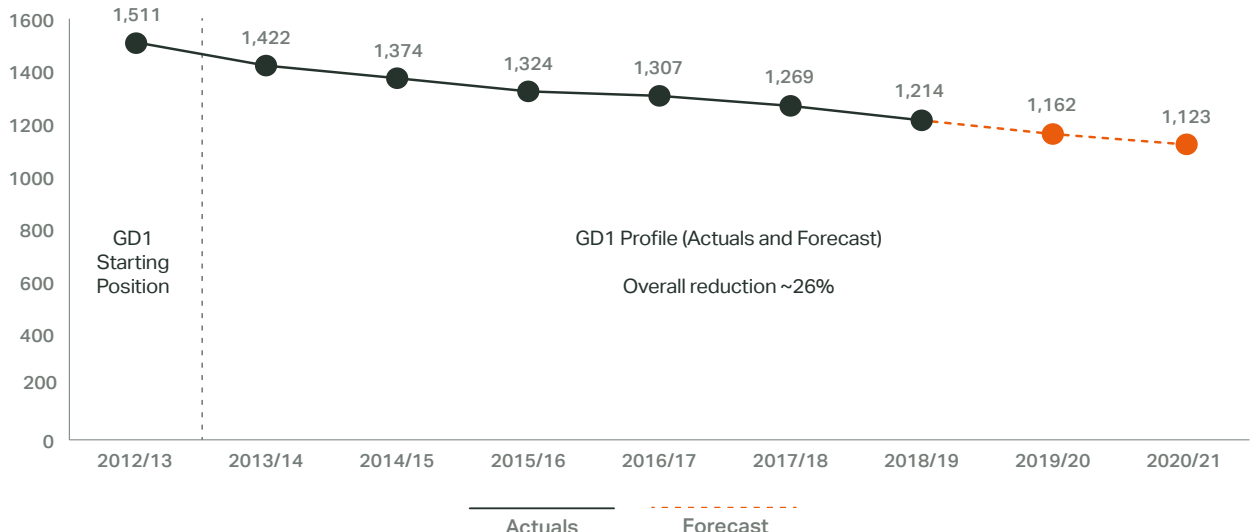
LESSON LEARNED

Replacing metallic mains is the principal means to reduce network emissions.

HOW WE ARE APPLYING THIS LEARNING

Our mains replacement plan tackles leakage hotspots, as well as delivering a safer network.

Figure 04.04: Cadent shrinkage profile ('GWh')



4.2.6 We need to improve our services to customers in Multi-occupancy buildings

When it has been necessary to isolate our customers' supply to MOBs, we have often taken too long to reconnect them. Whilst we have been rightly focused on public safety, we have occasionally failed to place the appropriate emphasis on customer experience. As can be seen in Figure 04.05 below, our London network has many more MOBs and high rise assets than any other UK distribution network. We regret the fact that we missed one of our output targets during RIIO-1. We are very conscious that many of our customers have been significantly inconvenienced and we are committed to improving our performance.

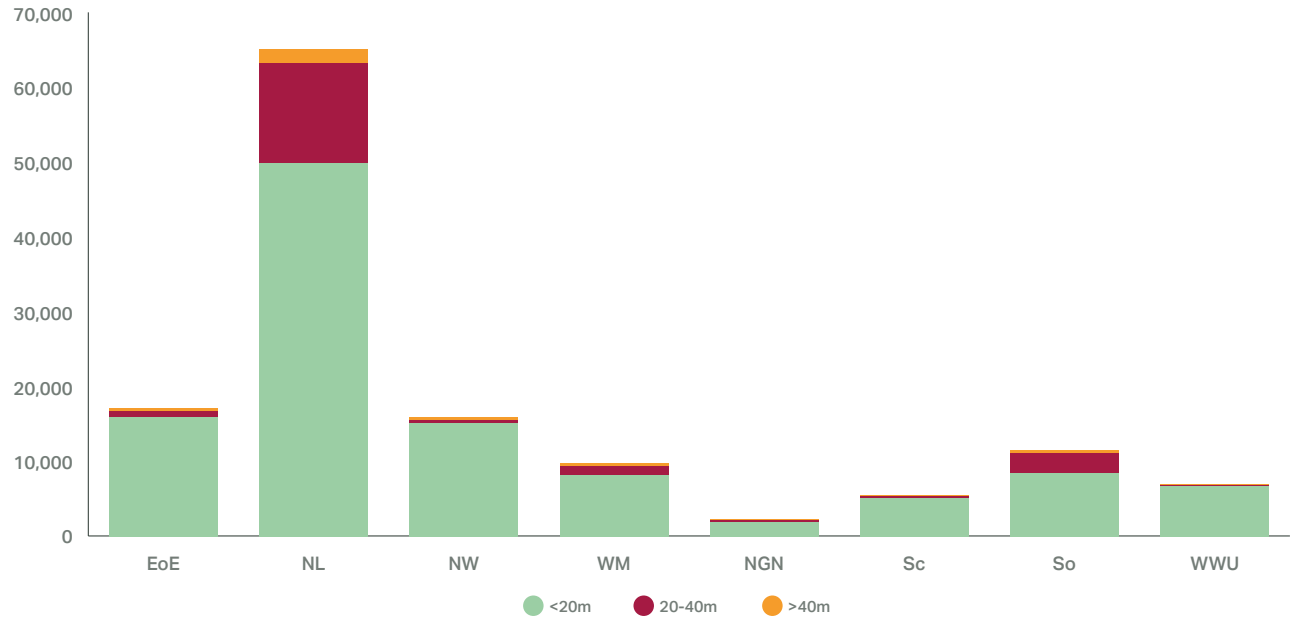
LESSON LEARNED

We must deliver on our safety requirements at the same time as improving customer experience.

HOW WE ARE APPLYING THIS LEARNING

We are addressing risks in our MOBs assets, whilst improving service for our customers. See Appendix 09.04 - Transforming the experience for MOBs customers.

Figure 04.05: High rise assets



The average time taken to reconnect a high rise building is much longer than for a standard single domestic residence (typically a number of weeks compared to less than a day). This is due to a range of factors, including the complexity of accessing the building and gaining the necessary agreements from multiple parties to design and commence work. For example, we often need planning consent or the consent of building owners before work can commence. We have learned that we need to work more closely with the relevant stakeholders and do pre-planning work to support reductions in the time customers are without gas.

LESSON LEARNED

Stronger collaboration and advanced pre-planning are critical to reduce the time customers are without gas in MOBs.

HOW WE ARE APPLYING THIS LEARNING

We are working towards building-by-building plans for high rise blocks though stronger stakeholder engagement.

There was a significant increase in the number and average duration of interruptions in our North London network from June 2017 through to the end of 2018. This was driven by two things: first, an understandably more cautious approach by stakeholders to building safety in the aftermath of the Grenfell Tower tragedy; and second, in early 2018 we identified that our high rise building records were incomplete. As a result of the gap in our records, in 2018 we carried out a large programme of surveying work, completing approximately four times the normal number of surveys for a single year. Although the additional surveys did not affect the average duration of interruptions, they did have an impact on the total number of MOBs that were disconnected over this period.

Learning from past performance continued

Over the first six years of RIIO-1, there was an average of 1 building off gas in each of the North West and West Midlands regions. In the East of England there was an average of around four properties off gas in each year. In marked contrast, in London the number of buildings off gas rose from 21 in 2014/5 to 67 in 2018/19.

The speed with which we can deploy repair innovations and processes is a key focus area. It has the potential to reduce the number of MOB disconnections and interruption minutes. We have learned that we need to challenge ourselves and other stakeholders to deploy innovations more quickly to ensure customers experience the benefits without undue delay. Having learned these lessons, we are implementing a comprehensive programme that will accelerate a step-change in performance of MOB interruptions during RIIO-1 and continue into RIIO-2. This programme is detailed in our **Appendix 09.04: Transforming the Experience for Multiple Occupancy Building Customers - Risers**.

LESSON LEARNED

Repair innovations must be exploited fully to reduce the number of MOBs disconnected.

HOW WE ARE APPLYING THIS LEARNING

A specialist repair team has already been established in London to maximise the use of innovation.

4.3 We have improved cost efficiency throughout RIIO-1

We have improved cost efficiency throughout RIIO-1. We have invested in our networks and our services, and have delivered improvements in safety, reliability, customer service, social and environmental outputs as a result. We have delivered these outputs and service improvements within the allocated cost allowances and are forecasting to underspend our total RIIO-1 allowance by 7%, as illustrated by Figure 04.06.

Figure 04.06: Cadent under/(over) spend of allowances

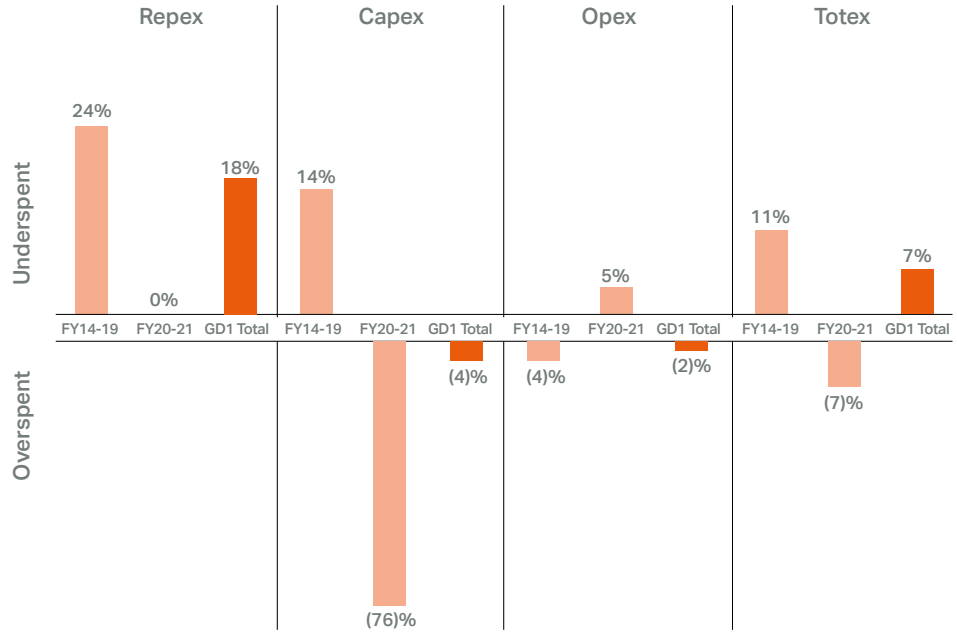


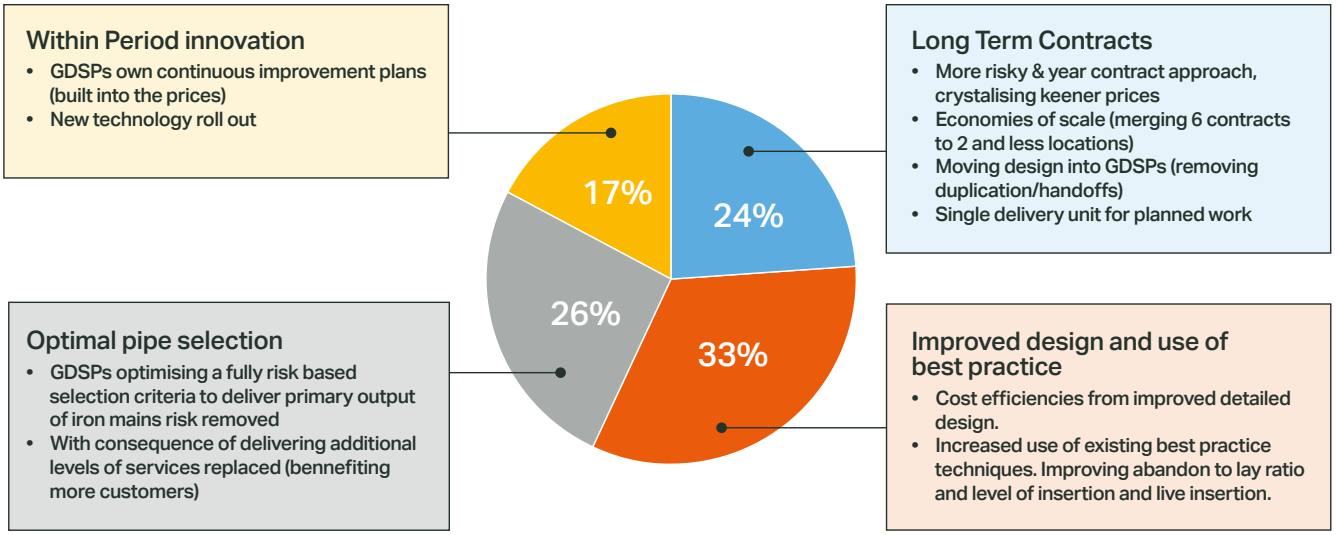
Table 04.04: Overall totex performance

Overall totex performance*	Current year		RIIO-1 to date		8 Year forecast	
Network	Variance to allowance £m	% Variance	Variance to allowance £m	% Variance	Variance to allowance £m	% Variance
East of England	34	10%	122	7%	38	1%
London	46	15%	268	17%	255	10%
North West	47	19%	115	9%	141	7%
West Midlands	38	20%	139	14%	218	14%

4.3.1 Repex work is being delivered more efficiently

We expect to deliver the RIIO-1 primary output of iron mains risk removed and the secondary output of length of mains decommissioned. We expect to do this at a cost that is 18% below the allowance. We have achieved this by deploying the four levers summarised in Figure 04.06b below.

Figure 04.06b: The four drivers of repex underspend to allowance



We recognised the challenges associated with our decision to change our contracting approach to what we call Gas Distribution Strategic Partnerships (GDSPs). We took the decision to adopt a new and innovative contracting strategy to deliver efficiency. However, we have experienced delivery issues, which are being managed actively. These issues included the GDSPs focusing on delivering to price at the expense of seeking improved customer service. Moving forward, and in light of the change in ownership of Cadent, we are refreshing our contracting approach to improve the service we provide to customers.

The delivery issues, along with our conscious decision to defer larger diameter (more expensive) work, accounts for our underspend in the first four years (25%) of RIIO-1. As we address these issues and face a tightening market, we expect to catch up the backlog in work and our underspend will only be 8% in the last four years of the control.

LESSON LEARNED

An over-emphasis on cost efficiencies can result in other service and delivery consequences.

HOW WE ARE APPLYING THIS LEARNING

We are implementing a new contracting structure and an increase in decentralised control. This will help us balance competing aims more effectively.

We have achieved some efficiency improvements by optimising the pipe selection. When designing our programme, we have targeted pipes with a higher risk score. This has led to a greater number of smaller diameter pipes being delivered which are typically cheaper to complete. The risk profile of the remaining iron mains population which needs to be replaced is now relatively flat, and we believe that there is an opportunity to balance the replacement plan going forwards between risk score and other areas of benefit, including emissions reductions and the pipes that drive significant Opex costs due to more frequent leakage.

LESSON LEARNED

With risk levels reduced, a more balanced delivery of mains replacement work will deliver whole system benefits for our customers.

HOW WE ARE APPLYING THIS LEARNING

We will build in protections to future contracts.

None of our outperformance has been generated by the non-delivery of commitments. For example, when we scaled back the RIIO-1 London Medium Pressure Scheme to reduce congestion in the City (given the number and scale of competing cross-sectoral infrastructure projects), we returned £60m to customers.

LESSON LEARNED

Stakeholder feedback on large projects can lead to change: our framework needs to be flexible.

HOW WE ARE APPLYING THIS LEARNING

We engaged early on our investment proposals for RIIO-2.

Learning from past performance continued

4.3.2 Capex spending is in line with allowances

We deliberately profiled our Capex towards the end of the RIIO-1 period. Our strategy, particularly in relation to the Asset Health Network Output Measures ('NOMs'), was to collect and refresh asset health data in the early part of RIIO-1 so we could make more informed decisions about the interventions we needed to make. Having improved our asset health data, we sought to deliver work via bundles that were tendered competitively because we thought that this approach would be efficient and attractive to potential suppliers. The tendering process revealed that the cost of the work was significantly higher than we had expected and so a revised approach was devised. This led to a larger volume of asset health interventions taking place towards the end of RIIO-1 than we intended.

By the end of RIIO-1 we expect to have delivered all of our capital investment regulatory outputs, and in doing so will have spent marginally above our allowances. The overspend is mainly as a consequence of the higher unit cost pressures that are materialising in the wider market as our work programme accelerates.

LESSON LEARNED

Prompt mobilisation of the capital plan to prevent back-loading can support efficient delivery.

HOW WE ARE APPLYING THIS LEARNING

We have developed longer term network asset plans owned by network-aligned teams.

4.3.3 Our transformation programme is reversing our historical opex overspend

At the start of RIIO-1 we were less efficient than our counterparts – our indirect business costs were notably inefficient. A decision was taken to try and benefit more from economies of scale, with further centralisation of activities, including business support activities. However, the complexity of different network needs and the additional handoffs blurred accountabilities and removed decision rights away from local management.

Moreover, the new GDSP contracts restricted our ability to move resources across opex, capex and repex activities. This had an unintended consequence on our ability to deliver the Repair Risk commitment. In RIIO-1 we committed to completing our repair work faster than our counterparts and this stretched the resources in our repair teams at significant cost. We are now delivering on this challenging output area, having worked hard to increase efficiency and performance.

The way we organised ourselves, spreading accountability for delivery, also reduced flexibility and prevented us from fully meeting our customers' needs.

LESSON LEARNED

By tailoring our support functions to deliver the specific needs of our business through our transformation programme, we can drive improved performance and efficiency.

HOW WE ARE APPLYING THIS LEARNING

We are three years into our wide-reaching transformation plan, informed by benchmarking and best practice.

LESSON LEARNED

Centralisation does not always deliver economies of scale or the local service necessary given the differences in the local environments. Segregation of resources can reduce our flexibility to deliver our customers' needs and cost efficiency.

HOW WE ARE APPLYING THIS LEARNING

We are implementing a depot-centred operating model, reflecting the lessons learned during RIIO-1.

Our costs have been higher than our allowances during the first five years of the price control. Since becoming a standalone business we have sought to transform our business. Over the second half of RIIO-1 we expect our costs to be below our allowance and we are positioning Cadent to deliver greater value for money into RIIO-2. Our ambitious transformation plan, including a new contracting strategy, represents a significant challenge for our whole business, for the benefit of our customers. Our transformation programme is described in greater detail in **Chapter 9, Costs and efficiency**.

As the Table 04.05 shows, we we expect our totex to be 7% lower than the allowance for Cadent as a whole over RIIO-1. Two of our networks have reduced costs by more than the Cadent average and two by less. This pattern can be explained by the relative weight of repex to opex work within each network (given repex is the area where we have secured the greatest reductions against our RIIO-1 allowance).

4.4 In RIIO-1, bills have reduced and shareholders have made fair returns

Our customers and stakeholders hold us to high standards. Unsurprisingly, energy networks have come under close scrutiny over the course of RIIO-1. We recognise that it is important to ensure that the profits we make are in line with what our customers and stakeholders expect

LESSON LEARNED

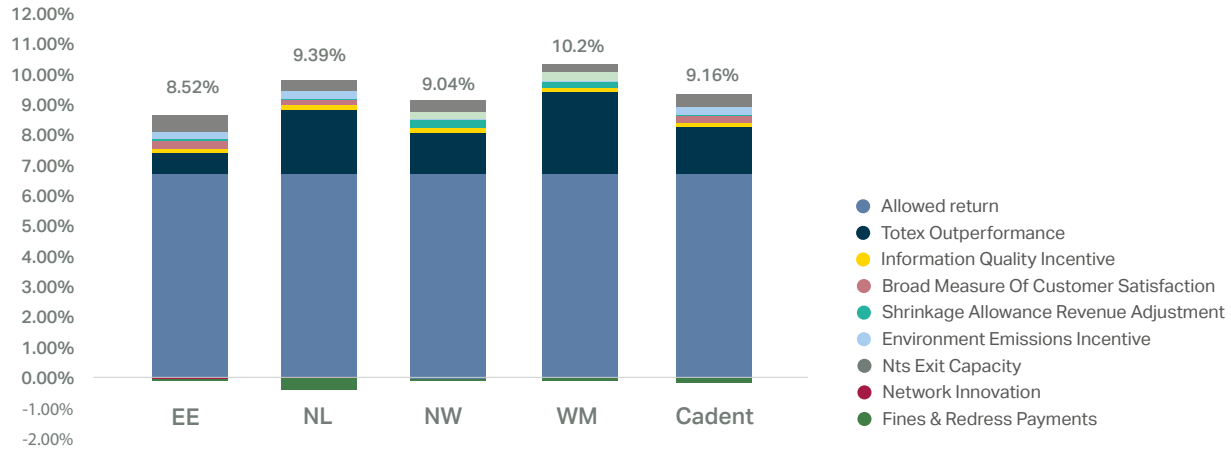
Trust is hard to win and easily lost. We need to build and maintain trust throughout RIIO-2.

HOW WE ARE APPLYING THIS LEARNING

We have set out how we will aim to be seen to be trusted to act for our communities in our Trust Charter - see Appendix 07.05.00.

The returns we forecast to earn over the eight year RIIO-1 period and into RIIO-2 are summarised in Figure 04.07 below (expressed in Return on Regulatory Equity, 'RORE'). Our method of RORE calculation is aligned to the approach used by Ofgem in the production of the RIIO-1 annual reports.

Figure 04.07: Eight year forecast RORE performance (post tax, real)



The table below summarises the main factors which contributed to our RORE performance. As can be seen from the table, beyond the base return allowed by Ofgem, our returns have been driven by the exit capacity, environmental emissions and customer satisfaction incentives.

Table 04.05: Drivers of forecast RORE performance for Cadent as a whole

Contributory factor	Contribution to RORE	Comment
Allowed return	+6.70%	The base return allowed by Ofgem for RIIO-1.
Totex outperformance	+1.53%	The benefits to Cadent from underspending against the totex allowed by Ofgem. The main area of underspend was against our repex allowance. We were able to optimise the repex programme by targeting high risk, low cost mains replacement. The scope to continue this approach in RIIO-2 is limited (as explained above).
NTS Exit capacity	+0.42%	The gain to Cadent from actions to optimise the capacity it reserves on the National Transportation System. The scope to earn rewards from optimising exit capacity in the future will depend on how the incentive is designed by Ofgem.
Environment emissions incentive	+0.25%	The financial reward from reducing emissions which are harmful to the environment. We have proposed environmental outputs which will continue to incentivise us to reduce our impact on the environment.
Broad measure of customer satisfaction	+0.23%	The reward for improving customer satisfaction. We have proposed outputs which will continue to incentivise us to improve the service we provide to customers.

Note - the other incentives and regulatory mechanisms that have impacted our performance were: the Information Quality Incentive, which Ofgem is not continuing in RIIO-2 (+0.14%); shrinkage (+0.05%); the cost of funding network innovation (-0.03%) and regulatory fines and redress payments (-0.14%).

Learning from past performance continued

4.5 How consumers have been protected from additional or delayed costs

The RIIO-1 framework provides automatic protection for customers in the event that circumstances turn out to be different from expectations. Our revenues are adjusted if costs are lower than our allowance, to the benefit of customers. In this context, we describe the action of uncertainty mechanisms in **Chapter 10, Managing risk and uncertainty**.

However, we have also taken positive steps to protect customers from the impact of delays and cost increases:

- The contracts we established with our GDSPs fixed contract rates. Through these contracts we saved customers £10m p.a. over RIIO-1, a total of £80m over the period.
- As mentioned previously, when we scaled back the RIIO-1 London Medium Pressure Scheme to reduce congestion in the City (given the number and scale of competing cross-sectoral infrastructure projects), we returned £60m to customers.
- We have worked hard to reduce the impact of smart metering on our customers across the industry.
- At the start of RIIO-1, Shippers told us that they wanted our charges to be predictable. We worked hard to put effort into better forecasting and to introduce a two year lag in pricing. This was to provide more predictability and stability in Shipper charges, removing transportation pricing risk from Shippers/ suppliers and, in turn, allowing them to reduce charges to customers.

4.6 Shareholder returns

The RORE performance noted above delivered customer benefits (through cost outperformance sharing and meeting output commitments) and also resulted in a fair return to shareholders. The level of dividend paid has been lower than the level of profit generated in each financial year of RIIO to date, as shown in Table 04.06 below.

Table 04.06: Beneficiaries of our performance during RIIO-1

	National Grid				Cadent		
	13/14	14/15	15/16	16/17*	17/18	18/19	Average
Gas Distribution Networks ('GDNs')	387	436	383	95	415	420	356
Other (Metering and Non-Regulated)	68	104	75	0	3	3	42
Total Dividend	455	540	458	95	418	423	398
Profit after tax (PAT)	817	612	818	503	465	542	626
Dividend as % of PAT	56%	88%	56%	19%	90%	78%	64%

* PAT excluding exceptional items (due to materiality). Low dividend value due to year of separation from National Grid.

Looking forward to the end of RIIO-1 and into RIIO-2, dividends are forecast to be significantly lower than the average paid in RIIO-1 to date, as the cost of delivering our 8 year RIIO-1 output commitments increases and allowed returns significantly reduce. Our notional company RIIO-2 Plan is aligned to Ofgem guidance with an opening target gearing of 60% of the RAV and a dividend yield of 3%. The reduction in the notional gearing assumption relies on continued liquidity in the market for new equity which is uncertain given the low level of returns proposed at RIIO-2. This uncertainty is reinforced by the Ofgem dividend yield assumption of 3%. This is discussed in more detail in **Chapter 11, Affordability and financing our plan.**

4.7 Our history remains visible today

We are simultaneously proud of and constrained by our culture and history. There are many aspects that deserve recognition, for example, our safety record and our work on exploring the pathways to decarbonisation of heat. However, we recognise that we need to refresh and modernise our approach to business.

The process-aligned operating model that we adopted in RIIO-1 (with a heavy emphasis on centralisation and standardisation) has moved decision-making too far from the customer. Our contract partner model has not succeeded in sufficiently aligning customer interests with the interests of those responsible for laying new gas mains and connections. Until recently, our strategic focus on repex efficiency has taken precedence over the removal of waste associated with diseconomies of scale.

Whilst the physical separation of National Grid and Cadent is all but completed (with some IS changes remaining), the cultural separation and establishment of a new Cadent style is an area where we still need to put in a lot of hard work, but there is enormous opportunity for Cadent to improve through cultural changes and we are really excited about the possibilities.

LESSON LEARNED

We are on a cultural journey that will take time to embed. This can be accelerated by working with expert organisations in delivering cultural change and we are working with external experts ('Vision') to fast-track our journey.

HOW WE ARE APPLYING THIS LEARNING

Our wide-ranging transformation plan builds on our engaging vision and we will create the business we need.

We understand our relative performance, what we do well and where we need to improve to deliver consistently for our customers. There are some particular areas of focus for our improvement plans:

- driving our cost base down to the right size;
- achieving consistency in our delivery to increase customer satisfaction; and
- completing our work to rectify past mistakes and underperformance on Multi-occupancy buildings.

Our response to this challenge is wide-reaching. It involves every part of the business and every employee. We have:

- A new Board with a fresh and ambitious outlook, comprising an expanded presence of independent directors and our new owners.
- Recast our vision, and are carefully embedding it into everything we do.
- A wide-reaching cultural and operational transformation programme to accelerate the business's performance.
- A challenging CEG which is pushing us hard to improve.

4.8 We have a plan to transform experiences

We are clear about where we want to get to. Our vision is to set standards that all of our customers love and others aspire to. We want to do this in all aspects of our business: the day-to-day services that customers see and interact with; the decisions that we take in the background to deliver the safest, most reliable network; and our work to shift the UK, a global leader of the response to climate change, through the use of hydrogen.

We recognise that this destination is ambitious; it demands a lot. We recognise that our transformational journey will be challenging as well as exciting, and we are committed to creating an organisation that will set the standards for the industry. We are investing all of our effort into things that move us closer to our vision and we have detailed plans about how we will take our next steps in this direction. We are confident in the plans we have developed because they are built on tough self-reflection and our learning from the past.

5 Enhanced engagement

This chapter describes the framework and approach that we have used to gather insight from our customers, stakeholders, benchmarks, employees and other sources. We explain the role played by our CEG and how we will make enhanced engagement a business as usual activity.

This chapter has the following structure:

Key messages

- Engagement sits at the heart of our strategy to deliver our vision.
- We have engaged with over 30,000 customers across 33 segments using over 50 engagement techniques.
- We have embraced a framework that recognises a hierarchy of needs.
- We have sought insight on customer needs, present and future, conscious and unconscious, as well as insight from stakeholders and experts in the areas of our propositions.
- We have followed an 'innovative' six-phase process, recognising the unique and diverse nature of our customer and stakeholder base.
- Our engagement incorporates best practice and learning from multiple industries.
- Our Business Plan commitments have been shaped and revised based on the feedback from our engagement programme.
- We have had effective challenge from our CEG and as a result we have modified our approach.
- Our plan has been substantially shaped by the results of our engagement with changes noted from July to October and again from October to December.
- We have made a long-term commitment to enhanced engagement.

Enhanced engagement

5.1 We have enhanced our engagement with customers and other stakeholders

From our Board, right through to the frontline of our organisation, the strategic importance of high quality engagement with our customers and stakeholders is fundamental to reaching the ambitious nature of our vision.

We talk about setting standards that all of our customers love, but we can only do this if we know what these standards are. Part of our engagement strategy is to devise the right questions to ask, the right approaches to follow and the right audiences to involve, to gain the rich insight needed to confidently identify these standards.

Our Board recognises the strategic importance of effective engagement. It is critical to the long-term commercial success of the business, not only for the reasons described above, but also because our long-term success requires us to influence the behaviours of others. Examples where wider behavioural change is required include our role in defining the future role for gas, supporting the transition to a more sustainable source of heat, as well as in changing mindsets across the industry and of gas consumers, such that we can meet our ambition of never leaving a customer without gas.

We are now a standalone gas distribution business, with new ownership and brand identity. We have the opportunity to significantly transform into a truly customer-centric organisation, where engagement is paramount. We've made several significant steps towards this over the last 18 months; we have appointed our Director of Customer Strategy, raising the profile of our customer engagement strategy at an executive level, and our business transformation programme will geographically align operating model to support a regionally delivered engagement approach, tailored to the needs of each of our networks.

In addition, insights from engagement directly underpin the performance management regime across the organisation and we have invested heavily in our data and technology platforms to improve the quality and quantity of insights received as well as our ability to analyse, interpret and act on these insights.

Our Stakeholder Engagement Strategy has been updated to reflect our new company vision, the strategic direction of the business and our RIIO-2 Plan commitments. The feedback from our 2018/19 Stakeholder Engagement Incentive Submission identified significant improvements on our approach in previous years. The strategic presence of engagement across each layer of the business was noted, along with our regionally aligned delivery model, backed up by a rich data-led analytical capability. Our Stakeholder Engagement Strategy builds on these strengths, along with actions to address the feedback that our Customer Engagement Group has provided, such as how we engage with expert stakeholders to truly embed the importance of high quality engagement across the whole organisation. Our strategy document is contained in **Appendix 05.01**.

5.2 We have engaged with customers and stakeholders on an unprecedented scale

In total, our enhanced engagement programme has included over 180 separate engagement events, using over 100 different engagement activities, involving direct discussions with over 30,000 customers and stakeholders spanning 33 segments or groups.

Figure 05.01: Our Engagement Highlights

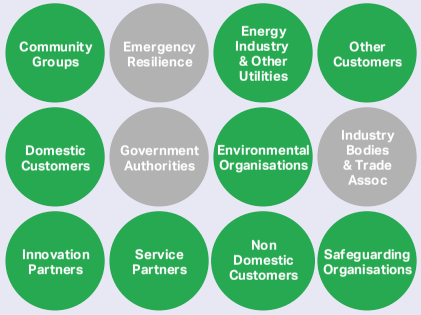
5.3 Our enhanced engagement programme has followed a six-phase process

Our process was based on six phases of customer and stakeholder engagement. It combines these with multiple layers of benchmarking with other organisations and industries, and additional research to capture political, societal, economic and regulatory trends that directly influence the development of our Business Plan.

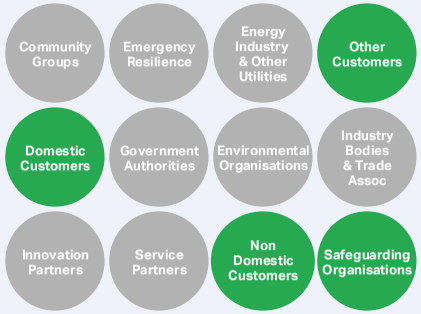
The process was fully joined up with the business as usual work undertaken by our Customer Insights team. This has helped ensure that additional insights gained through the RIIO-2 engagement work were captured and acted on now (where appropriate), rather than waiting for the next regulatory cycle to start. Our engagement process is depicted in Figure 05.02 and a detailed description of this provided in **Appendix 05.02**.

Enhanced engagement continued

Figure 05.02: Our Enhanced Engagement Process

Phase	Engagement Inputs	Segmentation*	Engagement Delivery	Engagement Outputs	Assurance
PHASE 1: BUSINESS AS USUAL INSIGHT	• 20k C-Sat returns • 60k SMS feedback surveys • 26k complaints • 2k social media feeds • 133k customer enquiries • 500k emergency calls • 200 connections surveys with business and bio customers • 20k post-work completion surveys • Engineer feedback from over 2,000 customer site visits • Strategic partner feedback from over 2,000 additional customer site visits		Taking the last 3 years' worth of insights from customers and stakeholders in relation to our daily operations, we were able to identify trends between customer segments, activities, circumstances and satisfaction levels.	• Initial view of customer priorities • Overview of perceived strengths • Overview of perceived weaknesses • Development of three customer outcome areas: 1. Delivering a resilient network to keep the energy flowing safely and reliably 2. Providing a quality experience to all of our customers, stakeholders and communities 3. Tackling climate change and improving the environment	Design of early engagement undertaken with expertise from EQ and Sia Partners
PHASE 2: DISCOVERY	• Regional workshops with 120 stakeholders • Regional interviews with 21 expert stakeholders (e.g. Citizens Advice, Sustainability First, Green Alliance) • Customer deliberative workshops with 200 customers • Focus Groups with 60 hard-to-reach customers • Domestic customer survey with 2,300 customers split regionally • 11 interviews with professionals representing CIVS • Face-to-face interviews with 13 CIVS • GDN collaboration: interviews with 21 national stakeholders • GDN decarbonisation workshop with 72 experts and customers • Workshop with 220 customers re. Willingness-to-Pay potential • Facebook-run public survey response • 4 x fuel-poor focus group workshops – 32 fuel-poor customers involved • Regional customer forums with 200 customers • Business interviews with industry and commerce, and S/M/L businesses • 50 stakeholder interviews with councils, LEAPs, MPs, environmental experts, customer experts • Online community with over 30 participants • Employee engagement with over 800 employees from all departments in the business and representing all levels of the organisation		We designed a structured engagement programme to develop a more detailed understanding of the priorities that sit within each of the three customer outcome areas identified in Phase 1. We undertook comprehensive segmentation analysis to ensure that we gained a wide ranging views from all of our customer and stakeholder segments.	• Identification of a fourth outcome area: Trusted to act for our communities • Input to inform 17 key customer and stakeholder priority areas that sit below the four outcome areas	
PHASE 3: TARGETED ENGAGEMENT	• Desktop research on current services • New services research through customer forums focusing on fuel poverty, customer vulnerability, CO awareness, interruptions, disruption, reinstatement, resilience and safety and GSOPs with over 1,200 customers, experts and stakeholders • Webinars on obligated reinstatement, long term planning, whole system thinking and CO neutrality • Pop-up communities on carbon neutrality, waste, our employees and the environment, air quality measures, • Face-to-face expert meetings regarding off grid communities, the future role of gas and demand-side responses		We developed a more targeted engagement programme around each of the priorities that we identified from the discovery engagement phase. The intention was to explore each priority with the relevant segments of our customer and stakeholder base to identify the themes that sat below the priorities, to allow us to propose output commitments in our July draft plan. We focused on different areas with different segments, bridging gaps identified from previous engagement and considering which segments benefit from each commitment being tested.	• A more comprehensive understanding of the measures and deliverables that customers and stakeholders expect, that sit below each of the priority areas. The use of our hierarchy of needs engagement framework allowed us to ascertain this for different segments/types of customer and stakeholders. • We identified c.45 output commitments, some of which were further tested in Phase 4 – willingness-to-pay	Input from Savanta and BrandWalk. Introduced Hierarchy of Needs Framework and assurance over sampling and segmentation

*Segments coloured green were engaged with during this phase

Phase	Engagement Inputs	Segmentation*	Engagement Delivery	Engagement Outputs	Assurance
PHASE 4: WILLINGNESS-TO-PAY	• Stated preference cognitive groups with 20 customers • Stated preference cognitive interviews with 15 customers • Stated preference survey pilot with 307 customers and stakeholders • Stated preference survey (online and F2F) with 2,000 domestic and 1,000 business customers • Revealed preference focus group with 40 customers • Revealed preference surveys with 800 customers and stakeholders • Network Extension study – focus on experience of customers in interruptions • Benefits transfer – desktop exercise		We worked with a willingness-to-pay research expert organisation, NERA, to develop a programme of customer testing based on stated preference, revealed preference and benefits transfer analysis, that was ultimately triangulated to inform the values that customers placed on certain output commitments that had been identified in Phase 3.	• A view of the costs that customers were willing to pay for a number of the output commitments identified through the previous three phases of engagement • After this phase we were able to develop an initial view of our business plan commitments to build into our draft July Plan.	Independent assessment and assurance provided by WTP expert Professor Ken Willis of Newcastle University
PHASE 5: BUSINESS OPTIONS TESTING	• Quantitative survey with 2,500 domestic and business customers to test options in the July plan • 4 x customer forums with 300 customers • 2 x fuel-poor workshops to test options in this area – with 80 customers living in fuel poverty • Employee workshop to test options with 100 employees • 3 x business customer workshops to test optioneering • 2 x non-English language customer workshops • 4 x future customer workshops • 4 x CIVS and experts workshops • Roundtable expert stakeholder discussions – with 6 parties including Citizens Advice, a gas supplier and a local authority • In depth telephone interviews with customers on trust • 4 x customer deliberative workshops on trust • Regional workshops with customers, on executive pay and transparency		The output commitments developed in July were tested extensively through four main routes: 1. Qualitative and quantitative testing with customers and stakeholders, facilitated by Traverse – focusing on all outcome areas 2. Online and pop-up community testing on environmental outputs working with Verve 3. Quantitative research undertaken to explore options against all outcome areas through our Cadent Voices summer roadshow campaigns 4. Qualitative and quantitative research supported by Britain Thinks in relation to our commitments under the 'trusted to act for our communities' outcome area Where relevant we tested costed options to allow customers and stakeholders to understand the bill impact related to their preferences. Each engagement was targeted across the segments that receive the services related to the options being tested.	• An overall assessment of the output commitments and associated costs built into our July draft Business Plan • Specific preferences from relevant (identified during planning phase of engagement) customer segments and stakeholders against a range of costed options • The outputs of this phase of engagement were triangulated with other phases of engagement to determine a far more informed set of commitments in the October draft Business plan • This reduced the total cost of commitments by c.£30m, changing 17 commitments, adding three new ones and removing four (from the July version)	Approach co-created with research specialists Savanta and delivery partners Britain Thinks, Traverse and Verve
PHASE 6: ACCEPTABILITY TESTING	• Cognitive testing quantitative survey with 100 customers • Customer survey with 4000 customers • Business survey with 500 customers • 4 x uninformed domestic focus group with 64 customers • 2 x future customers focus group with 16 customers • 2 x CIVS focus groups with 16 customers • 4 x fuel-poor focus groups with 50 customers • 4 x customer forums with 120 customers • 50 x business interviews		We tested our plan with customers and stakeholders to assess the acceptability of our overall business plan in terms of its content/quality and its affordability.	• A fully tested plan in its entirety based on an assessment of quality and affordability. Total acceptability from both domestic and business customers was over 83% and unacceptability less than 2%. We weighted our quantitative results higher than our qualitative results due to the scale of engagement although both sets of results were extremely similar.	Engagement programme assurance provided by Savanta and Engagement completeness by Sia Partners

*Segments coloured green were engaged with during this phase

Enhanced engagement continued

5.4 We have embraced a framework that recognises a hierarchy of needs

The framework has been chosen because it is consistent with our vision. Our vision is to set standards that all of our customers love, and the framework is built around the simple concept that not all customer needs are equal. For example, it is not possible to ask customers to simply choose between: safety, or the resilience of future gas supply, or supporting customers in vulnerable circumstances, or issues about environment improvement.

These issues can all be important to the same customer and stakeholder, but they are very clearly different in kind. The understanding that not all customer and stakeholder needs are equal sits at the heart of our research framework.

Our categorisation of customer needs has its roots in established psychological theory – Maslow's hierarchy – drawing on three levels:

- delivering functional needs (core, basic services e.g. security of supply, regulatory obligations and safety);
- meeting psychological needs (customer service, customer engagement and empowerment); and
- creating opportunities for self-fulfilment (broader societal contribution).

Our view of the hierarchy, as it relates to gas infrastructure providers, is based on:

- targeted initial exploratory research to uncover the issues, priorities and needs that are important in people's lives (including those not directly tied to issues of energy supply, so as to provide important broader context); and
- validation of the core themes through survey data, focus groups, a review of historical research (ours and published sources), engagement with our staff and an extensive range of stakeholders, as well as, and importantly, data from customer interactions (e.g. complaints and feedback received through social media).

By engaging in this manner and ascertaining the range of requirements at different levels of the hierarchy, have sought to understand what we must do and how we must operate in order to achieve our vision. We believe that if we can identify and satisfy the needs of our customers at each level of their hierarchy of needs (functional, psychological and fulfilment) then we can be confident that we are delivering the standards that all of our customers love. The following principles were applied when planning and undertaking our enhanced engagement process:

- the layers must be considered sequentially, starting at the bottom – if basic needs have not been met then those above are far less important;
- in separating out basic needs in particular, as these are largely 'expected' by customers, we have an opportunity to learn much more about how we can meet customers' psychological and self-fulfilment needs, thereby improving overall customer satisfaction;
- we can still improve our understanding and delivery of basic needs and thereby reduce dissatisfaction.

5.5 We have sought insight on present and future, conscious and unconscious customers' needs

Throughout the evidence gathering process we have sought to combine stated and revealed sources wherever possible. Our framework is built on an understanding that behaviours in this arena are often not conscious decisions and that increased knowledge often changes decision-making or customers' views and priorities.

The complexity of the issues that need to be considered in order to provide a robust and reliable customer view means we need to consider that the further one goes into the future, the less customers are conscious of the important issues that might affect them, future generations, and their current and future gas supply.

Choices which customers are asked to evaluate and prioritise also meld with their contextual views on the importance of factors surrounding the environment and the potential impact on things such as biodiversity or sustainability. These are issues which people understand are about longer-term changes.

5.6 We have used segmentation and a regional approach to ensure all customers and stakeholders have been heard

We have kept our approach to segmentation under continuous review. We wanted to hear from a diverse and representative sample of the 11 million homes and businesses who pay for or are impacted by our decisions. We have sought to tailor our approach to engagement to the needs and circumstances of all of our stakeholder groups. To develop the sampling framework for domestic customers, we applied characteristics such as age, gender and ethnicity across the population of each of our networks.

We grouped our stakeholders into 12 categories and 33 sub-categories. In the early phases of engagement, it was important to engage widely across all of our segments to ensure that the priorities we built into our Business Plan were representative of all of our key stakeholder segments. As we began to target the engagement discussions (from Phase 3 onwards), we undertook lengthy planning exercises before every individual engagement to consider who we needed to engage with on which topic. This became even more detailed in the business options testing phase, especially when considering the expert stakeholders that it was important to engage with. The 12 stakeholder categories and 33 sub-categories are shown in the figure below and we break down the 12 stakeholder categories that we engaged with during each phase of engagement on the previous page.

Figure 05.03: Customer and stakeholder segmentation

We also engaged with expert stakeholders to inform our commitments. We identified the expert stakeholders in a number of ways. Firstly, the Cadent Engagement Team created their own list based on their general understanding of each of the output commitments in the Business Plan. Each output commitment was then tested by the subject matter experts across the organisation. Additionally, we sought the advice of our delivery partners and also acted on feedback and challenges provided by our CEG.

5.6.1 - Ensuring an inclusive approach to engagement

A key aspect of consideration in our approach to segmentation was how we ensured that our engagement approach was inclusive and accessible to all. For each of our regional workshops we ensured that meeting space including facilities to cater for various disabilities and we asked customers to confirm any special requirements prior to sessions so we could make any necessary arrangements. For specialist engagement events such as engaging with customers who did not speak English we involved translators and changed the materials that we used. We sought feedback after all events to seek ways to improve our events in the future, including any feedback relating to inclusivity or accessibility. These are hugely important factors in our consideration of our ongoing Stakeholder Engagement Strategy (**Appendix 05.01**).

When determining the segments to engage with on each engagement topic, we used the following four criteria:

Table 05.01: Segmentation Criteria

Criteria	Key Questions we Asked
The topic that we are engaging on/aims of engagement	What existing research already exists that we could use? We will not seek to engage with certain groups if this will not provide new/improved insight Who are the main users or interfacing organisations with a service? How wide-reaching is the topic area?
Levels of expertise, impact and interest in the subject matter	Who is/will be impacted by the topic of the engagement? Which time horizon are we engaging on? Are future customers equally important?
Regionality	Is regionality a factor? What level of localisation is required? How can we use our existing regional engagement routes to facilitate RIIO-2 plan engagement?
Influence	How much influence do individuals/groups have on the outcome being engaged on?

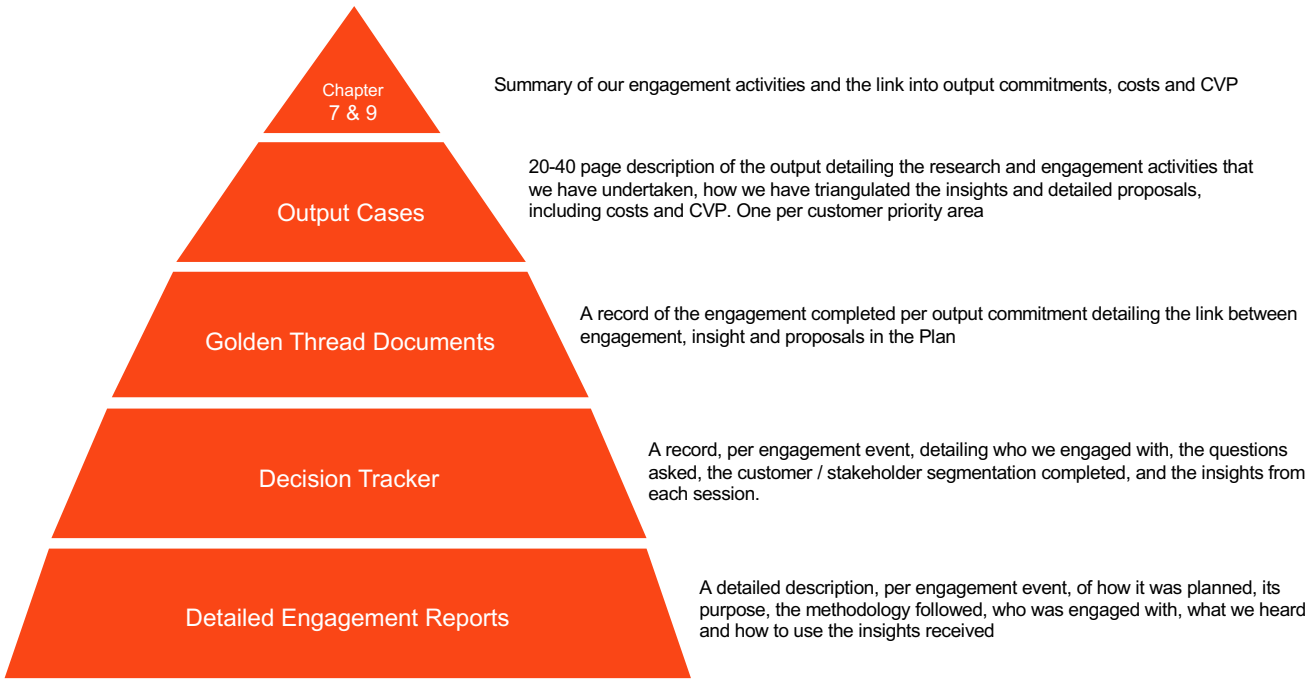
This multi-layered approach to identifying the necessary segments of our customer and stakeholder bases provided us with a high degree of confidence that our engagement model had excellent coverage. It also allowed us to then consider the methods by which we engaged with different segments. We describe our segmentation methodology further in our Stakeholder Engagement Strategy (**Appendix 05.01**).

Additionally, our Engagement Decision Tracker, **Appendix 05.03** contains a list of all of the engagement activities that we completed as part of our enhanced engagement programme, and the segments that we engaged with during these activities, the questions we asked and the insights we received. This document is where we show all of the engagement activities that we have undertaken in one place.

5.6.2 Our golden thread

Figure 05.04 describes the multiple layers of engagement evidence that we have captured in our plan which come together to form our golden thread. This chapter along with chapters 7 and 9 provides a high level summary of the process we followed and how this has informed our commitments. Our output cases describe this in far greater detail, linking the insights received directly to the proposals we have made. This gradually builds up into very detailed engagement event-specific reports. All documents have been provided as appendices to this plan with the exception of 'Golden Thread documents' and the 'Detailed Engagement Reports', because of their size, but these will be made available on request.

Figure 05.04: Capturing 'the golden thread'



Enhanced engagement continued

5.7 Triangulating the results of our research and engagement programme

Our approach to engagement has been iterative where each phase of engagement fed the next and we continued to build evidence and clarity in order to develop our plan, meant that we were continually building layer upon layer of insight and triangulating as we went. Whilst we had a separate engagement team, they worked hand in hand with business experts and those ultimately writing the business plan to ensure that all insights were considered, and the relative weighting/robustness of insights were taken into account when making decisions.

In most cases, as our engagement became more and more targeted it allowed us to determine specific measurements that are important to customers and stakeholders. However, in a small number of cases, the different layers of insights received were conflicting. In these cases, we had to develop an additional process to triangulate the data to determine how we would respond to the feedback. The business subject matter expert responsible for the output case determined where the additional triangulation process was required.

In total, seven of our output commitments saw conflicts between the views of different customer and stakeholder groups that required the additional triangulation step:

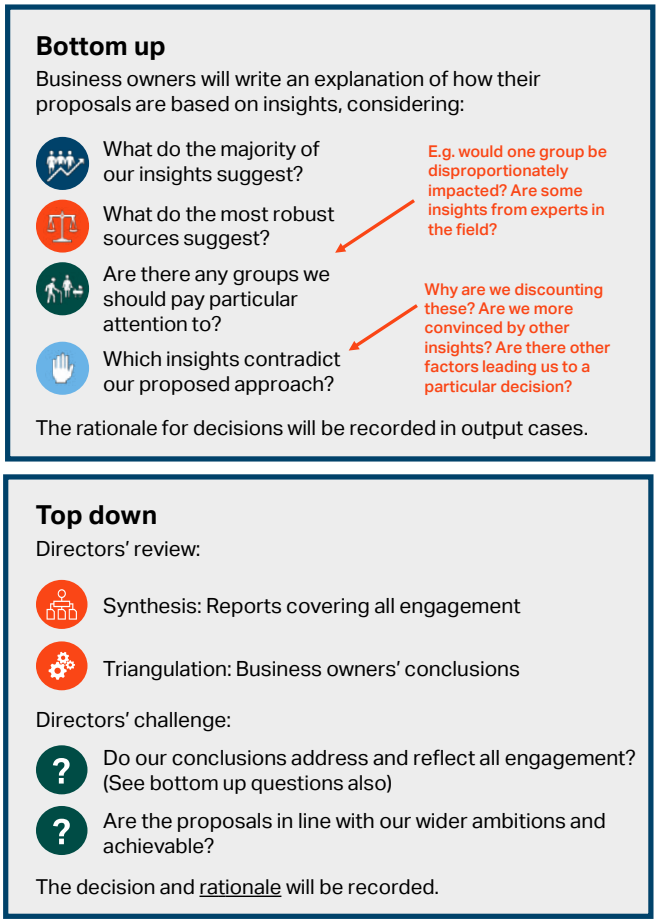
- CO Awareness.
- Tackling affordability and fuel poverty.
- Identifying your needs and joining up support services.
- Interruptions – getting our customers back on gas.
- Going beyond to strive to never leave a customer without gas.
- Supporting off grid communities.
- Becoming a carbon neutral business.

The conflicts differed by output commitment. For example, the main conflict in relation to the CO awareness output commitments was between customer and stakeholder expectations and our capability to deliver the desired levels of ambition. In the space of fuel poverty and PSR awareness, the main conflict is seen between customers' willingness-to-pay (which was lower than that implied by the ambition levels expected by different customer segments), specialists working in these fields (including charities) and many of the benchmarks being set by other organisations.

In each of these cases we followed a two-phase process to analyse each of the data feeds together to synthesise the feedback first on a bottom-up and then on a top-down basis. This process was developed in conjunction with NERA and Complete Strategy who both brought experience and best practice from numerous research programmes. We also asked Savanta to provide a level of independent assurance over the designed process, which they did, confirming that they believed the process to be both robust and a good fit for this specific need.

The bottom-up process considered majority responses, the robustness of each source of insight, whether there are particular groups that require additional attention and compared the insights to the proposals. The robustness analysis, which is described in the 'Assurance' section of this chapter below, applied weightings to certain types of engagement and stakeholder feedback. The top-down approach involved a full day workshop where the business subject matter experts presented the results of the research and engagement exercises to date and explained the conflict(s) identified through the synthetisation of the data to the four RIIO-2 Programme Directors. The Directors weighed up the insights to determine the option that was ultimately tested in our Acceptability Testing phase of engagement. Three CEG members, a member of the PwC assurance team, members of our RIIO-2 Engagement team and a Senior Manager from Complete Strategy also attended the top-down triangulation session.

Figure 05.05: Our two phase approach to triangulation



In order to determine our ultimate output commitments we agreed weighting to be applied to the conflicting aspects of feedback. The relative weighting to insights was not always the same. Whilst in all cases, the results from deliberative workshops was afforded a higher weighting than that from quantitative research such as surveys, we also considered the nature of the output commitment. For example, those relating mainly to the service levels received by end customers were weighted more heavily based on the feedback that customers provided over other stakeholders or political framing. Whereas when considering the carbon neutrality conflict area, more weighting was applied to societal expectations, the views of expert stakeholders and government requirements. We established the weightings through discussions with each of the partners we have worked with to build our evidence base. We used their experience and our understanding of the business to determine the weightings used. The model below shows how the relative weightings were applied, though it is important to note that some discretion was applied in the final decision, especially where other factors required consideration, such as the Board and shareholder strategic agenda, our vision and strategic positioning and the organisation's ability to deliver.

The degree of black in each circle below represents the relative weighting applied and the 'political agenda' category includes aspects such as the UK's commitments on climate change and specific regulatory considerations.

Figure 05.06: Relative weighting of insight in triangulation

Outcome Area	Majority Customer Preference	Specific Customer Segments	Stakeholder /Expert	Benchmarks and Trends	Political Agenda
CO Awareness and Safety Provisions					
Fuel Poverty					
PSR Awareness					
Interruptions – getting our customers back on gas					
Going beyond to strive to never leave a customer vulnerable without gas					
Supporting off grid communities					
Becoming a carbon neutral business					

5.8 Our engagement incorporates best practice and learning from multiple industries

We developed our engagement process by working with multiple research and engagement specialist consultancies. **Appendix 05.04** provides a summary of the consultancy organisations that we have partnered with across our engagement programme.

Our Plan has been developed by combining the insights and feedback received from customer and stakeholder engagement with a comprehensive understanding of good practice elsewhere within our industry and beyond and research and studies developed either internally or by third parties.

Benchmarking has played a significant part in our enhanced engagement process. We benchmarked our engagement process and framework by co-creating it with organisations who are experts in research and engagement, such as Traverse, NERA and Britain Thinks.

We also took the opportunity to review the approach undertaken by water companies during the ongoing water industry price control review ('PR19'). We sought to identify best practice adopted by these organisations. For example, we developed our commitment to be 'trusted to act for our communities', because in our deliberative workshops customers and stakeholders expressed interest in who we were, how we could be more proactive about sharing this information, how we made money and how we spent money. We compared what we heard from customers with:

- engagement exercises undertaken by other organisations (including Severn Trent Water and Amazon who both have relatively well trusted brands);
- additional studies (including Sustainability First's Fair for the Future project); and
- we applied an external lens to consider societal, political, environmental and economic factors.

The third element of benchmarking came when we assessed our commitments and targets against those of other organisations inside and outside our industry. We commissioned Enzen to develop three separate benchmark reports, focusing on sustainability, safeguarding and how companies focus on trust. Additionally, we undertook our own benchmark studies via desktop studies and site visits. The benchmark exercises undertaken are summarised in individual Output Cases and also support our evaluation of our Consumer Value Proposition (CVP) see **Appendix 07.01.00**.

5.9 We applied several layers of assurance over our enhanced engagement programme

5.9.1 Co-creation of engagement plans with leading research and engagement partners

Before commencing with each phase of our engagement programme, we carefully considered who we would partner with to support its delivery by going through a robust procurement exercise. Once appointed, we undertook detailed planning sessions with each partner, using their experience and good practice guidelines to co-create how we would undertake each phase.

5.9.2 Independent assessment over the completeness of our evidence

We asked Sia Partners to undertake an exercise to assess the quality and robustness of the engagement activities undertaken after each phase of the engagement programme. This provided us with a clear understanding of where additional engagement was required or where certain segments of our customer and stakeholder base had not been sufficiently heard. Sia considered the following criteria in making their assessments:

Enhanced engagement continued

Figure 05.07: Robustness Assessment Criteria

Research & legislation	Studies and research, either by third parties or commissioned by Cadent, as well as UK legislation and acts.
BAU & historical information	Information on Cadent's BAU activities and past performance.
Engagement methods	The variety of methods Cadent used to engage with their stakeholders and customers.
RIIO-2 specific engagement	Whether or not, and how many, RIIO-2 specific activities Cadent carried out related to the commitment.
Engagement coverage	The various customers and stakeholder groups that were engaged, as well as regional coverage.
Robustness & relevance of evidence	How robust a source is, and how relevant the feedback and insights are to each commitment.
Industry collaboration	Whether Cadent included industry collaboration for a commitment, as stated in Ofgem's requirements.
Whole system solutions	Whether Cadent considered/engaged on whole system solutions, as prioritised by Ofgem.

Sia's methodology followed four stages: analysing the content of output cases, categorising and converting into the eight criteria shown above, applying a weighting to each category, and finally calculating the overall completeness of the research and engagement activities completed to date.

The final assessment was made after Acceptability Testing was completed and demonstrates robust coverage across all of our outcome areas and output commitments – see **Appendix 05.05**.

5.9.3 We developed a consistent assessment of the quality of the engagement

The model described below was developed by Complete Strategy. It was used alongside the Sia model described above. Whilst Sia's model is run periodically to provide an overall view of the completeness of our evidence, this model is used on an ongoing basis to inform decisions we make, feed into the triangulation approach and identify gaps that need filling. In this model we assessed each source of customer and stakeholder insight against three criteria to measure the overall 'robustness' of the information it contained:

- Was the information collected or updated recently (2017, 18, 19)? This is important since customer preferences and circumstances can change over time and we want to take account of this.
- Was the information collected using a sampling approach or similar method to ensure a representative group (e.g. across all Cadent's regions)? This is important because we want to ensure all customer and stakeholder segments are heard, and that particular groups are not under-represented.
- Was the information collected for the express purpose of the question we want to answer for our Business Plan, or did we infer the answer from information collected for a different purpose? This is important since we want to place more weight on direct statements customers and stakeholders make on a topic, than inferences we can draw from discussions on other topics.

When insights were shared and discussed whilst developing the Business Plan, each source was given a Red/Amber/Green ('RAG') rating to indicate its score against these three criteria (green = 3/3, amber = 2/3, red = 1/3 or 0/3). This information allowed us to make a balanced judgement, based on the number of different sources of insight, and their overall robustness. This assessment is shown against each engagement event listed in our 17 output case Appendices.

5.9.4 We have sought retrospective independent assurance over our enhanced engagement approach at various stages

We engaged with Savanta, a leading research specialist organisation in April 2019 to provide their assessment over our engagement activities to date. They were complimentary about the methods used, reach and breadth of our research and engagement to date and our approach to segmentation. They recommended that we enhanced the structure and narrative of our engagement framework, which we have subsequently done.

Noting that willingness-to-pay is a very complex and highly specialist form of research we asked Professor Ken Willis from Newcastle University, a leading scholar in this type of research, to provide an independent assessment of the work we have completed in this space. Professor Ken Willis completed a similar piece of work for Anglian Water as part of their PR19 engagement process. His assessment of our research programme was positive, noting good practice in sampling, segmentation and in the data triangulation process.

In November we also asked Savanta to formally assess the entirety of our engagement programme. They concluded that they had "been able to provide assurance from top to bottom: we can advise that the overall thinking behind the approach is sound, that the design of individual programmes was rational and that the methodologies were implemented in an appropriate and customer-centric manner. Moreover, we have seen Cadent consistently use industry-leading research techniques to engage customers, primarily through building on and learning from the successes of the PR19 process in the water industry.

We have seen the programme develop substantially in its sophistication of thinking and, just as importantly, in its ability to clearly document the research streams. This has enabled Cadent to demonstrate its extensive coverage of customer views and feedback and ensure they were fit for purpose to feed internal decision-making around the plan and various options. See **Appendix 05.06** for the full report.

5.10 Our Plan has evolved as we have continued to engage

Each phase of our engagement programme has helped us to develop our output commitments. In Phases 1 and 2, customers and stakeholders confirmed their priorities which underpinned four key customer outcome areas. In Phases 3 and 4, we were able to create over forty output commitments that sat within the priority areas. These were the commitments that we documented in our July draft business plan. During July and August, we tested these commitments through our business options testing (Phase 5) and made a number of changes.

The figure below summarises the degree of change at an output commitment level from our July draft Business Plan to our December final submission.

Figure 05.08: Changes made to our outputs based on customer and stakeholder feedback

Business Options Testing and high-level business deliverability assessment

- 4 outputs removed – e.g. rapid reinstatement
- 12 outputs reduced the targets or cost – e.g. Employee volunteering
- 19 outputs remained the same – cost and targets
- 3 outputs changed refocused – e.g. enhanced engagement incentive
- 2 outputs increased the targets or costs - e.g. CO awareness
- Refocussed Trusted to Act for Communities outcome area into our Trust Charter
- CVP Established

Acceptability Testing, CEG challenge and comprehensive business deliverability assessment

- 3 outputs removed – e.g. CO appliance isolations
- 3 outputs added – e.g. Trust Charter annual publication
- 6 outputs refined for costs or targets – e.g. fuel poor interventions
- CVP amended – 6 items removed. 3 added and refocussed around Social Return on Investment (as opposed to customers' willingness to pay

Our detailed Output Case Appendices (see **Chapter 7, Our Commitments**) detail how our commitments have evolved and changed through our ongoing enhanced engagement programme.

5.11 We have been innovative in our approaches to engagement

We identified early on in our process that customers and stakeholders need incentivising to provide us with the quality insights that are critical for us to develop our Plan. In some cases, we have financially compensated individuals and organisations, but in all cases, we have tried to make engagement easy, fun and rewarding. We also recognise that many of the customers and stakeholders that we are engaging with were involved in helping to shape water companies' plans for PR19 and many more are also customers and/or key stakeholders to other energy companies, which are undertaking their own enhanced engagement programme at the same time as us. As such, we built and continually improved a Plan that was designed to be engaging, innovative and worthwhile for customers and stakeholders.

For example:

- Customer Deliberative workshops – these were a first for Cadent, working with customers to inform them about our business and who Cadent are, to enable customers to provide informed feedback and decisions on the services they would like Cadent to provide and what customers' priorities are.
- Revealed preference willingness-to-pay – the first time that these have been used across our industry and offering informed customers the opportunity to engage in an area where the chance to provide input is valued.
- Through the use of virtual reality headsets at customer forums we have been able to bring to life some of the real experiences of our customers, stakeholders and employees in delivering the work that we do. This has enabled more informed and higher quality discussions to be had.
- During the summer, we used a series of videos to bring to life the options that we were presenting to them as part of the business options' testing process.
- Cadent Voices campaign –we ran a number of fun and engaging events during the summer to involve local communities and employees, which we used to share our Plan and seek additional insights from audiences less attracted to more traditional engagement events.
- Employee engagement – We employ over 4,000 individuals, working right across our operational footprint. Our youngest employees join our apprentice scheme from the age of 18 and our oldest employee is 72 years old. Our workforce is made up of individuals following 30 different religions with 12 different languages used as a first language. Over 12% of our workforce is from a BAME background. Engagement with the Plan – we have sought views on our planned commitments from over 200 employees across 14 of our sites. Not only has this enabled us to thoroughly test the deliverability of our Plan, but it has also brought our people along on our journey to significantly improve the customer service levels we strive to deliver.

5.12 We ensured that our Plan has been tested with current and future customers

Our RIIO-2 Plan not only extends to 2026, but also includes several important considerations that extend well beyond this, especially those centred around energy transition and the future role of gas. As such it has been necessary to engage with future customers to future-proof our plans. These have included younger people who are not yet home owners, individuals and communities not currently connected to the gas network and different types of connections customers. We engaged with future customers during Phase 3 of our engagement plan and to an even greater extent in Phase 5 – business options testing.

When applying the hierarchy of needs framework, we noted quite a considerable difference between current and future generation customers. Their priorities differed, especially those in relation to our proposed commitments around sustainability, with future customers placing these lower down their hierarchy (i.e. they saw them as a fundamental part of our delivery), whereas existing customers placed them much further up their hierarchy (i.e. they did not see them as core but rather a psychological need or 'nice to have').

Enhanced engagement continued

5.13 We have had effective challenge from our CEG and the R2CG

5.13.1 We recruited and on-boarded individuals with broad expertise

We have established a CEG with a broad range of experience and specialism to challenge all aspects of our Plan. **Appendix 05.07** provides information on the members of our CEG. We adopted a systematic approach to the recruitment of our CEG, working alongside our chair (and supported by Sia Partners) to ensure we had coverage across all the key areas that they had been asked to consider by Ofgem. We also brought in members who had experience of the PR19 process to bring that learning to our work.

To ensure that each member of the CEG was able to engage effectively, we spent three days on-boarding them. We shared information on how our business operates, how we have performed over time, and in comparison with other gas network businesses, our successes, and the areas of our business where we are seeking to improve. This process provided all CEG members with a good grounding in our business, so they could provide effective challenge from the start.

5.13.2 The reach of the CEG was broadened by establishing CEG working groups

Through early discussions with CEG members, it became clear that it would not be feasible to cover all the areas within the scope of the CEG's work solely through monthly meetings. To get an appropriate level of scrutiny and challenge, we agreed with a recommendation from our CEG to establish four working groups to look at key areas that could have significant customer or bill impact. Members of the CEG were aligned to each working group based on their skills and areas of expertise.

The working groups were established in December 2018 and ran through to September 2019 when we reviewed their effectiveness and continued need with the CEG. In this session we agreed that we should continue with the Finance and Investment working group in its current guise as there was a lot of additional detail to be discussed. However, given the progress made in the other three areas, we agreed to bring the discussions back into the main CEG, albeit supplemented by additional meetings with smaller groups of the CEG as required, to cover very detailed agenda items.

In total we have met with the CEG as a whole 17 times and there have been a further 24 CEG Working Group meetings. Following the October draft plan, the role of the working groups increased to delve into detailed discussions to understand output cases, our CVP, output costs and to focus on the work required to close challenges in each area.

CEG working groups

Table 05.02 CEG working groups

Working Group	Areas of Focus
Future Role of Gas	The purpose of this working group was to focus on ensuring effective stakeholder input into considerations of the longer-term future of the gas network. This intended to ensure that a) stakeholder views are reflected in the company's decisions and the Plan, so it is better aligned to the needs of current and future customers and b) help ensure it is robust, as far as possible, against changing public policy and need.
Finance and Investment	The Finance and Investment Working Group provided independent scrutiny and challenge to Cadent on the content of the Business Plan relating to finance and investment. This included the underlying drivers of cost, the level of efficiency that is achievable, and the level of performance set out in the Business Plan.
Vulnerability	The aim of the Vulnerability Working Group was to support the work of the main CEG in relation to inclusive services, safeguarding and fuel poverty with a particular focus on ensuring Cadent's approaches in these areas are well targeted, efficient and effective.
Research and Engagement	The aim of the working group was to understand Cadent's position relating to research, customer and stakeholder insight, data strategy and engagement, including how objectives are set and how the outcomes from this are measured and managed.

5.13.3 We maintained an open, honest, supportive approach and welcomed the challenge from our CEG

We were determined to use the challenge they provided to grow as a business, so we could deliver the right outcomes for our customers and stakeholders. We involved the CEG from the beginning of our business planning process by sharing our initial draft versions for review and challenge. We explained how we had improved on each iteration of our Plan, reflecting the input they provided. We did this in a number of ways including maintaining a log of all recommendations provided in relation to each version of the plan, and how the plan was iterated or changed based on this feedback at each stage. This was completed in addition to maintaining an audit trail through the challenge log.

5.13.4 We have acted on the challenges raised by our CEG

To date our CEG has raised over 200 separate challenges. Whilst the challenges span all areas of the Plan, the main themes include:

- Our approach to engagement: in particular ensuring that we can demonstrate a golden thread that links the engagement activities we have undertaken to insights, and ultimately commitments in the Plan.
- Vision and strategy: in particular providing clarity around these and demonstrating how our Plan directly links in.
- Future role of gas: especially being firmer around the societal role we have to play.
- Being a responsible business and demonstrating commitments throughout the plan.
- Affordability and vulnerability and our stated ambition level.
- Network resilience: to be clearer how we have engaged and linking this to our proposals.

At the time of writing our July Business Plan submission, less than ten challenges had been formally closed, and when we submitted our October draft Business Plan, more than 40 had been closed. At the time of writing this Plan a little over 100 have been formally closed by our CEG although we believe that almost all will be closed once the CEG have completed their review process as we have provided evidence to demonstrate why we believe these challenges have been addressed. We believe a small number (below 20) may remain open for delivery in early 2020. The CEG will publish a copy of the Challenge Log along with their written assessment later in the month.

5.14 The challenge from our CEG is not only influencing our Plan, but also our business operation today

A large proportion of the challenges provided by the CEG relate to our RIIO-2 Business Plan. However, in some cases, we have already responded to challenges by improving how we operate today. Examples of changes made as a result of CEG feedback include:

- We have developed a new vision statement reflecting feedback that our previous version lacked ambition, was ambiguous and uninspiring. We have created our new vision through engagement with the CEG, over 100 employees, our Executive team and Board members, plus a number of customers and stakeholders. It was rolled out to the wider organisation in May 2019 at a leadership conference that focused the organisation around the need to prioritise customer outcomes.
- Our enhanced engagement programme has been revised to that described in this chapter, through active challenge at the Research and Engagement working group, including:
  - Bringing in additional expertise to the organisation to help shape our framework and approach and provide assurance through the programme
  - Our approach to segmentation and representation, specifically ensuring that the voices of business customers and expert stakeholders are heard and responded to
  - How we have captured the golden thread between how we have engaged, the insights we have received and our commitments
  - Specific improvements during each stage of engagement (for example how we test acceptability related to uncertainty mechanism, how we triangulate the various levels of insight, how we document our evidence and how we weight the relative significance of different sources of insight)
  - Our business options testing approach was expanded, based on a challenge that our plans were too focused on end customers and did not have sufficient focus on business customers and other stakeholders.
  - Attendance at a large number of specific engagement events and post-session feedback (as was the practice at every single event) to continually improve the processes we followed
  - Input into our ongoing stakeholder engagement strategy including its reach, strategic join across the organisation, segmentation approach and the development of output commitment specific engagement plans
  - Suggesting that we could gain additional value from the range of quantitative data we have collected through our Enhanced Engagement programme, by applying deeper analysis of this data, and whether we could overlay other datasets to give greater insight. Our Customer Insights team are considering this for application during RIIO-2 and in support of preparations for RIIO-3.
- We have strengthened the definition and widened the focus of our MOBs customer strategy.
- We have stretched the ambition level underpinned by our Environmental Action Plan.
- We have clarified and focused our customer vulnerability strategy, creating a clearer aim and established processes and actions by which it will be delivered.
- Our Future Role of Gas focus and leadership role has been clarified and our strategic positioning changed.
- We have amended our website to be more accessible and inclusive, including being multi-lingual and putting sign language overlays to demonstration/advice videos online; we are also planning on removing the charge associated with our general enquiry phone line to make it more inclusive.

Enhanced engagement continued

5.15 We have noted some divergent views between ourselves and the CEG

Throughout the process the CEG have raised challenges relating to areas of our Plan and the processes that we have followed, especially relating to our enhanced engagement programme. In a small number of cases either a challenge has 'timed-out' or we have questioned the legitimacy or relevance of the CEG challenge. This is an ongoing process and at the time of writing this, we have not seen the CEG's final assessment report which could lead to additional areas of disagreement.

The CEG have, on several occasions held different views to us over our strategic approach to certain areas. Examples of these include:

- Our vision statement – which we have subsequently revised, based on feedback from the CEG and engagement with customers, stakeholders, our shareholders and employees.
- Our ownership of the challenges associated with MOBs – which we have clarified through several focused deep dives and site visits and a clearer articulation of our approach in later versions of our Plan.
- Our articulation of our innovation strategy – which we have revised quite considerably since the CEG's first sight of this.
- Our enhanced engagement process – which we have continually reflected as we have developed it throughout the process.
- The level of detail captured in Output Case definition documents – we have updated our output cases to strengthen our evidence, in particular the engagement we have undertaken and how we have established our targets.
- Specific details relating to output commitments – for example the CEG challenged us to add an additional bespoke output commitment to our 'interruptions' output case, based on the volume of interruptions. Whilst we have referenced that in principle we agree with this suggestion in the output case, we do not believe that it is possible to measure this as well as the current proposed common measure, without driving unintended and potentially negative outcomes for customers.
- Our CVP determination criteria was challenged and we made it far clearer providing additional evidence into the Plan. In a small number of cases the CEG challenged the content of our overall CVP. In most cases we agreed (e.g. initially a number of commitments made in our Trust Charter were included in our CVP and they have since been removed from it).
- Our approach to engaging on cyber security and network resilience, in which we have engaged primarily with regulators and expert delivery partners rather than extensively with end customers due to the limited scope for change and the relative complexity of the subject matter.

If there are additional areas of divergent views noted after the CEG issue their final assessment, we will consider these and respond if required through the open hearing process.

5.16 The RIIO-2 Challenge Group ('R2CG') has provided feedback throughout the process that we have responded to

Following their review of our draft Business Plan in July, the R2CG provided us with feedback including a number of challenges, which we have responded to. They noted several areas where our July Plan was not fully compliant with Ofgem's requirements, for example we had not included details about our customer vulnerability strategy or our ongoing engagement strategy. In the main, these and other omissions were due to the small time window between receiving the guidance document at the end of May and submitting the Plan on 1 July. Most of these gaps were closed when submitting our October Plan and all have now been addressed, along with further feedback provided by the Group in relation to our October submission. A full list of feedback points raised and our response to these can be found in **Appendix 01.01** How we have responded to CEG and R2CG feedback.

5.17 We have made a long-term commitment to enhanced engagement

Our Plan has been heavily shaped and influenced through our enhanced engagement process. It has provided us with confidence that by delivering against the commitments we have made, we will be taking positive steps towards our vision – to set the standards that all of our customers love and others aspire to.

As stated in the introduction of this chapter, if we are to achieve this vision, we will need to ensure we stay close to our customers and our stakeholders, as engagement is fundamental to our business strategy. We are making a firm commitment to continue with our enhanced engagement. This will take several forms as listed below. The details of our ongoing engagement plan can be found in our Stakeholder Engagement Strategy, which is provided in **Appendix 05.01.**

Our ongoing commitments to enhanced engagement have been developed based on our learning from RIIO-1, input from our CEG and the benchmarking we have undertaken with other utilities, in particular water companies based on their PR19 submissions. Our strategy is consistent with our customer strategy and ongoing transformation programme, establishing an approach that is overseen and coordinated centrally, and delivered and owned locally.

The core elements of our ongoing engagement commitments are:

- Business as usual Insights – we will continue to undertake this work, which is centrally coordinated through our Business Insights Team but with enhanced capabilities, through the investment we are making in AI and machine learning, and in our people's capabilities during RIIO-1.
- Establishment of customer and stakeholder groups – Building on the learning from the RIIO-2 engagement programme, our intention is to continue engaging, on at least a quarterly basis in all regions, to check how we are doing with our commitments and to capture evolving areas of interest or challenge throughout the RIIO period. We will refresh our community every year to ensure we keep a broad customer base across our networks.
- Evolution of the Customer Insights Forum – Becoming an integral part of Cadent's performance management governance process, including Board level reporting.
- Regional Stakeholder Groups – We have repurposed our national Stakeholder Advisory Panel to create four network aligned, regional stakeholder groups. These are evolving as we establish even more localised forums that are driving more specific and relevant action plans. Where possible we are leveraging existing groups, such as our ongoing engagement with Local Area Energy Plans ('LAEPs').
- Cadent's Customer Engagement Group ('CEG') – We will continue to operate with an externally appointed and independent CEG, with rotating membership, to ensure continued fresh challenge and insight. As part of our commitment to ongoing engagement we have proposed a reputational ODI in which we will publish progress against the commitments in our stakeholder engagement strategy, which will receive input from our CEG, our Customer Forum and relevant regional stakeholder groups.
- Online Forum – noting the success of the pop-up community engagement events that were ran online as part of our RIIO-2 enhanced engagement programme, we will invest to establish an ongoing means to engage with customers and stakeholders through this method.
- Stakeholder Engagement Incentive Scheme – evolving to focus on the important area of future energy scenario development and whole system solutions.
- Brand Awareness – building on customer feedback and focused around supporting the delivery of output commitments in the Plan.

- Filling our expertise gap – as we develop our internal engagement capabilities we have worked with a number of consultancies to support our overall delivery. We are investing in training our own staff during RIIO-1 to ensure we have the skills to continue to engage with stakeholders on an ongoing basis.
- Stakeholder Engagement plans developed for all output commitments – in our Stakeholder Engagement Strategy we show how engagement is critical to the delivery of all our output commitments. Our strategy aligns with our innovation, MOBs and customer and customer vulnerability strategies, which all focus on how robust and structured engagement underpin successful delivery.

5.18 Measuring the added value and costs of ongoing engagement

We will measure the value added through our ongoing engagement programme in a number of ways which are described in detail within our Stakeholder Engagement Strategy. Primarily, as described in our ongoing Stakeholder Engagement Strategy, we cannot deliver the commitments in our Plan without carefully considered and thorough engagement, so in measuring our delivery against our output commitments, we are also measuring the success of our ongoing engagement activities. However, additional measures that we will apply include:

- Calculating the Social Return on Investment (SROI) – using our proven methodology that we developed alongside Sia Partners. We have used this extensively over the last year to prioritise the engagement initiatives that we have rolled out, including our continued funding of CO awareness and fuel poverty schemes, that often go beyond our regulatory requirements. This will be our primary method to assess which initiatives to prioritise during RIIO-2 and the one we use to measure their success.
- Cost Benefit Analysis – some engagement activities do not lend themselves to using the SROI methodology. In these cases, we typically seek to apply a more traditional cost-benefit analysis approach, which is also used to justify and prioritise the actions that we take (and ultimately assess the benefit of the engagement).
- Stakeholder Engagement Incentive Scheme (SEIS) – we are proposing an evolution of the current stakeholder engagement incentive scheme which encourages networks to clearly articulate the benefits associated with engagement activities. For RIIO-2 we are proposing that the SEIS focuses on whole system solution initiatives and those related to energy transition.
- CEG and regional stakeholder groups – continuing to operate the CEG and regional stakeholder groups will ensure ongoing challenge and review, which will add a further level of measurability over our engagement benefits. It is difficult to place a financial measurement of the value that the CEG and regional stakeholder groups have provided us with in developing our RIIO-2 Plan and therefore what we expect during RIIO-2. However, the diversity of expert views has fundamentally challenged and impacted our Plan, which can be seen by the changes we have made, providing benefits to customers, our communities and our business.
- We have defined an engagement strategy for each of our output commitments and these are documented in our Stakeholder Engagement Strategy. In measuring our delivery of each output commitment, where possible we will seek to understand the value added through our engagement activities.

There is a cost associated with our ongoing engagement commitments. Much of the cost will be spent in RIIO-1, through the investments we have made and will make, on data, technology and upskilling our people. Other costs, such as the running costs of the Insights Team and Forum and those associated with the SEIS, represent non-incremental costs as they are being delivered today and are a core part of our performance management and governance regime. However, there will be ongoing costs associated with the CEG and regional stakeholder panels, the online forum and brand awareness campaigns. The total costs of these initiatives are expected to be approximately £2m a year, which includes the employee costs associated with those directly leading on engagement activities, but excludes the costs of employees who are indirectly supporting engagement activities. Given the intrinsic link between high quality engagement and our ability to deliver all of our Plan, the reality is that we will spend considerably more on engagement activities that are operated locally by employees across all our regions. Engagement needs to be seen as a part of all employees' roles, just as other activities such as budget management, line management and performance management are.

6

Net Zero and a whole system approach

This chapter sets out how we are responding to the urgent need to decarbonise the energy system, on the road to the UK's Net Zero emissions target. It describes how we are applying whole energy system thinking to support decarbonisation and the energy system transition, and wider stakeholder driven environmental and economic considerations, including clean air and economic growth. We also explain how we are using whole energy system thinking to drive innovation.

We show how we are preparing for a range of outcomes resulting from different decarbonisation pathways. This includes the work we have done on a pathway where energy efficiency and clean gas could combine to deliver the climate change targets, and how we are determined to drive this transformation to secure a 'Net Zero' future.

This chapter has the following structure:

Key messages

- It is critical that we maintain momentum in delivering pathways which will contribute to meeting the UK government's climate change targets. We recognise the critical role that gas networks will have to play, given that these networks currently transport a predominantly fossil fuel product.
- We have been taking a leadership role in innovating to facilitate renewable gas producers to inject biomethane and BioSNG into the distribution network. We are exploring and developing the potential for hydrogen to be transported to our customers through our landmark HyNet and HyDeploy projects.
- We set out the timeline of the engagement work we are doing in conjunction with the other energy networks to provide tangible long-term solutions for clean gas, such as hydrogen conversion, hydrogen blending and renewable gases across our regions, including the commercial and regulatory frameworks that will be needed to support this.
- We set out our strategy on delivering whole system solutions across all four of our customer outcome areas.
- We set out our commitments to develop joint planning offices with electricity networks to support regional authorities with their plans, as well as optimising capacity between the transmission and distribution networks.
- We are proposing a stakeholder incentive to encourage further innovation and ongoing development of whole system solutions.

Net Zero and a whole system approach

6.1 The Net Zero challenge

The UK has already committed to reduce greenhouse gas emissions by 80% by 2050 from 1990 levels, and the government has now legislated to deliver a Net Zero target by 2050 based on the Committee on Climate Change's ('CCC') recommendation. The scale of this challenge is immense and urgent action is needed in the next few years to ensure pathways are available to deliver a low cost, secure and sustainable energy transition.

The core areas where we are taking steps to create such pathways are heat and transport. The CCC recognised in their recent report the key role lower-carbon gas and hydrogen could play in decarbonising heat. We have long been a leading voice, ensuring the gas network is playing a full role in the journey to decarbonise the whole energy system. We have always believed, supported by increasing research and studies, that there are no credible future low-carbon energy scenarios in which the gas network is not playing a vital role.

The needs of our customers and stakeholders have always been clear: that decarbonisation must be achieved at the lowest cost and with minimal disruption, both at home and in their communities.

The decarbonisation question we have sought to address has therefore been to identify how the gas network can help to unlock the lowest cost and least disruptive pathway to the decarbonisation of heat and transport.

6.1.1 Our engagement strategy and approach

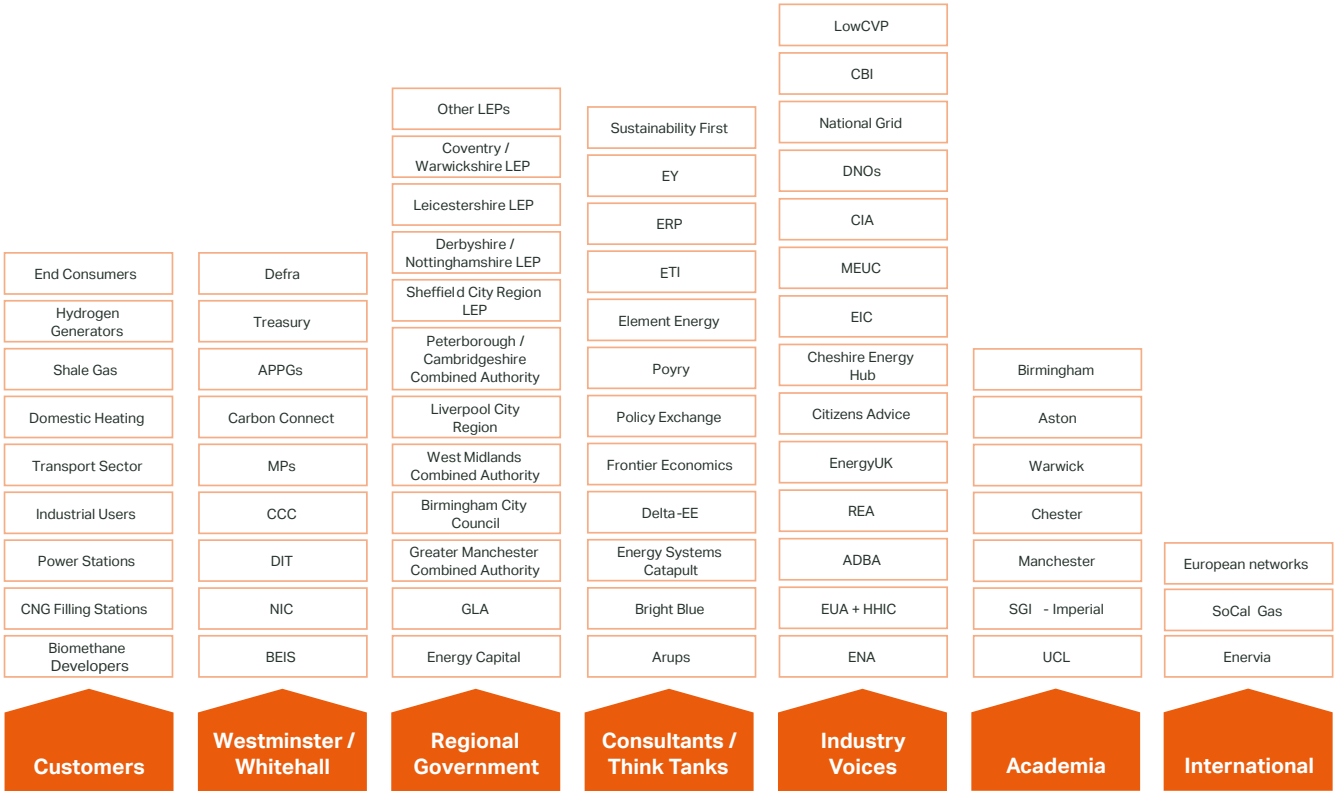
Our engagement approach has been to:

- Identify the opportunity
- Demonstrate the potential
- Support the enabling policy
- Facilitate and deliver

We have sought to do this collaboratively with the other energy networks and involve a wide range of stakeholders. The charts below show the breadth of our engagement and the types of channels and methods we have used to support the four goals above.

Figure 06.01: Breadth of Stakeholder Engagement

Our stakeholders



Net Zero and a whole system approach continued

Figure 06.02: Our future energy engagement

Our future energy engagement

Studies	Events	Innovations	Educate and Inform	Media	Memberships
Hydrogen	Trade Missions	Future of Gas Networks	Future of Gas	Print	Strategic Infrastructure Board
Heat	Sponsorships	HyNet	Advise on Air Quality	Interviews	High Level Infrastructure Board
Freight	Presentations	HyDeploy	Advise on Transport	Blogs	
Transport	Conferences	Future billing methodology			
Future Networks	Forums	Whole system modelling			
Infrastructure	Regular meetings				

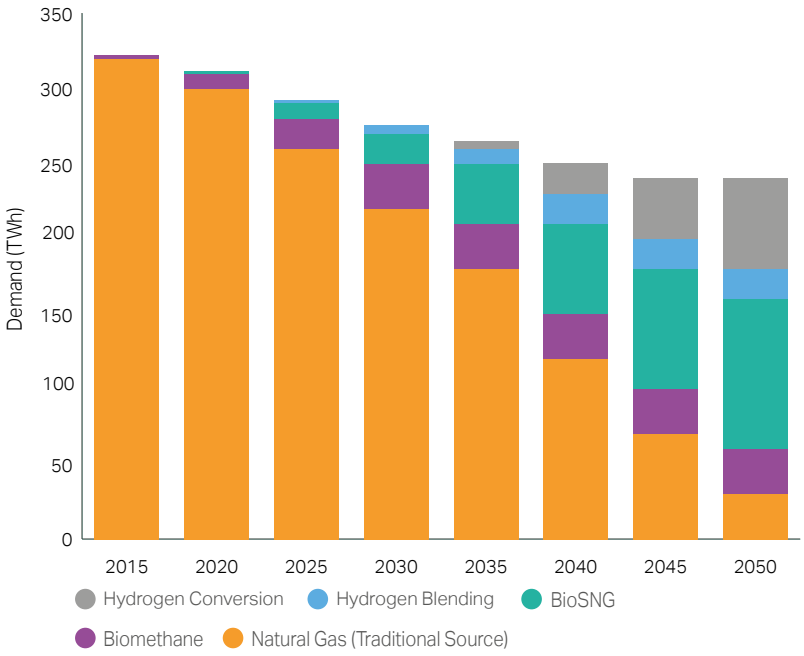
We engage widely on the energy systems transition through a mixture of national and regional engagement. We are actively supporting regional authorities and local enterprise partnerships to develop their Local Area Energy Plans. We are also active members of several government sponsored groups such as the Carbon Capture and Usage Advisory group as well as the Hydrogen Transformation Strategy group involving BEIS, Ofgem and the other gas networks. We are engaged with a wide range of academia and think tanks in developing evidence to support policymakers on the costs and practicalities of different decarbonisation pathways, in particular supporting Policy Connect's work and Imperial College's Sustainable Gas Institute research.

A significant challenge in delivering the Net Zero challenge will be consumer attitudes and behaviours towards heat decarbonisation given, unlike power decarbonisation, changes will affect people in their homes and require action of some sort with disruption and cost implications. We explored this issue in our Future of Gas series described below, and we are testing consumer attitudes to hydrogen transition through our HyDeploy blending projects at Keele University and with industrial customers attitudes through our hydrogen transformation project HyNet. We also explored general attitudes to heat decarbonisation in our customer forums as part of our tailored engagement approach. We continue to support the government through the Hy4Heat programme which is looking at trials to explore consumer issues and we will also support this through our off-grid community innovation project. We have identified consumer behaviours as a key theme for our innovation strategy and we will be looking to explore the practical issues and realities of the transition to Net Zero through further work in this area.

As the challenges of decarbonising heat and transport were not well understood, we published a series of discussion documents, starting in 2015, to help engage stakeholders and raise awareness to encourage a wider industry debate. The final document in this series is included in the references. It summarises the research findings around the topics of customer demand, transport, renewable gas and heat.

The summary from this work sets out a pathway of how the gas network could evolve to deliver a decarbonised solution for heat and transport as illustrated below:

Figure 06.03: The pathway to 2050



6.1.2 Our decarbonisation journey

The emergence of biomethane

Almost ten years ago we took the first steps to supporting the emerging biomethane industry, working with government to establish the Renewable Heat Incentive ('RHI') to support green gas injection into the gas grid. Our aim was to encourage the use of biomethane from anaerobic digestion. We worked to remove technical barriers and to establish an effective financial support mechanism through the RHI. We have also lobbied to encourage changes to wider energy policy to direct feedstocks from less efficient combustion to the production of lower emission and more flexible green gas.

This has been a great success, with an impressive step-change in the amount of low-carbon biomethane coming on to the gas grid across the UK. We now have 32 biomethane plants connected to our network with a capacity of 2.28 TWh/annum delivering 0.5% of total demand through renewable gas. There is still much more work to be done to build on this strong start and enable and facilitate the full potential from biomethane.

Bio-synthetic natural gas – turning black-bag waste into energy

Whilst biomethane is low-carbon, low cost, and reduces emissions with no consumer disruption, we knew that the scope for biomethane was limited by feedstock availability. We saw the potential from a new technology: BioSNG. This could create flexible Syngas, producing either hydrogen or methane, from the more abundant drier waste and non-waste feedstocks, including black-bag waste. We supported an initial pilot project at Swindon which successfully demonstrated each component. We then invested in a larger commercial demonstrator project. This project, supported by Ofgem's Network Innovation Competition and funding from the Department for Transport ('DfT'), has shown the challenges of gaining commercial agreement to significant investments during the innovation development stage and the risks that investors face.

The Swindon project continues to show the support for this emerging technology, and learning from the project has driven further development of the technology and supporting commercial models. We would welcome amendments to the innovation funding mechanism to respond flexibly to changes in external partner funding.

To understand the potential for green gas, we commissioned a **report from Anthesis and E4Tech** to identify the potential for biomethane and BioSNG from indigenous feedstock. This showed the UK could produce up to 180TWh of green gas in 2050, which is sufficient gas to supply 50% of homes in the UK.

Exploring the commercial regime

To take forward the discussion in supporting policy, in parallel with the technical demonstration, we commissioned EY to produce a report which assessed the best options for a financial support mechanism for BioSNG to enable large-scale roll out. This was published in 2018. Please see **Appendix 06.02**.

In parallel with the support for low-carbon alternatives to fossil natural gas, we have also considered the role of the gas network to reduce emissions from other sectors. The transport sector, whilst focusing on electricity for smaller vehicles, did not have a credible alternative to diesel for larger vehicles. We could see the potential for the existing gas network to support a large reduction in emissions from HGVs via the use of Compressed Natural Gas ('CNG'). We partnered with CNG Fuels and John Lewis to commission the first high pressure filling station near Preston and ensured a quality evidence base was built up so that the benefits were unequivocal. We established, with the help of Energy & Utility Skills and the EUA, the Natural Gas Vehicles Network, which brought together representatives across the supply chain to coordinate work and insights into potential for this technology. Through these partnerships, we successfully lobbied the Treasury to establish and maintain a fuel duty differential to support fleets switching over to CNG. There is now a healthy pipeline of new CNG refuelling stations being developed across our network, with manufacturers confident to develop the vehicles. We are also considering how this sector could subsequently transition to hydrogen in the longer term.

6.2 The road to zero emissions – a clean gas pathway

Biomethane and BioSNG can deliver a huge reduction in carbon emissions, but they cannot take us to or beyond our current carbon reduction targets. This requires the replacement of natural gas, with a zero or negative carbon alternative. The only candidate to fill this role at scale is hydrogen.

There are many engineering and other challenges associated with replacing natural gas with hydrogen in our network, and there is the potential for the introduction of hydrogen to result in disruption. Working alongside government and the other gas networks to understand the work required to repurpose the gas network for hydrogen, we have also led the work to show the merits of hydrogen blending. We developed and launched the HyDeploy project, which was designed to show how much hydrogen can be added to methane without requiring any changes to consumer appliances.

This would deliver a further step-change in carbon emission reductions beyond those from biomethane and BioSNG and would also enable the hydrogen supply chain to develop, prove itself, innovate, identify whole system interactions, and reduce costs. As well as the HyDeploy project, and to enable faster implementation, we are including a commitment relating to the implementation of an operational hydrogen blending regime in the **Environmental Action Plan** section of Our commitments.

To demonstrate the potential for hydrogen, as well as our work with government and the other gas networks to understand the impact of re-purposing the gas network, we have also listened to our stakeholders and identified the HyNet project as a strong candidate for the first hydrogen/Carbon Capture and Storage ('CCS') cluster in the UK. This project is primarily aimed at establishing a credible decarbonisation option for heavy industry, but would also provide a low-carbon fuel for transport, power generation and for heating. This is discussed in more detail in our **Environmental Action Plan (Appendix 07.04.00)**.

We are constantly engaging and responding to our stakeholders, and in 2018, government and BEIS challenged the gas networks to produce a coherent pathway to decarbonise gas, bringing together all the activities across different companies into a single credible strategy.

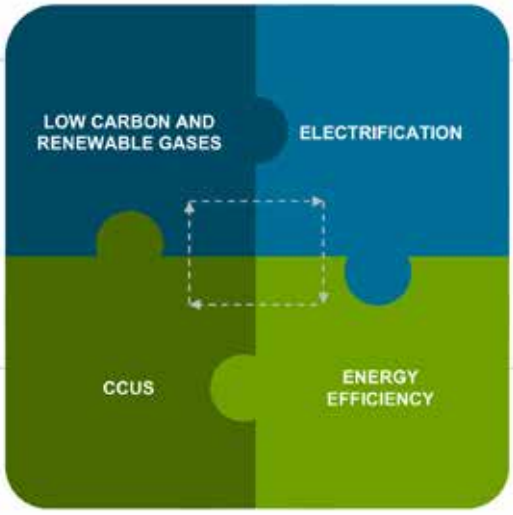
To determine a clear pathway to Net Zero, the Energy Networks Association commissioned a report by Navigant, which was published in October 2019 see **Appendix 06.03**.

Net Zero and a whole system approach continued

Figure 06.04: Gas pathways core elements

LOW CARBON AND RENEWABLE GASES
will be fully integrated into the GB energy system. By 2050, all gas end-users will be supplied with hydrogen and/or biomethane. Hydrogen will be produced by natural gas reforming, creating the basis for hydrogen clusters, and by electrolysis using renewable power (both dedicated and curtailed generation). Biomethane will be produced by anaerobic digestion and thermal gasification.

CARBON CAPTURE, UTILISATION AND STORAGE (CCUS)
will be needed to reduce emissions from hydrogen production and industrial processes. It will also provide "negative emissions" when combined with certain bio-energy technologies.

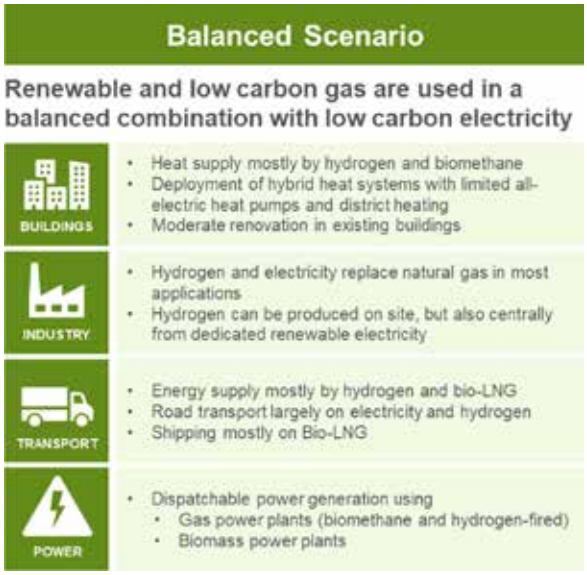


ELECTRIFICATION
will occur across the demand sectors. Most road transport will be electrified, as well as short-distance shipping. There will be electrification of low-temperature industrial processes. According to our analysis, hybrid heat systems – an electric heat pump paired with a low carbon or renewable gas boiler – will be a key technology for decarbonising the buildings sector in a cost-optimal way.

ENERGY EFFICIENCY
will need to improve across GB, particularly in the buildings sector as a complement to electrification. Renovation measures such as loft insulation and high-performance glazing will be deployed to bring the majority of buildings up to a moderate level of energy efficiency.

The Navigant work has been supported throughout by extensive stakeholder engagement, including with energy networks, energy suppliers, appliance manufacturers, trade and consumer representatives and academia. The study was based around four core elements:

Figure 06.05: The navigant balanced scenario

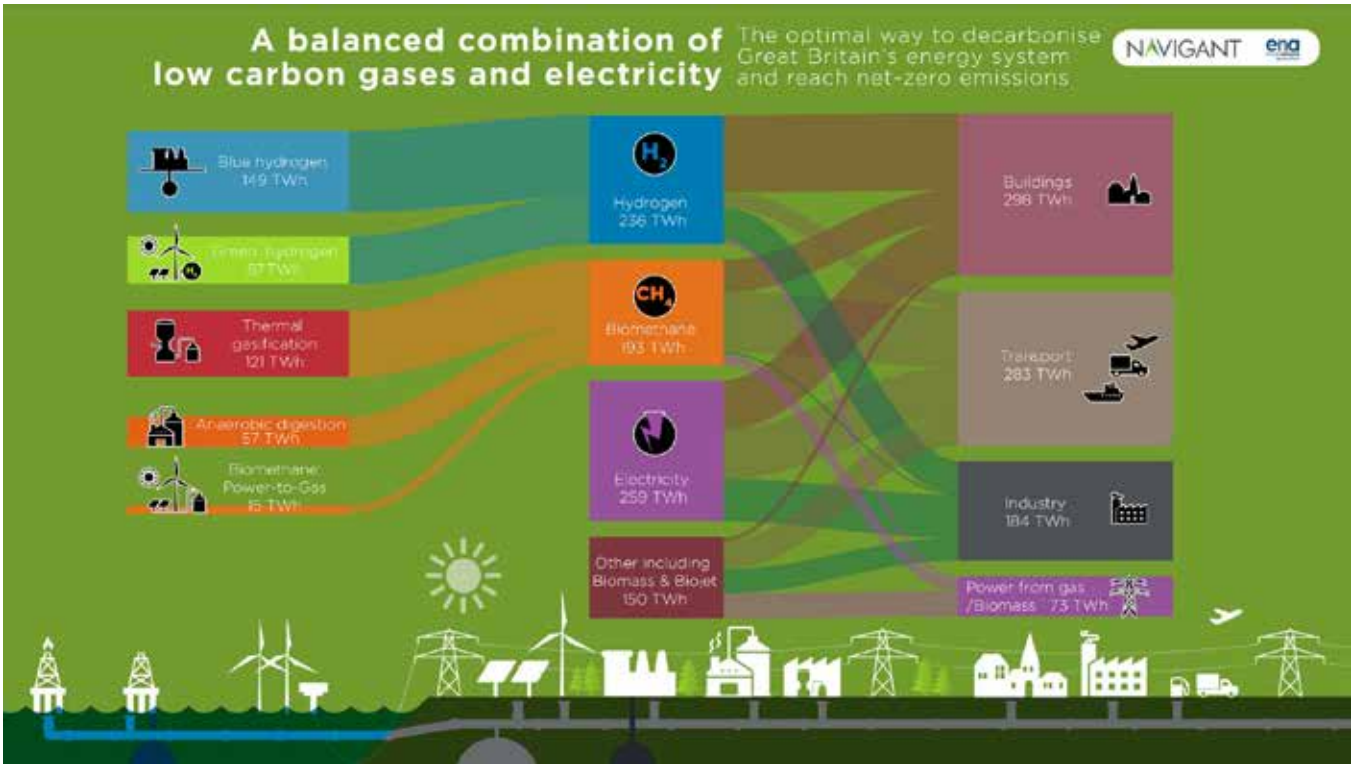


The Navigant work found the Balanced Scenario represented the lowest cost pathway for the energy networks to achieve Net Zero by 2050.

It shows how the first steps to Net Zero involving biomethane, BioSNG and hydrogen blending can be expanded, and with hybrid heating systems, and hydrogen production, progressively move the UK on to a clean gas economy.

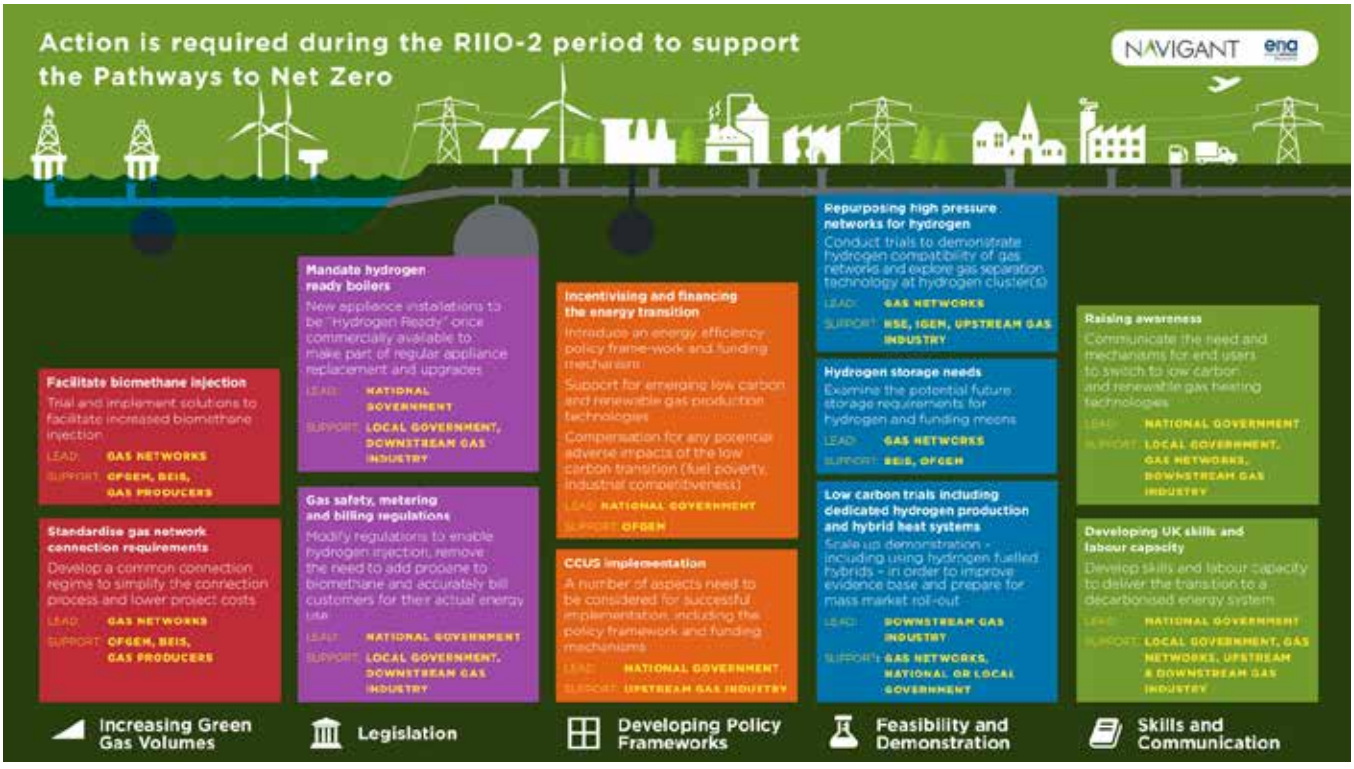
Their approach moves ultimately to 100% hydrogen in large areas, grown from the initial hydrogen/CCS clusters, and with blends of green gas in areas further away from where hydrogen production is viable.

Figure 06.06: The role for gases in the navigant balanced scenario



Navigant then set out the actions required to support the delivery of the Net Zero clean gas pathway, highlighting the actions that needed addressing within the RIIO-2 period.

Figure 06.07: Low regrets actions to support the Net Zero pathway



Following the publication of the Navigant report, the gas networks are now assessing the coordinated programme of work to deliver the required next steps. Some areas will be led by the gas networks, and in others, we will work with the ENA to influence government, Ofgem and other key stakeholders.

Net Zero and a whole system approach continued

There are many areas however where we have already recognised the need to take action, including filling evidence gaps. How we are supporting these actions, either with work already in progress, or within our RIIO-2 Business Plan, are summarised below.

Table 06.01: Cadent's supporting initiatives

Action	How this is supported by Cadent
Facilitate Biomethane injection	Entry enablement and ongoing Distributed Entry Gas Stakeholder Forum
Standardise gas network connection requirements	Entry Gas Connections Standard and ongoing Distributed Entry Gas Stakeholder Forum
Gas safety, metering and billing	Future Billing Methodology project is designed to identify a solution to remove the need to propanate. The Distribution Entry Gas Stakeholder Forum can propose supporting changes to the industry framework.
CCUS Implementation	We have been key members of the government's CCUS Task Force.
Repurposing high pressure networks for hydrogen	All networks are involved with H21 re-purposing. We also have existing innovation projects looking at hydrogen purity and de-blending potential to separate hydrogen from a hydrogen/methane blend.
Hydrogen storage needs	Innovation projects can support this, with NTS expected to take the lead
Low-carbon trials	Innovation projects and heat policy re-openers. BEIS Hy4Heat project will oversee hydrogen trials
Raising awareness	RIIO stakeholder plan, informed by trials and pilots supported by the innovation mechanisms

6.3 Preparing for different Net Zero scenarios

Whilst the work by Navigant shows a credible pathway to Net Zero, there are a range of possible pathways and destinations for the gas network when we look out to 2050. We have assessed the four pathways that BEIS are exploring as government develops its heat strategy. These options are green gas development, hydrogen solutions, electrification and hybrid gas and electric solutions. Broadly, this gives four End States which we may need to address. We have sought to ensure our Business Plan supports all likely pathways and does not create any unnecessary barriers under each of the four possible 2050 End States. These End States are summarised below and all require a substantial change to the way the gas network is employed.

Figure 06.08: Possible 2050 End States

Green Gases	The gas network is retained but is delivering low carbon green gases such as biomethane, blended with hydrogen.
Re-purposed for Hydrogen	The gas network is repurposed to transport hydrogen safely to homes, businesses, industry, power generators and the transport sector.
Peak and Emergency Energy Store: 'Powerbank'	The gas network is retained to transport hydrogen or green gas to deal with peak and emergency conditions, such as cold spells, or renewable electricity generation shortfalls. Homes would use hybrid heating systems to use clean electricity for most of the year, but an efficient gas boiler on peak days.
Decommissioned	The gas network is decommissioned. This would need close to full electrification of heat and new large scale secure and reliable energy sources for power generation and peak heat. This would require very large scale and highly visible infrastructure upgrades, to at least duplicate the existing electricity grid.

6.3.1 Our plans for RIIO-2

We have assessed these End States in developing the output delivery commitments for RIIO-2. We have considered our investment plans and we have also considered the balance of where we can forecast with certainty and where it might be more appropriate to have an uncertainty mechanism to keep options open or create flexibility to uncertain developments:

- Our detailed environmental action plan **(Appendix 07.04.00)** sets out our proposals for supporting each of these possible End States in terms of the actions we will explore and the mechanisms we are proposing.

  Part 1 sets out our plans to continue to reduce leakage of methane from our networks through our main replacement programme.

  How we plan to reduce to Net Zero certified on the rest of our business carbon footprint and reduce emissions from our supply chain.

  Part 2 sets out our plans on reducing our wider environmental impact looking at reducing waste to landfill, biodiversity and supporting our employees to reduce their environmental footprint.

  Part 3 set out the plans we have to facilitate the energy system transitions. The key elements are:
  - Distribution Entry Enablement – we are facilitating a charging and access review for entry connections which looks at how costs to enable additional capacity might be socialised over wider consumers thus potentially enabling greater volumes of clean gas.
  - Meeting the demand for gas fired power stations that wish to connect to the gas distribution network to provide a response and reserve service to the electricity balancing market.
  - Exploring the role clean gas could have in supporting off grid communities to switch from more carbon intense fossil-fuels such as oil and coal.
  - Our hydrogen transformation project in the North West, HyNet looking to decarbonise industry, transport and domestic heat through a consortium of hydrogen production, CCUS and a hydrogen pipeline connecting into the local distribution network.
  - Facilitating new exit connections for heavy duty transport such as HGVs, buses and trains, initially through CNG filling station and then transitioning to hydrogen.
  - Our continued trail to demonstrate the transition to flowing hydrogen though our network through the HyDeploy projects testing a hydrogen blend through Keele University and moving onto a public network.
  - Our future billing methodology which is looking at how we measure low Calorific Value gases entering the network and the best method to enable the most effective energy billing for clean gas options such as biomethane and hydrogen.
- Our **consumer vulnerability strategy (Appendix 07.03.00** and summarised in **Chapter 7**) sets out how we plan to horizon scan to understand and assess the impact of various technological and other changes which will impact on customers in vulnerable situations.
- Our **Chapter 9, Costs and efficiency** sets out how we have factored the risk of different pathways into our cost benefit analysis on payback periods and in assessing discretionary investment.
  - This has driven our approach to the volume of mains replacement and reinforcement we might need to provide in our network. We have looked at what work is essential to be delivered to meet our safety case requirements and have engaged with customers on the level of cost benefit work that we should progress in RIIO-2 as well as the balance of focus of the work between safety, reliability and the impact on the environment. (see **Appendix 09.02** for more detail) .
  - We have assessed the potential and benefits of supporting customers to exchange gas cooking for electric cooking in multi-occupancy buildings (see **Appendix 09.04**).
  - We have set out how we have used energy efficiency projections from the core agreed scenario of forecasting work done with the industry.
- The **Chapter 10, Managing Risk and uncertainty** sets out how we have assessed the required uncertainty mechanisms to support the changing futures.
  - Ofgem's proposed Heat policy re-opener.
  - A re-opener triggered by the outcome of our distributed entry charging review to support reinforcement requirements.
  - Connection volume and reinforcement revenue driver given volume uncertainty and housing growth.
  - Fuel Poor network extension scheme re-opener if policy changes.
- **Our Innovation and Competition plans** (**in Chapter 8**) set out how we propose to use the Strategic Innovation Competition to support the Net Zero challenge through our large scale hydrogen projects and through developing research into customer behaviours and how the transition would be delivered.
  - **Our competition plan** sets out that for the HyNet project a range of investment models could be looked at to deliver the different constituent parts and ensure a low cost solution for customers and manage risk for investors.
- Our **Chapter 11, Affordability and financing our plan** sets out how we might underpin long-term confidence in the investment community to support the climate change targets and uncertainty on pathways.

Our ongoing stakeholder engagement strategy and plan (see **Chapter 5** and **Appendix 05.01**) highlights the ongoing role for engagement in this area and the focus on particular groups.

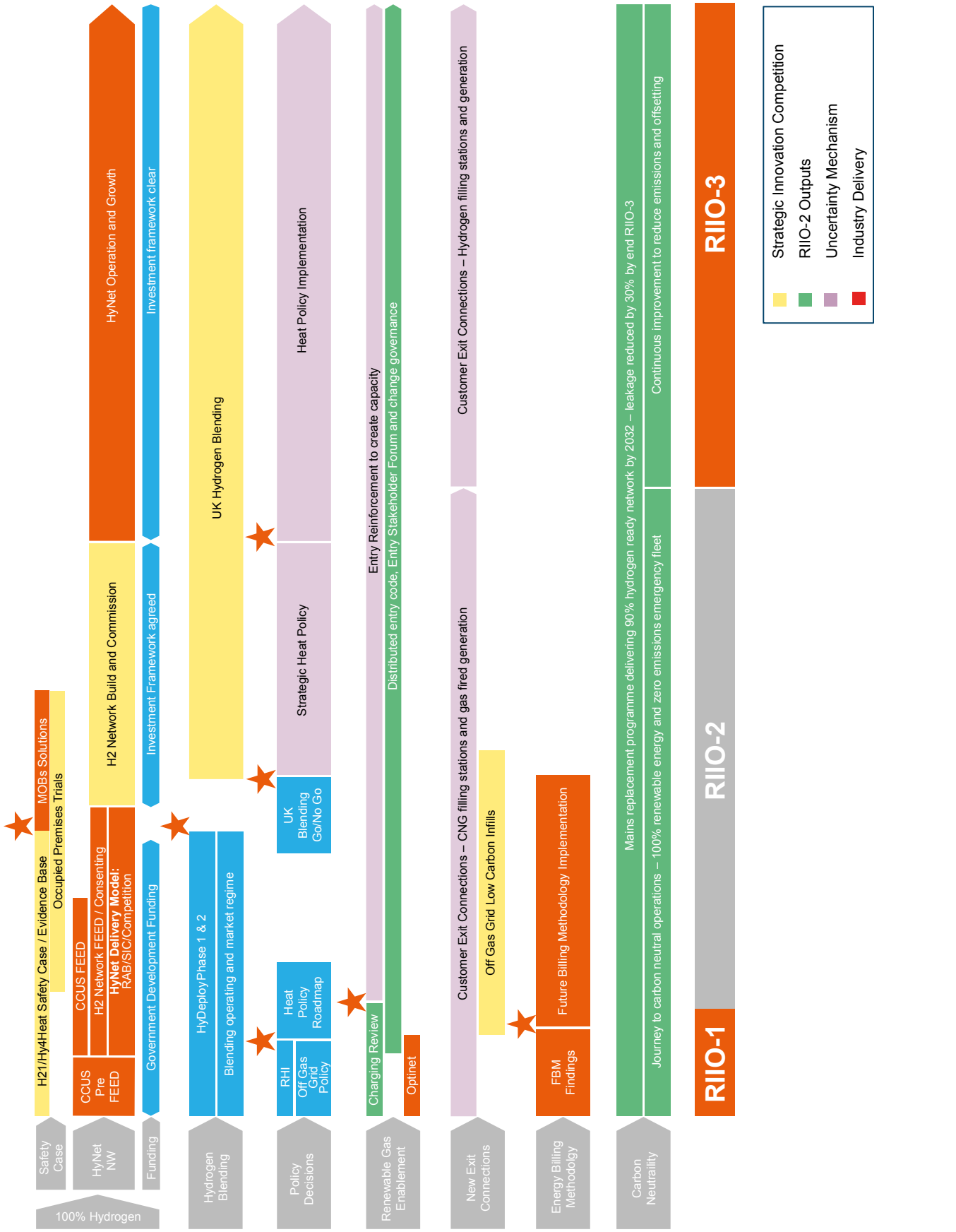
- Entry enablement focusing on meeting the needs of new renewable gas producers wishing to enter the gas market, with the establishment of an Entry Gas Stakeholder Forum and a Connections Standards Methodology to support consistency and transparency, and to provide a voice to influence and prioritise change.
- Our whole system section below setting out regional planning and development, standardised information and capacity signalling as well as timely reinforcement.
- An internal Net Zero strategy group chaired by the Safety and Strategy Director, feeding into the Safety and Sustainability Committee of the board. This cross-business group, including regional and operational leads, will monitor and respond to developments in the external landscape and track progress of both the Net Zero work and whole system thinking.

Net Zero and a whole system approach continued

6.3.2 Key milestones and interactions

There will be interaction between policy decisions, development and conclusions from innovation projects and testing, development of charging, commercial and funding frameworks and ongoing projects. We have summarised how these might interact in the diagram below.

Figure 06.09: Net Zero Key Milestones



This diagram illustrates the interactivity and potential timings of when policy decisions may drive changes to the plan or trigger the need for action through customer demand changes, infrastructure development and project stage gates.

We will continue to work with BEIS and Ofgem on developing and demonstrating the delivery of the clean gas pathway and in developing the frameworks and mechanisms to roll out with minimal disruption to the end consumers at the lowest cost. Our plan has been shaped to enable the flexibility to do this without taking big bets about the precise form of this given its ongoing development and the need to consider this at both a local and national level.

We set out in the next section of this chapter our approach to working beyond the gas sector to consider whole system solutions which embrace the challenges of creating flexible solutions for customers across sectors.

6.4 Enabling whole energy system solutions

The role of the gas networks in the low-carbon energy system of 2050 is an example of long-term whole system thinking at a macro-UK level. In the short to medium term, to deliver additional benefits to customers and stakeholders we have considered approaches which enable whole system solutions across all of the four priority outcome areas that have been driven from our customer insights and through our investment plans. We have considered where benefits will be seen by gas network customers but also explored benefits seen by other stakeholders and sectors beyond gas. The output commitments we have proposed are summarised below.

6.4.1 Engagement driving whole system thinking

Ofgem's broader approach to whole system thinking set out in their May 2019 sector specific methodology decision document and updated Business Plan Guidance, fully aligns with our approach to working with our colleagues in the energy networks and broader stakeholders to solve challenges beyond just our own network responsibilities.

We have taken an active and leading role in applying whole energy system thinking to the development of the future energy system architecture. We will continue to participate in relevant electricity sector engagement and consultation processes, and we will champion and support cross sector initiatives and trials, system modelling and forecasting, building on the work already undertaken in RIIO-1.

We have been prominent and active participants in the industry initiatives, including the Open Networks Whole System workstream, in which we are leading the team to identify and realise benefits in the Investment Planning area, working with a wide group of stakeholders. This has highlighted support for three deliverables, covering information capture and sharing, and a joint planning approach to support local strategies

We have included these in our plans and the initiatives are discussed further below.

We are supporting policymakers to adopt a whole energy systems perspective as they seek to decarbonise the energy system. There are no options for decarbonising heat and transport that do not have some impact on the electricity and gas networks. From diverting fuels and feedstocks, to providing secure back up or storage options, decarbonisation has to be viewed through a whole energy system lens. However, to date, a whole energy system coordinated vision has been limited.

Through stronger relationships with the electricity networks, we will encourage the emergence of a clear and coherent whole energy system consensus view on the future options for energy system decarbonisation.

Understandably, with the large scale of potential expenditure required to support the electricity system transition, industry attention on whole system benefits has focused on the electricity networks and, in particular, on identifying and delivering benefits across electricity transmission and distribution. However, with the increasing move to decentralised small-scale energy, in both the gas and electricity sectors, we are convinced that coordination across gas and electricity distribution networks will also deliver benefits for customers.

6.4.2 Network related whole system solutions

In parallel with the government's recognition that there are highly credible gas network alternatives to the full electrification of heat, through our ongoing engagement with our regional stakeholders we have also been making real progress in encouraging whole system thinking. Cadent are now active members of the regional energy and Infrastructure boards that are starting to emerge across the UK. These are constituted by the Authority directly or by the Local Enterprise Partnership, with the more established Boards operating in London, Manchester, Cheshire and Warrington and the West Midlands. We will continue to support these existing bodies and encourage and facilitate new emerging groups. Through these relationships we can listen to the challenges and ambitions of our stakeholders, and propose solutions and approaches that can help meet their objectives.

Three examples of such stakeholder driven initiatives included in our RIIO-2 Business Plan, are the establishment of a joint gas and electricity longer-term (3+ years) optioneering service for local authorities, a new mechanism to support timely and efficient network investments, and higher quality, more efficient data gathering. The rationale for these commitments are covered in more detail in the dedicated **Appendix 07.02.05 "Whole System Network planning"** with a summary of our proposals in these areas outlined below.

A. Joint energy network planning office

We have seen the emergence of LAEPs, and are involved in their preparation, including being a member of the team that produced the LAEP for Bury in the North West.

Regional authorities are developing long-term plans such as for low emission transport or for domestic and business growth, which will impact on the energy networks, and with a whole system approach, a wider range of options can be identified and considered. For example, the expected growth could result in extensive reinforcement requirements on the power grid, however, the creation of a gas fired combined heat and power scheme ('CHP'), or even conversion of existing electrical heating, could represent a preferred solution. The authority may have multiple drivers for their Decision-making and not just cost. The preferred option may be more expensive if, for example, it can be completed more quickly, be more robust to future uncertainty or have lower delivery risk.

The creation of a joint electricity and gas energy network planning office would provide a service for local authorities to share their development thinking, and receive a set of coherent whole system options that they can then take forward in their strategies. The need and value from this approach have been identified through our relationships with our regional stakeholders. The strongest example of stakeholder support has been through Cheshire and Warrington LEP Infrastructure Group, working with both the local Distribution Network Operators ('DNOs'): Scottish Power Energy Networks and Electricity North West. We have also confirmed wider support through the development of the Investment Planning deliverables, led by Cadent, within the ENA's Open Networks Whole Systems workstream. As part of these activities we supported a workshop case study with Coventry and Warwickshire LEP, and Western Power Distribution.

Net Zero and a whole system approach continued

We have partnered in five bids submitted this summer to Innovate UK for Smart Energy Systems. Most notable amongst these is the bid from the West Midlands (Energy Capital) to develop an approach to regional energy planning that could be rolled out UK wide.

To support regional authorities in the development of their infrastructure strategies and plans, we will establish a pilot joint energy network planning function with at least one DNO by 31 March 2022. If successful, and subject to DNO agreement, we will roll these out across our entire footprint by the end of RIIO-2.

Work is underway to develop this service within the Open Networks Whole System workstream. The 12-month action plan being taken to the Steering Board in December 2019 for agreement by the networks is outlined below, and is based on commencement with trials in early 2020. We have agreed with SPEN Manweb to explore using the Liverpool City Region and Cheshire and Warrington as a potential trial area.

Table 06.02: Whole system planning development timetable

Activity	Duration
Identify trial areas	Jan-Feb 2020
Local Authority confirm objectives and constraints	March 2020
Energy networks identify constraints and required works	Apr-May 2020
Energy networks identify options to optimise capacity	June-July 2020
Options report presented to the LA	August 2020
Trial Feedback Report	September 2020
Go/No Go	October 2020
Design Universal Service	Oct-Nov 2020
Develop Implementation Plan	Nov-Dec 2020

The final Universal Service may need to be funded by the local authorities, to avoid potential inefficiencies from the provision of a free service.

B. Standardising information sought by networks

We will continue to be champions of information sharing across the networks, and in doing this in a way that is efficient for all parties. A considerable part of the critical information used by the networks to develop their plans is sourced from external parties such as Local Authorities. It is important to make the capture of this information robust, consistent and efficient. We are seeking to avoid situations where different networks ask the same regional organisation for similar data, at slightly different times, with slightly different formats, and also possibly addressed to different stakeholder contacts. This is not conducive to quality and consistent data.

It also can introduce costs and frustrations for our stakeholders. Through our leadership of the Investment Planning activities within the Open Networks Whole Systems Workstream, we have championed a new process across the energy networks that will standardise and coordinate our approaches, with the aspiration to agree a single organisation to undertake the data capture and sharing for all networks.

An agreed programme to deliver a coordinated procurement strategy in 2020 is being discussed at the Open Networks Steering Group in December 2019.

C. Supporting timely and efficient network investment

A recurring issue from many of our regional stakeholders is that timely energy network investment is a barrier to their growth plans e.g. Greater Lincolnshire Local Enterprise Partnership. This barrier is created by the inability of the energy networks to make speculative investments ahead of demand. Inefficiencies can be created by the staged release of different phases to different developers over time, preventing a clear view of the overall requirement.

We have consulted on a potential solution to this issue, by enabling local bodies to underwrite appropriately sized and early reinforcements, without creating an asset stranding risk for existing gas consumers. We have had positive feedback on this initiative and we will bring forward detailed proposals through our Connection Charging Methodology.

We will work with our colleagues in the other networks to implement a similar approach as the principles are common across gas and electricity. This proposal will require regulatory support that the underwriting is a sufficiently strong signal to justify the network investment.

D. Providing information to facilitate the market in decentralised gas operation

There seems little doubt that the growth in decentralised gas generation will continue – this growth is a feature of the forecasts and scenarios issued by National Grid and the electricity Distribution Network Operators, and reiterated in the Core Scenario work.

The driver for gas generation is the provision of services to the electricity sector. The gas networks role is secondary and one of facilitation. As companies compete to offer services to the electricity market, if their offerings are contingent on access to gas network capacity, information provision about our network will improve the efficient operation of the market. We will therefore commit to publishing data on available or scarce network capacity and will continue engaging with our stakeholders through RIIO-2 to identify and implement further improvements in information provision that might better facilitate the market in decentralised gas generation. This is also an Investment Planning deliverable validated and supported through the Open Networks Whole Systems workstream.

Subject to the decision by the Open Networks Steering Group in December 2019, we expect a deliverable across all the energy networks to be taken forward in 2020 within the ENA Energy Data Working Group. This cross-sector ENA group has been set up to coordinate the network's activities on digitalisation and in response to the Energy Data Taskforce conclusions. We will therefore assess how best to make available the planning information publicly as part of our Data and digitalisation strategy. Further detail on our proposals can be found in **Appendix 07.02.05 "Whole System Joint Network Planning"**.

6.4.3 Optimising capacity across transmission and distribution

Efficient development and operation of the gas network across transmission and distribution will deliver whole system benefits, with the provision and management of network capacity a key factor. In RIIO-1, Ofgem set a framework which would encourage GDNs to effectively manage their network capacity such that customer demand was met at the lowest cost. The RIIO-1 Capacity Incentive encourages us to book capacity on the NTS to meet our 1 in 20 licence obligation, against a target volume set out at the start of the price control. This ensures companies do not hoard capacity and incentivises them to book at an efficient level, helping the NTS to have the ability to manage their network effectively. The NTS Exit Capacity incentive has delivered significant benefits to gas customers.

Ofgem has proposed to amend the existing incentive as at RIIO-1 by:

- Replacing advance capacity price estimates with final offtake capacity prices when calculating rewards and penalties; and
- Introducing a mechanism that enables a within-period adjustment of offtake capacity baselines, to ensure ongoing alignment between baselines and peak demand forecasts.

We are seeing an increasing demand for flexible capacity across the gas networks (including to facilitate gas generation). This has been seen most clearly across the NTS with the need for increased compressor operation to deal with the high level of within-day fluctuations. Managing within-day flexibility capacity is a whole system issue as it is a key requirement for gas-fired power station operations which support both the electricity and gas markets. We fully support Ofgem's review of this issue in the context of the current transportation charging and access work. We have set out our commitment to work with Ofgem and industry participants to bring forward detailed proposals for a Flexibility Incentive to support the exit capacity incentives to maximise the whole system benefits. The overall exit capacity approach will be informed by the UNC changes currently under development, with conclusions due in the next few months.

We will continue to work with Ofgem and National Grid NTS to develop the NTS exit and flexibility incentive mechanisms.

Further detail on our proposals in this area can be found in **Appendix 07.02.04 "Optimising capacity between transmission and distribution".**

6.4.4 Wider whole system solutions

We have also gained insight from customers and stakeholders outside of our regional and local authority relationships, and through these observations, we have identified a number of other whole energy system initiatives:

Off Gas Grid Communities Decarbonisation

Ahead of policy to decarbonise heat across the UK, the government are considering the approach to decarbonise high carbon heating off the gas grid. We have urged a whole system approach to off gas grid communities, so that the energy infrastructure can be designed that can meet the whole community's long-term needs. We continue to believe that, in some cases, extending the gas grid will be the option preferred by communities to deliver faster, lower cost emissions reductions than any other alternatives. Further benefits can be delivered as the gas carried by the networks is progressively decarbonised.

To provide the evidence to support this hypothesis, **we will extend the network a short distance to connect with pilot communities and work with householders to switch from oil or coal as soon as possible**. We will work with these communities to identify the best options for them, including considering energy efficiency measures. This work will provide vital evidence to enable gas solutions to play a full part in whole system solutions for off gas grid communities.

More detail on our proposals to support off grid communities can be found in Appendix 07.04.09 "Supporting Off grid communities" and in our Environmental Action Plan in Chapter 7, Our commitments.

Connection Standardisation

We have made a commitment to remove barriers and present solutions for our customers and stakeholders by bringing forward changes to the regulatory and commercial framework (see developing a safe and resilient network for now and the future). By supporting customers and stakeholders that operate across many regions and many energy networks, this will enable a whole system approach: this initiative supports gas power generators, gas refuelling stations, biomethane plants, and regional authorities, all of which operate and impact multiple sectors. This whole system perspective is clear for gas power generators, but **the commitment to establish Distributed Entry Gas Connection Standards across the gas networks** is also a whole system approach, applicable outside of Cadent's networks, and responding to a clearly stated customer challenge.

More detail on our proposals to this commitment can be found in Appendix 07.04.00 our Environmental Action Plan in Chapter 7, Our commitments.

HyNet

The HyNet project is an alliance of partners from across the sectors, industry and academia. These partners have come together to create a vision for how industry can be decarbonised in the most cost-effective way with significant benefits to local employment and the creation of an exportable industry for the UK.

HyNet was applied initially to the heavy industry in the North West but it can also play a significant role in supporting the reduction in emissions in the transport, power generation and heat sectors. The proposal includes hydrogen production and carbon capture, transportation and storage, all of which are outside of our Business As Usual ('BAU') activities.

We have used our innovation mechanisms to support the development of HyNet, and most recently this has included a study into the benefits of using HyNet supplied hydrogen in the transport sector known as 'HyMotion'. We are working closely with the government as they progress their plans for carbon capture and hydrogen clusters, with the aim of having clusters operating in the next decade.

We have a strong relationship with Scottish Power Energy Networks and they also support this project as they believe it can deliver substantial value by keeping significant new loads, including heating, off their network.

A demonstration of our approach has been the development of a vision for decarbonisation of the North West of England. HyNet has been developed by an alliance of partners from across the sectors, industry and academia to create a vision for how industry can be decarbonised in the most cost effective way with significant benefits to local employment and the creation of an exportable industry for the UK.

More detail on our proposals to this commitment can be found in our Environmental Action Plan in Chapter 7, Our commitments.

Energy exchange in multi-occupancy buildings

We have employed whole system thinking for our approach to gas in multi-occupancy buildings, set out in detail in Our commitments – revolutionising the experience for customers living in multi-occupancy buildings.

In our London network, we have identified existing and planned district heating schemes, and we will seek to explore whether these present a lower long-term cost and practicable alternative to the extensive replacement of gas infrastructure. We also work with local authorities and housing bodies, and the electricity distribution networks, to explore opportunities to rationalise energy infrastructure by replacing gas cooking facilities with electrical alternatives where there may be a disproportionate cost and complexity of maintaining dual infrastructure, and where there is a customer demand for this and there is capacity on the local power grid. We are progressing with this option in RIIO-1 and have built a continuation of this into our plans for RIIO-2.

More detail on our plans can be found in the Appendix 09.04 'Transforming the experience for customers living in Multi-occupancy Buildings'.

Net Zero and a whole system approach continued

Applying whole system thinking to addressing the needs of vulnerable customers

We have applied this thinking to a number of areas in the proposed plan, seeking to deliver the best outcome for customers and stakeholders at a whole system level from their perspective, rather than just from what we could do as a gas network. Highlights of our proposals are summarised below, and you can find further details in **Our customer vulnerability strategy Appendix 07.03.00**:

- **Fuel poverty** – We are trialling an approach to bring together funding streams from a number of sectors to deliver the best fuel poverty actions in England (starting in our West Midlands network) as well as delivering a new fuel-poor identification tool which can be used to identify homes to target for both energy company obligation services and fuel-poor network extensions.
- **Going beyond to strive to never leave a customer vulnerable without gas** – We are reaching beyond our traditional boundaries to developing services to ensure customers can get reconnected with gas supply following a disconnection.
- **Identifying needs of customers in vulnerable situations** – We are joining up the Priority Services Register Needs Codes; identifying services required and creating partnerships to deliver services to customers in a one-stop way.

These commitments can all be seen in our Customer Vulnerability Strategy in Chapter 7, Our commitments.

Minimising disruption – Coordinating works with other utilities

The cost of congestion to the general public, commerce, industry and the local and wider economy is increasingly significant as urban and rural areas become more populated and infrastructure develops. Our customer insight (summarised in **Chapter 5, Enhanced engagement, discussed in detail in Appendix 07.03.08)** has highlighted this as one of our customers' key priorities. We have also been working with local authorities and regional development agencies who are keen to explore solutions whereby better planning could be achieved across utilities to minimise the time roadworks are required and to plan infrastructure developments with less disruption.

We are exploring with the Greater London Authority how we might value the cost of disruption in order to assess the whole system solution benefits of coordinating works. We have also made a commitment to develop schemes in partnership with other utilities and to monitor and measure the benefits delivered **(this is covered in the 'Delivering a quality experience for our customers' outcome' area of Chapter 7, Our commitments)**.

6.5 Whole system commitments summary

The summary below outlines our headline whole energy system initiatives and we have mapped them against the criteria set by Ofgem in their RIIO-2 Business Plan guidelines:

- Plans for joint planning with other network companies and/or system operator.
- Identification of effective whole system solutions and approaches.
- Demonstrates long-term whole system thinking and value for customers, including identification of uncertainties and mitigations .

We have also shown the wider whole system solutions map to the guidelines.

Table 06.03: Summary of whole energy system initiatives

	Joint Planning	Whole System Solutions	Long-Term Thinking	Benefits
Whole System Solutions – Network related				
Joint Planning Office	✓	✓	✓	Sector costs, reduced carbon, clean air, non-sector costs and growth.
Standardising information sought by networks	✓	✓	✓	Lower costs, higher quality data enabling better Decision-making.
Timely Reinforcement	✗	✓	✓	Economic growth, lower carbon.
Network capacity information	✓	✓	✓	Enabling better customer/stakeholder Decision-making.
Optimising capacity across Transmission and Distribution NTS Exit and Flex Capacity	✓	✓	✓	Lower costs.
Wider whole system solutions Please see Chapter 7, Our commitments for more information				
Off Gas Grid Communities	✗	✓	✓	Sector costs, reduced carbon, clean air.
Connections process standardisation across networks	✗	✓	✓	Sector + non-sector costs, facilitating competition.
HyNet North West	✓	✓	✓	Sector/Non-Sector costs, reduced carbon, clean air, growth.
Preparing for different Decarbonisation Pathways	✓	✓	✓	Sector costs, reduced carbon, clean air.
Energy Exchange for MOBs	✓	✓	✓	Lower overall costs, less disruptive.
Fuel Poverty interventions	✓	✓	✓	Energy efficiency, warmth, social mobility.
Going beyond to never leave a customer vulnerable without gas	✓	✓	✓	Improved customer experience.
Identifying common needs for customers in vulnerable situations	✓	✓	✗	Lower costs, improved customer experience.
Coordinating works with other utilities	✓	✓	✓	Reduced disruption, better customer experience, growth facilitation.

The table below explains the cost and regulatory treatment of our whole system commitments.

Table 06.04: Whole energy system output commitment

	Cost	Regulatory Treatment	Comments
Whole System Solutions – network related			
Joint Planning Office Standardising information sought by networks Network capacity information	£0.5m (2 FTEs per network)	Base plan totex	Costs split with electricity DNO, exploring whether local authority could be charged for this service.
Timely Reinforcement		Revenue driver	Dependent on new commercial arrangements on user commitment being approved.
Optimising capacity across Transmission and Distribution NTS Exit and Flex Capacity	£102m p.a. forecast base cost	Output delivery incentive of costs around base plan Re-opener for new projects	Dependent on outcome of NTS exit charging review and ongoing development of flex incentive options with NTS.
Co-ordinated whole system thinking uncertainty mechanism	Materiality Threshold TBC		Ofgem proposed re-opener mechanism to cater for material new projects during RIIO-2.

Stakeholder engagement on whole system thinking

A stakeholder engagement incentive was introduced for RIIO-1. This aimed to reward high quality stakeholder activities undertaken by GDNs and the outcomes they deliver beyond business as usual activities.

All GDNs have received rewards under the Stakeholder Engagement incentive and the feedback from the independent panel is that the stakeholder engagement incentive in RIIO-1 has driven significant improvements in how GDNs engage proactively with, and are responsive to the needs of, a wide range of stakeholders.

In particular, the incentive has driven a focus on stakeholder engagement on: the future role of gas, the challenges facing customers in vulnerable situations, development of cost benefit analysis for measuring the benefits of stakeholder engagement, and development of different tools and strategies for engagement. The use of objective criteria to assess the performance in this area has also helped development year on year.

Whilst we have set out a diverse range of whole system solution proposals in this plan, it seems evident that this is an area that will evolve and should be an area where we might be encouraged to continue to develop plans through the RIIO-2 period. Our insight tells us that stakeholder engagement is going to be critical in further developing whole system thinking to create value beyond local responsibilities. This is illustrated by the breadth of engagement required as illustrated in Figure 06.02 above. Whilst firm foundations have been established around ongoing stakeholder engagement, given the size and nature of the challenge and significant societal benefits possible, we believe that a stakeholder engagement incentive should be created to stimulate and reward additional innovation in engagement-led outcomes in developing whole system thinking. This view also reflects representations made by Sustainability First, the National Infrastructure Commission and National Council for Voluntary Organisations all who call for ongoing focus and incentivisation for collaboration to develop whole system solutions. We are proposing a reward-only incentive and assessed by an Independent Panel who could judge the value that has been added from above and beyond engagement-led initiatives. More detail on the rationale and evidence for this incentive can be found in **Appendix 07.03.02 "Enhanced engagement incentive on whole system thinking"**.

Output	Measure	Common/bespoke output?	Regulatory Treatment (PCD, ODI, LO)	RIIO-1 Position	RIIO-2 Target Ambition
Enhanced Engagement on whole system thinking	Independent Panel assessment against prescribed criteria	Proposed Common	ODI (F)+	ODI (F) on enhanced stakeholder engagement	Continuing to raise the bar on engagement and outcomes on whole system thinking

Tracking Progress on delivery of Net Zero and Whole System Thinking commitments

Given the importance of the Net Zero commitments and the need for whole system thinking, our Board have taken strategic ownership of this area. They regularly have agenda items to horizon scan the external landscape and assess our thinking, They have also set up Safety and Sustainability sub-committee which will oversee the progress around the Net Zero commitments and our progress on whole system thinking. Our Executive have also set up a dedicated Net Zero Strategy committee which will contain representatives from each of our Network Directors covering our four networks as well as input from our regional stakeholder engagement managers. Chaired by the Safety & Strategy Director, this group will monitor progress against our whole system commitments and assess and refine our engagement strategy and Net Zero action plans on an ongoing basis.

References

Appendix 06.00 Future of Gas series: **Unlocking network capability**
Appendix 06.01 Review of bioenergy potential: **Survey Report**
Appendix 06.02 EY report on **Options for stimulating investment in BioSNG**
Appendix 06.03 Navigant report: **Pathways to Net Zero: Decarbonising the gas networks in Great Britain**

7 Our Commitments

This chapter summarises what we are committing to deliver for our customers, and the engagement and rationale for these commitments. We have worked with, and listened to, our customers, stakeholders and employees to create our most stretching and bespoke set of commitments ever. We have applied a systematic process to ensure they are robust, well evidenced and valued.

Structure of the rest of this chapter

The remainder of this chapter sets out the specific output commitments we are making in each of the four outcome areas. We have structured the chapter as follows:

Key messages

- **We have made our most ambitious commitments ever, which will improve outcomes for all of our wide customer and stakeholder base.**
- **Our consumer value proposition estimates a benefit of £537m in RIIO-2 rising to £723m in RIIO-3.**
- **We set out the mains replacement volumes, asset health targets and emergency service standards that deliver a resilient network.**
- **We set out our plans for delivering cyber resilience, physical security, workforce resilience and our data strategy.**
- **We set out stretching standards of providing a quality experience to all of our customers and stakeholders.**
- **We explain how we will transform the experience for the historically worst-served customers in multi-occupancy buildings and in our connections service.**
- **We set out our Customer Vulnerability Strategy and how we will support customers through identifying their needs, raising awareness of carbon monoxide and aiding those in fuel poverty.**
- **We are committed to striving to never leave a customer vulnerable without gas.**
- **We set our Environmental Action Plan.**
- **We showcase our community fund, our ongoing stakeholder engagement plans and how we will create an environment for our employees to thrive and be proud of the service they deliver.**

Transforming experiences

Our most stretching and tailored output commitments ever

A Plan which maintains the **outstanding levels of safety and reliability** that our customers rely on

A Plan which focuses on **improving the experience for all our customers,** including targeted support through our vulnerability strategy

An environmental action Plan which **demonstrates our leadership on tackling climate change** by innovating and driving momentum to create pathways to decarbonisation

A Plan which builds **trust that we are acting in the best interests of our communities** and embracing **whole-system thinking**

We have taken these four outcome areas and assessed what our customers say are the priorities we need to focus on in order to deliver great outcomes for them. We summarise these below.

Figure 07.01: Outcomes our customers need us to deliver

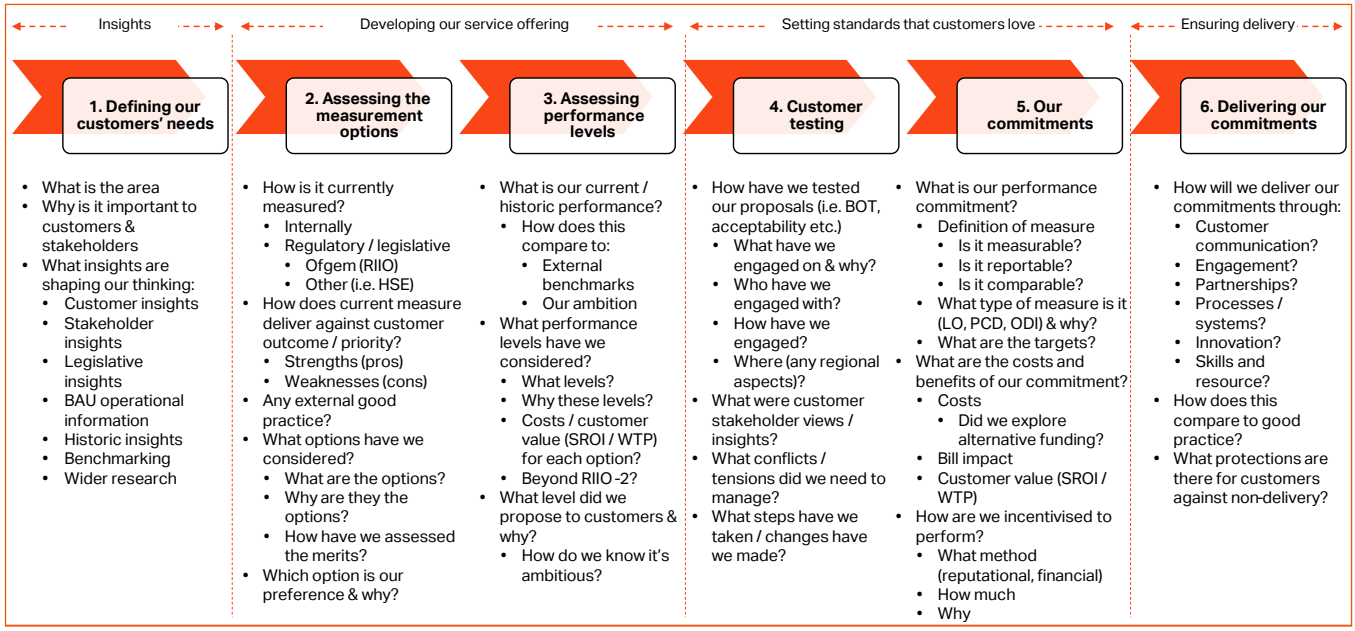
Outcome	Delivering a resilient network to keep the energy flowing safely and reliably	Providing a quality experience to all of our customers, stakeholders & communities	Tackling climate change and improving the environment	Trusted to act for our communities
Priorities	Managing network asset risk for now and the future - Mains replacement - Asset health risk - Emergency service	Setting standards that all of our customers and stakeholders love	Decarbonising our business operations	Building trust through every action
	Cyber resilience	Keeping the energy flowing	Reducing our wider environmental impact	Making a positive difference for our communities
	Physical security	Minimising the disruption from our works	Facilitating the low emissions energy systems transition: - Green Gas - Hydrogen - Peaking and Storage - Decommissioning	Sustainable engagement to drive better customer outcomes
	Workforce planning	Supporting customers in vulnerable situations - Identifying needs - CO awareness - Fuel poverty - Going beyond		Creating an environment for our employees to thrive and be proud of the service we deliver
	Data strategy			Transparency in how we operate
	Whole-system Approach			

We have developed a whole-systems' solution approach to all of the four outcome areas and some specific commitments which are covered in **Chapter 6, Net Zero and a whole-system approach**. This includes whole-system joint network planning, optimising capacity between transmission and distribution and enhanced engagement on whole-system thinking.

Our commitments continued

Under each of the four themes we have undertaken a systematic approach to defining our output commitments by following the process steps below.

Figure 07.02: Our systematic approach to determining outputs



Appendix 07.00.00 summarises the approach we have taken to derive our outputs and a summary of our prospects. We have set out detailed evidence in Appendices to this chapter for each output commitment which we reference later in this chapter.

Our vision is to set standards that all of our customers love and that others aspire to. We recognise it will be challenging to deliver this goal. Our RIIO-2 Plan is a stepping stone on this journey. We have looked to set ambitious, but achievable, output commitments. We have tested our commitments through business options and acceptability testing and through extensive challenge from our Customer Engagement Group .

We have structured each outcome area **(sections 7.2 to 7.5)** as follows:

1. We summarise the priority areas in each outcome, explain how we propose each area should be addressed from a regulatory perspective, highlight the contribution the areas make to our consumer value proposition and note any incremental costs associated with each area.
2. We explain what we have learned from our engagement strategy, highlighting any differences of view that we have needed to resolve.
3. We set out our commitments, how we plan to deliver and how we protect consumers against non-delivery.

In addition, we have included an appendix which sets out our consumer value proposition methodology and the quantification calculations we have undertaken for each relevant commitment in **Appendix 07.01.00**.

In describing the regulatory treatment of our output commitments we have used the definitions that Ofgem have set out in their Sector Specific Methodology Decision document, as summarised in the table below:

Table 07.01: Output types

Output Type	Abbreviation
Licence Obligation	LO
Price Control Deliverable	PCD
Output Delivery Incentive (Financial)	ODI (F) +/- = symmetrical, + reward only, – penalty only
Output Delivery Incentive (Reputational)	ODI (R)
Uncertainty Mechanism	UM

* In January 2016 KPMG undertook an independent study on behalf of all GDNs to ascertain the benefits associated with the Iron Mains Replacement Programme. They considered factors such as safety and environmental impacts of the programme and determined an NPV of £1.6bn over the period until 2050.

7.1 Our Consumer Value Proposition ('CVP')

This is our most ambitious plan ever. It acknowledges that there is no such thing as an 'average customer' and seeks to provide far more tailored services to meet the different needs of our customers. It goes significantly beyond the strong foundations established in RIIO-1, especially in providing additional services for customers in vulnerable situations, including those in fuel poverty. It robustly tackles the challenges associated with climate change by proposing actions to reduce the impact on our own business operation, and consolidating the leading role we have played in supporting the UK's work to decarbonise the energy landscape.

Our CVP includes the commitments we are making in respect of supporting local communities, ongoing engagement and building trust through our community fund and transparent business operation. It doesn't include the value of community benefits delivered through our mains replacement or other capital investment work (which we see as a core business deliverable), despite the importance that our customers attach to safety and network reliability (it is their number one priority).* Excluding this value, the total monetary value of our CVP over RIIO-2 is just over £800m. The cost to achieve this benefit is £236m, determining a net benefit of £537m. This is based on our calculations of the social return on investment delivered (£403.8m and more traditional cost benefit analysis (£421.3m using customers' willingness-to-pay values to determine benefits.

In Ofgem's Business Plan Guidance it confirms that businesses can claim additional levels of CVP through their application of bespoke uncertainty mechanism (UM). We have designed several Uncertainty Mechanisms to protect customers from the exposure of potentially avoidable costs. We have calculated the value for these as £247.1m over the period but have not included this value in our headline number. If we did, our total CVP would be £1.03bn.

We included a very high-level overview of our CVP in the July Plan. In October, we calculated our CVP as £1bn (net benefit). This was higher than our final version as we have subsequently removed certain items following challenge from our CEG and additional internal reviews. The total figure also reduced as we had previously included additional willingness-to-pay calculations where we had not calculated SROI values. Whilst there is a case for using willingness-to-pay values (as they are directly derived from customer preference) we have chosen to use SROI as our primary measure as the values and assumptions can easily be transferred and directly compared with other Plans, providing far greater transparency. Please see **Appendix 07.01.00** for a breakdown of our CVP calculations.

We have used the Business Plan Guidance set out in June and again in September to classify the area of additional value that is provided by aspects of our Plan. Ofgem have set out nine categories / examples against which additional value can be demonstrated and throughout our CVP we have been clear which criteria are satisfied by each aspect of the Plan. We have then applied a second set of criteria based on the level of stretch beyond RIIO-1 or external benchmark data to truly test whether an item should be considered as part of our CVP.

The majority of our CVP is represented by output commitments that we have built into our Plan, but also takes into account other deliverables such as our innovation strategy, approach to competition, how we are proposing to manage uncertainties and ongoing engagement activities. As detailed in **Chapter 5, Enhanced Engagement**, we have followed a robust process to establishing these commitments with customers, stakeholders, our employees and shareholders and have completed robust benchmarking across multiple sectors to test them.

Our CEG have robustly challenged the process by which we have engaged in the development of our Business Plan commitments and at times over the ambition level implied by our commitments. In October and November we held detailed sessions to explore and challenge each of our CVP items along with the overall methodology. As a result our total value changed slightly but there was strong support for the approach we had taken.

7.1.1 Determining output commitments that represent our CVP

We have used the nine categories / examples set out in the Business Plan Guidance documents to determine the output commitments that make up our CVP:

1. Service quality levels that are higher than existing levels and delivered at the same or lower cost.
2. Bespoke outputs in aspects of service provision that are not currently reflected in the existing framework of outputs.
3. Commitments for stakeholder engagement, which could take the form of bespoke outputs, likely to result in measurable positive outcomes for consumers.
4. Well justified initiatives in the Environmental Action Plan to reduce the environmental impacts of the network that will result in measurable outcomes that are valued by consumers.
5. Uncertainty mechanisms that highlight risks to consumers of which Ofgem would not otherwise have been aware.
6. An innovation strategy likely to drive forward energy system thinking and address consumer vulnerability.
7. Whole-system approaches likely to drive forward the industry – including proposals for data sharing.
8. Strategies and implementation plans likely to deliver positive impacts for consumers in vulnerable situations, including use of the consumer vulnerability 'use it or lose it' allowance in gas distribution.
9. The company's commitment to an above business as usual approach to sharing information and data with relevant parties to facilitate greater whole-system coordination.

We then applied our own test against five additional criteria:

- It must be significantly beyond minimum standards or any licence condition
- It must represent significant additional value from that provided by similar initiatives in RIIO-1
- It must offer significantly more value to consumers than is typically offered by other similar organisations
- It must be valued by consumers
- It must be quantifiable, measurable and progress against it reportable (or just reportable for qualitative benefits)

Measuring our CVP

We have calculated our CVP using a number of methods, recognising the different types of benefit that are delivered to customers and other stakeholders through our Plan.

Social Return On Investment ('SROI')

We have calculated the SROI value associated with deliverables within our Plan using a model that we developed in conjunction with Sia Partners. SROI is a method for measuring value that is not commonly reflected in traditional Cost Benefit Analyses ('CBA'). This includes environmental benefits (e.g. a reduction in CO_2 emissions), health benefits (e.g. a reduction in hospital visits) and financial benefits to customers (e.g. a reduction in future household energy bills). It then demonstrates the net benefit created for customers for each pound spent on an initiative, factoring in HM Treasury Green Book criteria. For each SROI calculation made we have maintained a comprehensive audit trail of the assumptions made. These will be made available through additional Appendices when submitting the December Plan.

Cost Benefit Analysis

It is not always possible to calculate a SROI. In these cases, we have used a more traditional CBA model, based on the value that customers have told us that they are willing to pay for different output commitments. For example, if a customer is willing to pay £1 per for a level of improvement and the improvement will impact 1 million customers, we have calculated the total benefit as £1m.

Our commitments continued

Our CVP also includes the total efficiency saving that we will deliver through the RIIO-2 period. The details behind this are explained in **Chapter 9, Costs and efficiency** and are made up of the benefits delivered through our competition, innovation and transformation strategies. The total cumulative efficiencies delivered total £155m (18/19 constant prices).

Other Benefits

In other cases, it is much more difficult to place a monetary value on our CVP. For example, we know that we have delivered numerous benefits to consumers and communities through the initiatives that have arisen from our stakeholder engagement, but to allocate an accurate CVP amount in RIIO-2 from our proposed ongoing engagement strategy is very difficult; some may be double counting benefits captured elsewhere and many initiatives are not yet known (but will be subjected to SROI analysis to prioritise them and demonstrate value when known).

Taking this approach provides a conservative estimate of our overall mechanism reality; other such initiatives will deliver additional customer value, but it is very difficult to provide accurate estimates. In most cases these additional areas have been determined through the ongoing engagement with customers and stakeholders who have confirmed that they are important to them.

Where we have been unable at this stage to provide a monetary CVP amount, beyond the cost to achieve, we have provided a description of the non-monetary value of the benefits.

Uncertainty Mechanisms

We have identified a number of bespoke uncertainty mechanisms to protect customers from the exposure of additional costs that we cannot quantify with high certainty. The details of each of these bespoke Uncertainty Mechanisms are contained in **Chapter 10** of our Plan. Whilst the Ofgem Business Plan Guidance document suggests that "uncertainty mechanisms that highlight risks to consumers of which Ofgem would not otherwise have been aware" is an example that could constitute a CVP in business plans, we have separated this aspect out of our headline figure because it is difficult to truly monetise in a consistent manner.

The value of an uncertainty mechanism to customers does not obviously lend itself to be monetised in the same way as some of our outputs commitments where we have calculated a social return on investment or have clear willingness-to-pay data. However, one way the value could be calculated is to look at the value that might otherwise have needed to be forecast into the base expenditure plan that may not have been subsequently needed if the uncertainty did not arise, For example, by taking either the low medium or high case estimates of the uncertainty and multiplying this by the totex incentive sharing factor that the customer would be faced with (e.g. 60%) we can calculate a reasonable benefit proxy. We have used this model to estimate the additional CVP that our approach to managing uncertainty has led to.

Table 07.02: Summary of our consumer value proposition

Commitment	Deliverable	Total Cost	Total SROI Benefit	Total WTP Benefit	Total NPV / Net Benefit	Ofgem Criteria
CO Awareness and Safety Plan	Educate 200k customers Issue 3m alarms 15,000 appliance services, repairs, replacements	£34.0m	£59.4m		£22.5m	2,3,7,8,9
Fuel Poverty Plan	Take 36,500 customers out of fuel poverty through: • providing energy efficiency and income advice to 25,250 customers • making 5,000 tailored interventions • piloting and implementing a new cross-industry funding approach	£32.6m	£102.2m		£61.3m	1,2,3,7,8,9
Going Beyond the Meter	Repair/replacement of appliances	£2.7m	£19.8m		£15.0m	1,2,8
Priority Service Register awareness	2m conversations, awareness training and partnerships	£7.7m	£8.5m		£0.6m	1,2,8
Carbon neutrality	Reduce carbon footprint from 64k tonnes to 0 Reduce our people's emissions by 5k tonnes Zero avoidable waste to landfill Reduce theft of gas	£56.6m	£20.4m		-£30.9m	2,4
Supporting our communities	Our community fund worth 1% of annual post tax profit	£0m	£31.2m		£27.2m	1,2,3,4,6,8
Improved customer service	Time-bound appointments Personalising welfare	£16.3m		£275.5m	£229.8m	1,2,3,6,8
Whole-system thinking	Including entry capacity enablement and supporting off grid communities	£86.1m	£7.3m	£145.8m	£56.3m	2,3,4,6,7,9,
Delivering efficiencies	Competition Innovation Transformation	£0m	£155m		£155m	6,7,8
Non-tangible (non-monetisable) CVP attributes	• Ongoing Stakeholder Engagement – 10 commitments to ongoing engagement • Multi-occupancy buildings suite of improvements – including reduced interruptions, ongoing engagement, building response plans and enhanced welfare provisions • Creating an environment for our people to thrive – ten commitments in our plan • Measuring experience across all services with annual improvements • Improving service during interruptions – including better communication and reduced durations • Enhanced connections services – including 15 minute quotation process and three day site appointments • Minimised disruption – through working with others and enhanced communications					2,3,5,7,8
Bespoke uncertainty mechanisms	Reduced risk to customers	£0m	£247.1m		£247.1m	5
Total excluding Uncertainty Mechanisms		**£236.0m**	**£403.8m**	**£421.3m**	**£536.8m rising to £722.5m in RIIO-3**	
Total Including Uncertainty Mechanisms		**£236.0m**	**£650.9m**	**£421.3m**	**£783.9m rising to £969.6m in RIIO-3**	

7.2 Delivering a resilient network to keep the energy flowing safely and reliably

Note: This outcome area maps to the area Ofgem calls 'Maintain a safe and reliable network'

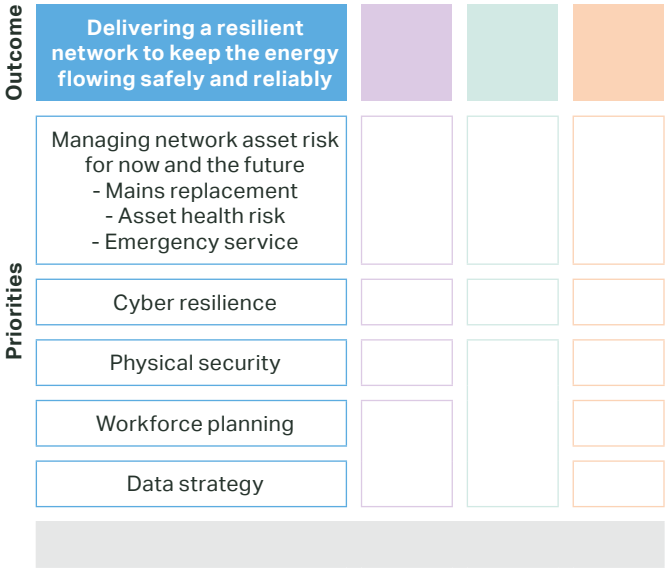
Summary

Our customers tell us that delivering a resilient network is the cornerstone of what they expect from us. This is a consistent theme across all our customer and stakeholder groups. Indeed, it is taken for granted by customers given the low incidence of both safety incidents and interruptions that customers see from our gas networks.

Our challenge in this outcome area is managing the requirements to address an ageing and deteriorating asset base with affordability for current and future customers. In addition, we need to assess how we ensure the network is resilient to climate change challenges and the energy transition.

In addition, our plans also address the challenges of non-network resilience areas such as cyber threats, physical security, workforce resilience and our strategy for data and digitalisation.

Figure 07.03: Outcomes our customers need us to deliver



What we will do – the commitments we are making to address this insight (priority areas)

Managing network asset risk for now and the future

We need to manage the risk on our network. This will allow us to deliver on customer expectations while facilitating growth, decarbonisation and whole-system thinking. We will optimise our programme of work, balancing maintenance, investment and other innovative approaches to ensure we deliver an affordable service for our customers. This includes the majority of our investment programme including mains replacement and our asset health investments. In addition we will continue to deliver our emergency response and repair service.

Managing non-network resilience:

Cyber resilience

We need to protect against external cyber threats to our operations which involves a plan for cyber security and for business and IT security.

Physical security

We need to meet BEIS's requirements for the level of physical security expected for different site sensitivities.

Workforce resilience

We need to sustain a resilient workforce to deliver the outcomes our customers desire given the ageing population, emerging skills risks, competition from other infrastructure projects and the change in network requirements and customer expectations.

Data and Digitalisation strategy

We need to have a long-term strategy to ensure data maturity and quality and meet the aims of the government's data task force.

Table 07.03: Summary of output commitments

Output	Common / Bespoke	Output type	Incremental Costs?	Part of our CVP?	Appendix evidence
DELIVERING A RESILIENT NETWORK TO KEEP THE ENERGY FLOWING SAFELY AND RELIABLY					
Managing network asset risk for now and the future					
Delivering metallic mains replacement – iron mains replacement	Common	PCD	N	N	09.02
Delivering metallic mains replacement – high risk steel replacement	Bespoke	PCD	N	N	
Network Asset Risk Measure	Common	ODI(F-) (NARMS)	N	N	09.00
High Rise Building plans	Bespoke	ODI(R)	N	N	09.04
Regional specific schemes – e.g. London Medium Pressure Programme	Bespoke	PCD	N	N	09.06
Emergency Call Handling	Common	LO	N	N	n/a
Emergency response – Uncontrolled 1 hour Controlled 2 hour	Common	LO	N	N	n/a

Priority area – Managing network asset risk for now and the future

We will replace 1,557km p.a. of Tier 1 iron mains to meet our obligations under the iron mains replacement programme, 67km p.a. of other high risk metallic pipes and will target key infrastructure needs such as London Medium Pressure. Alongside this, our asset health programme will maintain a broadly constant level of monetised risk. We will increase our engagement with local authorities and high-rise building owners to create building-by-building plans for them. We will maintain our strong performance in emergency response and call handling.

Roughly 80% of our controllable totex (c.£700m p.a.)	Not included in our CVP as business as usual	c. £50 of the annual bill

Managing network asset risk for now and the future

This priority area relates to how we deliver a safe, reliable and resilient network and an affordable service for our customers. We must meet legislative requirements and mitigate the risk of deteriorating assets. This will be supported by a 24/7 emergency call handling and response service.

What we are already doing in RIIO-1

In RIIO-1 we are delivering the required iron mains replacement length and are also focused on the optimal cost of risk removal, which has involved delivery of smaller diameter pipes and longer length projects. The learning from our delivery is the need to balance cost efficiency with customer service. We have undertaken a small-scale steel replacement programme. We have been working with other networks and Ofgem to develop the Network Asset Risk Methodology to create a monetised risk score for asset health. This is being used to help optimise asset health decisions and the target for RIIO-1 aims to keep risk broadly constant over the eight-year period. Our London Medium Pressure replacement programme has been partially deferred due to access constraints and our desire to manage the impact of the work on stakeholders. We returned allowances of £60m for the work that we have deferred. We are managing increasing pressures of Streetworks legislation and lane rental on gaining access and planning works. We have set out a detailed action plan for high rise buildings in the latter half of RIIO-1 to look at how supply can be maintained for these customers in the most effective way. Our emergency service is performing very well with required standards exceeded in all years and very positive feedback from customers.

Engagement summary

Who, how and purpose	Insights
Domestic customers We engaged with customers early in our programme to understand their priorities through surveys and workshops. We then conducted willingness-to-pay workshops and tested different options with different groups, in terms of length of mains replaced and how we should prioritise cost benefit workload between safety, reliability and the environment . We also tested the acceptability of our proposal with customers, quantitatively and qualitatively.	• Early on we established that a secure and reliable supply of gas and safety were customers' top priorities. They were also willing to pay for reduced interruptions. • However, when presented with different options for lengths of mains replaced, the least ambitious options were preferred by most customers. When we tested different approaches to mains replacement at our customer forum, a 'balanced' approach was preferred (as opposed to minimising environmental impact or cost). • In general, customers were happy with our current targets on emergency response and support further coordination with other parties (whole-system solutions). • Overall, 83% of customers found the resilience aspects of our plan acceptable, which was backed up in follow up workshops.
Stakeholders We engaged with a range of expert stakeholders on deliverability and work planning (e.g. GL Noble, Arup). In particular, we engage with the HSE on an ongoing basis to inform our planning in the long term and to assess the risk thresholds that we need to be managing.	• Expert insights provided on different areas of our mains replacement programme e.g. comparative risk of remaining metallic mains, asset management optimisation and cost benefit analysis. • HSE engagement confirmed they would not support any change that could be perceived as a reduction in safety standards.
CIVS and Fuel Poor CIVS and individuals in fuel poverty were included separately in our options testing and acceptability testing to see if they had a different view.	• CIVS and those in fuel poverty followed the same preferences as domestic customers, preferring the lower ambition options and a balanced programme. Both groups supported our plans for resilience at acceptability testing workshops.
Future customers We included future customers in workshops for options and acceptability testing.	• Future customers had the same preference for a balanced programme and supported our plans at acceptability workshops.
Business customers We included businesses in quantitative options testing and acceptability.	• Overall, businesses were more divided than domestic customers on different options, with responses divided between the least ambitious and most ambitious options. 82% found our proposals acceptable when we tested it with them.

And the steps we've decided to take in RIIO-2

We have updated our plan to reduce our proposed level of iron mains replacement such that we meet minimum run rate requirements for IMRRP together with a 50km p.a. cost benefit analysis work targeting the most optimal pipes to replace. We will target the highest risk steel pipelines for replacement at a volume that our supply chain suggest we can deliver. We will focus on significantly improving the asset health risk of MOBs given they are our worst served customers if we have an unplanned interruption, with a commitment around enhanced engagement with building owners to create a building by building plan for high rise assets. We will make interventions to maintain asset health risk at a constant level on the other asset classes to balance safety and reliability and keeping options open for the future. We have also further refined our proposals on the London Medium Pressure Project in light of stakeholder feedback and deliverability and proposed a Price Control Deliverable and a lower totex incentive sharing factor to recognise the ongoing uncertainty. We will maintain our current emergency response standards.

Measurement of success								
Output – annual targets	**East of England**	**North London**	**North West**	**West Midlands**	**Cadent**	**Comparison to RIIO-1**	**Cost (RIIO-2 total)**	**CVP**
Delivering metallic mains replacement – iron mains replacement (annual average)	561km	310km	389km	298km	**1,557km**	Average of 1,582km	**£1,680m (base plan)[1]**	**n/a**
Delivering metallic mains replacement – High Risk steel replacement (annual average)	18km	34km	6km	10km	**67km**	0 km (new output)	**£214m (base plan)[2]**	**n/a**
Network Asset Risk Measures 'NARMs'– change in monetised risk	£281m	£388m	£356m	£202m	**£1,226m**	Monetised Risk held flat for non-mains and services assets (see separate Figure 07.04)	**Covers repex and capex plans**	**n/a**
High Rise Building plans	Enhanced engagement with building owners to create a building-by-building plan for all high-rise assets by the end of RIIO-2.					No proactive plans at building level just for asset category	**£11.5m (base plan)**	**n/a**
Regional specific schemes – e.g. London Medium Pressure Programme (annual average)	n/a	2.6km	n/a	n/a	**2.6km**	3.1km	**£79.8m (base plan)[3]**	**n/a**
Emergency call handling – 30 seconds	>90%	>90%	>90%	>90%	**>90%**	>90%	**Covered in base opex**	**n/a**
Emergency response – 1 hour and 2 hour	>97%	>97%	>97%	>97%	**>97%**	>97%		**n/a**

Delivering our commitments
Customer communication: • We have set out specific plans to improve our communication around our planned works and our impact on roadworks (see quality experience output commitments). We have set out a target of coordinating with other utilities on delivery of major projects and are identifying options for how we might measure the benefits of this further working with the Greater London Authority.
Processes/systems: • We are developing a new depot-centric operating model which will establish new capabilities on planning and regional accountability for our outputs. This will provide greater flexibility of moving between repex, capex and opex work and we are seeking to utilise the Tier 2 contractor market more, which will stimulate greater competition and diversity in our delivery options. We have already commenced this journey with the establishment of our Construction Services North West delivery organisation.
Partnerships: • We have tested our scenarios (for km delivery, work and project type) by looking at supply chain delivery models to test deliverability. We have performed a deliverability assessment on each asset family NARMS proposal to build this into model assessment.
Ongoing engagement: • We have engaged the HSE with regard to safety management and iron mains replacement and, Ofgem on the NARMs methodology. We are supporting streetworks legislation development (to ensure access and efficient costs to customers), and we are engaging with local authorities around MOBs building owners to create a building-by-building plan. We have memorandums of understanding in place to jointly develop with a prototype already in place.

Protecting against non-delivery	
Price control deliverables 'PCDs'	To address any differences between actual work delivered and forecast, the output commitments for mains replacement length (iron and steel) will be set by diameter band. If length is not delivered, there is a mechanism for the allowances to be refunded. In addition, any change between diameter bands will be adjusted for. We are proposing a specific PCD for the London Medium Pressure Project given its challenging access requirements and interaction with other infrastructure developments and a totex sharing factor of 15% recognising the lower confidence in costs at this stage of its development.
Monetised risk targets	Network specific targets are set out for asset health work and assessed at the end of the RIIO period through the NARMS methodology. Revenues will be adjusted if there is a significant difference between the outturn level of monetised risk delivered for each network.
Licence Obligations	The emergency service is governed under a Licence Obligation which protects against non-delivery.

Reference: For further evidence on our proposals in this area, please see:
Appendix 09.00 – Overview: How we have developed our investment plan
Appendix 09.02 – Distribution Mains and associated services (from PE, Steel & Other)
Appendix 09.04 – Transforming the experience for Multiple Occupancy Building Customers – Risers
Appendix 09.06 – London Medium Pressure

1 Includes associated services and <=2" steel (as per Ofgem RIGs for Table 4.01)
2 Includes tier 2A iron mains and other high risk mains replacement and associated services
3 Includes associated governors

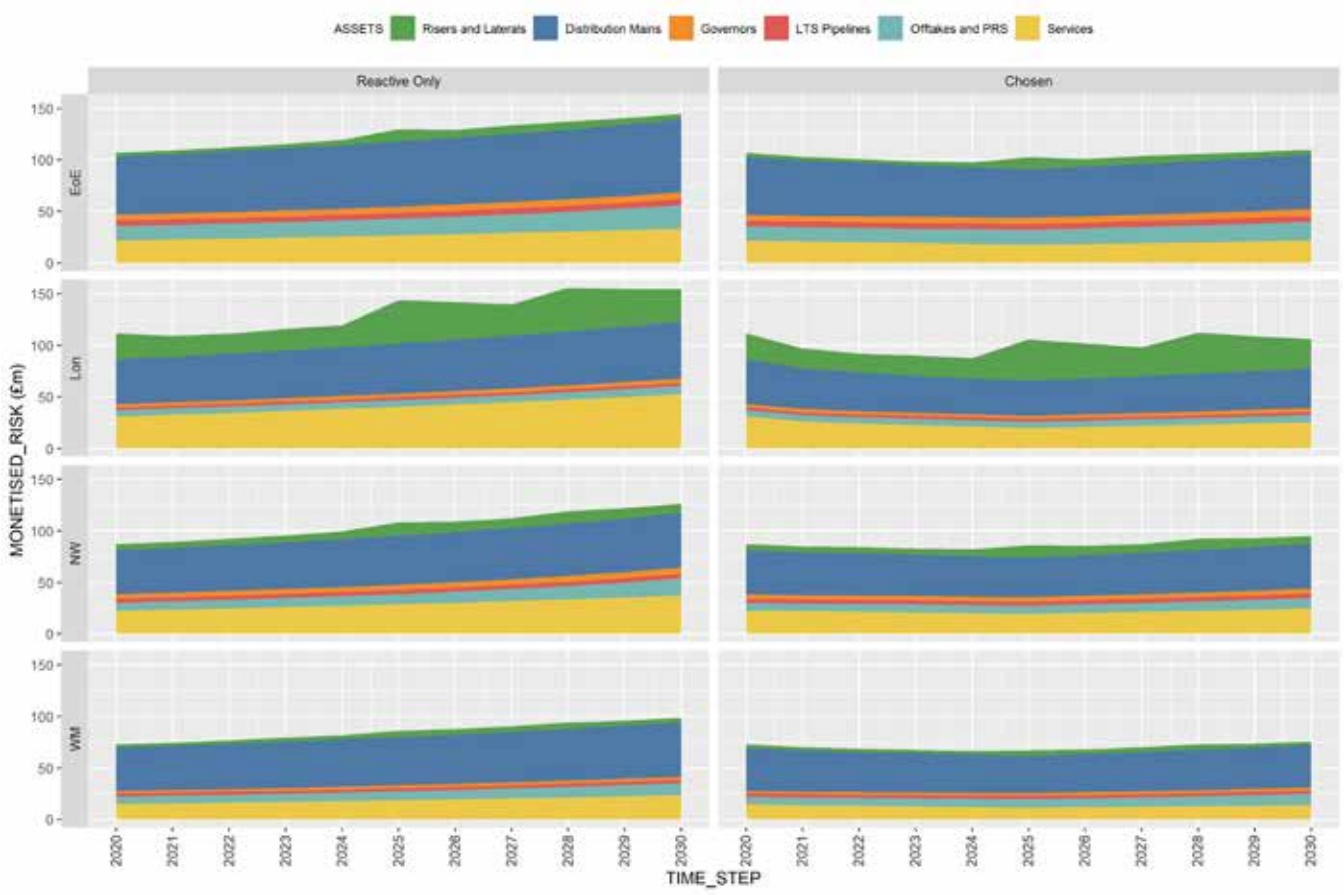
Our commitments continued

Table 07.04: Replacement summary

	Work Driver				
		Other Mains			
Category	IMRRP	Safety Driven	CBA	Total	Average Annual
IMRRP	7,692	0	0	7,692	1,538
IMRRP Dynamic Growth	93	0	0	93	19
Steel ≤2"	153	0	0	153	31
Tier2a	0	37	0	37	7
Tier2b	0	0	53	53	11
Tier3	0	31	15	47	9
Tier1 >30m	0	6	30	35	7
Steel	0	262	147	408	82
Asbestos	0	1	6	7	1
Total	**7,938**	**337**	**250**	**8,525**	**1,705**
Average Annual	1,588	**67**	50	1,705	

Figure 07.04: Monetised risk with and without intervention for RIIO-2 and beyond

Network	Total Long Term Benefit Risk Target (Discounted) 18/19 prices	
	£m over 10 years	NARMs related spend (£m)
East of England	£281m	£625m
North West	£356m	£499m
West Midlands	£203m	£434m
North London	£388m	£841m
	£1,226m	**£2,399m**



Cyber resilience

Technology is a core part of our operation and we understand the negative impacts that IS system failures can have on our customers. We take cyber threats seriously. We continually adapt our cyber security strategy and approach to reflect the changing threat, business and technological landscape. We do this to ensure that we remain an adequately protected business in line with the expectations of all of our stakeholders, balancing risk, resilience and cost.

At the time that we were setting out our RIIO-1 submission, cyber security was a new priority for Government and new standards were beginning to be set out, including standards for Critical National Infrastructure ('CNI'). The growth of technology, a number of high profile security incidents, and the rise of cyber-crime has resulted in the profile of cyber security rising significantly. It is now recognised not only as a core component of IT Service Delivery, ensuring the resilience of key business processes and avoiding operational, reputational and financial impact; but also as an essential element of all technology, including Operational Technology ('OT') and Industrial Control Systems ('ICS').

REDACTED

We have three security domains:

- The corporate or business **Information Technology ('IT')** domain which comprises the kind of technology common to most businesses in the UK
- Critical information systems which underpin our **Critical National Infrastructure ('CNI')** domain, the failure of which, could have a significant and immediate impact on UK business and society
- The **Operational Technology ('OT')** domain, which is technology that is embedded in the physical assets on our networks, enabling us to operate the networks safely and efficiently.

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These assets have traditionally been managed and maintained through the Electrical & Instrumentation part of our Operate & Maintain field force.

Previously, maintaining the security of our network assets has been driven by physical security controls. However, as technology has become ubiquitous, IT and OT have converged, which has resulted in OT increasingly becoming a target for sophisticated malicious attackers. The threat from cyber-attack is continuing to grow globally, and in response, the Government is implementing the Network and Information Systems Regulations to coordinate the mitigation needed across all operators of essential services. We are subject to these regulations, and we are working closely with Ofgem to understand the implications of the new regulations on our cyber security approach in Cadent. The rapidly evolving threat landscape means that we must continually review our controls and investments to maintain an acceptable level of security across all of our domains in order to protect our customers from disruption.

REDACTED

1. Our cyber strategy

We use threat intelligence to inform and innovate our security control set. We draw on trusted advisors, such as the National Cyber Security Centre ('NCSC'), Gartner and our Cyber Security Operations Centre ('CSOC') supplier, to ensure we maintain an acceptable level of control and risk.

In RIIO-1 our operating model focused almost exclusively on 'prevention' of security incidents with some 'detect' and 'recovery' capabilities. This has evolved to a more balanced focus across all dimensions of cyber security approach – prevention, detection, response and recovery. The rationale behind this change reflects the reality that preventative controls will at some point fail and that a largely preventative approach is no longer sufficient. This approach is supported by major security authorities and regulatory bodies which provide a number of control sets in support of this model.

We have developed an information security management system and framework, based on ISO/IEC 27001, an internationally recognised standard, with a risk-based approach to security control selection, and controls measured for effectiveness. We have also decided to utilise some controls from the US National Institute of Standards and Technology ('NIST').

2. Efficiency of investment

By adopting ISO 27001 underpinned by NIST as a framework, both of which take a risk-based approach, we can assess value versus cost for our investments. Other frameworks, which prescribe the control set to be adopted, would not enable discretion in the investments that are made.

We have established a number of IT service frameworks to deliver our cyber investment work.

Our investment plan assumes that we will always seek fit for purpose, standard, off the shelf solutions rather than build complex, bespoke solutions. However, our investment plan also assumes that some risks will require more complex controls or specialist resources and it is the extent of the complexity or specialism that drives some risk in setting out a forward plan for the RIIO-2 period.

REDACTED

Our commitments continued

3. Options

For each of the planned investment programmes, an option analysis has been completed.

Table 07.05: Business IT Security options analysis

For example, the following analysis applies to the investment planned in our Business IT Security:

Option (RIIO-2 Cost)	Investment	Consequences
A. Do nothing £0m	Nil. We cannot progress with our strategic investments to utilise Artificial Intelligence, Machine Learning, Internet of Things, Smart Networks, extension of services to customers, etc.	Would not meet regulatory requirements. Any implemented services will be liable to attack with no ability to prevent, detect or recover.
B. Minimum spend £3.3m	The minimal level of protection able to be undertaken. Not sufficient to reach an appropriate baseline of control.	Assumes that simple, standard services are all that is required to deliver our technology investment plan. A basic level of protection would be delivered, though there is a risk that the level of sophistication, complexity or need for specialist resources could leave large areas minimally protected: only our most critical systems would be adequately protected. Would lead to increased operating costs as more controls would need to be manual. We would have skills and resource gaps.
C. Baseline £6.4m	Somewhere between 50% and 80% of the cost range, we could implement a comprehensive baseline of controls. Our strategy to invest in technology to create value from the data that we hold, to provide information and new services to customers could reasonably be undertaken.	Assumes some simple and some complex services are required to deliver our technology investment plan. An adequate basic level of protection would be delivered. There is still some risk that the level of sophistication, complexity or need for specialist resources could leave less critical systems not so well protected.
D. **Proposed** **£8.2m**	**This level of investment should enable all proportionate and appropriate controls to be implemented, with little compromise on the depth, quality or breadth of the control, assuming that not all controls will require expensive solutions or specialist skill.**	**This level of expenditure should be sufficient for protection of our business. It provides broader detection and recovery capabilities. Some compromise will need to be made but we believe this would be an appropriate level of protection: we assume not all controls will need to be sophisticated, be complex or need specialist resources and all systems could be well protected.** **Would be well protected, with automated, efficient controls.**
A. Complex Solutions £9.5m	This level of investment should guarantee that no compromise on the level of controls needs to be made, albeit the cost range is estimated and could prove insufficient. Investment in recovery and resilience is improved.	We would be able to deliver all programmes and initiatives and meet our regulatory obligations, even if everything were complex, sophisticated and requiring specialist resources. No compromise needed.

In each case, our proposals are to invest at a proportionate and appropriate level of expenditure, realising a good set of outcomes in terms of risk management. Our plan proposes to spend £8.2m on cyber security.

4. Outcomes

Through the proposed investment, we will protect our operation against most threats.

REDACTED

REDACTED

5. Benchmarking

We engaged international research and advisory firm Gartner to benchmark our Plan in April 2019. Gartner benchmarked the three cyber security domains we have identified (IT, CNI and OT), using a triangulated approach:

- Top-down – verifying our estimates against analogous projects normalised for organisation size and complexity.
- Bottom-up – each building block benchmarked against Gartner database, normalised for scale/scope/complexity and modelled using assumptions (where required).
- Benchmark reference points used against effort-based model to create modelled total cost.

Business IT Security Plan (IT & CNI domains)

This Plan (which can be found in **Appendix 07.02.00**) includes investment associated with new technologies. The Plan does not include:

- Current cyber opex spend – We have negotiated fixed costs with our supplier for this activity in the early years of RIIO-1 (although the level of these costs could increase as a result of increased levels of threat).
- Expenditure to replace security assets. In line with Ofgem's expectations, these costs are included in the wider IS investment plan.

Costs and benchmarking

Gartner have benchmarked our April 2019 Plan against their database of similar companies and suggested that they would expect to see an investment cost range of £3.36m to £14.68m in today's prices (i.e. that in their survey of similar companies, 25% invest less than £3.36m on Business IT Security and 25% spend more than £14.68m).

Ofgem have proposed a re-opener mechanism to address the risk of new risks/threats that emerge post submission, and changes in legislation. There is also uncertainty over the range of costs that may need to be incurred to manage the existing threat level assumptions. We suggest any material deviations should also be captured in the mechanism.

In addition to the investment cost ranges, the implementation of controls will increase our IT operating costs through RIIO-2 by up to £6.2m by 2026.

Cyber Resilience Plan – response to NISR and OT security

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Costs and benchmarking

We propose an investment cost for the Cyber Resilience Plan of £14.2m, made up of:

- Cyber Resilience – Regulation Change, £9.5m
- Cyber Resilience – OT Security, £4.7m

Gartner assessed the costs of NISR changes and found them to be in the range of £9.08m–£16.92m in today's prices, and OT security investment in companies comparable to Cadent in the range £7.5m–£9.28m in today's prices over five years.

REDACTED

Uncertainty

Given how dynamic the cyber security landscape is, it is impossible to allow for every eventuality in developing our plans. There are a number of possible events which may occur during the RIIO–2 period which could have significant implications for Cadent, and for which we would anticipate Ofgem will consider reopening the RIIO–2 settlement. Below are some examples of the type of event or change which might lead to this situation.

NISR changes to baseline scope	This is the level of investment and/or operating costs required because of changes in the NISR regulations during the RIIO–2 period. These changes could be driven by specific incidents or a desire to 'raise the bar'.
Data Protection Act changes	This is the level of investment and/or operating costs required to meet any changes in the Data Protection Act or guidance associated with the Act during RIIO–2.
Incidents – Immediate cost	The cost associated with a major or mega incident.
Incidents – Consequential costs, including RTB impacts	In the event of an incident there may be consequential costs (one off or operating costs).

We have included Ofgem's proposal for a re-opener in this area in our **Chapter 10, Managing Risk and Uncertainty** and in **Appendix 10.05.**

More detail on our cyber resilience and business IT security plans are contained in **Appendices 07.02.00 and 07.02.01**.

Physical security

Alongside our cyber security plans, we have also set out our physical security requirements. We have been working with BEIS to understand how threats are evolving and have contributed to the development of their new Physical Security Upgrade Programme ('PSUP') document which describes the levels of protection required for sites of different sensitivities.

REDACTED

Our commitments continued

Workforce resilience

Our people are vital to us delivering our vision – to set the standards that all of our customers love and others aspire to. Achieving this will depend heavily on having people in the right roles, with the right skills and who are motivated to deliver great outcomes for our customers. Our workforce resilience strategy seeks to ensure that we understand the demands on our business now and into the future and how we will meet these demands. We are building on a strong and successful heritage of delivering safe and reliable outcomes to our customers but we must recognise that the world in which we operate is changing. New technology, different types of roles, the evolving network and the changing expectations of our customers, stakeholders, shareholders and employees are all factors that we must consider in ensuring our workforce strategy is fit for purpose now and into the future.

The wider environment presents a range of opportunities and challenges, from the future of gas and wider collaboration to Brexit. These need to be kept ahead of alongside a strong plan for maintaining a resilient workforce. The strategic challenges include supporting the future role of gas, the end of the mains replacement programme, the RIIO-2 settlement being tighter than before, attrition levels increasing, and the significant time to develop competency in many areas that are core to the industry.

Our Workforce Resilience Strategy (**Appendix 07.02.03**) recognises the balance that we need to achieve between the known challenges that we face today and the high level of uncertainty that exists around the future role of gas and the potential repurposing of our network. It is this balance that means we have focused our workforce strategy on the medium-term time horizon; ensuring that we have the right resources to deliver in RIIO-2, whilst setting the organisation up to establish a much clearer understanding of the long term to allow the strategy to evolve over the period.

Our strategy has been established to address the following seven challenges that we will face in the short, medium and longer term:

1. We need to maintain a technically competent workforce throughout RIIO-2 to deliver similar work to that we deliver today, but with significant uncertainty in the longer term.
2. There is a high degree of competition for technically competent engineering resources from a number of high profile construction projects (e.g. HS2) and the make up of the contracting industry has changed (and continues to change) following the Carillion collapse in 2018.
3. Despite recent progress in this area, we operate in an industry that has been very male dominated with a non-representative BAME employee profile.
4. There is a rapidly changing skillset requirement in certain parts of the organisation from technological advancements such as robotics, AI and machine learning.
5. Despite significant improvement during RIIO-1, we continue to operate with an ageing workforce, especially in core engineering roles.
6. We are aware of a number of 'hotspot' areas where it is difficult to replace, attract and retain specific and critical skill-sets for our business (e.g. Authorising Engineer and Safe Control of Operations roles).
7. The role of first line supervisors is increasingly important to drive local accountability and ownership of customer outcome delivery.

In order to address these challenges we have established five strategic objectives, which are summarised in the table below:

Table 07.06: Workforce resilience strategic objectives

Objective	Weakness	Opportunity
Through a strong employee proposition, engagement and commitment, deliver leading productivity and customer service.	Market median pay and terms and conditions can make it difficult to attract niche or highly technical skills into the organisation.	We are a business in a state of change and this creates an environment rich in opportunity.
Modernise the eco-system of suppliers and delivery partners	Work complexity and pressure on pricing are increasing and there are many growth projects in the economy that suppliers can aim to access.	Our reputation is solid and our scale and the security of demand we can offer suppliers is competitive.
To attract, develop and retain great people to productively deliver our services.	Our relatively low brand awareness, competition in the market and future network uncertainty.	We have award winning recruitment schemes, strong talent retention rates and a good employee proposition.
Our workforce to reflect the diversity of the communities and customers we serve.	Our limited gender and ethnic diversity today, especially in the field force population.	We have made good progress recently with our EmployAbility scheme, and with more appointments of women to senior leadership roles, and we actively run or participate in diversity and inclusion change programmes.
Address the key skills shortages in the business and in collaboration with industry peers to ensure the continued safe operations of our networks.	There are several skills risk areas, often with significant 'time to competency' and significant competition from other employers.	Our scale: we have people across four networks to leverage which controls our exposure to some of this risk, and creates opportunity for accelerated skills and experience development.

Data & Digitalisation Strategy

Building a data-driven business driving a customer-centric approach

We want data to be at the heart of everything we do. As we transform our network into one that is smart, self-sufficient, real-time, and integrated, we need to invest in building a data-driven organisation. We have set out an ambitious programme to help us achieve this aim.

A comprehensive data maturity assessment undertaken in March 2019 concluded that we are not where we need to be as a data-led organisation. This lack of maturity has a material impact on the value we can derive from our data and the value that we deliver to customers. In light of this assessment, we developed a Data & Digitalisation Strategy in consultation with our Customer Engagement Group ('CEG') that articulates how we expect data to support our business commitments going forward.

Our strategic intent

We use our data to **provide tailored services to our customers**, recognising their needs and engaging over their preferred channel. We have a **'single view'** of our interactions with them, allowing us to streamline their experience with us.

We have a **complete and holistic view of our asset data** combining location, asset health and asset risk data to enable us to make **better asset management decisions**.

Data capture is **simple for our operational teams** and we can **accurately measure our efficiency and quality**. Supervisors have **command centre style dashboards** to support and monitor their teams' activities in near real time.

Data is used to drive **operational excellence** in the back office, providing an **engaging employee experience**, helping to develop our people for the future and to **attract the next generation of talent**.

Data is **readily available to all our employees and customers** in a format that is suitable for them, **reducing time spent producing reports** and increasing the **quality of our data** through continuous use.

Our data can be **easily extracted** from our systems in an automated fashion to **meet regulatory reporting requirements** with **intelligent assurance** helping to identify potential problems ahead of human intervention.

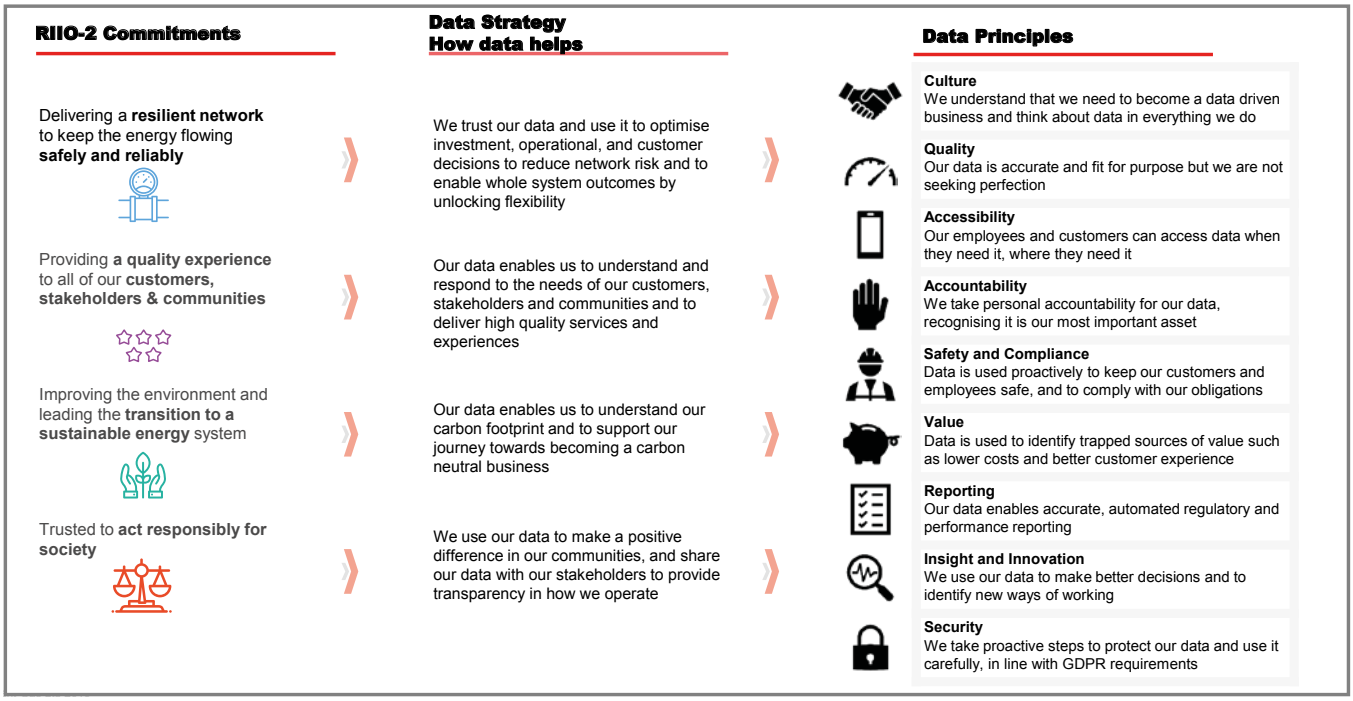
We use our data to **identify innovative ways of working** to lower our costs and to provide **valuable new services** for our communities and customers.

We **trust our data and share it externally** with our stakeholders, communities and partners who work with us to identify **new sources of value** and support the **transition to a low carbon economy**.

Purpose

Our Data & Digitalisation Strategy exists to support the delivery of our commitments to our customers:

Figure 07.05: Our Data & Digitalisation Strategy



Our commitments continued

Customer, partner and stakeholder commitments

At the heart of our Data & Digitalisation Strategy are our customers, partners, and stakeholders. We have published an Enhanced Engagement Strategy detailing how we are continuing to engage in a tailored and effective manner. Specific to our Data & Digitalisation Strategy, we have committed to engaging our customers, partners, and stakeholders in the following ways:

Figure 07.06: Our Customer, partner and stakeholder commitments

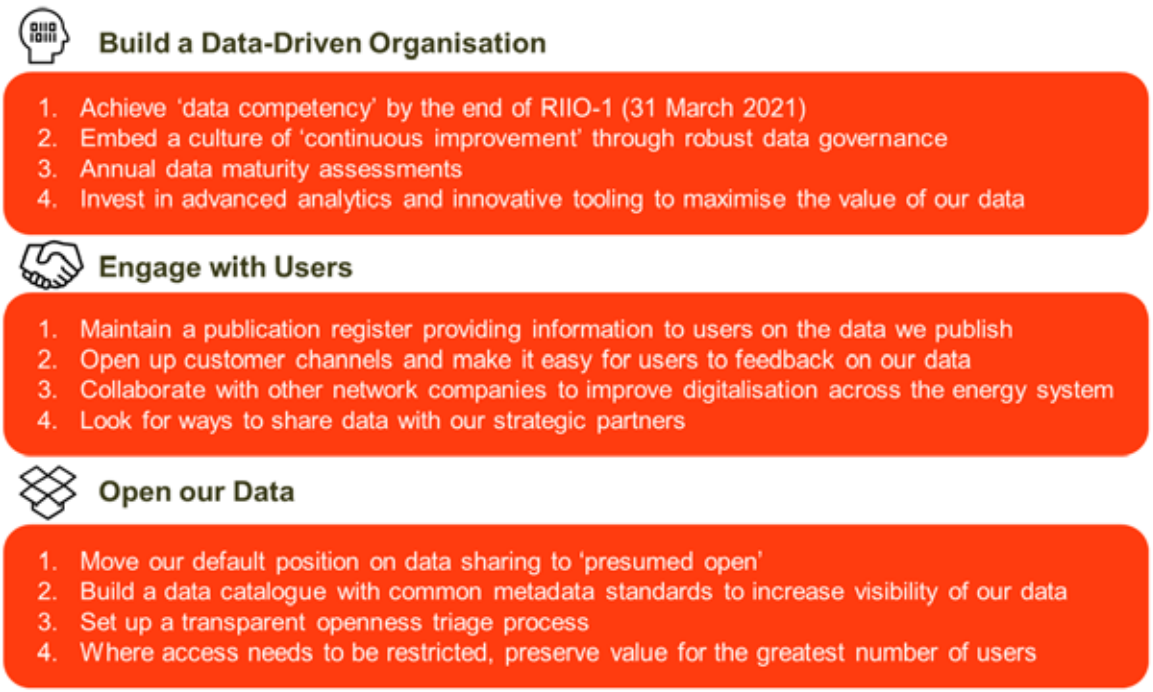


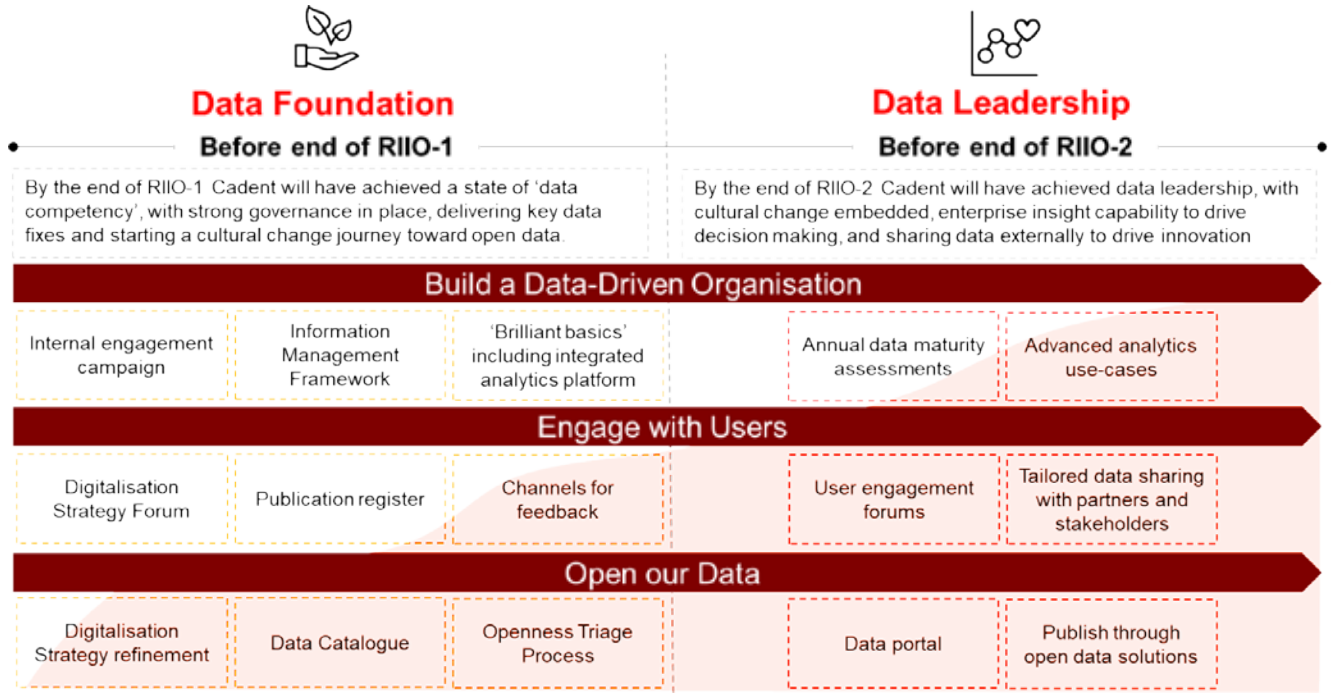
Table 07.07: Data & Digitalisation Strategy customer and stakeholder benefits

Topic	Consideration	Customer and Stakeholder benefits
Satisfaction	Customers' expectations regarding core service delivery are increasing.	Improved data quality will underpin how we meet commitments and deliver a safe and compliant service.
Visibility	Customers expect to have end-to-end visibility of in-flight processes.	We will adopt a principle of data accessibility and transparency for our customers, as well as our employees.
Personalisation	Customers increasingly expect a more tailored service.	We will capture and leverage customer data to improve and tailor our services, and improve standards of customer service.
Open data	Industries such as rail and banking are opening data sets up for external access and use to stimulate innovation and drive value.	Our data can be used to drive direct benefits for customers, as well as enabling new, innovative solutions in the value chain, both within Cadent and across the wider industry.

Our Plan

Our Data & Digitalisation Strategy recognises that we need to transition to a data-led business and ultimately becoming a truly data driven business. Our Plan will take us from a data foundation state, to one of data leadership.

Figure 07.07: Data & Digitalisation Strategy transition states



The plan also includes exploring the development of a digital twin of our network – a virtual representation of our assets, and how they interact across our network and with the environment. A digital twin would allow us to run digital simulations of real-world scenarios which could help optimise engineering works as well as plan the future of our network, including decarbonisation and the introduction of new gas sources.

Being data-driven will enable us to deliver significant benefits for our customers, partners and stakeholders. These include operational improvements, better insights into our customers' needs, and data-driven innovations to safeguard energy security for future generations.

The value we derive from our data will improve as we progress toward a data-driven organisation. We intend to continue to invest in our capabilities across technology, people, and cyber security, in order to improve our data maturity and generate insights that can propel the transition to a Net Zero energy system.

Costs in RIIO-2

We have included an investment cost of £5.7m over RIIO-2 to underpin our work on the data strategy. We are investing through the remainder of RIIO-1 to build our data team and enhance our data capabilities and this will increase our operational 'running' costs. This has been built into our opex forecasts alongside the efficiencies that better data is assumed to deliver for us.

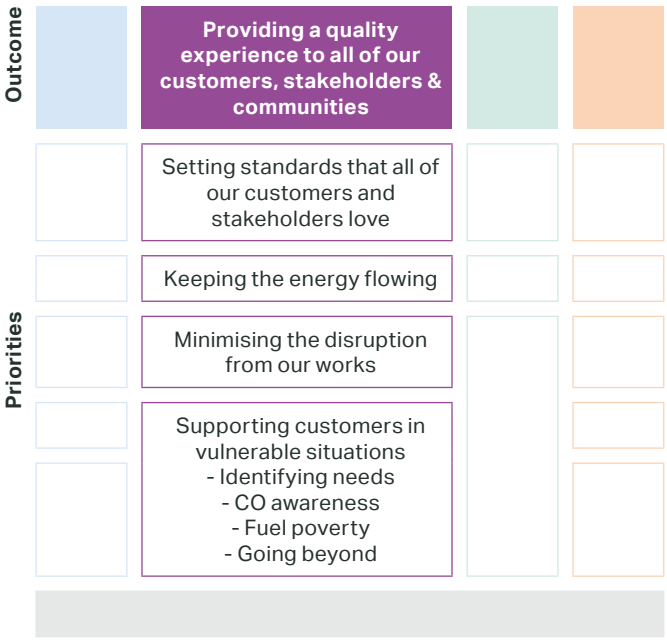
7.3 Providing a quality experience to all of our customers, stakeholders and communities

Summary

Customer expectations on service quality are higher than ever and rising. We know that we deliver on much of customers' traditional or basic requirements well. However, we also recognise that we must develop greater consistency and deliver on the full breadth of stakeholder expectations of a quality service, which extends far beyond their basic needs.

Our engagement with customers on providing a quality experience has revealed four key themes that we are using to group the commitments we propose for RIIO-2. These themes are:

Figure 07.08: Outcomes our customers need us to deliver



What we will do – The priority areas to address this insight

First, **setting standards that all of our customers love** will take us beyond the current measured satisfaction surveys to establish a standard for all of our services that takes reference from industries beyond the utilities industry. We will look to establish measures and improve all of our services. We have already started this approach and we have set out our commitments in two key areas of focus relating to our worst-served customers; namely household connections and customers living in multi-occupancy buildings. We recognise the inconvenience that customers in some MOBs have suffered especially in relation to time off gas following disconnections. We have committed to a step-change in performance during the remainder of RIIO-1 for MOBs. In addition, we set out plans to create an accessible and inclusive business to make life easier for our customers. There is no such thing as an 'average' customer and our services need to reflect this and work for the individual, and across the breadth of our services.

Second, focusing on **keeping the energy flowing to our customers** so that they can continue their daily lives. This priority area looks at both how we minimise the potential for a customer to be interrupted and the targets we have to reduce the average time that they are left without gas in the event of an interruption. It also looks at how we can better communicate and provide clarity around reconnection of a service.

Third, we need to **minimise disruption from our works**. Utilities have been focusing on this area for many years and have made some significant improvements. Our customers are clear that they want us to go much further, in particular, regarding impacts associated with roadworks and coordinating work with other utilities. Based on customer feedback, we have significantly changed our proposals in this area from our July draft Plan so that we are no longer targeting the speed of reinstatement. Instead, we are targeting clear communications and delivering our promises.

The final priority area is the need to **support customers in vulnerable situations** better than ever. We made significant improvements relating to vulnerability in RIIO-1, including raising carbon monoxide awareness, our work on the Priority Services Register and in helping to tackle fuel poverty. There is now a clear expectation that we and other companies take further steps to safeguard and provide the best possible service to vulnerable groups in our communities. Through previous price control deliverables, the benefits of gas have been brought to many; however, there are opportunities for more ambitious approaches to reduce fuel poverty and affordability concerns that build on learning from the past.

We have set out a broad list of commitments to address the feedback that we have received from customers. The number, breadth and specificity of our commitments, reflects our comprehensive engagement with the full range of stakeholder and customer groups, the diverse needs and expectations in today's world and our high level of ambition to transform experiences.

A number of our services are taken as business as usual requirements such as delivering guaranteed standards of performance. We have highlighted the areas where we are proposing to go beyond business as usual and are hence part of our 'Consumer Value Proposition' and referenced Ofgem's criteria. We have also set out clearly which are common and which are bespoke measures.

There are four output commitments for which we are seeking incremental funding.

Table 07.08: Outputs for which we are seeking funding

Quality experience Output commitments (£m) in 2018/19 prices	2021 /22	2022 /23	2023 /24	2024 /25	2025 /26	Total
Needs identification	1.5	1.5	1.5	1.5	1.5	7.7
Enhanced CO awareness	5.2	6.2	6.8	7.5	8.4	34.1
Fuel poor interventions and advice	6.5	6.5	6.5	6.5	6.5	35.6
Service beyond the meter	3.8	3.8	3.8	3.8	3.8	19.0
Total	**17.0**	**18.0**	**18.6**	**19.3**	**20.2**	**93.4**

There are a number of outputs where we are delivering improved service and new bespoke output commitments, but we are not seeking funding. Instead we are taking this as an additional efficiency challenge into our overall cost base, as set out in **Table 07.09**.

Our commitments continued

Table 07.09: Outputs to be delivered as part of an additional efficiency challenge

Quality experience Output commitments (£m) in 2018/19 prices	Average per year	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Measuring and enhancing accessibility and inclusivity	1.0	1.0	1.0	1.0	1.0	1.0	4.9
Better roadworks information	2.0	2.0	2.0	2.0	2.0	2.0	10.1
Coordinating with others	0.2	0.2	0.2	0.2	0.2	0.2	1.0
Total	**3.2**	**3.2**	**3.2**	**3.2**	**3.2**	**3.2**	**16.1**

We have estimated that these outputs imply that we will need to absorb costs of £3.2m p.a., implying an effective additional 0.1% ongoing efficiency challenge. Further details are provided in **Chapter 9, Costs and efficiency**.

Setting standards that all of our customers and stakeholders love

Table 07.10: Summary of output commitments

Output	Common / Bespoke	Output type	Incremental Costs?	Part of our CVP?	Appendix evidence
DELIVERING A QUALITY EXPERIENCE FOR ALL OF OUR CUSTOMERS, STAKEHOLDERS & COMMUNITIES					
Setting standards that all of our customers and stakeholders love					
Establishing and raising the bar for all of our customer and stakeholder experiences	Bespoke	ODI (R)	N	Y	07.03.01
Guaranteed Standards of Performance ('GSOPs')	Common	LO	N	N	
Customer Satisfaction Targets (RIIO–1 service measures)	Common	ODI (F+/-)	N	N	
Stakeholder measures	Bespoke	ODI (R)	N	Y	
MOBs Balanced Scorecard	Bespoke	ODI (R)	N	Y	
Responsive to your complaints	Common	ODI (F-)	N	N	07.03.03
Responding to your enquiries	Bespoke	ODI (R)	N	N	
Measuring and enhancing accessibility and inclusivity	Bespoke	ODI (R)	N	Y	07.03.05
Improving our household connections service	Bespoke	ODI (R)	N	Y	07.03.04
Keeping the energy flowing to our customers and communities					
GSOP1	Common	LO	N	N	07.03.06
Unplanned interruptions (minimum standard) for NW, WM and EE	Common	ODI (F-)	N	N	
Unplanned interruptions (minimum standard) NL	Common & Bespoke (Lon)	ODI (F-)	N	N	
Unplanned interruptions (targeted likely levels)	Bespoke	ODI (R)	N	N	
Providing time-bound appointments	Bespoke	ODI (R)	N	Y	07.03.07
Minimising disruption from our works					
GSOP2	Common	LO	N	N	07.03.08
Private reinstatement timeliness	Bespoke	ODI (R)	N	Y	
Better roadworks information	Bespoke	ODI (R)	N	Y	
Coordinating with others	Bespoke	ODI (R)	N	Y	
Supporting customers in vulnerable situations — Identifying your needs					
Principle based licence condition to treat customers fairly	Common	LO	N	N	07.03.09
Needs identification	Bespoke	PCD	Y	Y	
Annual showcase event and report	Common	ODI(R)	N	N	
Supporting customers in vulnerable situations — Raising carbon monoxide awareness					
Carbon Monoxide awareness action business as usual	Common	PCD	N	N	07.03.10
Enhanced Carbon Monoxide awareness	Bespoke	PCD	Y	Y	
Supporting customers in vulnerable situations — Tackling affordability and fuel poverty					
Fuel poor gas network extensions	Common	PCD	N	N	07.03.11
Additional fuel poverty interventions	Bespoke	PCD	Y	Y	
Income and energy efficiency advice	Bespoke	PCD	Y	Y	
Pioneering new funding model trial	Bespoke	ODI (R)	N	Y	
Targeting customers in fuel poverty	Bespoke	ODI (R)	N	N	
Supporting customers in vulnerable situations — Going beyond to strive to never leave a customer vulnerable without gas					
GSOP3	Common	ODI (F-)	N	N	07.03.12
Personalising welfare facilities	Bespoke	PCD	N	Y	
Service beyond the meter	Bespoke	PCD	Y	Y	

Our commitments continued

Our Customer Strategy

Underpinning our commitments in this area is our Customer Strategy. In 2018 we revamped our strategy to focus on establishing a customer-centric culture across the organisation. It is based on six pillars that each contribute to this aim:

Establishing a customer-centric operating model – We are in the process of shifting from a highly centralised process-centric operating model to a regional delivery model that puts greater emphasis on local accountabilities for delivering customer outcomes. This is creating much closer proximity between our customers and decision makers, putting the emphasis on our local teams to engage with their own stakeholders and customers, shaping and defining standards that they can deliver day after day.

Real time data driving far greater quality insights – Having access to better and real time data helps our people provide improved customer experiences. In 2018, we started this process by creating our Customer Insights team that sits at the centre of the newly created Chief Operating Officer structure. In addition, we invested in a new SMS real time feedback provision ('Rant & Rave') and recruited experienced data analysts and social media professionals to maximise the intelligence from customer insights – linking this in with other existing insights.

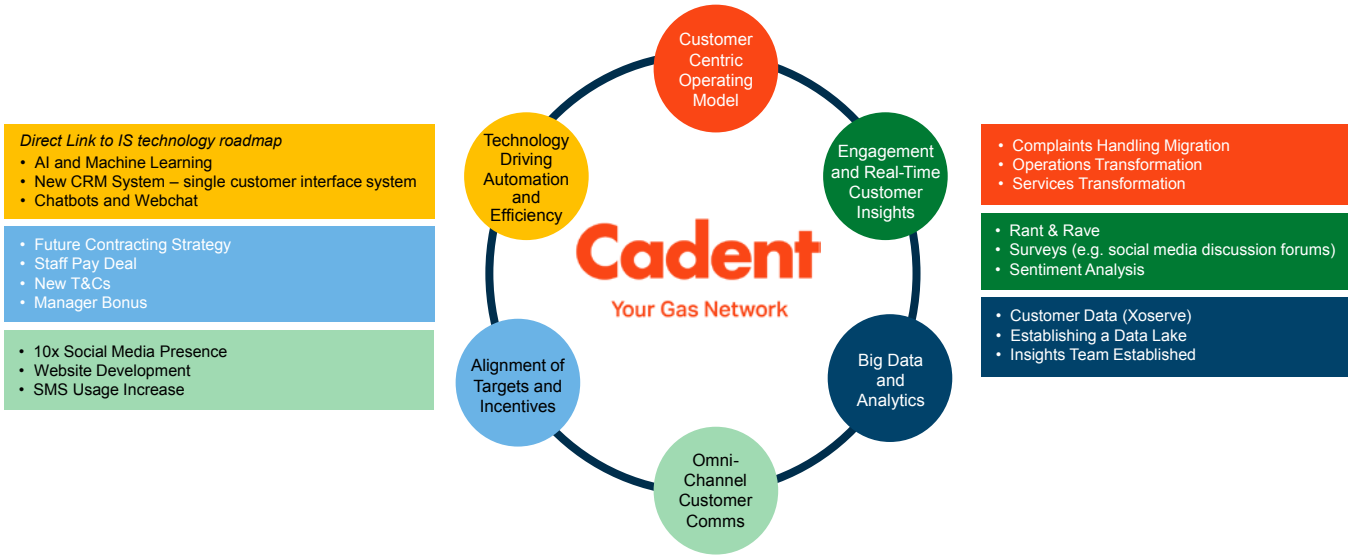
Enhanced engagement and data analytics – Also in 2018, we established our enhanced engagement programme, spending just over £2m on additional engagement activities with stakeholders across multiple segments. At the same time, we have built our customer 'data lake' on Amazon's Web Services platform to create a single repository, allowing us to collate insights from business as usual operations, our enhanced engagement programme and publicly available data. This unlocks more forensic data analysis ability, so we can truly understand the needs of our customers, which is fed into our Customer Insights Forum to drive action across the organisation.

Multi channel communications – Our customers tell us that their preferred communication methods have changed. Over 50% of adults in the UK prefer to use social media or SMS for communicating. In addition to our investment into SMS channels for customer feedback, we are using this for proactive customer engagement regarding our work and services. We have increased our social media following by 50% and are using platforms such as Facebook to engage with customers about our forthcoming mains replacement programme. We have developed a series of videos and infographics to engage with customers and stakeholders on who we are and the services we operate and have enhanced our website offering customers and stakeholders another route into Cadent.

Incentives aligned around the customer – We all respond to incentives. Our key service provider contracts have been amended to add far greater financial incentives for delivering better customer service outcomes, encouraging far greater local ownership and engagement with stakeholders to deliver this. Additionally, we negotiated a new pay deal for all staff that links an element of their annual bonus to the company's customer satisfaction and stakeholder engagement scores, enhancing the proportion of managers' bonuses from 10% to 35% in this area.

Technology enablement – We have invested in AI and machine learning to support the gathering of additional insights into the Insights team, now allowing complex sentiment analysis to be used and acted upon. Furthermore, we have started the process to procure a new state of the art CRM system, which will allow customers to access real time information relating to work in their area and services that they are receiving, and allow two-way dialogue with customer agents. This will be in place before RIIO-2.

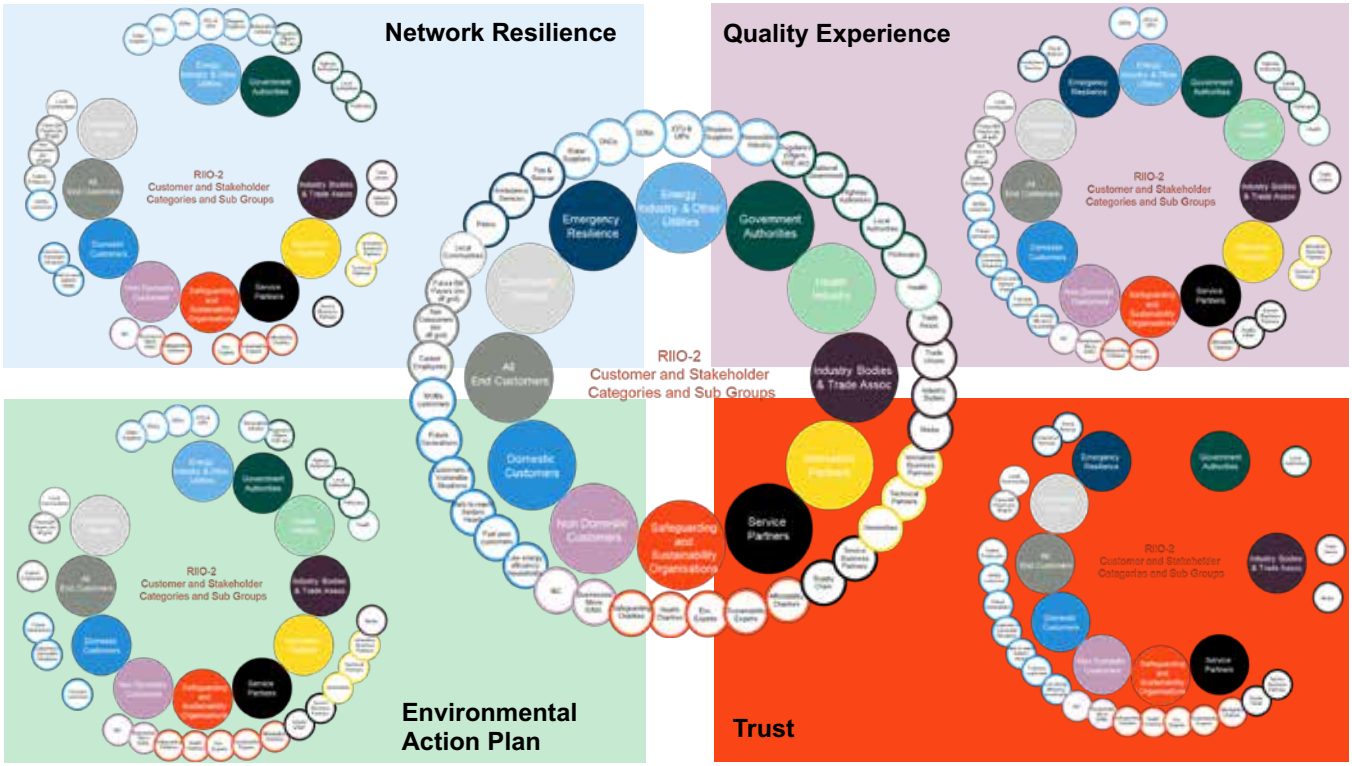
Figure 07.09: Our customer strategy



Recognising the importance of segmentation

Our customer strategy helps us to identify the specific needs of each of our customer segments through the way we capture and use data, our multi-channel customer communication process and our improved analytics capabilities. It has also been critical to recognise these segments in the way that we have engaged to determine the output commitments in this area. prior to every engagement event we held a series of meetings and workshops to determine the desired outcome of the engagement, what we needed to engage on, and with whom. For example, some of our services are exclusively delivered to domestic customers, in which case we did little or no engagement with non-domestic customers. However, in other cases, it was critical to engage separately with different groups of customers, refining how we engaged in order to ensure that we have captured the needs of all of our customers. We explain our approach to segmentation in **Chapter 5, Enhanced engagement**, and in more detail in **Appendix 05.03, Engagement Decision Tracker**, where we link every engagement event to the commitment in the plan and show who we engaged with, the questions we asked and the insights we took. This insight is then summarised in each individual output case appendix to show the complete 'golden thread' between engagement, insight and proposals. We maintain a stakeholder segmentation database with 33 different groups and 12 sub-categories of groupings. The diagram below shows these segments and details which segments we engaged with against each of our four customer outcome areas:

Figure 07.10: Recognising the importance of segmentation



Our Customer Strategy underpins the journey we are on to set standards that our customers will love and that others aspire to. Our commitments (which are summarised below) seek to make a significant step towards setting measurable benchmarks for the experience that all of our customers and stakeholders receive. This will help move the frontier or performance across the industry in RII0-2 and beyond.

Priority area – Setting standards

In RIIO-2 we are committed to enhancing our existing customer service measurements, including Guaranteed Standards of Performance ('GSOP'), CSAT and complaints handling, and establish measures against all core services, allowing us to set robust performance baselines and continually improve the experience for all our customers, and our stakeholders. We will seek to establish separate measures within each service area for different customers, including business customers, recognising the segments that exist within this categorisation. We know we need to monitor and improve our service in specific areas, therefore we have already defined measures for general enquiries handling, household connections, customers living in multi-occupancy buildings, and stakeholder satisfaction.

£4.9m incremental absorbed and GSOP costs incurred c. £10m	Qualitative customer benefits (no financial CVP)	No bill impact

We will set standards that all of our customers and stakeholders love and others aspire to

Our vision is to set standards that all of our customers love and others aspire to, therefore we must measure how ALL of our customers and stakeholders feel about the standards we are setting and ensure that we are able to benchmark and compare ourselves to others within the industry and beyond.

There is an expectation across all areas of society that businesses provide great services to all their customers. This includes enhancing our existing obligations, including our minimum standards, CSAT surveys and complaints. However, we want to go beyond this and measure performance across all our services to improve the experience of our customers and stakeholders, and to ensure our services are accessible and inclusive to all.

What we are already doing in RIIO-1

During RIIO-1 we have seen customer satisfaction and complaints handling performance increase across all our measured services in all networks. However, our service level has not been consistent, and our performance is not at the level of our comparator networks. We have re-focused our customer strategy to undertake a transformational programme that will put delivering great customer outcomes at the forefront of how we do business. We are seeing positive progress but there is more work to be done to fully embed and drive towards our vision. Although the CSAT incentive has driven significant improvements in customer experience, this is limited to only part of our customer base and some of our service offerings with no current regulatory measure of stakeholder satisfaction. The complaints handling measure has also driven significant responsiveness improvements for all GDNs in RIIO-1. However, there is no such measure for general enquiries, which we and many of our customers believe there should be to drive rapid resolution in all customer queries.

Engagement summary

Who, how and purpose	Insights
Domestic customers We reviewed complaints, enquiries, CSAT and SMS feedback data from the last three years to analyse the reasons for high and low levels of satisfaction. We have engaged with customers in a series of workshops to understand their priorities for GDNs so that we can ensure that we are measuring the aspects of our service that most matter to them.	• Customers highlighted that our services should not be 'one size fits all' and should reflect the specific needs of different customers. • Keeping people up to date is a priority. This should take place though various channels including social media, calls, emails and face-to-face contact, keeping everyone updated on ongoing works, interruptions and emergencies. • Customers felt that our approach to communication should be: honest and transparent; accurate and consistent; accessible (including to non-English speakers) and tailored to customer needs. • Most customers prefer to respond to surveys using their phone, especially younger customers.
Customers in vulnerable situations ('CIVS') We engaged with CIVS and experts supporting CIVS via in-depth interviews to understand their needs and requirements to help tailor our standards of service.	• Accessibility is key, providing support and getting out to the community where possible, ensuring clarity in the language used to communicate. • CIVS should be prioritised above other customers and provided with a higher level of service.
Business and other customer segments We conducted in-depth interviews with business customers to gain their views on our current service levels and discussed future enhancements. We engaged directly with UIPs, IGTs and biomethane gas suppliers to understand their specific requirements through face-to-face meetings and interviews. In 2018 we began a comprehensive end-to-end review of our connections business. We worked with leading customer service consultancy Perpetual Experience to interview customers, past and future, to understand the key areas for improvement, recognising their different needs. They brought extensive experience of good practice elsewhere for us to leverage.	• Smaller businesses stated that we should increase visibility and communication about who we are and what we do, so that businesses can better understand how our activities impact their organisation. • The needs of business customers differed from domestic customers and should be monitored and improved. • Biomethane, IGT and UIP connections customers felt frustrated that we and other GDNs are publishing 'connections customer satisfaction' scores that do not represent their views as major customers in this area. • Domestic connections customers said that it took too long from initial contact to the engineering work starting. The process was generally efficient thereafter.

Engagement summary	
Who, how and purpose	**Insights**
Expert stakeholders We engaged early with expert stakeholders, including those on our Customer Engagement Group, over the limitations of the current measures to determine satisfaction levels. We undertook acceptability testing interviews with expert stakeholders, presenting our draft plan to get their views and thoughts on our proposed commitments.	• **A water company** were supportive of our proposals and highlighted that it was good to see the inclusion of our proposals on accessibility and inclusivity. • **A trade organisation** highlighted that it is good to see commitments that acknowledge our impact on everyday lives. • **Last-mile utilities operator** explained that minimum standards of service are really important and that alternative customer measures should be explored beyond CSAT which is an ageing measure. • **Citizens Advice** believed that we should have a separate measure of satisfaction for customers registered on the Priority Services Register. • **Sustainability First** believed that we should measure the inclusivity and accessibility of our services. • Most stakeholders, when asked, would welcome us measuring their satisfaction levels.
Industry experts We have engaged collaboratively with other GDNs and Ofgem to understand how the existing CSAT measure can be enhanced and how the minimum guaranteed standards can be updated and improved to meet the needs of all customers.	• Noting that the current measurement regime is adding value, there is little appetite beyond ourselves to change the existing limited approach to ascertaining customer satisfaction levels with a more robust and wide-reaching set of measures.

And the steps we have decided to take in RIIO-2

Our insights inform us that measurement drives improvement and therefore it is important we develop measures across all core customer and stakeholder experiences. There are a number of key areas that customers prioritise (e.g. minimising disruption, keeping appointments, respecting customers, etc.) that are not currently assessed in the RIIO-1 CSAT measure or GSOPs. Measures set against these areas would ensure that we are focusing on the areas that matter most to customers. Given our feedback from our customers and stakeholders, for RIIO-2 we will enhance existing customer service measures, including guaranteed minimum standards, complaints, and CSAT, including measuring CSAT separately for customers registered on the PSR. We will also establish measures for all our key service areas and stakeholder activities, including general enquiries handling, household connections, stakeholder satisfaction, and report our progress against the breadth of our MOBs customer service commitments in a balanced scorecard. In establishing these new measures, we will provide benchmark data to set the base performance level for RIIO-3 and beyond, allowing us to deliver long term benefits for customers and stakeholders. We will also measure the transparency, accessibility and inclusivity of our communications and establish measures for this.

In response to the feedback from our connections customers, we will continue to deliver segment-specific improvements through our Service Transformation Programme. In addition, to respond to very clear feedback about the timeliness of the front end of the domestic connections process, we have developed two timeliness measures relating to the two stages of the process that currently take the longest – time to quote and time for site visit.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Inc Cost (RIIO-2 total)	CVP
Customer service GSOPs 1-3, 12-14	✓	✓	✓	✓	✓	Increased compensation payments, automatic payments and some updated targets (in line with regulatory GSOP changes)	**Estimated efficient level £10.4m**	**No financial CVP, qualitative benefits only**
Connections GSOPs 4-11	>90%	>90%	>90%	>90%	**>90%**			
Customer satisfaction	Targets to be confirmed following CSAT trial between October 2019 – March 2020. We will also measure PSR CSAT to understand and improve services for customers in vulnerable situations.					Updated scope, questions and increased numbers of response channels	**£0**	
Complaints metric score	To be rebased on GD1 performance – Ofgem to confirm					Re-baselined benchmark	**£0**	
Enquiries metric score	We will establish an Enquiries handling metric which encourages rapid response and resolution of enquiries. This will follow a similar structure to the Complaints metric.					New measure for RIIO-2	**£0**	

Priority area – Setting standards continued

Measurement of success continued								
Output	**East of England**	**North London**	**North West**	**West Midlands**	**Cadent**	**Comparison to RIIO-1**	**Inc Cost (RIIO-2 total)**	**CVP**
Measuring and enhancing transparency, accessibility and inclusivity	We will work with an independent expert to establish an index which measures the transparency, accessibility and inclusivity of our communications.					New measure for RIIO-2	**£0 (£4.9m absorbed cost)**	**No financial CVP, qualitative benefits only**
Establishing and raising the bar for all our customer experiences	We will establish measures for all our key customer service areas and set a robust baseline in order to drive improvement for all customer experiences.					New measure for RIIO-2	**£0**	
Stakeholder satisfaction	We will establish a stakeholder satisfaction measure in order to understand how satisfied our stakeholders are with our services and drive improvements.					New measure for RIIO-2	**£0**	
MOBs balanced scorecard	We will establish a scorecard of customer measures related to improving the experience for customers living in MOBs including a MOBs specific CSAT measure.					New measure for RIIO-2	**£0**	
15-minute household connections quotes – % adherence	>90%	>90%	>90%	>90%	**>90%**	GSOP4 minimum standard – four working days	**£0**	
3-day site visit following acceptance of household connections quote – % adherence	85%	85%	85%	85%	**85%**	Not measured in RIIO-1	**£0**	

Delivering our commitments
Customer communications: • We are looking to improve our customer performance levels by simplifying call agent scripts, making improvements to the processes followed by Customer Liaison Officers and the continuation of a number of improvement activities already put in train across the business. • We will continually review our written and digital communications, including website accessibility with videos in multiple languages which help give greater context to our works.
Process/systems: • We will enhance the technological capability of our systems to support big data, customer insights and multi-channel communication. We will look to make use of AI including self-service voice and chat to smartly handle enquiries and complaints. • We will look to make use of AI including self-service portals and chat functionality to ensure we can continue to respond promptly to enquiries from our customers.
Partnerships: • We are continuing to work with Perpetual Experience on our service transformation journey. This work will help to ensure that our service design and delivery is aligned with our customer strategy. • We will develop partnerships with organisations who can effectively benchmark our services to allow us to measure continual improvement.
Engagement: • Engagement will be ongoing with Ofgem and the other GDNs to trial the new CSAT survey and multi-channel approach. We will be establishing ongoing regional customer forums to monitor and improve our customer performance. • We will continue to engage with expert stakeholders to ensure that good practice is noted and acted on.
Skills and resource • We will train frontline delivery teams and customer call agents to ensure they are equipped with the latest skills in engaging with customers and ensuring they are always satisfied with our services.

Protecting against non-delivery	
Guaranteed Standards of Performance	Minimum delivery standards for interruptions, communications, priority customers and connections. Compensation is payable to customers if GDNs fail to meet a minimum standard. (Connection standards are also stipulated in the GDN licence.)
Customer satisfaction incentive	Financial incentive +/- 0.5% of revenue for customer satisfaction performance across Emergency Response and Repair, Planned Work and Connections processes.
Complaints handling incentive	Downside financial incentive -0.5% of revenue. GDNs are penalised if they score above a certain level within the complaints handling metric. GDNs are measured on timely handling of complaints, repeat complaints and Energy Ombudsman referrals.
Reputational	Non-delivery against the reputational incentives proposed will have a negative reputational impact.

Reference: See Appendices 07.03.01 Establishing and raising the bar for all our customer and stakeholder experiences, 07.03.03 Rapid response to enquiries and complaints, 07.03.04 Improving our connections services and 07.03.05 Measuring and enhancing accessibility and inclusivity for more information.

Priority area – Keeping the energy flowing

In RIIO-2 we commit to transforming our customers' experiences during an interruption to their gas supply by reducing the likelihood of unplanned interruptions, reducing the average duration of unplanned interruptions when they do occur and offering timebound appointment slots for reconnection of gas to appliances for both planned and unplanned interruptions. We will set aspirational targets for MOBs and non-MOBs unplanned interruptions for each network (detailed below) leading to c.60% reduction in total duration by the end of RIIO-2 from 2018/19 levels and set minimum standard performance targets that exceed Ofgem's objectives of ensuring GDN customers are protected against any significant deterioration in the length of unplanned interruptions, and that existing performance issues with multi-occupancy buildings are resolved.

No incremental cost	£109m CVP based on willingness-to-pay for timebound appointments	No impact on the customer bill

Keeping the energy flowing

We aim to keep the energy flowing for our customers and communities. Even though the likelihood of an unplanned interruption to a customer's gas supply is one in almost 300 years, when they do occur, it can have a significant impact on their lives. We want to keep the energy flowing by reducing the likelihood of unplanned interruptions to supply and reducing the time it takes to get our customers back on gas when they do occur. We will also make supply restoration to appliances more convenient by offering timebound appointments. We understand that some of our customers experience significant delays in restoration e.g. customers living in multi-occupancy buildings and we will transform their experiences and build on the improvements we are already committed to deliver in RIIO-1.

What we are already doing in RIIO-1

Keeping the energy flowing is our priority and we do our utmost to maintain high levels of reliability in the supply of gas to our customers. In 2018/19 we sustained 99.996% overall network reliability, which corresponds to an average customer being off gas for 13 minutes every year. On average we restore a customer's gas supply following a non-MOBs unplanned interruption within 10 hours. For unplanned interruptions in MOBs we have created a plan which includes a series of short, medium and long-term actions to improve the customer experience, including our commitment to reduce the median duration of an unplanned interruption to ten days by the end of RIIO-1. We do not currently offer customers the option to select a timebound appointment slot to have gas restored at their appliances, but we do have several internal measures to accelerate restoration of supply (at the customers' appliances) following repair works and mains replacement.

Engagement summary

Who, how and purpose	Insights
Domestic (household) customers We reviewed thousands of complaints and CSAT returns which demonstrate the importance of keeping the gas flowing for customers. During early phases of engagement we asked customers what they expect and want from a GDN – minimising interruptions and support during them ranked very highly. We undertook stated and revealed preference willingness-to-pay studies to ascertain a monetary value associated with the improvements we could make. We tested three costed options in Business Options Testing (BOT) to understand customer preferences against the options we created based on their earlier feedback.	• Customers viewed disruption to their gas supply as their top priority area, as a reliable supply of gas supports their quality of life. • Domestic customers highlighted the importance of increased investment to stop interruptions occurring in the first place, for example through new technology to detect problems • During an unplanned interruption, customers expected their gas to be reconnected as soon as possible. However, there was limited willingness to pay for investment in tools and equipment to reduce average durations. • There was strong support for timebound appointments for internal supply restoration from customers at our forums and workshops. The majority of customers preferred two or four-hour timeslots.
MOBs customers and stakeholders (e.g. local councils, planners and transport organisations) We engaged with 41 MOBs customers via regional workshops. It is more difficult to make repairs in MOBs and therefore interruptions can last longer. It was therefore important to hear directly from MOBs customers to understand their views and priorities and help us shape our Plan. We also held a joint collaboration event with our strategic partners, tRIIO, with 48 MOBs stakeholders to understand specific needs.	• Whilst reducing the average time of interruptions was supported by all, there was a challenge to paying for it, and also believing that it would be delivered. • MOBs customers highlighted the importance of timely communication to keep customers informed, working with other stakeholders e.g. building owners and local authorities, and planning ahead to have the right permissions in place to undertake works. • Many questioned if a reduction in MOBs interruption times could be achieved given that many factors, such as coordination with building management, are outside of our control. • MOBs customers favoured being given a timeslot for having their gas switched back on, but that such slots should be convenient to customer routines and needs and that we needed to maintain regular communication with customers.

Priority area – Keeping the energy flowing continued

Engagement summary	
Who, how and purpose	**Insights**
Customers in vulnerable situations (CIVS) We engaged with CIVS via in-depth interviews to understand their needs and requirements to help us tailor and shape our service offerings in RIIO-2. We later tested costed options to understand their preferences.	• CIVS highlighted the importance of providing warning and precise indication (where possible) of when the gas would be off, as no warning could create panic and distress. • CIVS also highlighted the importance of providing alternative provisions to keep warm and having access to hot water and food (our proposals for this are set out in our 'Going beyond to never leave a customer vulnerable without gas' priority).
Business customers We conduced workshops and held in-depth interviews with business customers to gain their views on current service levels and discussed future enhancements.	• Organisations wanted us to focus primarily on getting the gas back flowing again. Whilst large / gas dependent organisations almost always have a back up heat supply, smaller organisations do not. • Many business customers wanted timeslots for reconnection to be as precise as possible (slots of no more than 1-4 hours). • Across business types, organisations wanted us to focus primarily on getting the gas flowing again. Companies that would be impacted by a loss of gas, such as hospitality and leisure services, suggested compensation be made available, while office-based businesses such as legal and accounting firms did not.
Customer feedback following large incidents We spoke with 100% of customers impacted by large scale incidents to understand their specific needs. We used feedback from this in our analysis. We undertook an additional survey to drill down into aspects of the customer experience received at two major loss of gas incidents at Deanshanger, Northamptonshire and Eye, Cambridgeshire.	• The vast majority of respondents thought that our response to the emergency exceeded their expectations (more than 90% in Deanshanger and more than 80% in Eye). • All bar three respondents said that they trusted us to keep the energy flowing to their home – those three said that they trusted us 'a bit'. • The use of the Incident Application (mobile app) and onsite presence of our people ranked as aspects working very well.
Expert stakeholders We engaged with experts throughout the process including undertaking acceptability testing interviews in which we presented our draft Plan to get their views and thoughts on our proposed commitments.	• **Water company** – nine hours seems acceptable, given the challenges experienced. • **Last-mile utilities operator** – restoration times are acceptable, would be better if it could be quicker, but acknowledged it can be really complex. • **Citizens Advice** – support our proposals to reduce the impact of interruptions, and the additional support we are proposing for CIVS

And the steps we have decided to take in RIIO-2

Our insights and engagement highlight clear differences in preferences based on the type of interruption experienced:

Reducing the average durations of unplanned interruptions

- **Household (non-MOBs) unplanned interruptions** – After triangulating our engagement results, there is limited support to invest in new equipment to reduce the average restoration time for non-MOBs interruptions at a cost to customers, and the lowest target option that we tested (to maintain current performance levels) was the preferred option for the majority of customers during Business Options Testing. Although customers supported maintaining existing performance for non-MOBs interruptions, benchmarks confirm that we can achieve a 10% improvement without any additional costs to customers through innovation and implementing best practice.
- **MOBs unplanned interruptions** – Business insights and engagement with MOBs customers informed us that our performance needs improvement. Although there are many challenges with MOBs beyond our control, we still believe we can make further improvements to reduce the likelihood of an interruption and the current average restoration times.

Reducing the likelihood of unplanned interruptions

This was a primary focus area for many (in particular business customers). We are forecasting to reduce the likelihood of our customers experiencing an unplanned interruption by 13% by the end of RIIO-2 from 18/19 levels. We will continue to work with Ofgem to develop a measure for this and the overall customer impact from it. We are forecasting a c.60% reduction in total unplanned interruptions duration for our customers by the end of RIIO-2 from 18/19 levels.

Major incidents – Major incidents are predominantly driven by third parties and impossible to forecast. Customers tell us that we perform above their expectations during large incidents and we will continue to make this our aim in RIIO-2.

Gas supply restoration to customer appliances – We will provide timebound appointments slots for restoring supply to customer appliances due to the strong customer support received. However, expert stakeholders tell us that we must prioritise the needs of customers in vulnerable situations, which we shall do. Our benchmarks show that two hour appointments is a leading-level service for utility businesses and offering a free service goes well beyond most leading customer service industries.

Measurement of success								
Output	**East of England**	**North London**	**North West**	**West Midlands**	**Cadent**	**Comparison to RIIO-1**	**Inc Cost (RIIO-2)**	**CVP**
GSOP 1: Restore customers' gas supply following an unplanned interruption within 24 hours	✓	✓	✓	✓	✓	Increased compensation in line with inflation – removal of £1,000 cap	**£9m est**	–
Adherence to timebound appointment slots	90%	90%	90%	90%	**90%**	Not measured	**£0**	**£109m**

Unplanned interruption targets – By end of RIIO-2								
Output	**Interruption type**	**East of England**	**North London**	**North West**	**West Midlands**	**Comparison to RIIO-1**	**Cost**	**CVP**
Likely levels – unplanned interruptions average duration (minutes)	MOBs	19,385	31,029	9,440	16,400	Non-MOBs: 10% reduction in all networks MOBs: 10% reduction in EE and WM, maintain c.40% reduction in NL that we will deliver by the end of RIIO-1 and then 1% year on year reduction in durations through RIIO-2. Maintain performance in NW Note: % reductions based on weighted average of years 15/16 – 18/19	**£0**	**No financial CVP, qualitative only**
	Non-MOBs	471	618	562	481		**£0**	
Minimum standards – unplanned interruptions average duration (minutes)	MOBs	25,937	**36,078****	17,906	36,078	Not a formal measure in RIIO-1. However, we have set minimum standard performance targets that exceed Ofgem's objectives of ensuring GDN customers are protected against any significant deterioration in the length of unplanned interruptions, and that existing performance issues with multi-occupancy buildings are resolved.	**£0**	
	Non-MOBs	684	744	736	644			
	Major incidents	7,212	7,212	7,212	7,212			
	Combined*	**1,852**	**1,493**	**1,848**	**2,505**			

* Combined duration for EE, NW and WM is a combination of non-MOBs, MOBs, and major incidents. Combined duration for NL is combination of non-MOBs and major incidents only.

** Ofgem have confirmed that a separate bespoke minimum standard target will be set for London MOBs unplanned interruptions.

Delivering our commitments

Customer communications:

- We will regularly communicate with customers and stakeholders during works to keep them informed of progress and minimise the impact of an unplanned interruption.
- We will establish a MOBs 'hotline' so that building owners or their building managers can contact us easily to find out key information about their building and our work plans. We will also have a dedicated MOBs team in London to keep customers on gas and engage with customers as soon as possible to deliver an improved customer service.
- We will work around the needs of our customers by offering timebound appointments for restoring the gas supply at their appliances.

Process/systems:

- We will continuously improve our working practices, policies and technologies to minimise the time our customers are off gas following interruptions and share and adopt best practices in the industry in reducing the likelihood and duration of unplanned interruptions.
- We will accelerate the application of innovations to enable riser repairs without the need for an interruption. We will develop our systems and applications to offer and manage timebound appointment slots.

Partnerships:

- We will partner with housing authorities, residents' associations, and local councils to ensure work is completed efficiently and customers are kept informed.
- We will maintain partnerships with key MOBs stakeholders in London and develop further relationships with all London boroughs and multi-occupancy building owners.

Priority area – Keeping the energy flowing continued

Delivering our commitments	
Engagement: • We will improve our engagement with local authorities and building owners to ensure we are able to restore the gas supply in MOBs as soon as possible. • During major incidents we will engage with local community leaders, stakeholders and other utilities (where required) to maintain the great customer service we provide in these situations. • We will take a more proactive approach to stakeholder engagement at senior levels within London's mayoral and local authority constituencies to help us target our efforts where they are most needed and to better understand opportunities to improve.	
Protecting against non-delivery	
Guaranteed minimum standards: GSOP 1 – Supply Restoration	If the gas supply of a customer is interrupted as a result of failure, fault or damage to the gas pipeline system they will be compensated where their gas supply is not reconnected at their property within 24 hours.
Unplanned interruptions ODI – Penalty only incentive	Non-delivery against minimum targets for unplanned interruptions average restoration time will result in a penalty worth up to -0.5% of revenue.
CSAT incentive – ERR & Planned work	The financial CSAT incentive rewards/penalises GDNs for performing above/below the agreed target level. +/- 0.5% of revenue.
Complaints incentive	The financial Complaints incentive penalises GDNs for performing below the agreed minimum level. -0.5% of revenue.
Reputational	Non-delivery against reputational incentives proposed will have a negative reputational impact.

Reference: See Appendices 07.03.06 Getting our customers back on gas and 07.03.07 Providing timebound appointments for more information

Priority area – Minimising disruption from our works

In RIIO-2, we commit to minimising the disruption caused by our works. To do this we will reinstate customer property within an average of three working days following completion of works. We will provide additional roadworks information on specified jobs, such as communicating roadworks timescales and alternative routes, through multiple channels – including post, text, via an online portal or an app, social media, TV and radio. We will commit to greater coordination of planned works with other utilities and local authorities to jointly deliver streetworks. This will contribute to overall time saved in the road therefore reducing the impact our works have on communities.

We have absorbed the incremental costs of £11.1m as part of our efficiency challenge	There is no quantitative consumer value associated with these commitments. There are qualitative benefits of reduced disruption	No bill impact

Minimising disruption from our works

Repairs to our network following an emergency gas escape, new connections and works to improve and upgrade our network with safer and longer lasting pipes are essential to keep our customers and communities safe. However, they often require us to excavate holes in the street and in customer properties to access our pipes. This can lead to significant disruption to the lives of our customers and members of our communities, including traffic congestion caused by street works or spoil in the street and on customer properties. Recognising the disruption caused by our works, we have explored how we can minimise this, including timely reinstatement, coordinating with others, and how we might communicate better with customers about our streetworks to minimise the impact.

What we are already doing in RIIO-1

Reinstatement timeliness: There is a minimum guaranteed standard to complete private reinstatement within five days. We use techniques such as live mains reinsertion and robotics (CISBOT)to reduce the number of excavations needed to carry out works and reduce the overall time it takes to complete our works. On average it takes us between 2-6 working days to complete reinstatement on private customer property across our networks.

Better roadworks information: For most of our works we provide customers notification of expected roadworks along with permit boards and verbal on-site conversations. However, for larger works we have explored the use of other more engaging methods. In 2018, we won the "Communication Leaders' Street Works UK" Award for our efforts to effectively communicate with the local community in Stratford-Upon-Avon whilst completing mains replacement works.

Coordination: We publish our Streetworks plans on roadworks.org and have coordinated with other utilities and local authorities on some major projects e.g. London Medium Pressure.

Engagement summary

Who, how and purpose	Insights
Domestic customers We reviewed the insights from complaints, CSAT and other BAU sources of customer feedback and the largest single factor creating dissatisfaction was 'disruption'. We followed this up in workshops and surveys with thousands of customers to understand their priorities for a GDN and areas we could improve. In all four regions disruption ranked as a top priority. We tested three costed options that we developed off the back of earlier engagement in Business Options Testing ('BOT') to understand customer preferences and willingness to pay.	• Customers, especially when engaged through deliberative workshops, understood the critical role we play and the need for us to disrupt roads. However, they noted this as a major focus area for us in RIIO-2. • Domestic customers indicated that a high-quality job and sticking to agreed timescales were more important than setting a more stretching target for timeliness of completion for reinstatement, which might be missed. • Customers asked for up to date information on start and end dates of works in the road to be made easily available. • During the BOT survey, when asked about filling in holes on customers' property after engineering work, most customers favoured the least expensive option: to fill in holes within three days, noting that this was acceptable.
Industry stakeholders We engaged with industry stakeholders across several forums and bilateral meetings to discuss disruption that can be caused because of our streetworks. This included local councils and other utility organsiations.	• Stakeholders emphasised the importance of collaborating with other parties and coordinating with local bodies and other utilities to minimise disruption. • Key industry stakeholders such as the Greater London Authority ('GLA') and Department for Transport ('DfT') were supportive of our proposals to collaborate with others to minimise road congestion. • We have explored the option of linking our roadworks information with Google satnav systems, but their customer feedback shows that customers are more concerned about actual 'live' travel times rather than the causes of delay.

Priority area – Minimising disruption from our works continued

Engagement summary	
Who, how and purpose	**Insights**
Business customers We conducted in-depth interviews and surveys with business customers to gain their views on our current service levels and their areas of priority.	• Business customers ranked 'minimising the disruption from our works' as the most important due to inconvenience caused, travel disruption, and potential shut-down of operations and direct financial impacts for some businesses. • Business customers felt that multi-utility working "made sense", although some questioned the feasibility of successful coordination and collaboration between different companies. • Their main ask was that they be provided advance knowledge of planned work to allow them to put contingency arrangements in place.
Customers in vulnerable situations (CIVS) We engaged with CIVS and experts working with CIVS via in-depth interviews to understand their needs and requirements to help us tailor and shape our services and how we innovate in RIIO-2. We later tested costed options to understand their preferences.	• Professionals advise that engagement with CIVS is best conducted face-to-face or over the phone. If action is needed, then simple clear messaging should be used. • Promoting the technology of Bluetooth Beacons on our street works sites to people directly and through families was felt to be a positive way forward. • The use of Sightline Barrier Rumble Strips on our street works sites was felt to be a very good idea. Considerations included: for those who have sight-loss, ensuring we make the barriers strong, consistently placed and as easy to see as possible.
Future generations We held six focus groups that included future generations (ages 18-24) to identify any additional or specific requirements that they had that were not represented at more general engagement events.	• Participants at our future generations workshops gave 'reducing roadworks and other disruptions from repairs' a fairly low prioritisation because they felt disruption was a necessary inconvenience for safeguarding the gas supply. When engaged further, they often did not rely on cars or own houses.

And the steps we have decided to take in RIIO-2

In July we submitted our first draft Plan. In the Plan we made a commitment to reduce the time taken to reinstate holes to one day at a relatively significant cost. Our early engagement suggested that timeliness of reinstatement was a key priority. In July and August we tested various costed options to minimise disruption and this option received very low support. This led us to engage further through qualitative forums to understand how else we could reduce disruption. We ultimately developed the commitments that are shown below which received strong support from domestic and business customers and from stakeholders that we engage with regularly through our works. Customers were supportive of us coordinating with others to minimise disruption and congestion on roads. Therefore, we will do more to collaborate with other utilities, local authorities and other stakeholders to reduce disruption and work with key industry experts to measure coordination and the associated value (e.g. days of congestion saved). We will also provide customers affected by our works with tailored and targeted information on roadworks, timescales, road closures and alternative routes utilising various digital and non-digital channels.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	CVP
GSOP 2: Private reinstatement timeliness	5 days	5 days	5 days	5 days	**5 days**	5 days (minimum standard), however in RIIO-2 compensation will increase in line with inflation	**£0**	**No financial CVP, qualitative benefits only**
Adherence to timebound appointment slots	3 days	3 days	3 days	3 days	**3 days**	No bespoke measure to go beyond GSOP 2 minimum standard i.e. 5 days	**£0**	
Provision of roadworks information	✓	✓	✓	✓	✓	Not measured in RIIO-1	**£0 (£10.1m absorbed)**	
Collaborative streetworks	Coordinate streetworks with other utilities and establish a measure in RIIO-2 to report on the number of days saved due to collaboration					Not measured in RIIO-1	**£0 (£1m absorbed)**	

Delivering our commitments
Customer communications: • Deliver improved roadworks communication through digital and non-digital channels to keep customers informed throughout our works. • We will adopt a tiered and tailored approach to ensure the right level of communication is provided based on traffic sensitivity, number of customers impacted, and the impact on business and tourism.
Process/systems: • We will continue to innovate in new technologies to reduce excavations and improve timeliness of reinstatement without the need for significant investment. • We will leverage our revised, more localised contract strategy to support consistent, strong reinstatement performance across networks.
Partnerships: • We will collaborate and coordinate with other utilities and local authorities to deliver efficient roadworks and reduce disruption for customers and communities. • We will work with Streetworks UK, GLA and other industry bodies to develop a robust measure for collaborative works.
Engagement: • We will engage with customers and key stakeholders to continually find ways to minimise disruption from our works. • We will engage with expert stakeholders such as those supporting CIVS to stay up to date with good practice noted elsewhere so we can ensure that we are tailoring our services to best meet the needs of all of our customers. • We will engage with other utilities and regional planning departments to consider ways to better inform the public of planned works.

Protecting against non-delivery	
Guaranteed minimim standard: GSOP 2	If we fail to reinstate a consumer's premises within five days following engineering works, customers will receive compensation.
CSAT incentive	The financial CSAT incentive rewards/penalises GDNs for performing above/below the agreed target level. +/- 0.5% of revenue.
Complaints incentive	The financial Complaints incentive penalises GDNs for performing below the agreed minimum level. -0.5% of revenue.
Reputational	Non-delivery against the reputational incentives proposed for reinstatement timeliness, provision of roadworks information, and collaborative working will have a negative reputational impact.

Reference: See Appendix 07.03.08 Minimising disruption from our works for more information.

CISBOT

Our commitments continued

Supporting customers in vulnerable situations

In developing our strategy we considered a number of factors including what we mean by vulnerability and the outcomes that customers and stakeholders tell us that they want. As such we created our definition of vulnerability alongside our Stakeholder Advisory Panel and have subsequently tested it with numerous expert stakeholder groups. Our definition is: "Vulnerability describes a situation, be it transient or permanent, that can impact a customer at some point during their life. Vulnerability can arise through changes that happen both inside and outside the energy industry. Those customers who find themselves in a vulnerable situation are more affected by Cadent's action or inaction than other customers."

Our vision is to set the standards that all of our customers love, and this means that we must understand, plan for and respond to the needs of all vulnerable situations that customers find themselves in. Our strategy factors in how vulnerability is managed by us our data, the services our customers need, along with the feedback we have had from customers and stakeholders, our own lessons learned and good practice we have noted from others. It is informed by Ofgem's definition of consumer vulnerability and also takes into consideration the levels and types of vulnerability faced by our customers today and how this is likely to change into the future.

Half of UK adults (25.6m people) display one or more characteristics of being potentially vulnerable (Financial Lives Survey 2017). Over 1.5m adults in the UK do not have a bank account, 16.4% can be described as having very poor literacy skills, 4.5m have never used the internet and according to Government statistics, 13.9m are registered as disabled.

It is widely accepted that the level of vulnerability will increase over time as people live longer, and technological advancements leave many customers behind. Our strategy recognises that all customers are unique and that their individual circumstances today could be different tomorrow. Our strategy therefore reflects the need to understand these changes before they happen so that we can plan, adapt and continue to provide great experiences to all of our customers.

As the largest GDN within the UK, we and our customers believe that we should take a leading role in supporting customers and in developing the landscape for the future; one that ensures that access to services is based on customers' needs irrespective of where they live. The over arching principle of our strategy is not to utilise labels and categories, but to provide services to all, recognising the specific circumstances of each customer individually and tailoring services to meet their needs. Providing services for all means gaining and maintaining a deep understanding of our customers' needs, mapping their needs and co-creating responses with partners to ensure that the appropriate skills and services are deployed.

Our strategy has been developed against three tiers – our aim, our strategy to plan and our plan to commitments – this is shown in the figure below. **See Appendix 07.03.00 for our complete Customer Vulnerability Strategy.**

Figure 07.11: Our Customer Vulnerability Strategy

Priority area – Identifying your needs

In RIIO-2 we will commit to having two million direct conversations with customers to raise awareness of the Priority Services Register ('PSR'). This will mainly be achieved through forming over 80 strategic, programme and project partnerships. We will deliver annual vulnerability awareness training for all Frontline staff and innovate to deliver new products and services for customers in vulnerable situations (CIVS).

£7.7m incremental cost	CVP of £0.6m based on social return on investment	11p annual customer bill impact

Identifying your individual needs and supporting those in vulnerable situations

We have a duty and moral responsibility to ensure that the needs of all our customers are understood and acted upon in a respectful and relevant way. The PSR is a powerful mechanism to identify the needs and tailor services according to these needs. However, it is only as effective as the number of people who are registered and for that they must know it exists. We will raise awareness of the PSR to two million customers over the period. In addition, we will join up support services and find the easiest and most cost-effective way of addressing customer needs. We will also equip our frontline staff with the knowledge and skills to identify and support CIVS.

What we are already doing in RIIO-1

Throughout RIIO-1, we have driven industry-wide improvements to the PSR and have been the leading utility company for best practice in serving customers in vulnerable situations. We led the development of a cross industry PSR and developed 27 consistent Needs Codes via a cross-industry collaboration. These Needs Codes drive how the industry shapes and delivers solutions for each individual need. There is no formal regulatory measure for the number of PSR awareness conversations, however we do measure registrations. We have already registered over 3,000 people onto the PSR in 2019/20, meaning that we are ahead of the same point this time last year, and have registered over 12,500 across RIIO-1 to date, remembering that not all conversations result in a registration. The challenge for RIIO-2 will be to ensure that quality, direct conversations are taking place via our workforce and predominantly via our partners who are experts in this, as we scale up this work. At present, vulnerability training is not a formal module within our standardised training approach. For RIIO-2 we want structured, tailored training that will become mandatory for all frontline staff. The vision is that training will range from web-based modules to real life role play with actors to really bring situations to life and ensure that our people are equipped with the skills to best serve our customers.

Engagement summary

Who, how and purpose	Insights
Domestic customers We held regional customer forums, conducted surveys and ran focus groups to really understand customer views on how to best serve CIVS in RIIO-2 and beyond. We also tested our ambition levels within our RIIO-2 plan to ensure our thinking was aligned with customer expectations. We informed customers of a range of costed options for the extent of the services we could offer	• Customers confirmed their willingness to pay more for additional awareness activities. • Customers stressed the importance of identifying vulnerability and the use of various approaches to meet different sets of circumstances. • Our focus should be on providing tailored services. • Only 26% of customers (sample of 206) had heard of the PSR.
Industry stakeholders Industry stakeholders were engaged with across several collaborative forums, Ofgem led workshops, surveys and in-depth interviews to get their views on how our Plan can best support them and the people they represent.	• Awareness of the PSR, or lack of, is a key blocker that needs to be prioritised. • All stakeholders agreed that innovation and new technology should be encouraged to support CIVS.
CIVS We engaged with CIVS via in-depth interviews to understand their needs and requirements to help us tailor and shape our services in RIIO-2. We later tested costed options to understand their preferences.	• Increasing awareness of the PSR should be a priority for Cadent. • We should partner with a wider support network such as charities, social care or health care providers, carers and families.
Business customers We conducted in-depth interviews with business customers to gain their views on our current service levels (including how we serve CIVS) and discussed future enhancements.	• Co-creation with partners/experts is something we should do more of, in a structured and focused way. • Working collaboratively across organisations and utilities would seem a sensible operating model for us to benefit from shared expertise.
Future customers Future customers were engaged with through a number of regional focus groups. We wanted to understand their views on how best to serve CIVS both now and in the future as the vulnerability landscape changes.	• Collaborative working with other Gas Distribution Networks ('GDNs') to roll out initiatives was supported. • Future customers suggested working with social services and mental health service providers to identify customers who would most benefit from products and services. • There was a low level of PSR awareness amongst future customers.

Priority area – Identifying your needs continued

Engagement summary	
Who, how and purpose	**Insights**
Expert stakeholders We engaged with 19 charities to discuss vulnerability and understand their priorities We undertook acceptability testing interviews with expert stakeholders, presenting our draft plan to get their views and thoughts on our proposed commitments.	• Awareness of the PSR amongst the 19 charities was also low, with only 5 out of the 19 having knowledge of it. • **National Energy Action** believed that our plan sets out some very positive and welcome activities to support customers in vulnerable situations and it is important to ensure that activities are joined up across departments wherever practicable, to ensure continued delivery and longevity. In addition, PSR needs to be focused not just on numbers, but on quality as if it captures too many people then it ceases to become a meaningful priority register – it has to capture the right people. • The **Carers Trust** agreed with prioritising meaningful conversations to raise awareness of the PSR. Our approach to partnership working seemed sensible and practical. • **Rural England** were wholly supportive of raising awareness of the PSR, and this is essential in rural areas due to the increasing number of older people who live in isolation. They believed that all our people should at the very least be aware of the PSR and Needs Codes. Innovation and new technology should be encouraged to minimise risk for customers in vulnerable situations especially the elderly and those with disabilities.

And the steps we have decided to take in RIIO-2

Customers during quantitative business options testing favoured our least ambitious option in raising awareness of the PSR. However, qualitative customer and stakeholder engagement suggested a far higher ambition. Customers favoured an innovation approach of being a fast follower, rather than spending significant amounts on research and development. All feedback told us to focus vulnerability training programmes on customer-facing staff only rather than all staff. In our triangulation of these insights we placed greater focus on expert insights and qualitative feedback. Therefore, we commit to have two million direct conversations to raise the awareness of the PSR and we will form over 80 partnerships to deliver improved services for customers in vulnerable situations.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	Net CVP
New standard special condition: treating customers fairly (details TBC)	Zero failures	Zero failures	Zero failures	Zero failures	Zero failures	New licence obligation	**£0**	
PSR awareness conversations	760,000	380,000	500,000	360,000	**2,000,000**	Not measured in RIIO-1	**£2m**	**£0.6m**
Partnerships	**Form a minimum of 82 partnerships across our footprint**					Not measured in RIIO-1	**£2m**	
Annual awareness training	**c.3,000 frontline members trained every year**					New measure	**£3.7m**	
Annual showcase event	Annual event and report on common vulnerability service metrics (TBC by Ofgem).					New measure	**£0m**	

Delivering our commitments

Customer communications:
- PSR conversations will continue across all our customer-facing services. We will work with our partners to increase the volume of conversations we have to reach wider audiences.

Process/systems:
- Our systems will be updated with the latest PSR data as we get it. This data will help us to understand the vulnerability landscape and shape the services we deliver for CIVS. We will focus on improving the data flow across the industry.

Partnerships:
- We will increase our breadth of partnerships in order to serve harder to reach CIVS and ensure they have access to the services they need.
- We will collaborate with GDNs and the wider industry to deliver joint initiatives to identify and support customers in vulnerable situations.

Engagement:
- Engagement will continue across the industry with expert stakeholders, charities, advisory bodies, gas distribution networks and other utilities to share best practice and ensure a consistent application of PSR data. We will contribute to the annual showcase event to exhibit our vulnerability initiatives and share best practice.

Protecting against non-delivery

Principles-based licence obligation	The licence obligation will require GDNs to treat all domestic customers fairly, including customers in vulnerable situations.
Use it or lose it allowance – price control deliverable	Funding for a number of vulnerability activities has been allowed by Ofgem in a 'use it or lose it' format. Any funding not used by GDNs will be returned to customers in full.

Reference: See Appendix 07.03.09 Identifying your needs and joining up support services for more information.

Priority area – CO awareness

In RIIO-2 we commit to educating 200,000 about the dangers of Carbon Monoxide (CO), distributing three million alarms and providing additional services beyond the meter to repair or replace 15,000 unsafe appliances for those most vulnerable. These commitments will be delivered largely by forming effective partnerships with experts in the industry including trusted Gas Safe Registered Installers ('GSRIs'), Fire and Rescue services, NHS Trusts and ambulance services in our footprint

£34m incremental cost	CVP of £22.5m net total value based the social return on investment	51p annual customer bill impact

Carbon Monoxide awareness

We aim to keep our customers warm, independent and safe in their homes. Therefore, we must continue to raise awareness of the dangers of CO poisoning, and intervene to prevent the risks from this colourless, odourless toxic gas that can escape from poorly maintained flues and appliances. Around 50 people living in our regions die every year from CO poisoning, 4,000 people go to Accident and Emergency and 200 are hospitalised. We have explored how to leverage our existing work to expand our reach in raising the awareness of the dangers of CO through targeted education, improved partnerships and increasing CO alarm ownership. In addition, for those most vulnerable there is an opportunity to provide additional services to repair or replace unsafe appliances to ensure these customers are able to use their gas supply when they need to.

What we are already doing in RIIO-1

During RIIO-1 we have focused our approach into three discrete areas:

Educate: Using our existing interactions with customers and through partnerships we are raising awareness of the signs and symptoms and how to stay safe – inspiring behavioural change. During the early years of RIIO-1 we established the CO awareness survey and began to form partnerships with the Fire and Rescue service, working collaboratively to raise the awareness of CO, reaching a broader range of customers. Over the RIIO-1 period we are forecast to issue over 155,000 CO alarms via emergency visits, education and through partnership working. This is beyond our RIIO-1 target of 105,000 alarms issued.

Innovate: Supporting and trialling innovative approaches to improve both detection and awareness. Our Safety Seymour programme for Key Stage 1 school age children is a structured programme, which educates children but also acts as a significant tool to change behaviours of parents and grandparents. Safety Seymour went live in 2016 and we plan to have educated over 44,000 children by the end of RIIO-1. We also developed 12 audio features based on the adventures of Safety Seymour to be broadcast on Fun Kids Radio and since the launch there have been 80 broadcasts and 425,000 listeners have heard the series to date.

To broaden our reach to customers and the public on the signs and symptoms of CO poisoning and the importance of owning a CO alarm, we used CO hotspot reports to identify key areas that would most benefit from an awareness advertising campaign. Following adverts in magazines, to broaden the reach we had four billboard posters up in hotspot areas across our networks that have high volumes of passing traffic. 14.5 million customers saw these billboards resulting in 300% increase in visits to our CO awareness webpage.

Eradicate: We have consistently lobbied to shape policy and deliver a step change in CO safety and subsequent reduction in incidents through our membership of the All-Party Parliamentary Carbon Monoxide Group.

Engagement summary

Who, how and purpose	Insights
Domestic customers We held regional customer forums on CO, conducted surveys and ran focus groups to really understand customer views on CO awareness and their priorities. We also tested our ambition levels for CO awareness within our RIIO-2 Plan to ensure our thinking was aligned with customer expectations. We informed customers of a range of costed options for the extent of the services we could offer.	• Customers were consistently supportive of us raising awareness of the dangers of CO and in particular for us to provide alarms. • We should partner with trusted community organisations to promote awareness and help distribute alarms e.g. NHS, Fire and Rescue services and local GP surgeries because these are 'trusted brands'. • We are uniquely placed as a regional monopoly to address CO risks and PSR customers should be prioritised – customers believed it is our role and duty. • Although customers were aware of the dangers of CO, the knowledge required to act remained low.
Industry stakeholders We have participated in the All-Party Parliamentary Carbon Monoxide Group to shape policy to deliver a step change in CO safety and subsequent reduction in incidents. Industry stakeholders were engaged with across several collaborative forums to get their views on how our Plan can best support them and the people they represent.	• The All-Party Parliamentary Carbon Monoxide Group believed it is a high priority that people do not die from the "silent killer" through greater alarm ownership and awareness of the dangers. • Citizens Advice believed that Gas Distribution Networks ('GDNs') are well placed to deliver CO awareness and the allowance spent on these activities should be set in consideration of each GDN's stakeholder and customer appetite for these activities. • National Energy Action believe that CO educational projects should be supported by the regulatory use it or lose it allowance. Projects should also be better targeted towards customers who need it most.

Priority area – CO awareness continued

Engagement summary	
Who, how and purpose	**Insights**
CIVS We engaged with CIVS and experts working with CIVS via in-depth interviews to understand their needs and requirements to help shape our CO Plan for RIIO-2.	• Raising awareness of the dangers of CO should be made more accessible, for example, to the deaf community • Alarms should be provided based on sensory needs
Hard-to-reach stakeholders Stakeholders with English as a second language, future generations and non-customers from rural areas were engaged to gain a broader view on how we should target our CO services.	• We should do more to raise awareness of CO and make CO alarms mandatory, even if it means bills would be raised. • We noted a lower level of awareness amongst these groups. • Customers on the PSR should be prioritised for alarm distribution.
Expert stakeholders We undertook acceptability testing interviews with expert stakeholders, presenting our draft Plan to get their views and thoughts on our proposed commitments.	• Policy Connect were "very impressed" with our proposals and hoped other GDNs will emulate such an ambitious programme. They were confident that our RIIO-2 proposals will represent a marked improvement over the price control period. • A trade organisation believed our proposals to be an ambitious set of commitments that cover the key areas of CO safety. • A last-mile utilities operator explained that the CO activities in our proposals are a good thing to be involved in and that our commitments are positive and ambitious with perfectly reasonable costs to deliver. • Sustainability First acknowledged a gap in the industry currently to support CIVS with appliance repairs / replacements and welcomed the role we are taking.

And the steps we have decided to take in RIIO-2

There was overwhelming support from across our customer and stakeholder community to continue our work to keep customers and the public safe from the dangers of CO. Qualitative and quantitative research delivered very consistent insights making this a relatively simple area to triangulate. Over the RIIO-2 period we will educate 200,000 of those most at risk, issue three million alarms and partner with every Fire and Rescue service, every ambulance service and every NHS Trust across our footprint. We will work with expert partners to repair or replace 15,000 unsafe appliances for those who are most vulnerable. This represents a significant step up from RIIO-1 and a stretch for us to deliver, but we must do this to respond to the feedback we received.

Although our Social Return on Investment analysis shows that providing CO alarms and education has a relatively small social return, it is seen as a primary role of a GDN by customers and there are longer term benefits that will be realised in future price control periods at no additional cost.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	Net CVP
Education	76,000	38,000	50,000	36,000	**200,000**	Not measured – only awareness surveys	**£2.1m**	**-0.9m**
Alarms (base plan)	38,000	19,000	25,000	18,000	**100,000**	Targeting 105k alarms in RIIO-1	**£0.8m**	**-5.1m**
Alarms (incremental)	**1,202,000**	**551,000**	**725,000**	**522,000**	**2,900,000**		**£22.2m**	
Fire and Rescue partnerships	**100%**	**100%**	**100%**	**100%**	**100%**	New measure	**£0.4m**	
NHS Trust partnerships	100%	100%	100%	100%	**100%**	New measure		
Ambulance partnerships	100%	100%	100%	100%	**100%**	New measure		
Repair or replace appliances (condemned following CO incident)	5,700	2,850	3,750	2,700	**15,000**	New measure	**£8.6m**	**28.5m**

Reference: See Appendix 07.03.10 CO awareness for more information.

Delivering our commitments	
Customer communications: • We will continue to raise awareness of the dangers of CO through our existing interactions on the doorstep via our emergency work and when customers contact us over the phone. All 200,000 educational conversations will be delivered in a classroom-based environment, mainly with Key Stage 2 children, recognising the great success rate of this in RIIO-1 (over 75% resulting in direct positive action). • We will also share vital information on CO safety through our website, social media channels, radio adverts, billboard and bespoke flyers/leaflets. • We will build on our Safety Seymour programme in schools to increase the scale and develop similar programmes to ensure learning is retained in later school years.	
Process/systems: • We will enhance the usage of data from our core systems and publicly available data to build our understanding of vulnerability in our regions in order to target our enhanced CO services to those who need it most.	
Partnerships: • Building on the success of our existing partnerships with the Fire and Rescue service will see us increase our reach with the NHS and ambulance services. Partners will be key in helping us raise awareness and distribution of CO alarms to the most vulnerable. We will develop relationships with leading CO alarm suppliers to ensure we are able to deliver on ambitious commitments. We will develop partnerships with industry experts and charities to deliver our commitments to repair/replace dangerous appliances for the most vulnerable in our networks.	
Engagement: • We will continue to work with the All-Party Parliamentary Group to discuss ways of tackling CO poisoning and raising awareness of the dangers. • We will continue to work with the wider utilities industry to share learning and best practice, so all customers are able to benefit, and contribute to the annual showcase event to exhibit our CO safety initiatives and share best practice. • We will continue to engage with expert stakeholders to ensure that we leverage good practice noted elsewhere and continually raise the bar of our service levels.	
Protecting against non-delivery	
Price control deliverables:	Funding for CO activites has been allowed by Ofgem in a 'use it or lose it' format. Any funding not used by Gas Distribution Networks will be returned in full to customers. The same principle will apply to the bespoke PCDs we propose beyond the Ofgem allowance.
Reputational:	Non-delivery against the reputational output delivery incentives proposed against proposed partnership targets will have a negative reputational impact.

Reference: See Appendix 07.03.10 CO awareness for more information.

Safety Seymour

Priority area – Fuel poverty

In RIIO-2 we will take 36,500 customers out of fuel poverty through a range of tailored interventions. This will include a minimum of 6,250 fuel poor connections, 5,000 additional in-house fuel poor interventions and offering income and energy advice to 25,250 customers. We will also trial a pioneering new approach to fuel poverty funding in England and continue to innovate in developing methods to better target those that should qualify for support.

£15.1m baseline plan cost	£32.6m incremental cost	CVP of £61.3m net total value based on the social return on investment	51p annual customer bill impact (in RIIO-2)

Tackling affordability and fuel poverty

Fuel poverty remains a significant problem in Great Britain and is a Government priority. There are 1.5 million homes in our network in fuel poverty, representing 58% of the total fuel poor households in the UK. We have assessed how best to provide whole-house solutions to tackle and reduce fuel poverty. Although fuel poor gas network extensions have some impact in lifting customers out of fuel poverty, they alone do not solve the issue. Whole house solutions have the greatest impact. That could be through a gas connection for those off the gas network, in-house interventions for customers on and off the gas network and improving affordability by offering energy and income advice and support to ensure that they benefit from it.

What we are already doing in RIIO-1

We made the commitment to deliver 34,650 fuel poor connections in RIIO-GD1. Our Cadent-led partner organisation, Affordable Warmth Solutions ('AWS'), continues its relentless focus on helping those in fuel poverty. They have focused on providing whole-house solutions by bringing together funding streams and delivering connections along with heating and other interventions. We are working with AWS to trial a new funding approach in Staffordshire to provide free first-time central heating to customers experiencing fuel poverty. Our commitment in RIIO-2 goes beyond our current commitments in two ways; firstly, the average annual number of interventions is c.70% higher and secondly our interventions will be more effective in taking customers out of fuel poverty.

Engagement summary

Who, how and purpose	Insights
Domestic customers We engaged with domestic customers from many backgrounds to explain who we are and the role we currently play to support customers living in fuel poverty. We asked them to share with us the role that they would like us to play and that helped us shape options to be tested. We tested three costed options in Business Options Testing to understand customer preferences.	• Many customers were unaware of fuel poverty reduction schemes but were overall in agreement that reducing fuel poverty in our networks is important. • Across our regional workshops, there was a strong preference for offering whole-house solutions (beyond the Fuel Poor Network Extension Scheme) to all in fuel poverty. • During BOT (once customer bill impacts were presented), views were mixed on what level of support we should provide to customers in fuel poverty. • This differed regionally with customers in the West Midlands the least supportive of paying for additional support of customers in fuel poverty.
Industry stakeholders AWS led a roundtable session with networks and Ofgem to discuss alternative options to the existing scheme. We also conducted regional workshops with expert stakeholders, asking questions to a more informed audience to help shape our Plan.	• Within the current scheme, stakeholders highlighted the difficulties in ensuring that take-up is from customers genuinely suffering from fuel poverty. • National Energy Action and Citizens Advice were supportive of the view that networks should not be restricted to tackle fuel poverty only through gas connections, and non-network solutions should be allowed if this delivers better outcomes. • Any future funding models should have a process for priority around funding to ensure equal access. • Stakeholders agreed that centralising funds would ensure efficiency.
CIVS We engaged with CIVS including c.100 living in fuel poverty via deliberative workshops and in-depth interviews to understand their needs and requirements to help us shape our service offerings for tackling fuel poverty and affordability in RIIO-2. We later tested costed options to understand their preferences.	• No one-size-fits-all solution to safeguard customers, needs and preferences are very individual. • The key is to work with the individual and respond to their needs as they arise. • Building trust is important when rolling out proposed solutions e.g. whole-house solutions. • Customers living in fuel poverty had very limited understanding of the various funding schemes available – they were often cynical of 'getting something for nothing'.
Expert stakeholders We undertook acceptability testing interviews with expert stakeholders, presenting our draft Plan to get their views and thoughts on our proposed commitments. We also had discussions with officials at the Department for Business, Energy & Industrial Strategy ('BEIS') and various expert stakeholders, exploring the potential for a holistic approach to fuel poverty funding arrangements in the UK.	• Fuel poverty commitments were "very well received" by a water company and innovating is "definitely something all businesses should be doing". • **BEIS** appreciated that networks are perhaps better placed for a more structured rollout of energy efficiency measures than energy suppliers. • **County councils, district councils and energy suppliers** supported our proposals to tackle fuel poverty through whole-house interventions and our new centralised funding model.

And the steps we have decided to take in RIIO-2

Expert industry stakeholders have supported our proposals to go beyond providing gas connections alone to tackle fuel poverty and have welcomed our commitments around providing in-house interventions and income and energy advice to have a greater impact in lifting customers out of fuel poverty. This feedback was not entirely consistent with the quantitative research we undertook with both domestic and business customers who were less supportive of spending more money in these areas. However, when we tested these views in deliberative workshops, we identified that the main concern was that funds would not be spent wisely and they believed that additional schemes (Government-led) existed. Once they understood the current funding models better they typically provided far more support. There was an outlier to this with less support in the West Midlands than other networks. However, in triangulating the results, we placed greater weight on expert stakeholder feedback and on the qualitative research, noting the complexity of engaging in this unique area. We also decided to offer the same service to all regions (which is consistent with our vision that talks of 'all' customers). As a result of these insights, we will provide 6,250 fuel poor connections, 5,000 in-house interventions and offer energy and income advice to 25,250 customers. We will also work with key industry experts and Government to develop a centralised model which brings together all sources of funding to tackle and reduce fuel poverty by providing customers with the right solution for their home.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	Net CVP
Fuel poor connections	2,050	500	2,250	1,450	**6,250**	Targeting 36,616 connections (RIIO-2 target is lower due to changes in eligibility criteria)	**£15.1m**	**£0**
Fuel poor in-house interventions	1,650	400	1,800	1,150	**5,000**	New output introduced for RIIO-2	**£28.8m**	**£13.2m**
Income and energy advice offered	7,200	4,400	7,550	6,100	25,250	Trialled with Citizens Advice in WM with positive results	**£3.8m**	**£48.1m**
Pioneering new funding model trial	Trial taking place in Staffordshire within our West Midlands network					New output introduced for RIIO-2	**£0**	-
Targeting of customers in fuel poverty	Establish measure and robust baseline – target 20% improvement					New output introduced for RIIO-2	**£0**	-

Delivering our commitments

Customer communications:

- Our broader approach to tackling fuel poverty by introducing in-house interventions and providing income and energy advice will help to ensure that customers are more equipped with the tools and knowledge they need to have the best chance of staying out of fuel poverty in the long term.

Process/systems:

- The Fuel Poor Data Predictor Model will help us to predict household fuel poverty via Energy Performance Certificate ratings. The underlying algorithm uses publicly available data to predict household fuel poverty status – with over 75% accuracy without having to complete costly and intrusive home visits. Furthermore, the model removes the need to enter sensitive data into other types of survey tools.

Partnerships:

- AWS will continue to work with industry stakeholders including housing associations, local authorities and MPs to identify those most in need of a gas connection or in-house interventions to reduce fuel poverty.
- Our overall partnership approach (described in our Customer Vulnerability Strategy) shows how the holistic approach we have taken will enable us to join together data, referrals, best practice and delivery across our 80+ strategic partners.

Engagement:

- We will work with Government to develop an alternative delivery model to best tackle affordability and fuel poverty in England. We will continue to engage and work with industry experts to develop and deliver the best solutions to effectively address fuel poverty.
- We will continue to engage with expert stakeholders including those supporting customers living in fuel poverty to leverage new good practice (including innovations) and maintain excellent service levels.

Protecting against non-delivery

Price control deliverables:	We are proposing that fuel poor connections, in-house interventions, and income/energy advice are set as Price Control Deliverables. Non-delivery of these activities would ensure funding is returned to customers in full.
Reputational:	Non-delivery against the reputational incentive set against the fuel poor targeting measure will have a negative reputational impact on us.
Uncertainty mechanism – Re-opener:	We will include a downside re-opener in line with Ofgem's guidance to reflect the potential impact of a government decision ending the Fuel Poor Network Extension Scheme.

Reference: See Appendix 07.03.11 Tackling affordability and fuel poverty for more information.

Priority area – Going beyond

In RIIO-2 we will commit to offering personalised welfare provisions for all customers who find themselves in vulnerable situations following a gas supply interruption (beyond the Priority Services Register ('PSR') and through expert partnerships we will repair or replace unsafe appliances discovered following isolation for those that need that assistance the most.

£19m incremental cost	CVP of £135.8m net total value based on Social Return and willingness to pay	11p annual customer bill impact

Going beyond to strive to never leave a customer vulnerable without gas

We aim to keep our customers warm, independent and safe in their homes. A gas supply interruption has the real potential to undermine this aim. However, to mitigate the impact of a supply interruption it is essential that we provide alternative provision to customers who find themselves in vulnerable situations, to ensure they are able to keep warm and have access to hot food and water. Although there is a minimum standard in place to provide alternative heating and cooking facilities to customers registered on the PSR, we have significantly increased the range of welfare services that we will offer and, in recognising that vulnerability is transitory, we will offer this to all customers who become vulnerable post the gas interruption (beyond those registered on the PSR). Our additional welfare package will include personalised services such as shower facilities, free meals or temporary accommodation. Furthermore, we are often required to isolate or condemn customer appliances to keep them away from immediate harm. This can create or increase a particular state of vulnerability and risk, and therefore we will work with expert partners to help repair or replace appliances where customers find themselves unable to arrange or pay for this themselves to ensure we never leave a customer vulnerable without gas.

What we are already doing in RIIO-1

During an interruption we offer alternative heating and cooking facilities for customers registered on the PSR in adherence with our Guaranteed Standards of Performance (i.e. GSOP 3). We are also working with National Energy Action ('NEA') on a pilot in our West Midlands network to support customers in vulnerable situations with internal appliance and installation repair work. Over two years, through this scheme, we have repaired or replaced approximately 500 gas heating and hot water appliances (including fires, boilers and internal pipework). This approach has allowed us to support customers in vulnerable situations with appliance or installation-based problems, where the work required is complex or whole appliance/system work is needed.

Engagement summary

Who, how and purpose	Insights
Domestic customers We ran both quantitative and qualitative research programmes with thousands of customers from various backgrounds to understand how they want us to best serve them and customers in vulnerable situations during a supply interruption. We tested an initial proposal for us to undertake proactive safety checks. We tested three costed options related to our commitments in this area during Business Options Testing to understand customer preferences and willingness to pay.	• People in vulnerable situations and businesses that depend on gas should always be protected and should be provided with welfare services and customers are generally willing to pay for this. • Heating was viewed as the most important provision, especially during winter. Provisions ranked less important included seat warmers and groceries. • A lot of customers voiced concerns that proactive safety checks would be moving away from our core responsibilities, even when comparing with benefits seen in other countries that take this approach.
CIVS We engaged with CIVS and c.20 experts working for organisations supporting CIVS (e.g. British Deaf Association and Age Concern) via in-depth interviews to understand their needs and requirements during a supply interruption, allowing us to tailor our service offerings for RIIO-2. We later tested costed options to understand their preferences.	• CIVS have individual needs and preferences. As such, support should be given on an individual basis. • There was low general awareness of the PSR, even with CIVS and those working with them. • Alternative heating and cooking solutions during an interruption are "very important", although the level of urgency is dependent on the duration of the interruption.
Fuel poor customers We held workshops with customers in fuel poverty. It was important to hear directly their need and priorities, plus their views on our proposals.	• With regards to repairing or replacing faulty appliances free of charge, some customers agreed that there should be a special focus on customers in vulnerable situations. • With regards to welfare provisions in the event of an interruption, the season was relevant, with more provisions needed in winter.

Engagement summary	
Who, how and purpose	**Insights**
Business customers We conducted in-depth interviews with business customers of various types to understand their expectations on customer service levels during a supply interruption. We also provided them with costed options for our Plan.	• Large businesses or those with an operational dependency on gas typically had alternative heating arrangements in place. • Most smaller businesses could cope without gas for up to 24 hours, hence the focus on timeliness of restoration for them (see 'getting our customers back on gas' output case). • A small number of businesses could see the benefit of additional heating solutions (to allow them to keep premises open) and support the wider commitments to other types of customers.
Expert stakeholders We undertook acceptability testing interviews with expert stakeholders such as Citizens Advice and various charities to get their views and thoughts on our proposed commitments.	• **A water company** said that the commitments are the right ones to make based on their experience. • **Policy Connect** explained that our proposals to repair or replace broken appliances for low-income customers is an excellent proposal and addresses a key barrier to GDNs protecting households. • **Sustainability First** believed that there has been a gap in the industry for supporting CIVS with appliance repairs and replacements and supported us taking a role in this. • All other feedback was positive and supportive of our recommendations.

And the steps we have decided to take in RIIO-2

Through our engagement we developed three key proposals in this area. The first two are described below and the third was for proactive safety checks to be offered. Although we tested these options with a wide range of customers and stakeholders including those who are informed and uninformed, with domestic customers, typically hard-to-reach customers (such as those with English as a second language), future customers, CIVS, and experts in supporting customers in various ways, we noted very little conflict in the feedback and insights we received. There was strong support to provide personalised welfare provisions to customers in vulnerable situations, rather than to all customers (because of cost), but through deliberative research we confirmed that there is a recognition that vulnerability expands well past the PSR. There was significant support from customers and very strong support from expert stakeholders for us to work with expert partners to undertake 5,000 appliance repairs or replacements following emergency incidents for customers in vulnerable situations. For consistency, fairness and deliverability, customers will be assessed against a common set of criteria that we will define and keep relevant.

We are removing our proposal to undertake proactive safety checks, as many customers voiced concerns that this activity would be moving away from our core responsibilities and could give rise to safety concerns, as customers had not asked for us to be there, especially for customers in vulnerable situations.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	Net CVP
GSOP 3: PSR customers provided with alternative heating and cooking facilities within four hours	✓	✓	✓	✓	✓	Increased compensation in line with inflation and automatic payments for failure	£0	
Customers in vulnerable situations provided with personalised welfare provisions	Bespoke personalised welfare offered to customers in vulnerable situations including alternative heating, cooking, shower products, access to hot meals and temporary accommodation for long interruptions. We will track and monitor this over RIIO-2					Beyond GSOP 3 requirements – additional products/ services and customer scope	£16.3m	£120.8m
Repair/replacement of appliances for customers left vulnerable following an emergency incident	1,835	1,040	1,230	895	5,000	Establish scheme across all four networks (currently only in WM)	£2.7m	£15m

Delivering our commitments

Customer communications:

- We will communicate the services we are offering to customers during an interruption through various channels to ensure all customers in vulnerable situations can benefit.

Process/systems:

- We will enhance our systems to ensure customers are provided automatic payments when we fail GSOP 3.
- We will develop our systems and processes to offer bespoke and personalised welfare provisions (including accommodation, hot food vouchers, on-day payments) for customers in vulnerable situations, minimising the impact an interruption can have on their lives.
- We will explore app-based technology to assist our frontline engineers with the right decision-making tools to offer services and develop modern means of offering credit to customers at pace (e.g. for meals in the event of an interruption).

Priority area – Going beyond continued

Delivering our commitments
Partnerships: • We will build on the NEA trial and partner with industry experts to offer additional appliance repairs or replacement services to customers in vulnerable situations when we encounter unsafe appliances. • We are working with the Energy Innovation Centre to find the best partners to support us with exploring innovative techniques and technology to provide customers with bespoke welfare facilities. This will include the logistical challenges with providing increased welfare services.
Engagement: • We will engage with key safeguarding groups and organisations to ensure we continually provide the right services to customers in vulnerable situations. • We will set up regional stakeholder groups with representation from a number of groups who have expertise in vulnerability.
Skills and resource • We will train frontline delivery teams and customer call agents to ensure they are equipped with the knowledge and resources they need to offer bespoke welfare provisions and services beyond the meter to customers in vulnerable situations.

Protecting against non-delivery	
Principles-based licence obligation	The licence obligation will require GDNs to treat all domestic customers fairly, including customers in vulnerable situations.
GSOP3 – heating and cooking facilities for priority domestic customers	When customers registered on the PSR experience a gas supply interruption, they will be provided with alternative heating and cooking facilities within four hours. If we fail, the customer is entitled to compensation.
Price control deliverable	Non-delivery against the targets proposed will lead to any unused funding returned to customers in full.

Reference: See Appendix 07.03.12 Going beyond to never leave a customer vulnerable without gas for more information.

How we propose to use the customer vulnerability and CO safety 'use it or lose it' allowance

In meeting the expectation levels of customers and stakeholders, we have tabled very stretching output targets across our customer vulnerability strategy. From a regulatory treatment perspective, this strategy is made up of:

1. Activities that form part of ongoing business as usual activities that are designed to at least meet minimum vulnerability requirements proposed to be set out by Ofgem subsequently.
2. Activities that go beyond business as usual and so could form part of Ofgem's proposed 'use it or lose it' fund or be bespoke price control deliverables for us.

The chart below sets out the commitments that have incremental costs within our Customer Vulnerability Strategy. We have set out whether we believe the activities are part of business as usual or beyond business as usual.

For the beyond business as usual activities we have set out either:

a. The social return on investment we have calculated.
b. The willingness-to-pay we have identified as part of our Consumer Value Proposition through our engagement.

Whilst some initiatives show a negative return in RIIO-2, they provide a positive return in RIIO-3 and beyond.

Table 07.11: Incremental costs of commitments within our Customer Vulnerability Strategy

	Cost over RIIO-2 (£m)	Base BAU	Beyond BAU	Net SROI/WTP value (£m) in RIIO-2	Ranking by value/£ invested
CO					
100k alarms	£0.8	£0.8			
2.9m alarms	£22.2		£22.2	-£5.1	8
200k educated	£2.1		£2.1	-£0.9	7
100% partnerships	£0.4		£0.4	covered in above	7
Repair or replace 15,000 appliances (CO)	£8.6		£8.6	£28.5	3
Fuel poverty					
6250 FP Connections	£15.1	£15.1			
5000 FP Interventions	£28.8		£28.8	£13.2	5
25,250 Income & Energy advice	£3.8		£3.8	£48.1	2
New funding approach	–		–	–	
Identifying your needs					
2m conversations	£2.0		£2.0	£0.6	6
82 partnerships	£2.0		£2.0	covered in above	6
Vulnerability training	£3.7		£3.7	covered in above	6
Going beyond					
Personalised welfare	£16.3		£16.3	£120.8	1
Never leaving a customer vulnerable without gas	£2.7		£2.7	£15.0	4
TOTAL		**£15.9**	**£92.6**	**£220.2**	

Generally, these outputs have a linear relationship between the number delivered and the cost to deliver. For example, the unit cost per fuel poor intervention provided remains flat as more are delivered. This makes these output targets ideal candidates for 'use it or lose it' allowances, as we can accurately calculate the money to be returned to customers should we not hit the ambitious targets that we are aiming for.

Ofgem have set out a potential £30m fund for vulnerability proposals beyond business as usual, with 25% of this reserved for collaborative work between the GDNs and the remainder apportioned by customer numbers between the GDNs. We have therefore estimated that this 'use it or lose it' fund for us is around £11.5m which equates to roughly £0.7m p.a. for each of our four networks over RIIO-2.

As can be seen in the table above, we have identified initiatives which far exceed the proposed 'use it or lose it' fund. Our evidence suggests customers are willing to pay for these additional benefits through both quantitative and qualitative means and they deliver a positive social return on investment supported by expert stakeholders, including various charities associated with supporting customers in vulnerable situations.

We have shown a ranking of the benefits of the initiatives in terms of overall value and by value per pound invested which could be used to prioritise against the Ofgem mechanism.

However, we would propose that all the commitments are supported as part of the RIIO-2 framework. For those beyond any common 'use it or lose it' fund, we would suggest they are treated as bespoke price control deliverables with a similar 'use it or lose it' approach.

We propose to assess delivery at the end of Year 3 of the price control period, where we will have established the necessary partnerships, processes and experience to deliver the outputs in the most effective manner and, as such, will be confident over future delivery numbers. At this stage, if necessary, we will reforecast our delivery potential and return the value associated with any under-delivery.

Linking our ambitious Customer Vulnerability Strategy with the Cadent Foundation

The Cadent Foundation is described later in this chapter in the outcome areas Trusted to act for our communities. We are planning to use the fund during the remainder of RIIO-1 to test the SROI and deliverability of a number of the output commitments that we have listed above. In 2019, we plan to test the Enhanced Fuel Poor Interventions, going beyond the meter to never leave a customer vulnerable without gas and the pioneering approach to Fuel-poor funding across England. This will provide the extra information to give increased confidence that our final proposals are accurate and deliverable in RIIO-2.

Introduction of an annual showcase event that we will host around customers in vulnerable situations

We recognise that many organisations face similar challenges to us to support all of our customers in vulnerable situations, including those in fuel poverty. We have collaborated with others consistently during RIIO-1, especially to raise the awareness of vulnerability and the dangers of CO. The benefit of this collaboration is clear, with lessons learned and ideas being shared, and often more joined up solutions being proposed and implemented.

To this end, we support the inclusion of a reputational ODI for us to host an annual showcase event, which we will report on annually (against a common set of vulnerability service measures to be developed with other GDNs). This event will involve other GDNs, energy suppliers, DNOs, expert stakeholders (such as charities) and extend beyond the energy and utilities sector to encourage wider collaboration and idea generation.

Our commitments continued

7.4 Tackling climate change and improving the environment

Summary

In 2019 the Government legislated to deliver a Net Zero decarbonisation target by 2050. The scale of this challenge is immense. Urgent action is needed in the next few years to ensure pathways are available to deliver a low cost, secure and sustainable energy transition for future customers. We recognise that we play a critical role in helping to deliver this challenge as we currently transport a predominantly fossil-fuel product. The Committee on Climate Change recognised in their recent Net Zero report in May 2019 the key role that lower carbon gas and hydrogen could play in delivering the most cost-efficient and secure pathway to decarbonise heat. We are taking steps to create such pathways in heat and transport.

We have also set out an ambitious action plan to continue to reduce leakage of gas from our network through the ongoing mains replacement programme and pressure management. In addition, we will target zero emissions from the rest of our business operations and look at how to reduce our wider environmental footprint. Our commitments in this outcome area are set out in our detailed Environmental Action Plan (**Appendix 07.04.00**).

Figure 07.12 Outcomes our customers need us to deliver

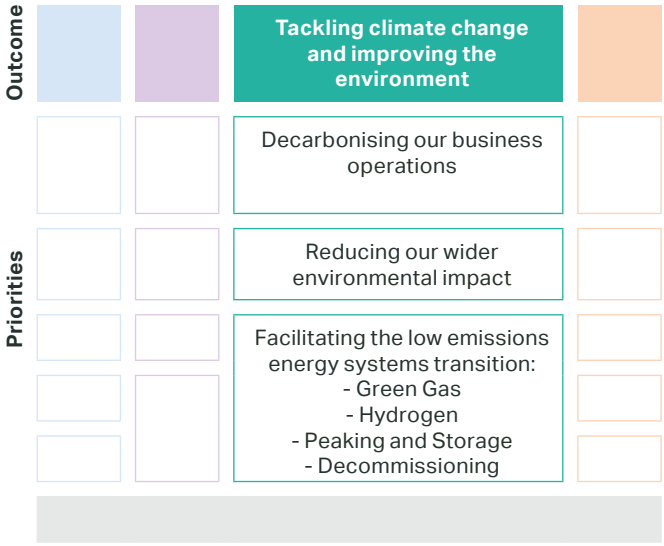


Table 07.12: Summary of output commitments

Output	Common / Bespoke	Output type	Incremental Costs?	Part of our CVP?	Appendix evidence
TACKLING CLIMATE CHANGE AND IMPROVING THE ENVIRONMENT					
Appendix 07.04.00 covers all of our environmental actions and commitments					
Overall environmental progress					
Annual environment report	Common	LO	N	N	07.04.00
Decarbonising our own operations					
Addressing losses from our network – Shrinkage	Common	ODI (R) ODI (F+/-)	N	N	07.04.00
Carbon neutral operations	Bespoke	ODI (R)	Y	Y	07.04.04
Tackling the theft of gas	Bespoke	ODI (F+/-)	N	Y	07.04.05
Reducing our wider environmental impact					
Zero avoidable waste to landfill	Bespoke	ODI (R)	Y	N	07.04.06
Supporting our people to reduce their emissions	Bespoke	ODI (R)	Y	Y	07.04.07
Facilitating the low emission energy system transition					
Entry capacity enablement - Flexible reinforcement	Bespoke	UM	N	Y	07.04.08
Connections standardisation	Bespoke	ODI (R)	N	Y	
Off gas grid communities	Bespoke	NIA/SIC	Y	Y	07.04.09
HyNet hydrogen scale demonstration project – Network Innovation project	Bespoke	SIC or UM	N	N	07.04.00
Hydrogen blending rollout – strategic innovation project	Bespoke	SIC or UM	N	N	
Heat Strategy re-opener	Common	UM	N	N	10.04

Costs associated with our Environmental Action Plan

There are three output commitments for which we are seeking incremental funding.

Table 07.13: Outputs for which we are seeking funding

Quality experience Output commitments (£m) in 2018/19 prices	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Decarbonising our operations	4.5	4.6	15.4	15.6	15.6	55.6
Reducing our wider environmental footprint	0.1	0.1	0.1	0.1	0.1	0.3
Facilitating the low emissions energy system transition	0.1	0.1	0.1	0.1	0.1	0.6
Total	**4.7**	**4.8**	**15.5**	**15.8**	**15.7**	**56.5**

There is one output where we are delivering improved service and new bespoke output commitments, but we are not seeking funding.

Table 07.14: Outputs to be delivered as part of an additional efficiency challenge

Quality experience Output commitments (£m) in 2018/19 prices	Average per year	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Theft of gas	0.6	0.6	0.6	0.6	0.6	0.6	3.0
Total	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**3.0**

We have proposed a financial incentive for the theft of gas activity such that if we are successful in identifying theft and returning money to wider customers then we share the benefits. As such the costs of undertaking the activity are absorbed and at risk if we are not successful.

Our Environmental Action Plan ('EAP')

Building on our insight and learning from the past, our EAP sets out our approach to drive improvements in our environmental performance through the RIIO-2 period. The EAP reviews our progress and commitments to date, and then looks at RIIO-2 activities by considering three major priority areas **(please see Appendix 07.04.00 for further detail on the Plan)**:

Our EAP is based on a thorough consideration of our environmental impacts. Our environmental management system has been certified to ISO14001 standards for over 20 years, including recent accreditation to the updated ISO14001:2015 standard. This management system combines many elements of good practice:

- It identifies those elements of an organisation's activities that have the potential to impact on the environment. These are collated within a business-wide 'Environmental Aspects' register and set out the risk and control framework to ensure compliance with legislative and other obligations.
- The aspects are ranked and prioritised on the basis of the potential severity of their impacts on the environment to ensure that the appropriate controls are enacted.
- It identifies metrics that can be used to measure the scale of impacts on the environment and targets to drive continual improvement. This helps us to prioritise areas of focus.
- It monitors emerging or changing requirements, external trends and best practice.
- It identifies opportunities to embed more sustainable practices and drive environmental benefits.
- We have established a cross-business Environmental Best Practice Forum and Network Safety Health and Environment forum.
- We carry out an annual management review process, presenting a comprehensive statement of performance risk and opportunities to our Executive Team and our Board, ensuring visibility at the highest levels of the organisation.
- Our investment sanctioning process includes examination, evaluation and sign-off of environmental risks and opportunities for all projects. This integrates elements of changing environmental legislation, such as the Medium Plant Combustion Directive (now in Environmental Permitting Regulation, 2018) into forward business plans.
- We monitor standards of environmental management on all our sites through an annual baseline exercise and periodic focused audits.

These practises enable us to identify risks and potential impacts, and specify the controls required to minimise environmental harm. This system has enabled us to deliver strong environmental performance in RIIO-1. We used this foundation to develop our environmental ambition and our action plan for RIIO-2.

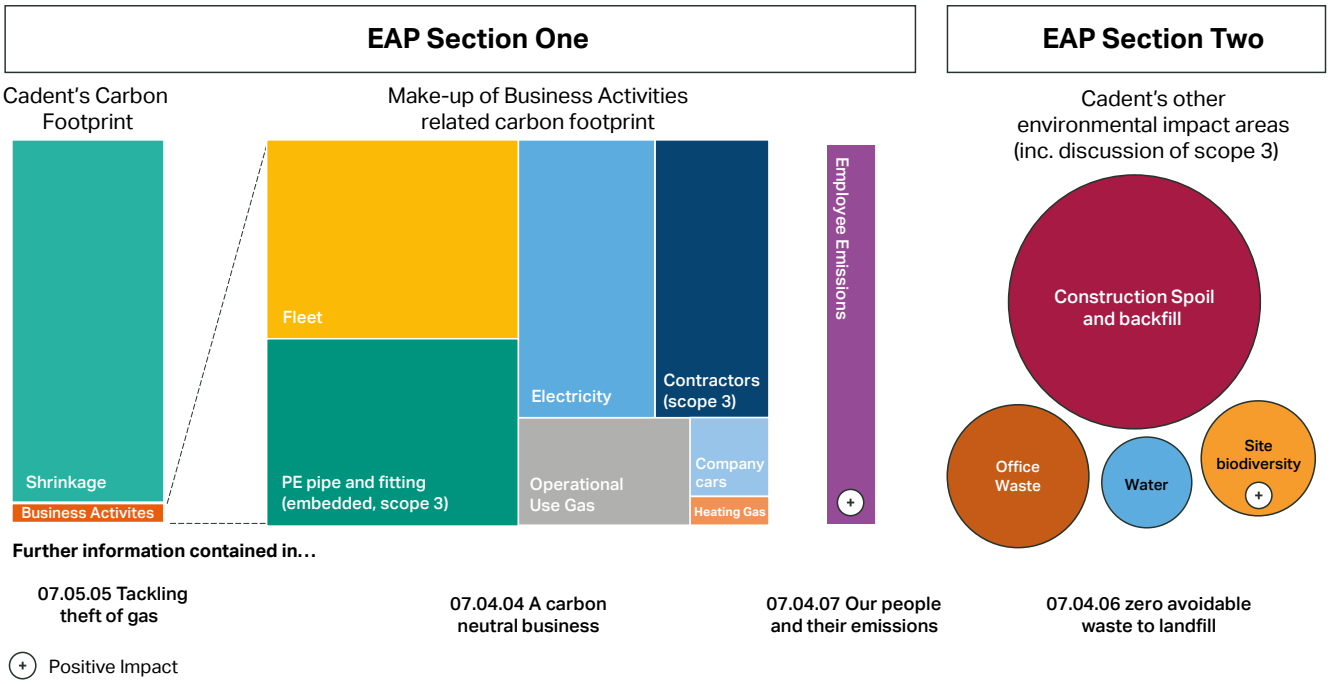
Our EAP is structured into three parts:

- **Part 1: Decarbonising our business operations**
- **Part 2: Reducing our environmental impact**
- **Part 3: Facilitating the low emissions energy system transition**

Our overall environmental footprint is encapsulated in Parts 1 and 2 and the following diagram shows the relative scale of the impacts and the areas we are focusing on. Part 3 of the EAP sets out how we are facilitating and supporting the UK to meet its Net Zero climate change target.

Our commitments continued

Figure 07.13: The structure of our Environmental Action Plan



Part 1: Decarbonising our business operations

This part of our EAP considers the greenhouse gas emissions that our business is responsible for, either directly or indirectly, and initiatives that we propose to reduce such emissions under the following headings:

- Shrinkage (including gas theft)
- Direct (Scope 1 & 2) emissions (including stakeholder engagement)
- Indirect (Scope 3) emissions (including embedded carbon)
- Managing uncertainty and deliverability of net zero emissions

	Action
Part 1: Decarbonising our business operations	
Action 1: accreditation of environmental goals	We will regularly review our longer term targets beyond RIIO-2 and pursue accreditation of our goals and programmes from the Science Based Targets Initiative.
Action 2: shrinkage reduction	We will achieve and strive to outperform our reputational shrinkage incentive target for RIIO-2. We will report progress and the specific actions we have taken to achieve this in our annual Safety & Sustainability Report.
Action 3: theft of gas	As one of the components of shrinkage, we will maximise the benefits to customers and stakeholders from a theft of gas incentive, and our ambition is to recover at least £8m over the RIIO-2 period.
Action 4: energy consumption	We will reduce all utility energy consumption by at least 10% by 2024.
Action 5: renewable energy	We will procure 100% certified renewable energy to meet our energy needs by 2026.
Action 6: business mileage	We will deliver a 15% reduction in our business mileage emissions intensity through RIIO-2.
Action 7: vehicle fleet	We will deliver a zero emissions first responder vehicle fleet across all our networks by the end of RIIO-2.
Action 8: embedded carbon in pipes and fittings	We are targeting a reduction in carbon intensity of our pipes and fittings throughout RIIO-2 by delivering the recommendations of a report to be published by 31 March 2021, setting out the opportunities and barriers to reducing the carbon intensity of PE pipe and fittings.
Action 9: work with suppliers to reduce emissions	We will work with our suppliers to extend the measurement of, and continually reduce, Scope 3 indirect emissions.
Action 10: measuring the carbon intensity of major projects	We will develop our methodology to measure and report on the carbon intensity of major construction projects.
Action 11: carbon offsetting	We will offset all residual unavoidable emissions to become a certified Net Zero company.

Part 2: Reducing our environmental impact

This part of our EAP considers the impact of our business operations on our physical environment under the following headings:

- Spoil and other waste associated with excavations
- Direct waste generated and accumulated on sites
- Helping our employees reduce their environmental impact
- Community, biodiversity and natural capital
- Water consumption

	Action
Part 2: Reducing our environmental impact	
Action 12: waste from excavations	During RIIO-2, less than 5% of our waste from excavations will be sent to landfill.
Action 13: minimising use of first-use aggregate	During RIIO-2, less than 10% of our backfill will be first-use aggregate in the North West and East of England, and 5% in the West Midlands and North London.
Action 14: sustainable procurement	In our annual environmental reporting, we will include a summary of the environmental and sustainability criteria we have used in all significant procurement events.
Action 15: reducing our employees' carbon footprint	We will work with our employees to help them and their communities deliver a reduction of 5,000 tonnes CO_2e a year by the end of RIIO-2.
Action 16: key site environmental enhancement plan	We will publish our key site environmental enhancement plan as part of our environmental and sustainability annual reporting before the start of RIIO-2. We will then update these plans, and report on performance and delivery annually through the RIIO-2 period. We will undertake the Wildlife Trust's biodiversity benchmarking process to ensure that our plans are robust and conform to these externally assessed standards.

Part 3: Facilitating the low emissions energy system transition

This part of our EAP explains how we propose to support the transition to an environmentally friendly, and flexible, low carbon and low emissions energy system.

We will continue to play a leading role in bringing this transition to life and supporting policymakers and customers as they develop practical solutions to decarbonise at scale. We will do this through our plan to innovate to demonstrate hydrogen conversion and blending. We will explore and develop the operational requirements and the commercial and regulatory frameworks that we will need to underpin the decarbonisation pathways. We believe it is essential that these groundbreaking projects progress in RIIO-2 in order to bring this Net Zero pathway to life for future customers. It is therefore critical that the RIIO-2 framework creates a means to facilitate this though strategic innovation or direct funding and allows us to deliver on this vital customer priority. We are also developing ongoing regional stakeholder engagement processes to understand and help facilitate local energy transition plans.

We will continue to introduce renewable resources into our network and have committed to leading a charging and access review and to enhanced engagement with this customer segment through the establishment of a distributed entry connection code and voluntary governance process to support investment and remove barriers to green gas.

Figure 06.09 (in Chapter 6) describes the range of activities and a timeline.

	Action
Part 3: Supporting the low emissions energy system transition	
Action 17: review of distributed entry gas arrangements	We will lead an industry review of distributed entry gas commercial arrangements to establish methodologies that are robust, sustainable and scalable, with the ambition of presenting initial change proposals to Ofgem prior to the commencement of RIIO-2.
Action 18: funding for entry gas reinforcement	We will establish and utilise a flexible funding regime for entry gas reinforcements, supported by an appropriate uncertainty mechanism.
Action 19: entry gas customer and stakeholder forum	We will establish an Entry Gas Customer and Stakeholder Forum to allow customers and stakeholders to raise issues, for the gas network to test issues we have identified, to identify and action knowledge sharing, and to establish and maintain an activity schedule of framework changes.
Action 20: entry gas connections methodology	We will establish an Entry Gas Connection Standards Methodology statement and a supporting voluntary governance arrangement to enable customers and stakeholders to propose value-adding improvements.
Action 21: off gas grid communities	We will conduct a trial to identify small communities where the gas network can be extended at a low cost.

Our commitments continued

	Action
Action 22: off grid communities	We will establish a community connection support service to identify and advise communities that could economically connect to the gas grid.
Action 23: HyNet	Given a direction from Government and/or Ofgem, we will deliver the HyNet project to design, construct and operate the hydrogen transportation network with a supporting commercial and operational framework, to meet customer and stakeholder requirements for hydrogen in the North West of England.
Action 24: hydrogen blending	We will ensure an efficient and effective hydrogen blending regime can operate at the earliest opportunity, with the end customers protected financially by paying for the energy they receive, and from unsafe gas blends.
Action 25: hydrogen conversion	We will support Government plans for large scale trials of hydrogen conversion.
Action 26: emergency / back-up network role	We will ensure the network can support increasing use in emergency, back-up and peak conditions.
Action 27: decarbonisation of heat	We will promote and build up the evidence case that supports least cost, least disruptive options for our customers to decarbonise their heating.
Action 28: evidence for electrification	We will ensure all the evidence for alternative options, including the wide scale electrification of heat is challenged and recommendations based on robust analysis and information.
Action 29: decommissioning plans	We will develop robust decommissioning plans and protocols to protect customers during the transition, following the publication of the detailed strategy and programme to install alternative systems. This may not occur during RIIO-2.

Our final action in the EAP (Action 30) is to monitor and report on our progress against the plan.

Annual reporting

We will report on the progress against our Environmental Action Plan annually through our ongoing engagement channels such as the online community, regional stakeholder groups, our Customer Engagement Group and dedicated customer forums. This will allow the review and challenge of our progress and future plans. This will build on the existing reporting on our environmental activities through our Annual Report and Accounts and our Safety & Sustainability report (found on our website at **https://cadentgas.com/about-us/responsibility/safety-and-sustainability-report**).

Priority area – Decarbonising our business operations

In RIIO-2 we will commit to continue to reduce gas losses by at least 14%, reduce our energy consumption, procure renewable energy, reduce our business mileage and introduce zero-emission vehicles, reduce gas theft and become a certified Net Zero company. We will also pursue accreditation of our goals and programme from the Science Based Targets Initiative.

Costs – leakage reduction through mains replacement, theft of gas (£3m)	£55.6m incremental cost for Net Zero certified non-leakage business carbon footprint	-£35m CVP NPV based on SROI	4p reduction per year (but 23p increase in RIIO-3)

Decarbonising our business operations

The impact of greenhouse gas emissions on our climate is one of the most pressing issues facing society. We have assessed our impact on the environment and planned accordingly. We have optimised our plans to reduce network leakage and how we tackle gas theft. We have assessed how we achieve carbon neutrality (Net Zero) in the rest of our business operations and considered the scope to use renewable energy and operate a zero emission emergency service by the end of RIIO-2.

What we are already doing in RIIO-1

The most important activity we are undertaking is bringing down shrinkage related emissions through the replacement of metallic pipelines with polyethylene ('PE'). We expect to have driven down leakage of gas by 28% by the end of the RIIO-1 period. Our investment in pressure management profiling systems, automatic control measures and further innovations in use of gas conditioning in RIIO-1 has greatly enhanced our ability to manage leakage across our networks.

We have also made good progress in reducing our business carbon footprint and we are on target to outperform our RIIO-1 emissions targets. We have achieved an overall reduction of 33% (at the end of 2018/19) for emissions defined in the Business Carbon Footprint as Scope 1 and 2. In 2019, we published our first Safety & Sustainability Report as part of our commitment to improving transparency of our performance and wider access to key data.

Engagement summary

Who, how and purpose	Insights
Domestic customers We asked about domestic customer priorities through a representative survey, workshops and willingness-to-pay and customer forums. We tested different options on investment to reduce shrinkage with customers through quantitative and qualitative elements, and finally through quantitative and qualitative acceptability testing.	• Customers generally viewed the environment as important, but often not as much as safety or reliability, and a small number were sceptical of climate change. • Domestic customers were not willing to pay anything for reductions in shrinkage, and when asked about different levels of investment to address environmental options there was no clear majority, but marginally more people preferred less ambitious options. Our theft of gas incentive was supported by a majority. • 83% found the environmental aspects of our plan acceptable.
Stakeholders We participated in joint GDN interviews arranged by the ENA and held our own stakeholder workshops to discuss priorities. We have also engaged key environmental organisations.	• Innovation in relation to the environment is one of the reasons stakeholders gave for positive views of gas networks, and our proposals received support from key environmental stakeholders. • Suggestions to reduce our emissions included using greener vehicles or renewable energy; some offered to work in partnership with us.
CIVS We interviewed customers and professionals about their priorities and included CIVS in BOT and acceptability testing.	• Two out of seven customers interviewed thought the environment should be our priority because this protects everyone. • Results for CIVS from BOT were very similar to the overall result (spread evenly with lower ambition slightly more popular). • CIVS found our plan acceptable and thought we were 'leading the way', although some wanted us to move more quickly.
Business customers We included business customers in our early surveys, BOT and acceptability testing.	• Business customers were not willing to pay anything for reductions in shrinkage, but preferred medium levels of ambition in options testing. • Like domestic customers, 83% found the environmental aspects of our Plan acceptable.
Future customers We included future customers in early workshops, BOT and acceptability testing.	• Future customers said carbon neutrality is highly important, and found our Plan acceptable, although some wanted us to move more quickly.
Fuel poor We included fuel poor customers in quantitative BOT, and held specific workshops with them.	• Customers in fuel poverty preferred slightly less ambitious options than other groups. • They largely approved of our plans and felt we should set a precedent.

Our commitments continued

And the steps we have decided to take in RIIO-2

We presented three options, with differing levels of ambition, during BOT. While we acknowledge, the results of this testing demonstrated a near-even balance of customer opinion across the three carbon reduction options presented we have decided to pursue the most ambitious option. We do so in the knowledge that government, Ofgem, our Board and our CEG have all encouraged us to show ambition in this regard.

Shrinkage of gas is a huge component of our business carbon footprint and we will continue to reduce this significantly, primarily through the continuation of our mains replacement programme (50km p.a. of cost benefit work) and exploiting the benefits of our investments in pressure management and gas conditioning. We will deliver on our RIIO-2 targets for overall shrinkage performance, and will optimise our performance against the incentives proposed by Ofgem for managing system pressure and gas conditioning, which encourage the networks to stay as close as possible to the extremes of performance achieved at the end of RIIO-1.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	Net CVP
Annual environmental report	Publish annual report on progress against our EAP					Safety & Sustainability Report published in 2019	**£0**	**n/a**
Addressing losses from our network – shrinkage	52 – 62 GWh	40 – 46 GWh	37 – 47 GWh	30 – 39 GWh	**160 – 194 GWh**	14%-17% reduction on expected end of RIIO-1 position saving 0.4m – 0.6m tonnes CO_2e	**Delivered through repex programme**	**n/a**
Carbon neutral operations	Net Zero carbon by the end of RIIO-2, saving over 60,000 tonnes of CO_2e by the end of the period (further details below)					80% reduction from 1990 levels by 2050	**£55.6m**	**-£36.3m**
Tackling the theft of gas	£1.6m funds recovered	£4.8m funds recovered	£0.8m funds recovered	£0.8m funds recovered	**£8m funds recovered**	Financial incentive to increase returns to customers	**£3m (absorbed)**	**£1.3m**

Delivering our commitments

Customer communications:

- We will deliver an annual Safety & Sustainability Report to show our progress against our Environmental Action Plan across all categories within it, including those specified in our licence.

Processes/Systems:

- We will subject the rollout of EVs or other alternatively powered vehicles in our fleet to further deliverability testing. This will consider the appropriate locations for initial introduction of EVs (which currently guarantee lower range than diesel vehicles) and enable us to flex our plans and costs as technology improves.
- Our more intensive theft detection measures will double the costs resultant from stolen gas recovered. By the end of RIIO-2 our ambition is to save over 18,000 tonnes per year of carbon from renewable energy, 4,000 from our fleet and a further 500 from business mileage. We will offset a further 35,000 tonnes.

Partnerships:

- Through our Global Supplier Code of Conduct we will measure and begin to reduce Scope 3 emissions.

Engagement:

- We will continue to work with specialist environmental stakeholders to develop our plans and seek out best practice.

Protecting against non-delivery

Output Delivery Incentives ('ODIs')	Ofgem have proposed a financial incentive around system pressure and gas conditioning inputs to shrinkage. We have some concerns with the proposed approach as described in the Sector Specific Methodology Decisions document which we will continue to discuss with Ofgem.
Reputational	Non-delivery of our carbon reduction and overall shrinkage targets would have a significant negative reputational impact on us. We recognise that our commitment to deliver a zero carbon first responder service is dependent on the availability and accessibility of EV infrastructure. Hence we propose that should we not be able to complete this by the end of RIIO-2, we would roll forward any unused funding to complete the programme in RIIO-3.

Reference: See our Environmental Action Plan 07.04.00 and Appendices 07.04.05 and 07.04.06.

Table 07.15: Detail of our emissions reductions per year (tonnes CO_2e)

Non-shrinkage carbon footprint	Baseline	2022	2023	2024	2025	2026	Cost to deliver
Renewable electricity Renewable gas Own use gas	12,000 750 6,000	11,500 750 1,200	11,500 750 2,400	11,500 750 3,600	11,500 750 4,800	11,500 750 6,000	£0.39m
Fleet electric vehicles	16,000	160	320	1,540	2,772	4,000	£49.6m
Business mileage (including charging points at sites)	2,000	164	254	343	425	500	£4.8m
PE pipe	15,000	0	0	667	1,333	2,000	–
Contractors' fuel use	10,000	0	0	667	1,333	2,000	–
Amount saved per year	**–**	**13,774**	**15,224**	**19,067**	**22,914**	**26,750**	
Offsets	–	5,000	5,000	15,000	20,000	35,000	£0.76m

Figure 07.14: Carbon emissions before offsetting (tCO_2e)

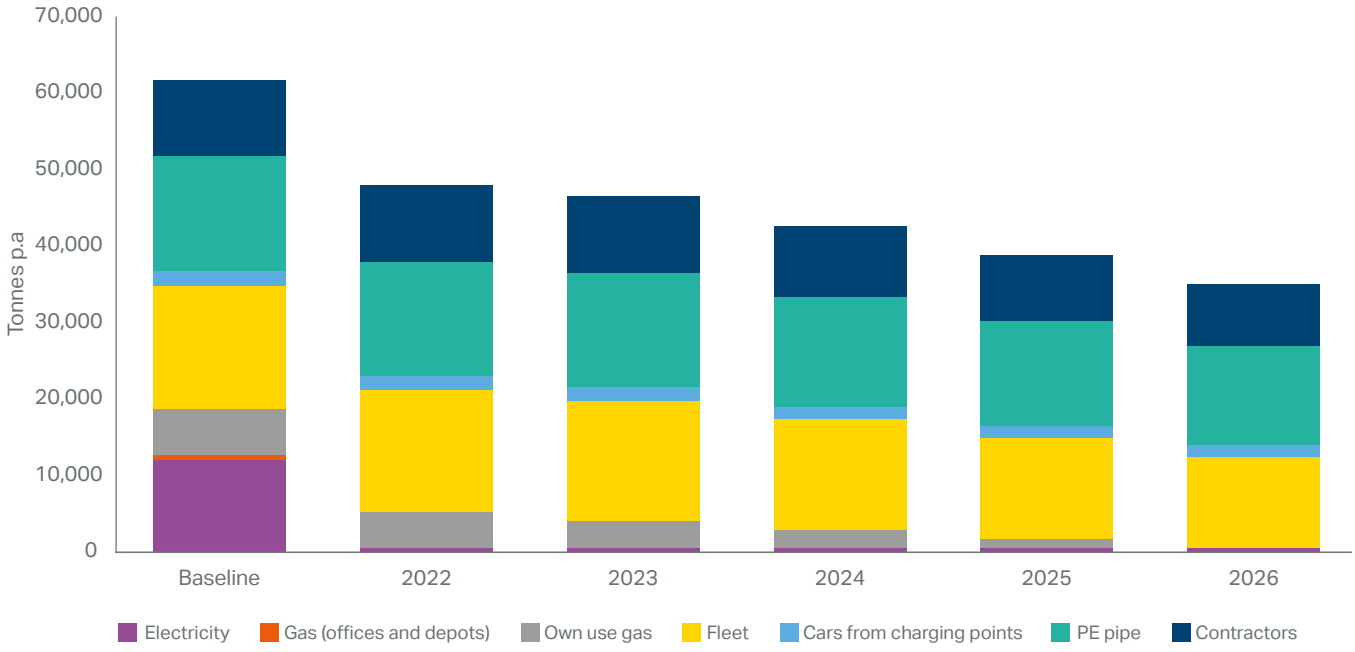
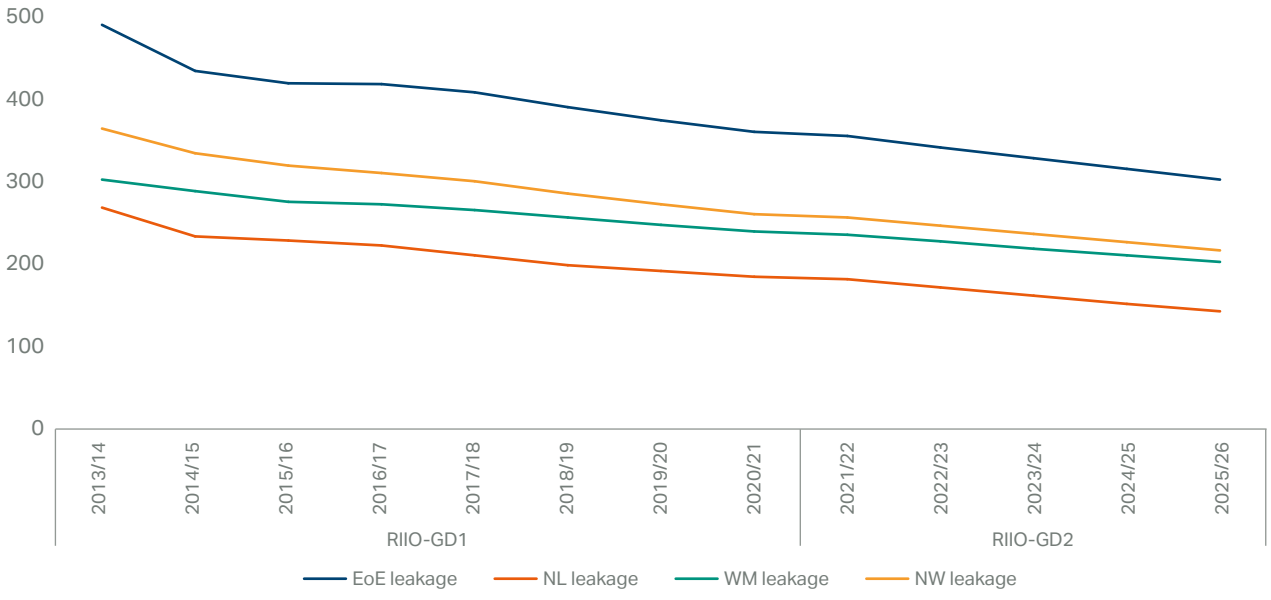


Figure 07.15: Leakage reduction trajectory RIIO-1 and RIIO-2 (GWh)



Priority area – Reducing our wider environmental impact

By the end of RIIO-2 we will send less than 5% of waste from excavations to landfill and use less than 10% first-use aggregate for excavation backfill. During RIIO-2 we will reduce the carbon intensity of our pipes and fittings, work with our employees and their communities to reduce carbon emissions and work with our suppliers to reduce indirect emissions. We will publish and maintain our key site environmental enhancement plan and report on our progress. We will develop our methodology to measure the carbon intensity of major construction projects.

£0.3m incremental costs	£4.1m CVP NPV based on SROI	1p annual customer bill impact

Reducing our wider environmental impact

We are committed to minimising our environmental footprint by reducing the amount of waste we send to landfill. We have explored measures to manage the sustainability and environmental impact of our resource use, and to generate a positive biodiversity impact, and how to provide guidance and support to our staff to help them reduce their household and their communities' emissions.

What we are already doing in RIIO-1:

We and our mains replacement contractors are currently outperforming the RIIO-1 target of 90% diversion of waste from landfill. In 2018/19, over 96% of this waste was diverted through reuse or recycling. We are also outperforming the RIIO-1 target of importing no more than 30% first-use aggregate – currently, this is 11% across our operations.

We have undertaken trials into the way we can help our employees to reduce their carbon and environmental footprint. We have an established Global Supplier Code of Conduct which requires all suppliers to meet the standards we set in environmental and social performance. As part of this we require specific disclosure of data relating to emissions impact. We are recording and reporting on indirect emissions, Scope 3 emissions embedded in pipe and fittings used in mains replacement and contractor vehicle usage.

We comply with all statutory requirements and good practice guidelines for managing the natural environment at our sites and during construction activities. We are improving the environment by planting four trees or hedgerow plants for every one removed.

Engagement summary

Who, how and purpose	Insights
Domestic customers We discussed plans for our environmental impact in our BOT public consultation, customer forum and acceptability testing.	• In our public consultation, respondents asked us to aim for zero waste. • In our customer forum, commitments around waste were seen as low cost and easy to deliver, although limited in impact. • 83% found the environmental aspects of our Plan acceptable.
Stakeholders We have researched other stakeholder views, used independent research and tested our proposals with a smaller group of experts to receive their feedback.	• All GDNs are actively trying to reduce employees' carbon footprints. • This area is a priority for the UK Government, who state "we must tread more lightly on our planet, using resources more wisely and radically reducing the waste we generated". • When we tested our environmental options with experts, they said nothing should go to landfill, with one saying 5% was the maximum.
CIVS We discussed our proposals for zero waste and supporting our people at workshops with CIVS during acceptability.	• CIVS we interviewed were keen on diverting materials from landfill, although they did have concerns about the lack of alternatives to plastic pipes in our network.
Future customers We held workshops with future customers as part of BOT and acceptability testing, and we considered external research.	• During workshops, removing plastics, recycling and diverting from landfill were relatively high environmental priorities, and future customers agreed with our proposals in this area. • A recent study showed millennials especially see businesses as partners in protecting the environment.
Hard-to-reach groups We held workshops with hard-to-reach groups early in our RIIO-2 engagement to understand priorities, and then as part of business options testing.	• Hard-to-reach groups wanted us to use more recycled materials and recycle more, rating these as high priorities. • Participants thought that training staff to be environmentally friendly should be a 'core commitment'.
Our people We held a workshop with our people to understand their views of our performance and where we could improve.	• Many participants felt we were already doing a lot in this area but could do more to publish it internally, for example work on removing single use plastics.

And the steps we have decided to take in RIIO-2:
Customer insight suggests that our ambitions on waste management are already high and we should maintain the level at <5% waste to landfill given some waste cannot be treated. Our commitment to supporting our employees is fully supported. Given this also drives a net saving, we are proceeding with our ambitious targets in this area. We have also included actions to measure embedded carbon and biodiversity in our EAP. We will ensure transparency by reporting delivery in our annual Safety & Sustainability Report.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	CVP
Zero avoidable waste to landfill – waste from excavations	**<5% of waste to landfill** We will tailor targets to meet specific geographical challenges					Increased pace of ambition	**Net saving of £0.7m**	**n/a**
Zero avoidable waste to landfill – first-use aggregate	**<10%**	**<5%**	**<10%**	**<5%**	**As per regional targets**	Increased pace of ambition		
Supporting our people to reduce their emissions	**5,000 tonnes of CO_2 saved by actions taken by the last year of RIIO-2**					New incentive to leverage influence of employees	**£1m**	**£4.1m**

Delivering our commitments

Customer communications:

- We will work with communities to take forward the local biodiversity projects they value, including through the Cadent Foundation.

Processes/systems:

- Whilst our ambition is for zero waste to landfill, there are some waste streams that we are obliged to return to landfill such as hazardous substances. Hence we have used the term 'avoidable' and our delivery will be dependent on both the legislation surrounding management of waste and what we find beneath the ground.
- We will increase recycling rates to 60% while diverting the rest of our waste. We will develop a biodiversity strategy for all our key locations. We will undertake an assessment of our resource use that will include the identification of energy risks in our supply chain.

Partnerships:

- We will work with woodland and wildlife conservation organisations to enhance the ecosystems and natural habitats of our sites.
- We will support community and volunteer access to green space in urban areas. We will publish the criteria used in all significant procurement events in our Safety & Sustainability Report.

Engagement:

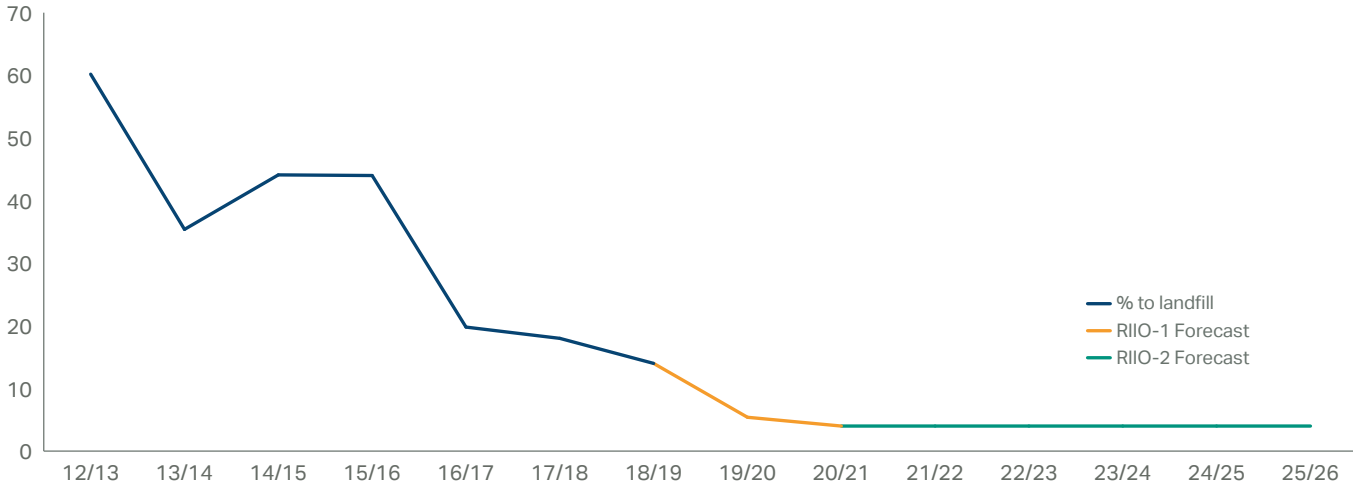
- We will engage environmental organisations in the development of our biodiversity strategy.

Protecting against non-delivery

Reputational	Non-delivery of our waste targets would have a significant negative reputational impact on us.

Reference: See our Environmental Action Plan 07.04.00 and Appendices 07.04.06 and 07.04.07.

Figure 07.16: Percentage of waste sent to landfill



Priority area – Facilitating the low emission energy system transition

We will support the transition to a low emissions energy system by being prepared to deliver HyNet and hydrogen blending projects. We will remove barriers to entry of greener gas by leading an industry review of distributed entry gas commercial arrangements and create a flexible funding regime for reinforcement. We will support the sector further with an Entry Gas Customer and Stakeholder Forum and connections standardisation. We will support off gas grid communities wanting to connect to an increasingly low carbon gas network.

£0.6m incremental costs (for off grid only)
Entry reinforcement range of £61m-£108m through UM
Innovation projects could total over £1bn if approved

£56.3m CVP NPV
Based on WTP

Less than 1p bill impact for incremental off grid costs
Further impact would be dependent on future heat policy

Facilitating the low emissions energy system transition

The urgent need to reduce greenhouse gas emissions is one of the most critical issues facing society. Finding a means of facilitating the energy transition, while minimising disruption to domestic and industrial customers, is a major challenge for the Government and energy sector. This priority considers how we can continue to play a leading role in bringing the energy transition to life, supporting policymakers and customers by developing and enabling solutions to decarbonisation using clean gas at scale. We assess how our networks can support all future states of the gas grid and ensure that the implications of such radical changes on our customers are fully considered.

What we are already doing in RIIO-1

We have worked with Government to establish the Renewable Heat Incentive ('RHI'), to support green gas injection into the gas grid and to remove technical barriers. We have also lobbied to encourage wider energy policy to direct feedstocks from less efficient combustion, to the production of lower emissions and more flexible green gas. We supported an initial pilot project at Swindon which successfully demonstrated each component and we subsequently invested in a larger commercial demonstrator project.

We partnered with CNG Fuels and John Lewis to commission the first high pressure filling station near Preston and with the help of EU Skills and the EUA, we established the Natural Gas Vehicles Network which brought together representatives across the supply chain to coordinate work and insights into potential for this technology. There is now a healthy pipeline of new CNG filling stations operating or under construction.

We have been working alongside Government and the other gas networks to understand the work required to re-purpose the gas network for hydrogen and we led the work to show the merits of hydrogen blending. We developed and launched the HyDeploy project to demonstrate how much hydrogen can be added to methane without requiring any changes, Usage to consumer appliances and have established the HyNet project, as a strong candidate for the first hydrogen/Carbon Capture and Storage ('CCUS') cluster in the UK.

Engagement summary

Who, how and purpose	Insights
Domestic customers We discussed topics relating to the future of heat with customers during deliberative workshops and asked about different options during BOT. We also used a combination of stated preference and benefits transfer studies to establish willingness to pay.	• Customers were supportive of the need to decarbonise heat. • Customers were interested in hydrogen but had concerns around issues such as boiler replacements, safety and cost, although these reduced once they were provided with more information. • They supported us connecting off grid communities (although not the most ambitious options we presented) and were enthusiastic about greener gas. We have established willingness-to-pay figures for both connecting off grid communities and green gas entry.
Stakeholders We have participated in stakeholder workshops and interviews with the ENA and on our own. We have also held a range of one-on-one meetings with stakeholders and attended conferences and round-table events.	• Stakeholders supported the decarbonisation of heat, although there was no clear consensus on the right way to achieve this. • We received strong written support for our HyNet project from local businesses and institutions (e.g. universities, local authorities). • Stakeholders supported biomethane, although there were concerns about the connections process.
Business customers We discussed the future of gas with business customers and a quantitative survey during BOT.	• Business customers found it hard to comment on the future of heat, as they did not feel well enough informed. • Business customers preferred the most ambitious options for connecting off grid communities by a small margin and were willing to pay for green gas in our network.
Communities We asked Newcastle University to research attitudes to hydrogen blending in proposed trial areas.	• Overall, the majority of respondents said they valued hydrogen, but were not willing to pay more for it. Knowledge of hydrogen and the impact it has on the environment were strong predictors of support.
Hard-to-reach groups We held focus groups with hard-to-reach groups to understand their priorities.	• Customers in focus groups were supportive of using greener gas, and supported hydrogen but repeated the concerns of domestic customers.

And the steps we have decided to take in RIIO-2

Given the scale of the challenge the UK faces to decarbonise heat, we need to maintain momentum in working with BEIS and Ofgem to drive actions to demonstrate Net Zero transitions at scale such as pursuing the HyNet project to design, construct and operate a hydrogen transportation network with a supporting commercial and operational framework. These steps will assist us to meet customer and stakeholder requirements for hydrogen in the North West of England if the Government prioritises hydrogen as a decarbonisation solution.

We will work to develop plans for an efficient and effective hydrogen blending regime. In doing so we will ensure plans protect end customers, who require safety guarantees and the confidence that they are only paying for the energy they use. We are committed to help develop the evidence base Government requires to make informed decisions regarding the energy transition.

Putting in place measures to support biomethane producers seeking to inject to the network will be low cost but could produce significant environmental benefits. We have proposed a charging and access review and enhanced engagement and governance process to remove barriers to this industry.

Given the transformative benefit that individual off grid communities would gain from connection to the gas network and minimal impact on customer bills we have decided to take forward a limited trial through the NIA. This will enable us to undertake localised engagement with off grid communities ahead of a trial and feed those insights into plans for further network rollout, and possible alterations to the regulatory framework.

Measurement of success

Output	East of England	North London	North West	West Midlands	Cadent	Comparison to RIIO-1	Cost	CVP
Entry capacity enablement – flexible reinforcement	Charging and access review of distributed entry gas commercial arrangements initiated, supported by an uncertainty mechanism to enable the resultant reinforcement to create capacity for connectees.					Triggering connectee pays cost	**UM mean £84m over RIIO-2**	**£51.9m**
Connections standardisation	Establish an Entry Gas Customer and Stakeholder Forum to facilitate knowledge sharing and framework changes. Establish an Entry Gas Connection Standards Methodology and voluntary governance arrangements.					Not included	**Included in base plan totex**	
Off gas grid communities	Expected trial location East of England, project run through Strategic Innovation competition. Targeting community of scale of around 450 properties					Not included	**£0.6m for process** **£2.3m trial**	**£4.4m**
HyNet	Project developed through BEIS CCUS challenge Fund followed by Ofgem Strategic Innovation Competition or a re-opener mechanism Overall project £1bn including CCUS, hydrogen production and storage, hydrogen pipeline (estimates £200m) and local reinforcements £50m.					Funded by NIA	**Overall £1bn (£250m distribution)**[1]	**n/a**
Hydrogen blending rollout	Roll out dependent on successful completion of Hydeploy 1 and II trials. Upon HSE approval, phased roll out.					NIC project HyDeploy	**£25m**	**n/a**
Heat Strategy re-opener	Ofgem have proposed a re-opener to be applied as a result of any Government policy change on heat decarbonisation strategy.					Not included	**£162m mean cost**[2]	**n/a**

Delivering our commitments

Customer communications:

- We will continue to communicate the findings of our research and our plans for the Net Zero transition with customers, key stakeholders and Government to demonstrate the potential of connecting off gas grid communities. We will publish updates through our annual Safety & Sustainability Report but also our future role of gas communications.

Processes/Systems:

- Investing in entry capacity will require establishing a new supply chain and capability development to manage the new types of assets such as in-grid compressors. We are trialling this through the Optinet innovation project.

Partnerships:

- For the off grid work, we will seek to work with experienced community partners such as Affordable Warmth Solutions to provide a managed connections service for customers seeking connection to low carbon energy.

Engagement:

- We will carry out systematic engagement with customers on the impact and benefits they see from the energy transition.

Protecting against non-delivery

Reputational	Not making progress on innovative environmental measures or undertaking research to support the energy transition would be damaging to our reputation and future business. Leading changes to the industry framework to create substantial additional entry gas capacity will have significant reputational benefits and highlight our role as a market facilitating System Operator.
Uncertainty mechanism – re-opener	Rollout of HyNet and hydrogen blending will only be taken forward if approved by Government and funded through uncertainty mechanisms. We have proposed an uncertainty mechanism for entry enablement triggered on a change to the charging and access arrangements, which will protect customers from the uncertainty over the associated reinforcement need. Ofgem's proposed Heat Strategy re-opener will provide protection and flexibility to respond to any Government policy announcements during RIIO-2.

Reference: See our Environmental Action Plan 07.04.00 and Appendices 07.04.10 and 07.04.11, and Chapter 6 of our Plan.

1 £200m for a hydrogen pipeline for industry and an additional £50m for hydrogen readiness.

2 This figure includes the probability weighted cost of HyNet and blending quoted above.

Our commitments continued

7.5 Trusted to act for our communities

Through our enhanced engagement programme our customers and stakeholders told us that in order to love the standards that we set they must trust us as an organisation. We have therefore proposed a fourth customer outcome area, in addition to the three identified by Ofgem – Trusted to act for our communities. In our July draft Plan, we set this outcome area out in the same way as the other four, but through our Business Options Testing, customers and stakeholders struggled with the concept of commitments related to trust being directly part of a regulatory settlement. We therefore engaged further through deliberative means and determined that a more appropriate approach would be to create a Trust Charter, where we capture the key aspects of building trust (based on the feedback that we have received) and commit to publishing our delivery against it every year. See **Appendix 07.05.00 - Trust Charter.**

Our engagement strategy: how and why we engaged on this outcome area

It was as we engaged with customers and other stakeholders on our other three outcome areas that we identified the need for a fourth outcome area. It was clear (when asking open questions in our Discovery phase of engagement) that customers and stakeholders had expectations of a business such as ours, that went beyond safety, reliability, service and environmental commitments.

We noted a general lack of trust in relation to energy companies and a very low level of understanding of Cadent or the role of gas distribution networks. The adverse public sentiment has been fuelled by very high-profile press coverage, such as the series in The Sun newspaper in 2018 entitled 'Griddy Guts'. Rather than focusing on energy suppliers, as has traditionally been the case, this series focused on network companies stating excess profits, executive pay and inadequate performance levels.

These pressures have been mirrored in the political environment where the Labour Party is developing plans to bring utilities back into public ownership. We have an active dialogue with key Labour energy ministers and advisors to discuss the role of the networks in delivering for customers.

Changes in public perception crystallise the need for us to be clear on the value that customers and society are deriving from the operations of the private network companies and for trust to be developed that the company's purpose and values are aligned to these needs.

There is a plethora of academic and professional studies linking trusted brands with organisational success. We have reviewed many of these and have identified traits, behaviours, values and commitments that correspond to successful, trusted brands and have used these as we have formulated our commitments. The research points squarely at a need for companies to be transparent and to operate in a responsible manner.

When exploring the concept of operating in the best interests of communities, we have drawn on the insight and research from our sponsorship and involvement in Sustainability First's 'Fair for the Future' project, which has been developing a strawman of a 'Sustainable Licence to Operate' for energy and water companies. This work takes case studies and best practice from across a number of different sectors and countries and includes input from a wide range of water and energy companies, regulators, consumer champions, third sector representatives and Government representatives.

The strawman is built on four pillars which provide the foundations for a company to build trust that it is acting in the best interest of society and its stakeholders. We are taking the learning from best practice to help determine, and then cross-check, the output commitments we are making in this area.

When it came to testing the options against our July Business Plan in summer 2019, we took account of what we had learned from previous engagement in this area. We noted that it can be difficult to engage with customers on the subject of trust. We partnered with Britain Thinks to facilitate our Business Options Testing programme. They have worked with numerous organisations to explore this theme in the past, including Severn Trent Water who were noted by Ofwat to have engaged very successfully on trust.

As a result of this research, we have fundamentally changed our approach to representing our commitments against this outcome area. Initially we presented this outcome area in the same way as our other three outcome areas; ultimately leading into a suite of regulatory output measures that we are proposing. At the time, most were reputational measures but two were related to financial incentives.

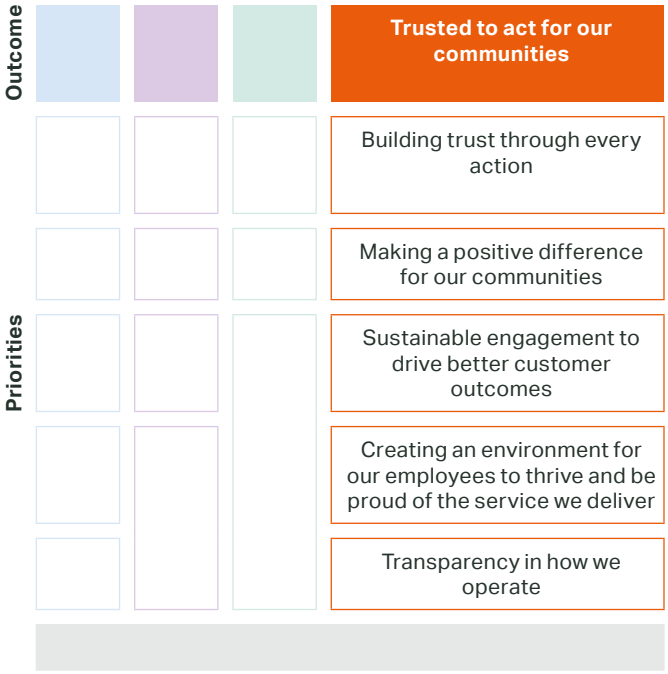
Whilst we received a large degree of support on our proposals, the overwhelming majority of both customers and other stakeholders did not understand why we were making commitments through regulated output measures, as opposed to simply committing to proposals through a 'charter' or 'manifesto'. Our CEG provided similar challenge in July when reviewing the first full Business Plan draft. We have taken this feedback on board (plus other specifics relating to individual commitments and priorities) and have changed the way that we are presenting this outcome area, establishing a 'Trusted to act for our communities' charter, which now includes just two reputational PCD outputs, one of which is outlined within Ofgem's Business Plan Guidance Document, relating to ongoing stakeholder engagement and the other publishing our delivery against our Trust Charter (described below).

What our customers and stakeholders have told us:
We purposely targeted engagement with different segments of our customer base, including future generation customers, customers in vulnerable situations, small and large business customers and customers across all four of our network regions. We wanted to explore different viewpoints that existed across these different segments.

We noted very few conflicting views; whilst business customers (both small and large) saw a lower priority in us becoming more transparent in our operation (especially in areas such as publicising our executive pay and dividends policy), none of our segments rated this as a high priority to them. With such clarity provided through the research programme, we have identified five themes with a very clear and consistent priority order associated with them and our charter is built against these five themes. Each of our commitments is clear and measurable.

Our Trust Charter is briefly summarised below but the full document can be found in **Appendix 07.05.00**. This document has been reviewed and challenged in detail by our CEG and all challenges subsequently closed.

Figure 07.17: Outcomes our customers need us to deliver



Our Trust Charter

1. Building trust through every action

When we asked customers to define what it is that they trust in organisations and brands and what it would take for them to trust us, the main factors they cited were when companies 'get the basics right' and 'consistently deliver on promises'. There is a clear read across into our 'network resilience' and 'quality service' outcome areas. However, due to the nature of our work, customers often do not understand how we are performing, but they would like to. We have therefore explored options of how this could be achieved.

In addition to delivering the improved service standards that we have set out across our other three outcome areas, we are making the following commitments:

- To publish on our website and through social media how we have performed against our key operational and customer safety measures
- To publish on our website and through social media how we have performed against each of our service benchmarks (including customer satisfaction)
- Continue to publish our total tax contribution as part of our Tax Strategy and assess opportunities to extend our best practice in this area.

Our publications will be developed through engagement from our Customer Forum, Customer Engagement Group and relevant regional stakeholder groups.

2. Making a positive difference to our communities

In terms of building trust, customers have told us that supporting the communities in which we operate in tangible, demonstrable ways, is their second highest priority.

We explored what customers meant by 'tangible and demonstrable' and noted that these were often code for 'local' and 'value-adding'. They talked about sponsorships of local sports teams and schools as examples. As we explored this more with customers, we were able to arrive at two very clear commitments against this priority.

The Cadent Foundation

We are keen to recognise the role we can play within the communities we serve – supporting economic growth and customers in vulnerable situations. We have therefore looked at how best to provide support through our proposed Cadent Foundation. The Foundation is being used to support a variety of priority activities within our communities – supporting customers in vulnerable situations, supporting the local economy (including encouraging local innovation), as well as specific local initiatives. The precise distribution of funds will be informed by stakeholder consultation. We are committing to investing a proportion of our profits directly back into the communities we serve. We have set up a stakeholder-informed community fund, which we will invest at least 1% of our profits into each year (forecast to be c. £6m p.a.). We have already started the fund in RIIO-1 by committing to invest 1.25% of our profits in 2018/19, 2019/20 and 2020/21.

Supporting employee volunteering

One of the ways we can contribute to our communities is by giving our time to volunteering. As well as giving back to the community, volunteering provides the chance to develop new skills or build on existing experience and knowledge. Volunteering also provides challenging and rewarding experiences for our people. While the decision on whether to volunteer is a personal one, we want to ensure that we support and encourage our people to spend a proportion of their time at work volunteering.

Our employee volunteering programme started in August 2018. Since then, 72 volunteers have provided 644 hours of their time, with over 32,000 direct beneficiaries. Following our separation from National Grid, we engaged Volunteering Matters as a provider of volunteering opportunities for our staff. Across all of their programmes, Volunteering Matters say 86% of volunteers feel they have an impact on the community. Additionally, 91% of volunteers have increased their sense of pride in working for their employer and 85% of volunteers feel more positive about their employer overall.

In RIIO-2, we want to expand this and increase the level of support for employees connecting with communities. We therefore propose a stretching target of encouraging over 2,500 employees into voluntary activity over the review period. This is ambitious in relation to other utilities, who support around 20% of the employee workforce in voluntary activity (see section above on best practice). We will fund our support for volunteering ourselves to support our employees in these activities. We will also consider longer term skills-based volunteering.

Our commitments continued

3. Creating a thriving environment for our people

The third priority area that our customers told us about was creating a thriving environment for our people. We were initially surprised about the level of importance our customers placed on this area, but were able to explore this in far more detail during the workshops and through testing our own ideas, and seeking additional ones, we have developed the following set of commitments:

A. A diverse and inclusive workplace – To be a successful business and deliver what our customers expect from us, it is important to have an diverse and inclusive culture. In the same way as we are targeting inclusion and accessibility of our services for our customers, we are striving to create an environment that embraces diversity and allows people to be themselves and bring the best of their skills to the workplace every day. We have several focus areas to ensure we are attracting and retaining a diverse range of talent, for example improving our gender pay gap, encouraging more diversity in our field force recruitment, supporting faith requirements and improving disability awareness. Over the RIIO period we commit to:

a. Provide unconscious bias training for all managers across the organisation by 2021.
b. Target a significant increase in Black, Asian and Minority Ethnic ('BAME') talent by 2026.
c. Show a demonstrable increase in the number of BAME senior managers.

B. Supporting women in the workplace – Whilst customers acknowledged our commitment to reducing our current gender pay gap and our transparency in publishing it, their primary focus was for us to make a clear commitment in respect of increasing the proportion of females in senior management positions. Through programmes targeted at developing female leaders, we will:

a. Target a balance between male and females being recruited through our graduate programme.
b. Increase the proportion of females joining our apprenticeships.
c. Increase the number of females in management positions.
d. Increase the number of females in Director roles.
e. Review the support provided for flexible working arrangements prior to 2021.
f. Include flexible working arrangements in all job roles by 2021.

C. Continue to change lives for the better through EmployAbility – The 'EmployAbility – Let's Work Together' supported internship scheme builds confidence, develops skills, raises aspirations and provides a step on the career ladder for students with special educational needs and disabilities ('SEND'). The programme has enjoyed long-term success rates, with 73% of interns achieving paid employment, against the national average for this group of just 6%. We commit to continue to operate this and promote its inclusion by other local organisations.

D. Keeping our people safe – Safety is paramount to all that we do. We are committed to ensuring the safety of our people, our customers, and the general public. We will always strive to improve our safety performance and create an environment to look after our people, and have developed a three year plan to reinvigorate our safety culture, with visible leadership for safety at all levels in our organisation. We are refreshing our safety management system with a 'back to basics' approach, and more effective communication of safety risks and issues, using real-time communication tools and other advances in technology. Our aim is to achieve long-term reductions in our lost time injury frequency rate ('LTIFR') even beyond the world class levels that we are currently delivering.

E. Bringing in new talent – As we look forward to supporting the transition to a low carbon energy future, it is vital that we build the capability to deal with a changing climate, to innovate and embed new technologies. We continue to bring in new talent with apprenticeships, graduate schemes and our Engineering Training Programme.

F. Fair and transparent reward and recognition – Our customers expect us to pay fair salaries that are in line with relevant market benchmarks. We commit to:

a. Continue to benchmark our salaries with recognised third party organisations for all roles.
b. Pay at least the national real minimum wage to our directly employed agency employees working in our main sites.
c. Continue to operate our Cadent Congratulates rewards scheme.
d. Develop an annual Chairman's Award for all employees to enter.
e. Maintain at least market median pay and reward schemes for all employees.

G. Ethics and 'Doing the right thing' – We encourage a strong culture of business ethics through our 'Doing the right thing' programme. This involves a charter of the behaviours we want to exhibit and online training on aspects such as fraud and bribery training, competition law and General Data Protection Regulations. We operate an independent business ethics support line to allow employees to raise any concerns as well as an employee assistance programme which provides external support and counselling.

H. Skills and training – We believe in supporting our people with training and development, to ensure their safety, and help them to thrive within their chosen career. We will:

a. Continue to support our employees with over 24,000 training days p.a.
b. Run at least 30% of training on-site.
c. Ensure all employees have the technical competencies to do their role.
d. Offer every employee the opportunity to develop a personal development plan, overseen by their management team.
e. Create new opportunities to improve our ways of working, collaborate more and learn via social cohorts.
f. Provide dedicated training centres such as those at Hitchin and Hollinwood and satellite centres at Windsor Street and Slough.
g. Focus on STEM enrichment, careers inspiration, and work experience.

These commitments will be delivered in addition to maintaining other areas of good practice for our employees. These include annual engagement surveys, supporting employees to be active in our community (e.g. volunteering schemes) and providing health and wellbeing advice and support.

4. Sustainable engagement to drive better outcomes

The feedback from our customers and stakeholders has been very positive in respect of our ongoing engagement programme. They liked the opportunity to be heard and had great suggestions about how we can improve. We recognise that engagement with customers and stakeholders is not a one-off exercise and it is essential to continue the dialogue so that we can respond to changing requirements and priorities and continually seek to improve.

To this end, our ongoing engagement strategy will see us continue to engage widely with customers and stakeholders throughout the RIIO-2 period and demonstrate how we are turning insight into action. In addition, we are exploring where there is additional customer value from enhanced stakeholder engagement to develop whole-system solutions. We have set out our ongoing engagement commitments in our Enhanced Engagement chapter and in our Stakeholder Engagement Strategy (**Appendix 05.01**). These include:

- Improving the way we use business as usual insights.
- Continuing customer forums.
- Evolving the Customer Insights Forum to add even more value.
- Continuing and expanding regional stakeholder groups.
- Committing to a CEG throughout RIIO-2.
- Evolving stakeholder engagement on whole-system thinking.
- Developing our online forum.

5. Transparency in how we operate

The final priority area that our customers and stakeholders discussed with us was transparency in how we operate. However, this was of much lower importance than the other priorities described above. Whilst customers and stakeholders expected us to abide by laws and publish our performance to our regulators, they had very little appetite themselves to review material such as our taxation summaries, our dividends policy, our executive pay or our governance structures. Whilst our impact on their gas bill is of interest to them, they saw it as the responsibility of gas suppliers to provide this information, rather than ourselves.

Nevertheless, we believe it is important to continue to prioritise transparency as an organisation and we will do this at no additional cost through:

- Reporting annually on Executive pay and how our Executive team are incentivised to deliver for customers.
- Transparent reporting of shareholder dividends with demonstrable links to meeting customer commitments.
- Enhanced data provision to both Shippers and customers to aid better customer understanding of the impact we have on their bill.
- Our Annual Report, which will provide detail regarding our governance that is beyond statutory requirements.
- Continuing the good practice in the publication of an annual Safety & Sustainability Report.

One of the ways we can build trust in our organisation is to ensure that our executive and leadership pay and reward is fair and in line with market comparisons, transparent and linked to successful delivery of customer outcomes. We can also ensure that we have a fair and transparent Remuneration Policy that is consistently applied and in line with market comparators.

Our objectives for Executive pay are inspired by the best practice guidance described in the Corporate Governance Code:

- Executive pay should be explained.
- Executive pay should be aligned with delivery of our customer outcomes.
- Executive pay should be transparent, and overseen by independent governance.
- Executive pay should be based on a clear structure.
- Our approach to Executive pay is in line with the best practice above and these objectives.

Full details of our Trust Charter are contained in the **Appendix 07.05.00**.

Our reward principles are aligned to our business strategy, with remuneration linked to performance. As part of the 2018 and 2019 Staff Pay Deal, the annual performance bonus targets for all Executives, managers and staff-graded employees are now the same. These targets are transparent, with progress tracked and reported across the business on a monthly basis.

For 2019, the weighting in the annual bonus measures based on Customer Excellence has increased from 20% to 35%, with a corresponding decrease in the weighting for the financial measures. In addition, the new Long Term Incentive Plan for the period 2019–2022 is heavily weighted (40%) towards the RIIO-2 Business Plan.

Table 07.16: Summary of outputs for our Trusted to act for our communities outcome

Output	Measure	Common/ bespoke output?	Regulatory Treatment (PCD, ODI, LO)	RIIO-1 Position	RIIO-2 Target Ambition
Stakeholder Engagement	Report published	Bespoke	ODI (R)	Not included	Demonstrating continual improvement in our stakeholder engagement approach and delivery of the commitments included in our strategy.
Trust Charter	Report published	Bespoke	ODI (R)	Not included	Report published annually to our customers showing progress against the commitments in our Trust Charter.

8 Driving performance through innovation and competition

In this chapter we describe how innovation and competition link to our vision and underpin our efficiency and the commitments we have made to our customers. We explore what our RIIO-1 approaches have been and what we have learned and achieved so far. The focus areas for RIIO-2 are explained, including the benefit areas we are targeting for our customers. The level of innovation funding that we are seeking is explained and we also set out our competition plan.

This chapter has the following structure:

Key messages

Innovation:

- We will place a greater emphasis on customer outcomes (especially those in vulnerable situations), reducing disruption, and energy system transition.
- Third party collaboration will remain key to the success of our innovation.
- We request a total RIIO-2 NIA budget of £40m across our networks.
- We have a structured approach to achieve this and are changing our organisational structure, contracting model and culture.

Competition:

- We already procure 71% of our totex through competitive processes, but we will continue to challenge ourselves to go further, encouraging 'native competition' by opening our activities and processes to add greater value for our customers.
- We will look for opportunities to apply 'late' competition, particularly for our clean gas projects.
- We will further extend native competition by embracing the thinking that underpins Ofgem's desire to see more examples of 'early' competition.

8.1 Innovation is core to our purpose, values and vision

Our innovation strategy is driven by our company purpose to 'Keep the Energy Flowing' and our vision to 'set standards that all of our customers love and others aspire to'. Our purpose not only describes the outcomes we are aiming to deliver, (the 'what') of safe, reliable and sustainable energy, but also 'how' we want to deliver this through our four values of curiosity, courage, commitment and community.

Two of our four company values are specifically aimed at embedding an innovative approach to all the work we do – '***Curiosity***' to seek out new ideas and ways of working and '***Courage***' to make changes, try new approaches and deliver for our customers. These values are an integral part of our managerial and staff performance assessments, which are linked to pay and reward.

Our approach has been to work towards a culture of innovation and learning to improve the service we offer to all our customers. We have done this by building capability in our central teams to manage complex technical and process improvement projects, and by implementing our Performance Excellence programme to drive continuous improvement (innovation) in all our activities. This includes technical and process improvements to data collection, communication, engagement and planning. This is an ongoing and continuously evolving journey to reflect changing customer priorities, technological advances and the business climate.

As a newly formed independent company we have the ambition to build upon our progress in RIIO-1 by being a leader in energy system transition, through whole system solutions, by driving projects to safely minimise disruptions and interruptions to supply, and improving the service we deliver to all our customers with particular emphasis on those in vulnerable situations. We have already embarked on this journey and are seeing benefits as a result.

8.2 The way we look at innovation

Innovation can be defined as executing a new or novel idea which addresses a specific challenge and achieves value for both the company and customer.

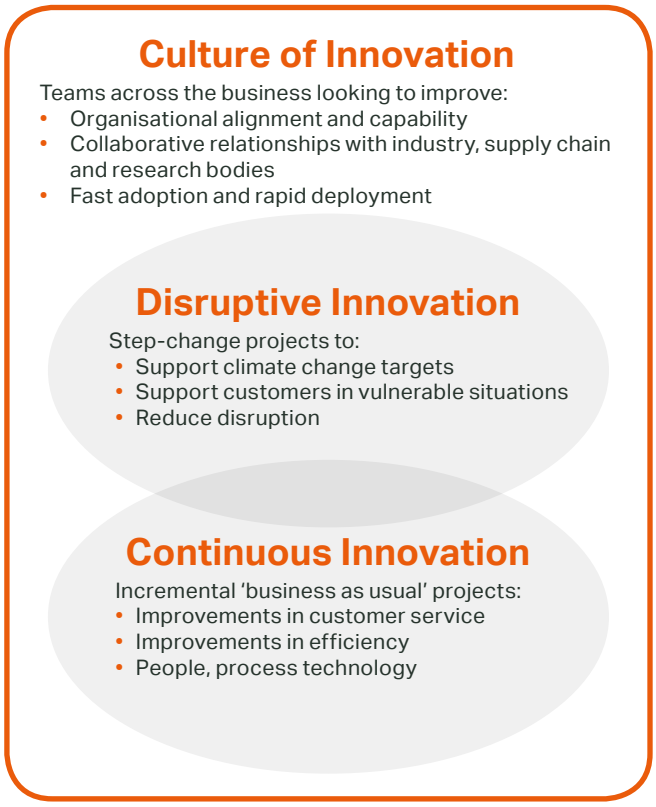
It is not just restricted to technology, as it can also take place through the provision of more effective products, processes, services, business models or environments.

Innovation can be split broadly into two categories:

1. **Disruptive innovation** is the practical implementation of an idea that creates a step-change for the industry or market, government or society and is usually associated with high risk
2. **Continuous innovation** is brought about by many incremental advances

Our strategy seeks to implement both continuous innovation (by building on our Performance Excellence and business as usual activity) and disruptive innovation (through our response to the climate change challenge and our focus on improving customer service and reducing disruption). We also recognise the need for cultural change to enable both to happen.

Figure 08.01: Innovation definition



8.3 Building on the success of RIIO-1

Our strategy focuses on doing the right thing for our customers now and into the future by building on the key successes and learning from our approach to innovation in RIIO-1. Our RIIO-1 strategy saw some significant progress in collaborating with our innovation supply chain to exploit new ideas (through a concentration on research and development investment), in collaborating with other network operators within and outside our sector (e.g. the creation of the Energy Innovation Centre) and by leveraging the skills and ideas of our employees (through our Performance Excellence training and approach).

8.3.1 What we have achieved

Disruptive innovation

We have delivered a step-change in identifying pathways to the role gas can play in delivering an affordable, secure and sustainable response to the **Net Zero challenge**. Our HyNet North West and HyDeploy flagship projects are building a great foundation at scale to demonstrate how the **decarbonisation of heat** and transport can be supported by clean gas and the use of hydrogen. We will continue with both initiatives through RIIO-2. For more information see **Chapter 7, Our commitments** and our **Environmental Action Plan in Appendix 07.04.00**.

Driving performance through innovation and competition continued

In addition, we have seen groundbreaking industry projects in the use of robotics in the RIIO-1 period through the collaborative work with other gas distribution companies. This work is used in core gas distribution services to minimise disruption to customers and reduce congestion in urban areas. **Appendix 08.00 'Minimising disruption and delivering a safe and reliable network: CISBOT'** illustrates some of the work we have been doing in Central London using robotics and 'Our journey to reduce disruption and interruptions' demonstrates how we have worked with other companies and have developed our learning to innovate further.

We have worked hard to deploy innovations which have delivered improvements in **customer service**. We are transforming the service we provide to customers connecting to our networks and have deployed innovations to influence customers' behaviours including those in **vulnerable situations**. Some examples of this, such as locking cooker valves, are given in **Appendix 08.00,** together with a more detailed case study explaining how we are leading the utilities industry in our work with the Energy Innovation Centre (EIC), to identify existing and future technologies that can help utilities and other service organisations safeguard people living in vulnerable situations. It also explains how we are engaging our people, customers and external stakeholders to mobilise the industry in this area.

Continuous innovation

We have also recognised the opportunity to harness the many ideas created by our employees to improve our overall business performance and customer service, and have implemented our Performance Excellence programme. Performance Excellence encourages a bottom-up approach for employees to understand their team's performance and customer priorities, and drive incremental innovation at a local level and deliver process or technological change at a network or business level (see later **section 8.3.2** for how this was done).

This approach has delivered some significant benefits that are now consolidated into our business as usual plans (see examples in **Appendix 08.00** and **section 8.5** later in this chapter).

We have also looked to use continuous innovation to improve our IT, digitisation and data. Our focus in RIIO-1 has been to automate, partly for efficiency, but primarily because of our volume of data, the complexity of our operating environment and the criticality of the decisions we need to make. For the remainder of RIIO-1 and into RIIO-2 we will be building data foundations as part of a broader Technology, Data and Digitisation Strategy. (See **Appendix 07.02.02 Data and Digitalisation strategy** and **Appendix 09.30 Technology – IT and Telecoms**).

Table 08.01 below illustrates some of the projects we have implemented, the benefits they delivered, the approach to funding and how we collaborated with third parties to build the capability and share learnings across the gas industry supply chain during RIIO-1.

Table 08.01: Examples of RIIO-1 projects

		Funding				Collaboration			
	Project	NIC	NIA	BAU totex	Benefit	Internal network	SMEs	University	Network operators
Climate change	HyNet	✓			Decarbonising through using 100% hydrogen for industry and transport, including carbon capture and storage.	✓	✓	✓	✓
	HyDeploy	✓			Understanding our ability and opportunity to use blends of natural gas with hydrogen to reduce carbon intensity.	✓	✓	✓	✓
	H21	✓			Understanding the network changes and impacts of transition to hydrogen energy.	✓	✓	✓	✓
Disruption and interruption	Serviboost		✓		Reducing customer disruption and time off gas during pressure problem events.	✓	✓		✓
	CISBOT		✓		Mains remediation with reduced disruption to customers.	✓	✓		✓
	Cryogenic Pipeline Cracking Technology		✓		Reduced customer disruption during mains replacement delivery programme.	✓	✓		✓

		Funding				Collaboration			
	Project	NIC	NIA	BAU totex	Benefit	Internal network	SMEs	University	Network operators
Safe and reliable network	Multi-occupancy Building CIP (HTC Serline)		✓		Improved customer safety and reduced disruption for MOB alternative riser replacement materials.	✓	✓		✓
	Phased Array Cable Avoidance		✓		Improved safety when working around buried high voltage cables.	✓	✓		✓
	In pipe drone feasibility		✓		Reduced risk of interruption associated with failure of buried pipeline asset.	✓	✓	✓	✓
Customers (inc. consumer vulnerability)	Easy assist Emergency Control Valve		✓		Improved safety for customers with reduced dexterity and hand strength.	✓	✓		
	Call for action on dementia		✓		Reduce the impact of energy supply interruptions for customers living with dementia.	✓	✓	✓	✓
	No power hot water		✓		Reduce customer hot water impact during energy supply outages.	✓	✓	✓	✓
Performance Excellence	Asset location data			✓	Right first time data capture – £1.6m rework cost avoidance.	✓			
	Complaint handling process			✓	Improve response time – £1.5m efficiency improvement.	✓			
	Connections transformation			✓	Improve customer satisfaction performance.	✓			

8.3.2 How we achieved this

Disruptive innovation

Our approach in RIIO-1 has evolved over time as we have learnt more about the issues facing our customers and the industry, and as we have built collaborative partnerships with the supply chain and our gas distribution networks (see **Appendix 08.00 'The development and evolution of our approach to innovation'**). We have found the work we have done with the Energy Network Association (ENA) and the other gas networks to develop the Gas Network Innovation Strategy (GNIS)[1] particularly beneficial. Through this we have established a joint approach that seeks to address some of the industry-wide challenges facing all our assets, how we operate them and the customers we serve. The themes outlined in the GNIS enable us to create specific challenge statements that then help us focus our innovation ideas to tackle specific issues. In latter stages of RIIO-1 and into RIIO-2, the GNIS will broaden to include partners in the electricity sector and so provide a **whole system** approach to improving the services delivered to our customers. We are currently working with the ENA and gas and electricity partners to engage with industry around this.

We are also keen to learn from ideas external to our business both nationally and internationally. **Appendix 08.00** outlines our approach and partnerships to enable this.

Continuous innovation and a culture of innovation

Not only has Performance Excellence delivered improvements to our business as usual totex, but the bottom-up approach has acted as a 'vehicle' to start a journey towards a culture of innovation. Examples of how this has been done include:

- Implementation of 'performance hubs' across the business
- Training our employees in problem-solving tools and techniques
- The development of our 'Change Management Framework' as an approach to innovation through process, people or technological change
- The sharing or innovations across our networks through **best practice** conferences and our communications channels
- 'Cadent Congratulates' to recognise and reward outstanding innovation
- Entering our employees into external awards, with some notable wins

Appendix 08.00 adds more detail to the points above, which together with 'The development and evolution of our approach to innovation', illustrates our innovation journey so far (of which Performance Excellence is a part). We will build upon this in RIIO-2 (see **Section 8.6.4**).

Our Data Strategy has been developed to address a need to modernise energy data as highlighted by the Energy Data Taskforce report. It is a key part of our transformation programme and, to enable improved data competency, we have implemented policies to provide leadership in the future. To facilitate this we have implemented policies to review our performance (e.g. data quality, engagement and architecture) as well as facilitating engagement with our data stakeholders **(Appendix 07.02.02 Data and Digitalisation Strategy)**.

1 For more information on the Gas Network Innovation Strategy visit **www.energynetworks.org/gas/futures/gas-network-innovation-strategy.html**

Driving performance through innovation and competition continued

8.4 Key learnings from RIIO-1

We have identified the key lessons learned from RIIO-1:

LESSON LEARNED
Culture is King

HOW WE ARE APPLYING THIS LEARNING
Continue to build a culture of innovation to improve our customer service

Although we have made a step-change in some aspects of our customer service and have improved the culture of our business, we believe there is much more we can do in these areas.

The GNIS is updated every two years with the next review scheduled for March 2020. In this review we will be looking to work with our colleagues from other gas network companies to put an even greater emphasis on using innovation to improve our **customer service** with particular attention to those in **vulnerable situations**.

We are also looking to further embed a **culture of innovation** in our business as part of our transformation journey (as outlined in **Chapter 9, 'Costs and Efficiency'**). The first step is to align our organisation to move decision-making closer to the assets and customers, and then to build upon our Performance Excellence programme and create the environment to further enable engineers to quickly deploy technology and techniques to improve customer service (see the section titles '**How we plan to innovate in RIIO-2 – extending and developing our culture of innovation**' later in this chapter for more information).

LESSON LEARNED
Partner and collaborate

HOW WE ARE APPLYING THIS LEARNING
Develop our partnerships and collaborate to find the best solutions and benefits

The **importance of partnerships and collaboration** has been demonstrated in multiple areas. Most notably, we have seen the importance of engaging and developing a mature supply chain of different national and international innovators (as seen for example, through our work with the Energy Innovation Centre and from the implementation of CISBOT from the USA) and working closely with a wide base of customers and stakeholders to develop innovation ideas (as seen in our HyNet North West project). We intend to build upon this further in RIIO-2 to include collaboration at both a regional and national level and also include partnering across sectors and with innovators from across the globe. (See **Appendix 08.00** 'Our journey to reduce disruption and interruptions' for more examples).

We will continue to work with the EIC to broaden idea generation from small and medium enterprises and work with the other GDNs to better share **best practice** throughout the project life cycle.

LESSON LEARNED
Project controls can undermine delivery pace

HOW WE ARE APPLYING THIS LEARNING
Improve the speed of our deployment centrally and locally

We need to **improve the speed of our deployment** both with our supply chain and within and across our regional networks. In doing this we need to define optimal project governance to ensure pace and simplicity, and this needs to include working to understand and develop utilisation of the relevant regulatory mechanisms such as NIA/NIC and their governance requirements. In addition, the balance of centrally driven innovation versus local innovation and being clear about where accountability lies for deployment is critical.

Through our recent application of the new Innovation Measurement Framework ('IMF') we have a benchmark for this lesson. Our IMF indicates that we currently take 255 working days to deploy an innovation project as business as usual.

We believe that our transformation journey to develop a culture of innovation will support this change, which together with a shift towards business as usual and totex funded innovation will make significant improvements in this area. We will also monitor our performance through the deployment of the 'Innovation Measurement Framework' (see **section 8.6.4** later in this chapter).

LESSON LEARNED
Think outside the box

HOW WE ARE APPLYING THIS LEARNING
Drive innovation in all its forms – people, process and technology

We must **consider innovation in all its forms** and avoid focusing too heavily on technological solutions. For example, we need to look for process and cultural solutions, and innovative ways of using data and engaging with our customers to address the challenges we face. We have made progress to broaden our perspective that innovation applies to far more than hard technology, but we have more to do to extend that broad perspective throughout Cadent, and build upon the progress made through our Performance Excellence programme.

LESSON LEARNED
What gets measured gets done

HOW WE ARE APPLYING THIS LEARNING
Measure the effectiveness of our overall innovation activity and our project benefits

We need to develop and apply a **robust measure of the benefits** of innovation, both in terms of individual projects and from our overall innovation activity.

For individual projects we plan to more clearly articulate, review and make visible the benefits of an innovation at key stages of the project by making better use of our 'Change Management Framework' (see later). This will encourage a greater level of interest and collaboration in the project (or encourage 'spin-off ideas') and potentially encourage better uptake of technology as business as usual.

For our innovation as a whole, as discussed above and elsewhere in this chapter, we recognise the importance of collaboration and in creating a culture of innovation, but we are unable at present to quantify how good we are at it.

This is a common challenge for the energy networks and the work carried out by the EIC to develop the Innovation Measurement Framework is key (see section '**Measure our performance**' later in this chapter).

8.5 Financial benefits from innovation

We expect to spend **£53m** (18/19 prices) during RIIO-1 on NIA projects, including those collaboration projects for which we have taken the lead. Against our innovation themes, the make-up of this spend is as follows:

Table 08.02: NIA spending by 2018 GNIS Theme

GNIS theme	RIIO-1 NIA spend
1. Future of gas	£12m
2. Safety and emergency	£5m
3. Reliability and maintenance	£16m
4. Repair	£4m
5. Distribution and mains replacement	£15m
6. Environment and low carbon	£1m
Total	**£53m**

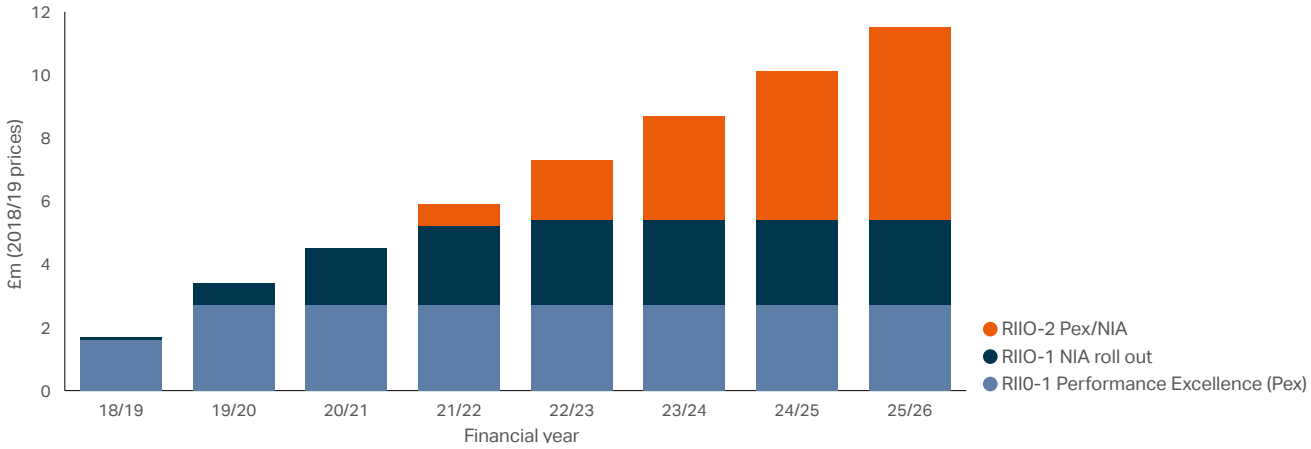
Research into near and long-term service to gas distribution customers accounts for 65% of NIA funds (Themes 1, 2, 3 and 6 in **Table 08.02**). The 'Repair' and 'Distribution and mains replacement' themes include research into new technologies that may deliver cost, customer or safety benefits in the future. Of this, £8m has been associated with potential use of robotics in support of the replacement activity, however these had a high risk of failure set against high rewards associated with them, and so have delivered varying degrees of success in operational environments see '**Appendix 08.00 Our journey to reduce disruption and interruptions**' for more detail. In RIIO-2 we will look to move forward the use of robotics for potential roll out into RIIO-3.

We are using £9m of NIA funds to deliver projects that are now being rolled out and are forecast to deliver £16m of benefit over an eight year period to 2025/26. By 2022/23 we forecast benefits will be realised (and sustained until the end of RIIO-2) at a rate of £2.7m per year. 65% of these annual benefits (a rate of £1.75m p.a.) will be realised by the end of RIIO-1.

Figure 08.02 below shows the benefits of the RIIO-1 NIA projects; the dark blue blocks show projects expected to be cost beneficial. The figure also shows the benefits being achieved through our performance excellence investment (light blue blocks).

The transformational change programme referenced elsewhere in our plan capitalises on the benefits of performance excellence, but these benefits are not included in these figures. We do not know specifically what improvements will be found to achieve these further savings, coloured in orange, but as is referenced in our **Appendix 09.20 Resolving our benchmarked performance gap**, we are forecasting ongoing improvements throughout RIIO-2 which will seek to deliver £7m of benefits per year by 2025/26 as part of the 0.94% p.a. efficiency assumption that runs though our plan, described in **Chapter 9, Costs and Efficiency**. This incorporates any benefits we can realise from introducing best practice techniques from; potential further roll out of our NIA projects, other gas distribution networks' RIIO-1 NIA projects, and other industries, which will be facilitated by our performance excellence process and therefore are stretching and ambitious.

Figure 08.02: Cost efficiencies through innovation roll out



8.6 Our Strategy for RIIO-2

As discussed in **Chapter 5, Enhanced engagement** we have engaged extensively with our customers and stakeholders to determine their priorities. Reviewing this feedback, we identified key aspects that can be supported by innovation and then carried out further engagement around specific areas (e.g. use of robotics). In general terms, the outcome of this further engagement is that our customers expect us to innovate, will value the outcomes of innovation in several areas and are willing to pay for it. From this insight, we have identified '**Innovation Themes**' where innovation will be key to support the delivery of the four customer priorities. See **Appendix 08.00 What our customers said about innovation.**

These themes build upon work done in RIIO-1 and continue to address the key industry and UK challenges. We will work with ENA and our gas network partners to build the sentiment of the themes into the Gas Network Innovation Strategy (GNIS) in March 2020 and seek to influence across other sectors as part of a joint gas and electricity strategy beyond that, thereby ensuring customer priorities are met.

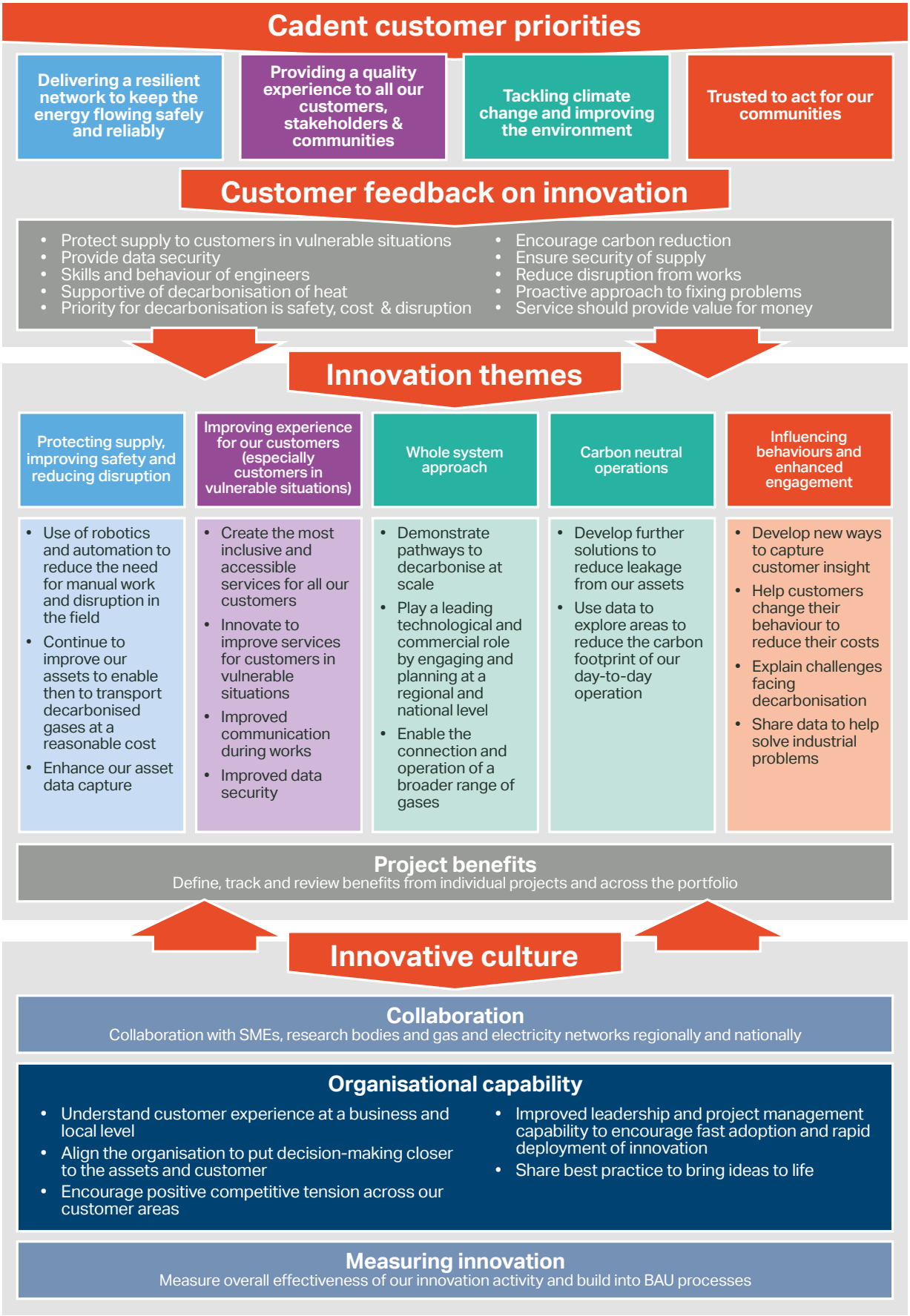
Furthermore, we will take a wider perspective on innovation to move beyond traditional technology innovation to embrace cultural, behavioural and commercial innovation (see also **Appendix 08.01 Our Competition Action Plan**).

The importance of engagement, partnership and collaboration remains key to the delivery of our RIIO-2 strategy and we will implement more effective ways of measuring the benefits of our individual projects and the impact of our innovation as a whole.

Driving performance through innovation and competition continued

Figure 08.03 below looks to summarise our innovation strategy onto one page by translating our customer priorities into our innovation themes.

Figure 08.03: Summary of our innovation strategy



8.6.1 What we plan to do – our RIIO-2 themes

The innovation themes outlined in **Figure 08.07** above, and in more detail in the paragraphs below, not only align to our customer priorities but also to our company purpose to ***Keep the Energy Flowing*** and our vision to 'set standards that all of our customers love and that others will aspire to'. The themes include both disruptive and continuous innovation and are underpinned and enabled by a culture that encourages innovation.

As a business we are mindful that we must spend our customers' money wisely and continuously improve the service we are offering them at a reasonable cost. Therefore, all our innovation activity will to continue to have a clear benefit associated with it whether that is financial, environmental, safety, service, community or for protection of our assets.

We recognise that risk is part of innovation and so some projects may fail, therefore effective project management is key (using our Change Management Framework) so that we can balance the level of risk of continuing the project against the potential benefit. We will take learnings from both success and failure and share them with other networks because this may act as a spur to future innovations. We also recognise the importance of measuring the effectiveness of our innovation as a whole, and this is covered later on in this chapter.

Our Data Strategy outlined in **Chapter 7** and in detail in **Appendix 07.02.02** and approach to Technology (IT and Telecoms) detailed in **Appendix 09.30** are intertwined with our innovation strategy (e.g. Improving experience for all our customers, protecting supply and safety and reducing disruption) and should therefore be considered in conjunction with this chapter to demonstrate our ambition in this area.

Similarly, our plans to improve our support for customers in vulnerable situations (See the **'Supporting customers in vulnerable situations' commitment in Chapter 7**) and to whole system solutions (See **Chapter 6, Net Zero and a whole system approach** and **Appendix 07.04.00 'Environmental Action Plan'**) feature heavily throughout this business plan and so should be referenced for more detail and information.

In this section it should be recognised that we are seeking to illustrate the purpose and direction of the theme and, as is the nature of innovation, this will evolve and change as we learn more. Therefore, there is expected to be some change to these areas during RIIO-2.

1. Protecting supply, improving safety and reducing disruption

This theme links very closely with four of the themes in the 2018 Gas Network Innovation Strategy (reliability and maintenance, safety and emergency, mains repair and excavation and service and mains replacement).

Delivering a reliable and safe supply of gas at an affordable price continues to underpin expectations from our customers and stakeholders. We need to continue to innovate to leverage the best use of digital technology and continuously update the tools and techniques we use out in the field. This includes enhancements to our asset data and capture of data from operational activities and the innovative use of techniques emerging from behavioural science.

Examples of innovations in the capture of data include:

- Our current 'eyes in the sky' project looking at developing satellite imagery to detect activity near our pipelines (as a potential alternative to helicopter surveying and walking routes).
- We will continue to explore the use of drones and virtual reality.
- Use of advanced analytics and artificial intelligence to optimise the appropriate intervention periods for assets.
- Creation of a digital reproduction of the network to simulate real world scenarios to plan maintenance, asset performance and optimise the distribution of gas.

See our **Data Strategy** in **Chapter 7** for more details.

In the area of behavioural techniques, we will continue to innovate through continuous improvement from our teams, best practice from different sectors on work management as well as exploring behavioural innovation such as work on human factors and improvements in Personal Protective Equipment ('PPE') and work methods. Our employee recognition scheme sponsored by the CEO highlights the contribution this innovation can make.

We will also continue the work initiated in RIIO-1 to develop automated processes and robotics to reduce the need for manual and more disruptive solutions in the field. In a similar way to the developments of keyhole surgery in the health industry, we are looking at ways in which to undertake work in a way that minimises disruption, reduces waste and drives operational efficiency and a better customer experience (e.g. against the status quo requirement to excavate to get eyes on and work on our assets).

The next stage of development in this area is to continue to develop tethered robots which can work cost-effectively at scale for customers, and to move developments onto the potential for untethered robots which could sit in pipes all the time to undertake repairs or carry out data condition surveys as required. This could have a material impact on disruption and in the cost effectiveness of asset management.

As this technology is at the very early stages of maturity, benefits are likely to be aimed for RIIO-3 and beyond and hence we plan to utilise the Network Innovation Allowance for this innovation.

Driving performance through innovation and competition continued

2. Improving experience for all customers (especially customers in vulnerable situations)

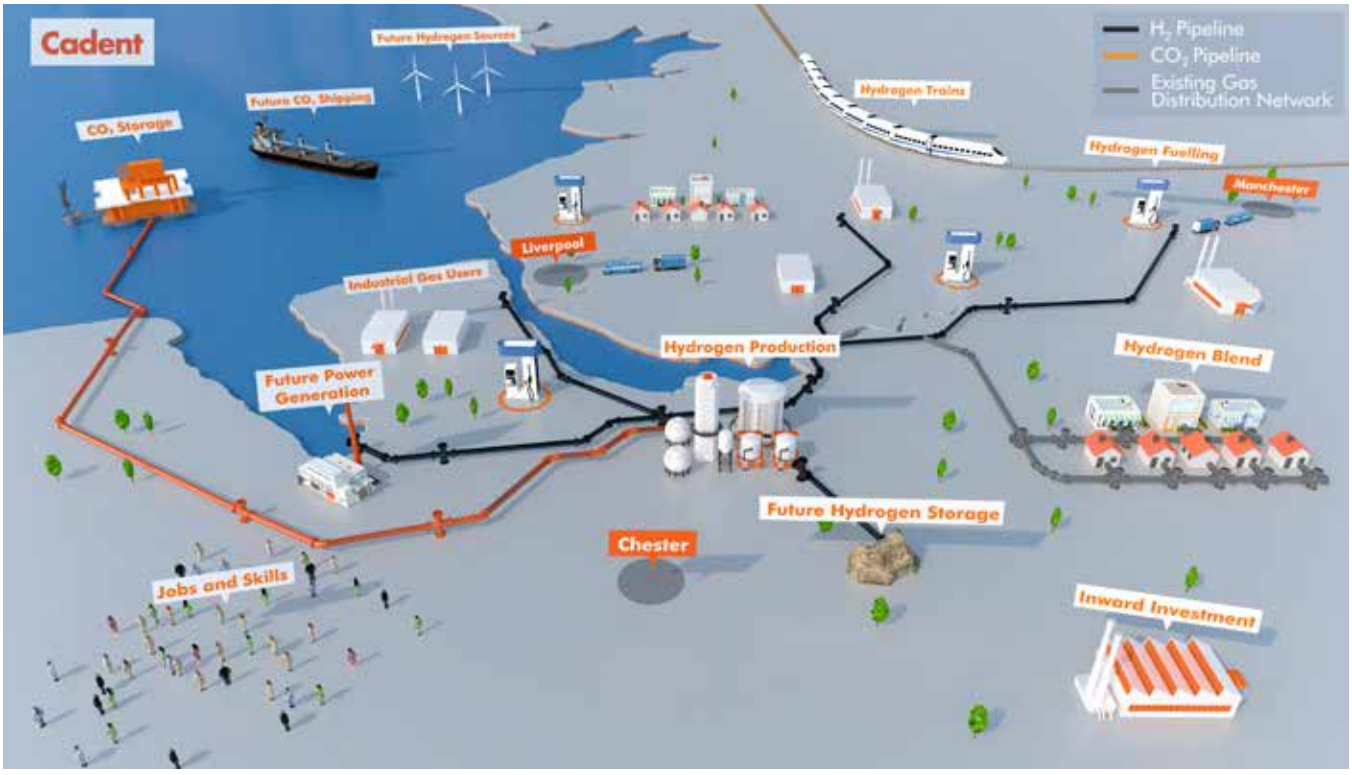
Delivering a quality experience to all our customers is one of the key outcomes of RIIO. Customer and society expectations continuously change and it is important to innovate, both in how experiences are created and delivered to customers, and also in ongoing engagement and analysis of the insight into customers' behaviours and motivations.

This theme will see us explore a number of key areas:

- Service improvements to our customers living in multi-occupancy buildings to deliver their energy needs in a reliable and safe way. For example, the creation and use of more live repair techniques to minimise the number of buildings isolated from the network.
- How we create the most inclusive and accessible services for all our customers, recognising there is no such thing as an average customer (in particular looking at the role digital technology can use to support customer segmentation analysis).
- Innovate to identify who will qualify for 'fuel poverty' and seek ways to support them by going beyond the gas connections to develop whole-house solutions.
- Better communication pre-work and during works (using technology to drive better solutions, visibility and interactivity).
- How we best innovate to improve services for customers in vulnerable situations.
  - Using the Priority Services Register ('PSR') to support the personalisation of services.
  - Implement technology to specific groups of vulnerable customers (e.g. those living with dementia or who are blind).
- Developing best practice ideas from other sectors (through our work with the Quality of Experience expert group).
- Use more channels to engage with customers.
- Provide a more efficient and customer-friendly quotation process.
- Invest in data security architecture to ensure customers' data is stored securely and to protect from cyber attacks.

This area will span business as usual continuous improvement, funded through totex allowances as well as work with other sectors through the Network Innovation Allowance.

HyNet: Delivering a blueprint for the UK hydrogen economy



3. Whole system approach

As set out by the Committee on Climate Change, it is critical that momentum is increased – action must be taken now and over the next decade. We are proposing to fund our plans predominantly through the use of the strategic innovation stimulus as this is a UK wide challenge that will extend well beyond RIIO-2. We plan to work in collaboration with other networks, regional bodies, customers and research and technology partners to support the energy system transition and whole system solutions.

As part of this we are currently partnering with the other gas networks on setting out the pathways to a decarbonised future through our work with Navigant, as described further in **Chapter 6, Net Zero and a whole system approach** and in **Appendix 07.04.00, Environmental Action Plan** We have set out some ambitious plans for demonstrating pathways to decarbonisation at scale in RIIO-2 and beyond, through our HyNet North West project. This project shows a way to decarbonise industry in the region. In parallel, our HyDeploy project looks at blending hydrogen to reduce emissions without any disruption to customers. Successful combination of these projects can deliver emissions reductions for domestic customers (please see our **improving the environment and tackling climate change output commitments and our Environmental Action Plan**).

This theme will also support innovation in creating the right commercial and operating framework for new and lower carbon resources, building on RIIO-1 projects such as the Future Billing Methodology.

In addition to these projects, we also intend to:

- Explore ways to support the Gas Pathways work to set out a clear route to Net Zero using the gas networks.
- Use of different and more detailed data collection and analytics to understand the impact of operating a more diverse gas system given the new resources being connected, such as biomethane, power generation and compressed natural gas filling stations.
- Develop new methods to facilitate the connection of new resources and to remove any perceived barriers to access to the networks.
- Develop new commercial and operating frameworks for a more distributed grid, hydrogen blending and hydrogen conversion.
- Support off grid communities wanting to connect to an increasingly low carbon gas supply (see **Appendix 07.04.09 Supporting off grid communities**).
- Establish improved demand and supply forecasting and modelling.
- Support public engagement based upon large scale trials of alternative low/zero carbon gases.

We expect to utilise different innovation stimulus areas for this theme, with some items included in our base totex plan, some proposals for work using the Network Innovation Allowance and the larger industry-wide work done through the Strategic Innovation Stimulus as well as utilising other funding from outside of the sector (such as the Carbon Capture and Utilisation competition).

We will continue to work with the ENA and the gas and electricity networks to develop a joint planning function to respond to climate change adaptation, whole system solutions and local area plans as discussed in **Chapter 6, Net Zero and a whole system approach**.

4. Carbon neutral operations

As well as innovating to support the wider UK challenges, we also need to innovate to reduce our own carbon footprint. Whilst we will continue to work hard to reduce the volume of gas that escapes from our pipes, we will not be able to reduce leaks to zero in RIIO-2. However, we can set an ambitious target to reduce the footprint of our other activities. We have set out a stretching goal for our business operations: to reduce leakage by 14% to 17% and become carbon neutral in our other operations by 2026 (please see **Our commitments, Section 7.4 of Chapter 7**). The major contributor to our own footprint is leakage from the remaining metallic pipes in our network. Whilst this is less than 0.5% of throughput, it is still our biggest contributor to emissions. We will continue to reduce this through the ongoing mains replacement programme and through our innovation projects to tackle leaks in more challenging areas (e.g. multi-occupancy buildings and road junctions).

In addition, we will look to innovate to support the reduction of our wider business carbon footprint by reducing waste and energy use from our operations (see **Chapter 7, Our commitments**). We plan to use innovation to investigate into (for example):

- Use of renewable energy to meet our operational needs
- Promoting the use of renewable gas to meet the needs of thermal plant
- Zero-emission vehicles for our First Call Operatives
- Reductions in business mileage emissions
- Zero avoidable waste to landfill (including diverting excavated soil)

We will fund this innovation activity through our business as usual activity.

Driving performance through innovation and competition continued

5. Influencing behaviours and enhanced engagement

This theme will build on our customer strategy and explore how changes to customer behaviour can support us in delivering the most effective services over the long term. This will build on the innovations that we have made in developing new ways to capture insight, and look at how we can influence customer behaviour to reduce costs to them and provide better service. For example, we saw the power of different communication methods to educate customers on what to do in the event of a frozen condensate boiler in the 'Beast from the East' cold snap in 2018. This enabled us to protect the emergency service for genuine emergency cases and enable customers to self-help to solve their supply problems within their properties.

We will explore the following areas:

- Where can we work with customers to reduce their costs or improve experience.
- How can we gather better customer insight.
- Improving our communication channels with our customers.
- Creation of new data interactions with customers' homes and appliances.
- New ways of engaging and enabling customers to understand what we do.
- Increasing engagement with consumers, industry and government to explain the challenges facing decarbonisation.
- Innovating to influence customer behaviours.
- 'Open data' so that there is two-way sharing of information to support transformational solutions to industry problems.

We are committed to train our frontline staff on identifying customers' needs and improving our service, particularly for those in vulnerable situations. This type of 'soft skill' development will help us broaden our view of customers and what they will value.

This area will span (business as usual) continuous improvement through our customer insight teams and operational teams.

8.6.2 What we plan to do – collaborate to best support our customer priorities

As outlined above, a key learning from RIIO-1 is the importance of partnership and collaboration to support the delivery of our five innovation themes, and so, our customer priorities. Effective engagement with our customers and stakeholders helps us develop ideas. Building our supply chain maturity helps us deliver them.

Although we have our innovation strategy to support delivery of our customers' priorities, we will continue to work closely with the other GDNs to collectively work to best serve the interest of all gas customers. We will share project selection and progress, collaborate on key projects, share best practice learning, and most importantly make the benefits the project delivers visible.

We anticipate the extent of the collaboration for individual projects will vary, dependent upon the level of challenge faced, the customer outcome, the industrial/supply chain capability and the maturity of the technology/idea (see **Appendix 08.00** for more details on our plans to collaborate).

8.6.3 How innovation should be funded – our proposal

We have made ambitious efficiency and output commitments in our plan and this is partly enabled by the innovations we have delivered in RIIO-1 through our Performance Excellence approach and the roll out of key projects such as our connections service transformation. Our Consumer Value Proposition (set out in **Chapter 7, Our commitments**) requires us to deliver on our innovation strategy to create outcomes well beyond minimum requirements and to develop whole system solutions during RIIO-2.

Innovation funded through business as usual totex

Our plan includes an overall continuous efficiency improvement of 0.94% p.a. over the RIIO-2 period and this will require us to continue to innovate to deliver this level of efficiency.

We are supportive of Ofgem's expectations that totex allowances are used to fund business as usual innovation work that pays back within the RIIO-2 period, and this forms part of our plan to achieve the cost efficiency set out in the **Chapter 9, Costs and efficiency**. We envisage the projects will address **regional** issues relating to our **customers or assets** and will use technology that already exists to drive process, cultural or commercial improvement. We will continue to collaborate with third parties to support these innovations and work with other individual distribution networks if they face similar challenges.

Community funding on innovation

We are earmarking a proportion of our community fund (Cadent Foundation) to support innovation within our communities. We will seek ideas to support regional growth and the local economy. We will look to support small start-up companies to innovate in the key themes set out in this chapter.

Innovation funded through Network Innovation Allowance

We recommend a 'use it or lose it' fund from the Network Innovation Allowance (NIA) to enable the delivery of our innovation themes and so the customer priorities.

We plan to use NIA funding when the innovation project delivers a return on investment that extends beyond the RIIO-2 period and if the technology/solution has not previously been used in the UK gas industry. Therefore, research and development will be required before the innovation can be used for our networks and customers.

Our proposal is that NIA spending is similar to RIIO-1 to reflect the critical UK priority to accelerate the process of decarbonisation and **energy system transition**, to support **customers in vulnerable situations** and to reduce **disruption** through the use of robotics.

We recommend using a NIA funding mechanism in these areas because:

- Our engagement clarifies that these areas are valued by our customers and also affects their willingness-to-pay.
- Financeability will be tighter in RIIO-2 and this will reduce our ability to self-fund projects that are not economical within the period RIIO-2.
- Low technical readiness projects deliver a slow return on investment and so may not be financeable (in light of the point above) without a separate funding mechanism.
- The supply chain may not respond positively to innovation projects if the funding mechanism is not seen as dependable for the duration of long lead time projects.

We believe an allowance for the length of RIIO-2 (as opposed to annual allowance) is the best approach to provide flexibility around project phasing. We also believe the 90%:10% funding split between NIA/company continues to be the right approach in these higher risk areas with limitations on the supply chain capability and relatively low technical readiness levels. The 10% funding by the company focuses activity on credible projects and drives interest internally and is also reflective of our customer feedback. Therefore, we believe this funding split has been shown to be effective during RIIO-1 and see no evidence to change it.

Table 08.03 below outlines the allowance type and, for NIA, the approximate amount of funding we are proposing, to deliver the benefits of the innovation themes. It should be recognised that the benefits will be shared across all the GDN customers and the costs may also be shared across the networks. We believe improved visibility and tracking of benefits and cost (through the Innovation Measurement Framework and business measures – see later in the chapter) is key in driving better transparency of outcomes for our customers. As mentioned earlier in this chapter we recognise the importance of spending customers' money wisely and so have not spent all the NIA allowance available in RIIO-1. We will enhance this discerning approach through careful and continuous cost-benefit analysis at key stages of project delivery for the remainder of RIIO-1 and throughout RIIO-2.

The funding calculation outlined in the table is based upon historical evidence from a representative sample of projects delivered in RIIO-1 to take them through each technical readiness level (i.e. research, development, field trial, market readiness). The split across each theme is reflective of the types of project we expect to deliver, recognising we will only request NIA funding for projects with a payback period that extends beyond RIIO-2 where the technology or solution is not currently available in the UK.

By the nature of innovation, we can only forecast the types of projects we expect to deliver because the political, economic and business climate will change, and similarly, the cost associated with projects is dependent upon the technical readiness level which is an unknown. Therefore, the costs below should be treated as indicative.

Table 08.03: Innovation funding

Innovation Theme	Key Benefit	Strategic Innovation stimulus (and outside sector)	NIA	BAU totex	NIA funding £
1. Improving experience for our customers (especially customers in vulnerable situations)	Create the most inclusive and accessible services to all our customers				
	Innovate to improve services for customers in vulnerable situations				
	Improved communication during works		✓	✓	£13m
	Improved data security				
2. Whole system approach	Demonstrate pathways to decarbonise at scale				
	Play a leading technological and commercial role by engaging and planning at a regional and national level	✓	✓	✓	£3m
	Enable the connection and operation of a broader range of gases				
3. Carbon neutral operations	Develop further solutions to reduce leakage from our assets				
	Use data to explore areas to reduce the carbon footprint of our day-to-day operation		*	✓	–
4. Protecting supply and safety and reducing disruption	Use robotics and automation to reduce the need for manual work and disruption in the field				
	Continue to improve our assets to enable them to transport decarbonised gases at a reasonable cost		✓	✓	£24m
	Enhance our asset data capture techniques				
5. Influencing behaviours and enhanced engagement	Develop new ways to capture customer insight				
	Help customers change their behaviour to reduce their costs		*	✓	–
	Explain challenges facing decarbonisation				
	Share data to help solve industrial problems				

* Possible areas for NIA funding during RIIO-2 if projects linked to customer priority themes are identified that meet NIA criteria.

Therefore, we are proposing an **NIA allowance of £40m** across Cadent with the split between networks shown in the table below.

Table 08.04: NIA funding allowance proposals

EoE	NW	Lon	WM	Cadent
£12m	£9m	£12m	£7m	£40m

This is based upon our current knowledge and a 'use it or lose it' criteria to implement the projects that support delivery of our innovation themes and customer priorities.

In addition to NIA and totex funding for innovation projects, we also look to utilise other sources of funding for research and development, where this is available. Examples of such funding include: supplier funding (where development of a solution may create a benefit that a third party is willing to invest in); local authority funding (for example, Transport for London's fund that Lane Rental receipts have generated, for projects that benefit the streetworks environment); and Innovate UK, the government scheme for R&D, innovation and collaboration.

Driving performance through innovation and competition continued

8.6.3.3 Strategic innovation stimulus

We are proposing to continue to use the strategic innovation stimulus funding (or a revised version for RIIO-2) for the larger UK wide challenge on tackling **climate change**. The scale of the challenge on decarbonising heat and transport will require some significant development work at a **national level**, in commercial and technical solutions, and also in the development of regional energy solutions. To keep the momentum going on these pathways, we would envisage a much more significant investment will be required than seen in RIIO-1 and more akin to the RIIO-1 Low Carbon Network incentive fund levels.

The funding mechanism should be capable of dealing with large asset-based projects (e.g. HyNet) funded over the life of the assets and should be flexible enough to fund additional streams such as local and central government (see **Appendix 07.04.00 Environmental Action Plan** for more details. We have also set out a timeline of how these projects may be developed in **Chapter 6 "Net Zero and a whole system approach"**).

As the funding mechanism has not been confirmed we have proposed uncertainty mechanisms to support this work.

8.6.4 How we plan to innovate in RIIO-2 – extending and developing our culture of innovation

To support the delivery of innovation themes and so our customer priorities, we have developed a simple improvement cycle that builds upon our Performance Excellence approach in RIIO-1 in creating a **culture of innovation**. The cycle is underpinned by best practice methodologies and is designed to broaden our innovation approach beyond the technical to behavioural and cultural.

Figure 08.04: Innovation improvement cycle

Understand how to improve our customers' experiences

Our business plan is based on customer engagement and our commitments in **Chapter 7** include ongoing customer engagement and measurement of our customers' and stakeholders' satisfaction. This feedback and insight will be a key enabler for us to take this first step in understanding what the focus areas for change and innovation ought to be. Further to this we want our employees to have the flexibility to drive improvements and we recognise the need to set the right environment and support to give employees the freedom to drive bottom-up change in our company.

Throughout RIIO-1 we have been working with external experts to apply a best practice approach known as **'perpetual experience'**. The perpetual experience 'toolkit' helps us understand customer behaviours and their experiences and understand the challenges facing our employees in delivering for customers.

We have tested this toolkit by working with our teams to map the customer journey of our connections service.

We are now rolling out this approach and have set some ambitious commitments for the RIIO-2 period (see **Chapter 7, Our commitments**).

This approach also underpins a number of our other output commitments, particularly in the outcome areas of **delivering a quality experience to all of our customers** and '**establishing and raising the bar for all of our customer and stakeholder experiences**' and **measuring and enhancing accessibility and inclusivity**.

Align the organisation and build capability to improve

As part of the broad cultural transformation ongoing across our business, and outlined more fully in **Chapter 9, Costs and efficiency**, we are creating an environment to enable a more **innovative and collaborative culture** throughout our organisation. We are bringing decision-making much closer to the customer which, together with a better understanding of our customers' experiences, helps teams identify new ways of delivering or improving outcomes. This will reduce the bureaucracy that can slow projects down and lead to a sense of frustration in our employees, as well as improve our agility.

To support this, and as discussed throughout this chapter, we recognise the importance of working across industry and different sectors. This requires us to continue to build strong **collaborative** relationships with our **supply chain and industrial and research partners,** aligning them to our organisation at both a national and regional level. (See the **section 8.6.2**).

We are therefore transforming our operating model, creating **'customer operations areas'** which are designed around the experience of our customers at a local level. These areas are naturally aligned to customer communities which will allow us to gain complete visibility and control over the work of our teams and also allow us to look closer at our assets.

At the heart of this customer-centric operating model are front-line engineers who will lead innovation, generate requirements and bring ideas to life, with **fast adoption and rapid deployment** of new techniques and technology with the support from our external partners.

In order to deliver the customer outcomes we require from this transformation, we recognise we need to make better use of the capability of our engineers, the teams they work in and the organisation as a whole, and build upon our RIIO-1 Performance Excellence programme thereby driving **continuous innovation** as part of our business as usual activity. **Appendix 08.00** provides more details about this approach.

For **disruptive innovation**, we will continue to develop our expertise internally and across our supply chain, to effectively manage low technical readiness projects and either see them through to implementation or close them if they are not viable, whilst ensuring learnings are shared internally (through our performance hub process) and externally (through the Smarter Networks Portal and the ENA Gas Innovation Governance Group).

One of our key areas of learning from RIIO-1 is to improve the speed and consistency of our deployment of innovations both working with our supply chain and within our organisation. To address this we are reviewing our innovation governance and aligning it to our Change Management Framework to identify where there are any blockers to timely deployment of proven innovations, as well as the testing process. Whilst safe deployment will continue to be our number one priority, we are gathering insight to identify the areas where we may be able to accelerate the process and we are working with the EIC to apply these processes in the supply chain. We see our revised operating model as key to this as it creates ownership at a local level.

Measure our performance

We will measure the performance of our innovation activity by directly tracking the **benefits** of individual projects and through the use of an innovation effectiveness measure ('**The Innovation Measurement Framework**').

Project benefits trackers

Although we have always created a cost benefit analysis for each of our projects, the Change Management Framework encourages the establishment of a project tracker with the benefits case to be reviewed throughout the project.

This enables us to continuously prioritise our resource across the project portfolio, balancing benefits versus risks versus speed of deployment. Should we find that the cost-benefit case reduces during the project or if the technology is not working as we envisaged, thereby increasing the risk, we can re-deploy our resource. Similarly, if we identify a low risk innovation that can quickly deliver benefits we can rapidly respond.

This approach therefore enables us to balance our portfolio and optimise the short and long-term benefits by looking at our projects together as a whole.

A key aspect of **continuous innovation** is that it predominantly involves our employees driving many small incremental improvements. The management focus is on providing support and encouragement rather than hindering activity with un-necessary governance, therefore we do not expect a project tracker for this type of activity.

At a regional level we want to leverage the move to a more depot-centric operating model to drive a competitive tension into the identification and deployment of innovation across our regions and within them. Greater comparative performance monitoring between regions and more stretching ambitions on **output delivery** will drive a real 'pull' for innovations from the regions. We are already seeing this through our four regional pilot depots where operational efficiency and customer satisfaction scores are improving at a rate higher than any other depots across our networks. Similarly, we are also seeing this with the pull for innovation at a network level to address operational issues (e.g. the use of CISBOT to support mains remediation in congested areas and Microstop and EZ Valve for repairs to high-rise buildings).

Overall innovation effectiveness – The Innovation Measurement Framework

Throughout RIIO-1 we have recognised that measuring the effectiveness of innovation across the business and the industry has remained a challenge. Through the EIC, we have supported a collaborative project with gas distribution networks to develop and test a new **IMF** as a common solution to this problem.

Figure 08.05: Innovation Measurement Framework

We have recently used the IMF to benchmark our innovation effectiveness with some insightful results. The details are in **Appendix 08.00**, and we have taken the learning and incorporated it into this business plan.

This initial benchmarking has highlighted some strengths, but more importantly some opportunities. Over the next few months we will develop a more detailed plan of action and use the IMF to help us focus our activity and improve our ways of working.

It should be recognised that the IMF is still in the early stages of deployment across the industry and we are early adopters of this approach. Therefore, there is still much to learn and we have identified some opportunities to improve the IMF itself, and so will work with the other energy businesses to develop a common approach to benchmarking.

Drive performance improvement and best practice

To help us drive improvements in performance and address shortfalls in our measures we are adopting an innovative model know as Commitment-based Management™ ('CbM'). CbM is driven by the quality and fulfilment of commitments made between 'performers' and their 'customers' and it can be applied within the organisation as well as where our operations connect directly with customers. It is focused on helping teams across our business make the right decisions with clear accountability on the delivery of improvement activity.

As mentioned above, our move to a more depot-centric operating model will look to leverage the improvement activity, and any resultant **best practice**. We are looking to support this by building on the annual innovation sharing showcases and provide additional best practice sharing methods to enable our regions to identify and share their ideas.

The move to a depot-centric model also breaks down the traditional barriers between corporate functions by providing the capability at a regional/depot level. This enables the **cross fertilisation of ideas** through an end-to-end process.

We are also setting up '**innovation laboratories**' to identify **proven innovation** that can be used to solve a particular customer or business issue. This involves inviting the suppliers to 'pitch' their solution to regional representatives and then working with the regions to develop and deploy a solution. This is already being tested with support from the EIC (see **Appendix 08.00 Case study - Leading the industry to support customers in vulnerable situations**).

At business level we will take the outcomes of the **Innovation Measurement Framework** and build them into our business as usual processes to ensure that we are delivering the **maximum benefit to our customers** through our innovation activity.

Driving performance through innovations and competition continued

8.7 Our competition plan

Our full competition plan is contained in Appendix 08.01 and is summarised in this chapter.

8.7.1 We have been longstanding advocates of competition

We have been proactive and at the forefront of using competition wherever it is feasible and beneficial. Our commitment to competition is borne out by the way we work hard to support the entry of new, competitive network companies to the gas market.

Competition runs through all that we do. We deliver value for our customers through rigorous, transparent and targeted contracting and procurement. We continually assess our contracting approach to ensure we can deliver best value for our customers.

When we are contacted by parties who want to connect to our network, we proactively direct them towards other connection providers. This has delivered tangible success – 90% of large housing developments and industrial and commercial connections are now provided by independent connection providers. Customers who want to connect to the gas network can already benefit from competition.

We are proud that we are the only GDN to offer the facility for competent third parties to undertake greater than seven bar ('>7 bar') pipeline design and construction activities (with us undertaking assurance activities during the design, construction and commissioning process). This has increased competition and the number of projects we have been able to connect to the higher pressure tier (see case study).

Facilitating third party design, build, ownership and operation for new connections (>7 bar)

Since 2012, we have seen a demand for biomethane injection into the gas grid. To facilitate competition and third party involvement, we have put in place an engagement framework with our customers pre and post connection. This creates an opportunity to share relevant connection information and ensure parties understand their operational obligations and compliance requirements.

Through this engagement with customers we recognised that they were interested in designing and building, as well as owning and operating the major elements of their connections. We moved from a model where we own and operate network connections, to a model where we only provide an assurance role to ensure the safety and technical proficiency on commissioning. This approach facilitates third-party market entry whilst maintaining network standards and ensures interoperability between all network assets.

8.7.2 We already have a mature approach to 'native competition'

Ofgem uses the term 'native competition' to refer to the home-grown initiatives that network companies take to run competitive processes to deliver projects.

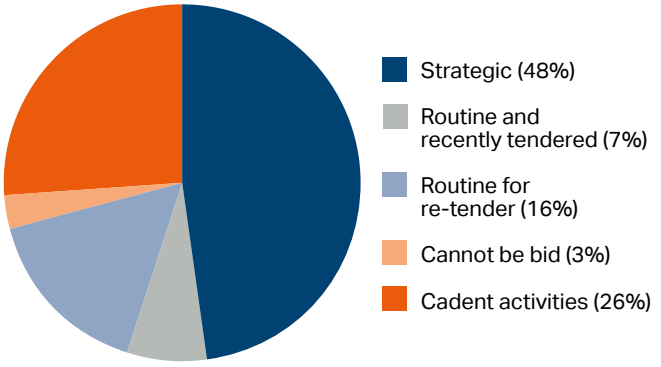
Our business relies on the services that we procure through competitive processes. We already procure the vast majority of our totex from competitive sources.

Our totex spend profile can be categorised as follows:

1. Large spend areas that have been subject to a business wide strategic review and tendering during RIIO-1 (48% of totex), e.g. mains replacement, IS.
2. Routine spend areas that have been subject to recent review and tendering (7% of totex).
3. Routine spend areas that will be subject to future review and re-tendering (16% of totex).
4. Activities which we are not planning to subject to tendering (26% of totex).
5. Fixed items that cannot be tendered (3% of totex).

In total, 71% of our totex spending is contracted out and sourced through competitive tendering. The remaining totex relates to fixed item spend that cannot be tendered (3%) or spend on activities that we conduct ourselves (26%). These activities include Emergency Response and Repair, the operation of our call centre, system control (the network control centre) and reactive maintenance.

Figure 08.06: Breakdown of our totex



We use the Official Journal of the European Union ('OJEU') to maximise transparency in our tendering. During financial year 2017/18 we ran a total of 139 tenders of which 43 were above the OJEU thresholds.

We are improving our already strong, established approach to procurement as we implement new IT systems. Our approach:

- Recognises the way that our supply chain can foster innovation, delivering value for our customers and underpinning our commitments.
- Establishes a 'Governance Gate Process' to make sure we make decisions at times that have the most material impact on results.
- Strengthens our alignment with customer needs.
- Ensures we gather data to inform future decisions.

We procure in line with Ofgem's best practice guide:

- We utilise competitive processes for the majority of our procurements and projects.
- We always aim for our competitive processes to be robust, transparent and to ensure the equal treatment of potential bidders. Information is provided equally to all parties.
- We protect the commercially sensitive information provided by our suppliers.
- We adopt a range of different procurement processes, proportionate to the value and time-sensitivity of the project or system need in question.
- Where relevant, we ask our suppliers to establish arrangements to manage any conflicts of interest.
- Whilst there will be instances where we are looking for suppliers who deploy a particular technical solution (for example, when we are looking for support to implement a particular IT software solution), as far as practicable, we are agnostic to technology and bidder type.
- We set high standards for our suppliers. When appropriate, we require our suppliers to prove further compliance around health and safety, quality, environmental capabilities and corporate social responsibility. We also expect our suppliers to adhere to a Supplier Code of Conduct. This Code spans: business ethics, health and safety, data protection, protecting the environment, resilience and business continuity, work and human rights, the use of community and supplier diversity, monitoring and reporting, and their subcontracting and supply chain. Our Supplier Code of Conduct, and the criteria that we use to select suppliers, address the wider interests of existing and future consumers.

We continue to look at best practice to ensure that we are challenging ourselves to think differently about how we apply this form of competition across our business. We are considering how we can further open up our activities and our business processes to encourage 'native competition' in all its forms and to deliver value for our customers. We are taking forward three initiatives, which are discussed further below:

- We are **unlocking markets** by removing barriers to entry to increase supplier competition.
- We are promoting **competition within**, delivering value through competition across our four network regions.
- We have considered **novel approaches to extend competition**.

8.7.3 Unlocking markets

We are opening up activities that are already outsourced, to facilitate greater levels of market competition. By thinking differently about how we procure, package and deliver our activities, we believe we can promote further competition by opening up new markets. This will deliver greater value for our customers (for example on mains replacement).

For example, we are seeking to strengthen our ability to utilise competition by re-orientating our contracting model. We have found that large multidisciplinary work packages limit the potential supplier pool to the larger Tier 1 construction companies, very few of whom are actively seeking work on gas distribution networks.

We want a larger pool of available contractors for this work. We plan to transition towards a model where smaller, geographically defined work packages allow for a broader range of partners, including more localised specialist contractors.

By being able to draw on a wider range of suppliers, we expect to be able to secure greater savings for our customers through the competitive process.

We will need to increase our internal capability to manage the greater number of smaller delivery partners but we anticipate that the savings from this approach will outweigh the costs. We have built cost savings into our efficiency forecasts because of this revised approach. We have trialled the new approach through our Construction Services North West initiative.

We have also included proposals in our Plan for the way we will encourage greater competition in entry and exit markets. To enable this, we will be undertaking a charging and access review to explore how capacity for new renewable resources can be facilitated in the most economical way and considering the best apportionment of costs. This includes supporting new entrants to the market as they input their ideas and innovations on entry enablement. (see **Chapter 7, Our commitments** and our **Environmental Action Plan**).

8.7.4 Competition within

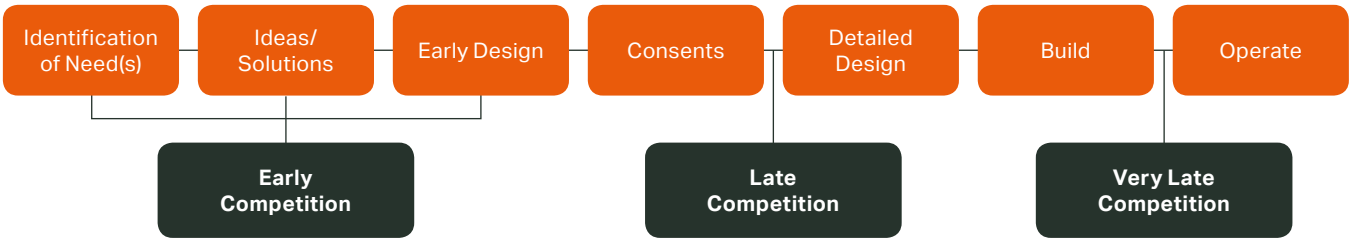
We aim to enhance internal competitive tension by utilising the diversity of our four network regions. As we discovered from our review of best practice, creating competitive tension within a business can result in new innovations, technologies and ways of working. Examples of this philosophy include our move to a depot-centric operating model. Given our unique position as an owner of four gas distribution networks, and with the right performance framework in place, this will deliver significant value to customers whilst also making our business a great place to work.

8.7.5 Extending the scope of competition

Drawing on the success of introducing competition in other markets, Ofgem has asked us, along with all network companies, to consider in our Business Plan how extending the role of competition , where appropriate to do so, could provide better value for our customers. Ofgem defines two forms of competition – 'late competition' and 'early competition'.

Driving performance through innovation and competition continued

Figure 08.07: Ofgem's perspective on 'early' and 'late' competition



We have used Ofgem's criteria for 'late' and 'early' competition to help to categorise the activities in our Business Plan and consider the scope to use 'late' and 'early' competition. Ofgem has proposed the following criteria to help identify projects that might be procured and/or delivered through these processes:

Table 08.05: Ofgem criteria for early and late competition

Late competition	Early competition
High value – the expected capital expenditure of a project which is over £100m.	**High value** – the expected capital expenditure of a project which is over £50m.
New – the project involves a new asset or the complete replacement of an existing asset.	**Contestable** – there is the potential for alternative solutions to the activity of service.
Separable – the boundaries of ownership between the assets and other (existing) assets can be clearly delineated.	

We consider that the strict application of Ofgem's criteria may limit the candidates for competion. In particular, there are lower value projects and activities that could be candidates for further competition. Therefore, we extended Ofgem's criteria. These extended criteria are set out below.

Table 08.06: Our extended competition assessment criteria

Criteria	Description
Value	Exceeds £100m (in the case of 'late' competition) or £50m (for 'early' competition). In the case of 'extended-native' competition, we have considered projects and activities with a value that is less than £50m.
New, separable and therefore contestable	Assets do not form part of the integrated network and are new network assets. There is a reasonable alternative solution to the system need and the market is sufficiently deep to facilitate meaningful competition.
Certain need	If the system need is uncertain, the value of competition may not be realised.
Not time critical	If the need is urgent, competition may delay the solution, therefore reducing customer benefits.
Safe for our customers	We look for opportunities where third party involvement would not increase the risk to customer safety.
Non-business critical	We seek to apply competition in situations that would not result in unacceptable risks or liability.
Legislation	We ensure there are no legislative barriers (including network code and licence requirements) that would prevent us from outsourcing the project or activity.
Expected benefits outweigh costs	We look for opportunities where the costs of running the competition are lower than the expected benefits.

We applied our competition assessment criteria to our full Business Plan. We did this to explore opportunities to aspects of **early and late competition** to deliver value for our customers. As part of this exercise we also identified potential opportunities to further extend our use of native competition across our business. We defined these as opportunities for **'extended-native' competition**.

Our opportunities for 'late competition'

As we move into RIIO-2 there is the potential for a number of exciting projects aimed at demonstrating decarbonisation at scale, with a specific focus on hydrogen. Of the projects we have set out in our Plan, we have only one where the capital expenditure is likely to exceed £100m – the HyNet project.

The HyNet project is being progressed by a consortium made up of a number of parties and each party is progressing their part of the solution. This project is at an early stage and, working with our partners, we are currently exploring funding mechanisms for the various parts, including Carbon Capture and Storage in the Mersey bay and for the detailed design. We believe that the hydrogen pipeline element of the project could cost in the region of £200m.

We applied our competition assessment criteria to the HyNet project and conclude that it is likely to be a good candidate for late competition. We are already committed to exploring market solutions for this project and will continue to actively consider the best use of competition. We have committed to report on our progress with the project, especially our use of competitive delivery, as part of our Annual Competition Progress Report (see **Appendix 08.01**).

Our opportunities for 'early competition'

Our work takes place on an integrated network. With the exception of HyNet, we have been unable to identify projects that are of a significant cost and meet Ofgem's eligibility criteria.

For example, the most significant area of spend in gas distribution is the Mains Replacement Programme. However, this work consists of thousands of individual projects that fit within a wider integrated programme. This work is already subject to 'native competition' – the vast majority is delivered by our engineering partners.

Whilst there are a number of projects and activities that meet the value threshold for early competition, these projects are not readily contestable. For example:

- Although our HS2 diversion and Lower Thames Crossing work is the right size to pass Ofgem's thresholds, these projects are paid for by third parties, who have appointed us to undertake the work.
- The cost of the London Medium Pressure project is substantially below Ofgem's £50m threshold and is hard to separate from other repex activities.

Our opportunities for 'extended-native competition'

We continue to challenge ourselves to identify opportunities to further introduce competition. We relaxed the Ofgem value criteria for late and early competition. This opened up a wider set of projects which we assessed against our criteria.

We have identified three candidates for extended-native competition which we plan to explore further through RIIO-2. The three projects or activities we have identified are:

Table 08.07: Opportunities for extended native competition

Area	Description
Metering services associated with assessment of Flow Weighted Average Calorific Value ('FWAC')	We think there are likely to be a number of organisations who can offer these services, which may help to secure savings for customers.
Activities associated with assessing and maintaining Civil Structures	We think it worth exploring whether the maintenance and upkeep of these assets could be undertaken through a contracting arrangement. There might also be an opportunity for a new owner and operator to repurpose the assets that are no longer needed to support our gas network assets.
National Security Interventions	We want to explore whether a third party could provide these interventions and services in an innovative way and also offer these services regionally or even nationally, to groups of network owners, resulting in economies of scale for all network customers.

For each of these projects and activities we propose to initiate an initial market test to explore market demand. The precise approach we take will depend on the characteristics of the project. Some may require consideration of licence and Uniform Network Code obligations. However, conceptually, our approach could take the following steps:

Figure 08.08: Our high level approach to market testing

8.7.6 Keeping our stakeholders informed of our progress

We will keep our stakeholders informed about our progress against our competition plan throughout RIIO-2. We propose to do this through an **Annual Competition Progress Report**. This report will summarise three key elements of our activity:

- Progress against our competition plan over the past year
- Milestones reached and lessons learned
- Planned competitive activities for the following year

Our competition report will include an update on our role developing the HyNet project, our progress in market testing exercises, and a summary of our wider native competition activities.

We provide further detail on our competition strategy and competition plan in **Appendix 08.01**.

9 Costs and efficiency

This chapter provides information on the cost forecasts that underpin our Plan. We explain the drivers of our costs, clarify and justify our assumptions on efficiency, explaining how we have ensured our Plan is ambitious and efficient. We explain how we have factored in the Energy Networks Association core scenario, summarise the trends in and justification of our costs and explain how we have optimised our Plan to manage significant workload and cost pressures.

This chapter has the following structure:

Key messages

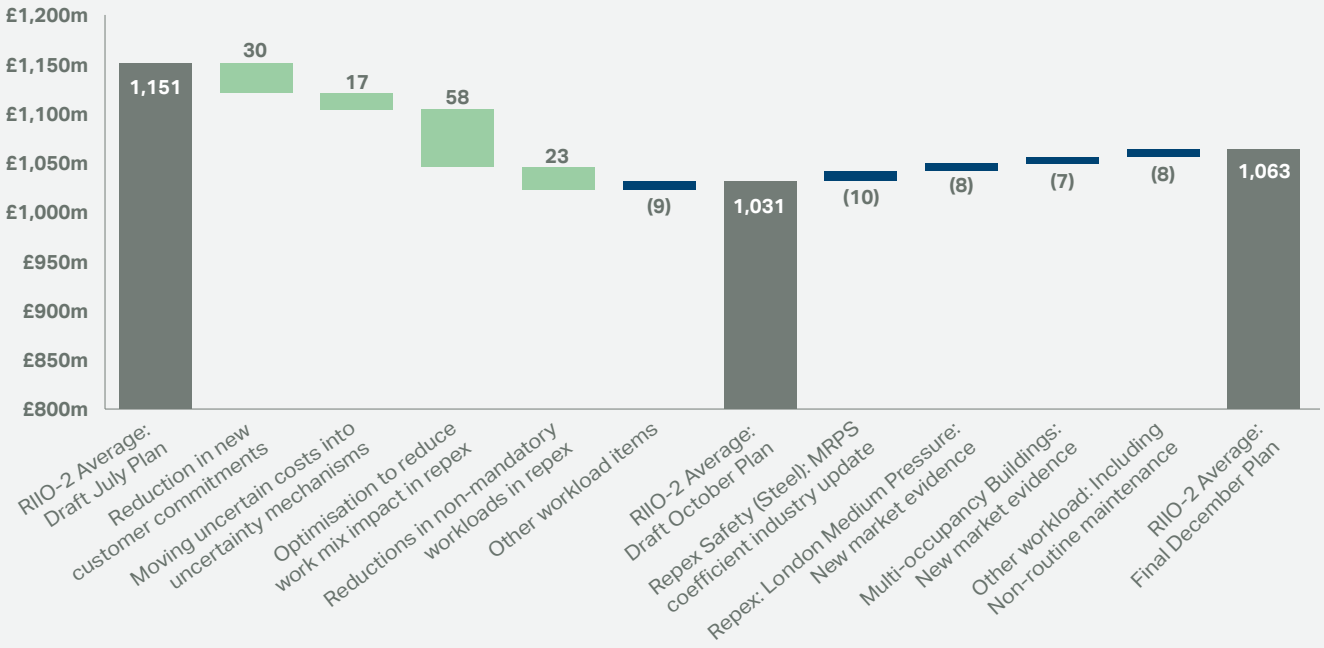
- We are forecasting investment of £3,146m in RIIO-2. £2,392m of this is on replacement activities mainly driven by our Iron Mains Risk Reduction programme.
- We have worked hard to optimise our Plan ensuring we mitigate and offset significant upwards workload and cost pressures, by focusing on totex solutions and challenging our non-mandatory work volumes.
- We have instigated a transformation programme that will deliver a step-change in our cost performance over the rest of RIIO-1 and into RIIO-2. We have closed the efficiency gap by £29m in 18/19 and are well on our way to delivering further progress by 20/21. This significant efficiency programme reduces our proposed cost projections by £92m p.a. against our RIIO-1 average totex.
- Our standalone RIIO-2 efficiencies represent a 0.94% p.a. ongoing efficiency, ahead of Bank of England estimates of total factor productivity and the RIIO-1 benchmarks. By the end of RIIO-2 this equates to a £43m reduction (4.6%) on our underlying annual totex spend.
- We have benchmarked our Plans against industry costs and other external costs and our planned totex is 2.2% lower than the forecast upper quartile efficient level over the RIIO-2 period, addressing our historic performance gap.
- Our average annual totex in RIIO-2 is 1% or £6m lower than RIIO-1, as our efficiencies more than offset other workload and cost pressures.
- We have built our Plan around the industry core scenario. Alternative scenarios have a limited impact on our operations due to our legislative requirements to operate a safe network. Where we have optionality on economically justified workload, we have applied a high hurdle rate to ensure our investment plan is 'no regrets'.
- We are confident that our Plan is stretching and ambitious and presents great value for all of our customers.

Costs and efficiency

Changes in our totex plan between July and December

We have been through a thorough review process to refine our totex forecasts over the last six months, ahead of our December Plan submission. This has resulted in a significant reduction in our investment spend as we have completed analysis on our replacement expenditure, updated our capital programme and have completed our Cost Benefit Analysis and asset health modelling in line with the sensitivities we had previously outlined. The changes in our average totex between plans are detailed in Figure 09.01 below:

Figure 09.01: Cadent RIIO-2 average annual totex – key movements between our July, October and December 2019 plans



The increase between October and December is driven by two areas. First, we have completed an industry audit on the risk scores allocated to steel mains which has increased individual pipe's risk scores and increased our workload by 17km p.a. This is in line with our previous approach and simply updates the final risk scores; Secondly, we have updated costs where we have sought market evidence or detailed design to provide high confidence costs. This includes updating our London Medium Pressure cost estimates, on the back of completing conceptual design that highlights the specific engineering challenges of the proposed work. We had also initiated a tender process to support the cost estimates for our MOBs fault repair programme and have reflected the initial bids in our pricing for this work. This leaves a reduction of £88m p.a. against our July draft with totex circa 1% lower than RIIO-1.

9.1 Affordability at the heart of our plan

Our plan sets out our toughest ever efficiency challenge, recognising that our overall cost performance is a key component of setting standards that customers love. Our transformational Plan will **deliver £155m of efficiencies over the RIIO-2 period with an average annual efficiency of 0.94% p.a.** in RIIO-2; this is significantly higher than average UK productivity (e.g. Bank of England forecast Total Factor Productivity of 0.3% p.a. to Q1 2022) which places us ahead of the identified upper quartile efficient level, a clear marker of the challenge we have set for ourselves. To further illustrate the scale of our ambition, if we compare our Plan totex forecasts to the cost of service we started with at the creation of Cadent in 2017, we are committing to deliver over £505m of savings, reducing our average annual costs by £101m p.a. (circa 10%). This should take us to the frontier benchmark through challenging decades of custom and practice, building a new and dynamic culture within our business.

9.1.1 Our transformation journey

In 2016 our CEO initiated a strategic project to assess the extent to which our current operating model was limiting our ability to deliver the same performance and efficiency levels as other GDNs. Over several months, we spent time with the other GDNs and other utility companies and organisations with large field force operations and/or a high degree of workforce planning requirements. This extensive piece of benchmarking work identified three key themes where our operating model was hindering our ability to compete on costs and service:

1. Our operating scale was significantly larger than more successful organisations. **Our highly centralised model had built a level of complexity that others had mitigated** by creating much smaller, more local operating depots. This complexity blurred accountability and moved Decision-making away from those closest to our customers. In effect we were experiencing diseconomies of scale.

2. **There was a gap between our strategy and operational plans.** Whilst our strategy was developed at an organisational level, our process-centric operating model meant that operating plans were typically developed at a process level, for example, separate plans for emergency, connections and planned work. This approach, whilst allowing us to effectively document and focus on specific customer journeys, created significant inefficiencies as resources were generally allocated to a single process – even when carrying out very similar activities such as resource planning.

3. Our **salary structures were higher** and our terms and conditions were less flexible than other GDNs and most similar organisations. Whilst all GDNs started with the same terms and conditions following the process to sell four of National Grid's distribution networks, others had tackled this sooner.

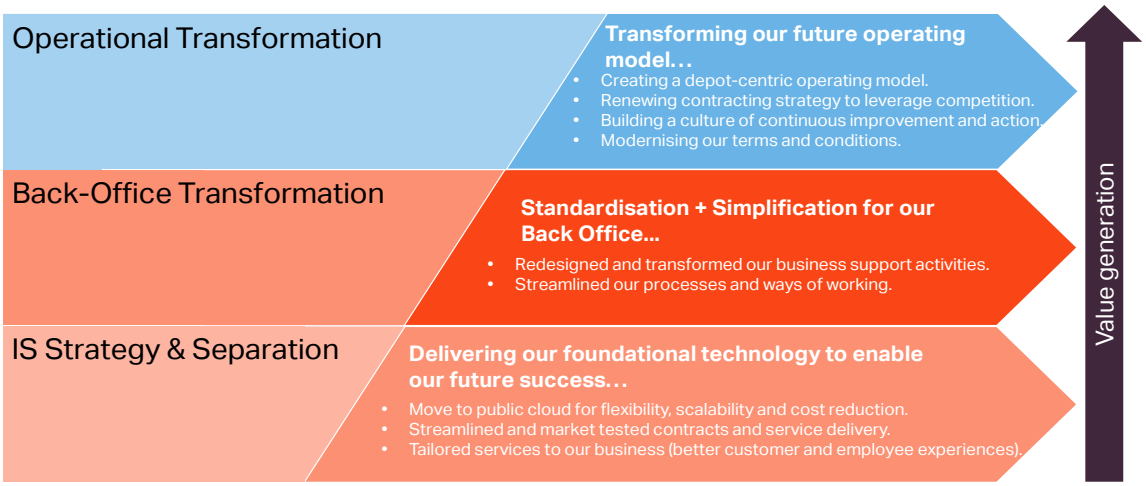
Costs and efficiency continued

Shortly after the strategic project finished, National Grid confirmed its intention to sell the remaining four gas distribution networks, causing us to put these changes on hold as we established ourselves as a stand-alone entity. The process took over two years to complete, but we are now progressing our business transformation at pace, building on the themes identified pre-sale and also leveraging further opportunities that the separation from National Grid has presented – for example, we are developing our own IT strategy, moving away from a traditional onshore physical environment to secure virtual infrastructure solutions based on a cloud-based approach with software as a service.

9.1.2 Delivering transformed experiences

The key components of our transformation programme are shown in the figure below:

Figure 09.02: Our transformation journey during RIIO-1



Our business transformation will see us shift from a highly centralised process-centric operating model into a more regionally aligned model creating much simpler operating areas, clearer lines of accountability and much closer proximity to customers and assets. It will facilitate a more geographically aligned stakeholder engagement process and build on the learning of two recent success stories where we have trialled a more regional approach. The first of these transformed our complaints handling process, which has helped us to shift our performance from the back of the GDN pack to near the front, whilst saving c.£700k in opex a year. We have also established regional Revenue Officers, working with local teams to ensure that claims related to damages to our assets are processed efficiently and effectively. This led to a significant decrease in missed revenue.

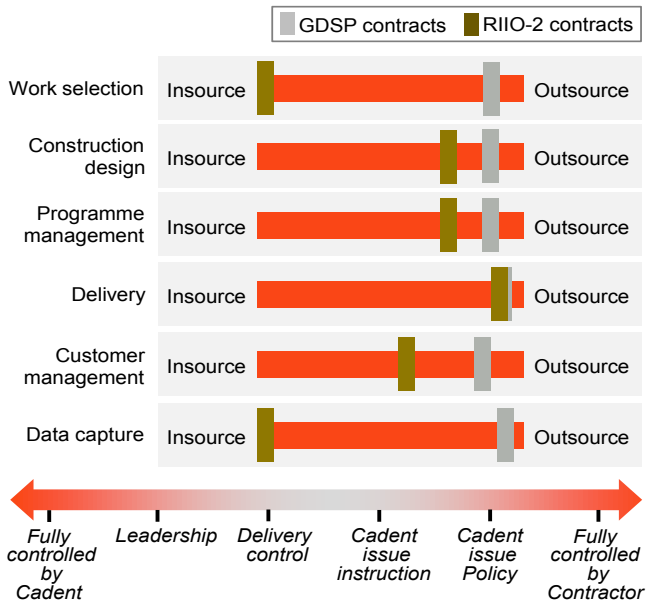
In early 2019 we embarked on four pilot studies, involving one depot in each network. These have tested different aspects of the transformation ranging from how connections work is delivered, to creating a single replacement delivery team. In each case, lessons have been and continue to be learned. In May 2019 we completed the appointment of four Network Director roles implementing the high level realignment into a network model under a newly appointed Chief Operating Officer (COO). Our Transformation Programme remains on track to complete the teams' realignment under the new Network Directors. We are moving asset-related decisions into the Networks and creating a much closer link between workload planning and delivery. This will be completed by early 2020.

The key components of our transformation programme are described in more detail below:

Operational transformation:

- **Creating a depot-centric operating model:** We have learnt that our scale can sometimes hinder our performance. In the past, we have centralised Decision-making and accountability for customers. This has created a separation from the customers we are trying to serve. As a result we have not been able to respond fast enough in a world where our customers expect more and where their needs are dynamic.
- **Renewing our contracting strategy to leverage competition:** Another critical part of our programme is our contracting approach. We have two large strategic partners – with Balfour Beatty in the West, and tRIIO in the East who are responsible for delivering our mains replacement programme. Whilst these contracts benefit from scale and flexibility and have driven significant cost efficiencies for customers, they have not delivered the customer service standards we require in RIIO-1. As we move into RIIO-2 we are looking to move to a more localised approach and to explore the Tier 2 contracting market, opening up our works to more providers and increasing competition in the market. We are already testing this with our construction management model in the North West. This is trialling a new way of working, allowing us to market-test the work as well as test both our (and our contractors') capability to deliver in this way. The diagram below shows how we are evolving our Gas Distribution Strategic Partners ('GDSP') contracts to ensure the skills and accountabilities are better balanced.

Figure 09.03: Our updated contracting strategy



- **Building a culture of continuous improvement and action:** We have invested heavily in our ability to deliver continuous improvement and this remains a key enabler in delivering increased levels of performance in RIIO-1 and RIIO-2. By developing an action-orientated, customer-focused, continuous improvement culture, with innovation and a competitive pull for new ideas, we will permanently transform our culture and in turn our performance. Without this cultural shift our strategy will not deliver what we want in the long term and so creating this environment, where our people can thrive, is critical. We describe our approach to innovation in **Chapter 8**.

- **Modernising our terms and conditions:** We have been reviewing our terms and conditions to ensure they are representative of the market and critically align with delivery of great customer outcomes. For example, we recently introduced new terms and conditions which are much more aligned with market median pay. We used several industry and non-industry, specific pay and reward benchmarks to baseline these against and agreed their implementation from October 2018. This, in addition to a commitment to a zero management pay increase in 2019, are amongst the initiatives to address the third core finding from the benchmarking review we completed in 2016.

In focus – A depot-centric model

We have set about transforming our operating model designed around the customer experience. To enable this, we have set out to create 'Customer Operations Areas', naturally aligned to Customer communities (e.g. Leicester, Stoke-on-Trent). The local team will be accountable for all customer outcomes, they will be engaged in our asset investment process and have full visibility and control over their workloads. The model will incorporate a modern, technology-enabled direct labour organisation, which matches market levels of costs and productivity. This will also allow us to integrate with locally based, and more agile, contractors.

We have also recognised that to support fast and effective local decision-making, we need to reset the leadership model from a historically hierarchical, command-control model to a commitment/promise-based approach, supporting entrepreneurial attributes in our engineers and local leaders.

We will also decentralise and geographically align core business support capabilities to enable decision-making close to the customer, including planning, work management, commercial controls and complaints management. The model will enable new ways of working and delivery methods with the fast adoption of new technology and local teams leading input to innovation.

Back-office transformation:

- **Creating a back office that is tailored to our needs:** We have taken the opportunity to redesign and transform our back office. As part of the National Grid shared services model we were subject to a 'one size fits no one' approach which caused many frustrations and delays for us. We have focused on streamlining our processes and ways of working to ensure we deliver the best outcomes for gas distribution customers.

IS strategy and separation:

- **A clear IS strategy:** IS is a key component of our operations and given our scale is a significant driver of costs. As we move off legacy National Grid systems, our IS function is a key enabler of what we want to achieve now and into the future. We need to become more efficient in the way we deliver IS. We have streamlined and market tested contracts and service delivery and used the transition to define tailored services to our business with a move to the latest cloud-based technology.

As we have described in the previous section, we have built our transformation plans and efficiency forecasts from the bottom-up, based on a number of external benchmarks and insights.

9.2 Benchmarking our plan

We have undertaken a thorough process to establish the efficient benchmark for the industry which, when combined with our ambitious efficiency plans, gives us confidence we are proposing a stretching plan for our customers. We have done this in four steps:

- Established current upper quartile performance
- Assessed ongoing efficiency
- Defined our efficiency ambition
- Tested how we compare to the upper quartile

The remainder of this section summarises our assessment; further details are provided in **Appendix 09.20 Resolving our benchmark performance gap**.

9.2.1 Establishing current upper quartile performance

We have considered a range of alternative cost benchmarking sources, including:

- **International gas distribution benchmarking:** Previously, Ofgem and GDNs have looked into the possibility of benchmarking outside the United Kingdom but found it very difficult to make valid comparisons due to differences in legislation, age of pipe, iron mains population, exchange rates and level of separation between supply, metering, transmission and distribution. We have reviewed external assessments of Phoenix Natural Gas and Firmus Energy in Northern Ireland and the eight GDNs[1]. In 2017 The Utility Regulator used this benchmarking to find that GB GDNs were significantly more efficient than the Northern Irish equivalents[2].

- **Other external benchmarks:** Ofgem have completed external benchmarking of Business Support costs by asking Hackett Group to use their database to compare energy utilities to other comparable industries. This revealed that the GDNs compared favourably and we have all since reduced Business Support Opex by 16%. This would indicate that GDN support costs are efficient when compared with other industries.

  As part of our RIIO-2 planning we have also tried to assess our current performance against other industries for our business support, repex and connections. This has highlighted the difficulty of normalising across industries and data sets, and we have found it difficult to trust the results of the work, even where it shows our activities as leading on efficiency. This demonstrates the difficulty of using external benchmarks for econometric modelling. However we have successfully used external benchmarking across a range of activities such as reviewing our operating model, our customer strategy and new IS infrastructure post-separation.

In developing our cost performance forecasts we have looked at our position in relation to competitors in the UK. To do this, we have evolved the RIIO-1 benchmarking methodology.

We have supported Ofgem through the Cost Assessment Working Group ('CAWG') process. Our analysis concluded that regression is the best technique, but that application of this technique suffers from the fact that the sector involves only eight data points from three network ownership groups. We also conclude that the mixture of both scale and workload drivers, as identified and used in RIIO-1, best meet Ofgem's criteria for models.

1 Deloitte, Annex 4 – GD17 Efficiency Advice, Final Report 11 March 2016.
2 Utility Regulator, Annex 5, Indicative Findings from Top Down benchmarking, GD17, paragraph 4.9.

Costs and efficiency continued

We have thus developed the RIIO-1 disaggregated (bottom-up) and aggregated (top-down) models and taken the following steps:

- We made pre-model normalisations for regional factors. We updated the RIIO-1 two-way regional factor for pay and have also updated for other one-way factors which we have re-evidenced; these are set out in full in **Appendix 09.21 Cadent's regional factors**. These include a number of specific external factors, the majority of which impact costs in our London network (c.£44m p.a., 17%), as well as our East of England network (which includes the Tottenham area) whilst keeping the RIIO-1 regional factors for other gas distribution networks. We have corroborated our London factors by taking part in a joint project with other London network operators, led by NERA and Arcadis, to identify common London factors across water, electricity and gas networks.
- On the disaggregated cost models, we have identified some improved drivers and updated driver coefficients based on engineering and business insight and model fit. However, we think there are limitations to the use of such models as some of the bottom-up models perform poorly from a statistical perspective (r-squared values are typically below 0.7). Across the GDNs, differences in organisational structure, cost allocation, capitalisation policy and solution choices (opex vs capex trade-offs) make it difficult to use bottom-up benchmarking approaches exclusively.
- We have used these new disaggregated models to refresh the totex model, including changing coefficient weights for the current industry proportion of totex for each of the elements. This produces a good model fit, with an r-squared value of over 0.98.

Following Ofgem's consultation on RIIO-2 cost assessment tools, we have also tested the alternative scale-based composite variables put forward. We observed in our response that these have a worse model fit, with three outliers and they do not address known asset differences between networks.

This analysis allowed us to update the aggregated totex model and identified that the 2017/18 performance gap was £50m. However, the disaggregated, bottom-up, view of the efficiency gap was 58% higher than the aggregated, top-down, view – highlighting that it would be wrong to attach undue confidence to a particular approach. Given the known inconsistencies in individual disaggregated cost models and the resultant poor model fits, we conclude that the top-down model should have more weight and so we have derived our assessment of the current performance gap by giving 67% weight to the top-down model. The results identified that our 2017/18 performance gap efficient UQ network level was £60m (6%) p.a.

We have now run the models on the 2018/19 outturns, which has confirmed that we are on track to remove the performance gap by 2020/21, with the gap now down to 3.2% as illustrated in Table 09.01.

Table 09.01: Cadent 2018/19 efficiency gaps

£m p.a.	2017/18	2018/19
Totex (top-down) gap	50	24
Bottom-up gap	79	44
Weighted average gap*	**60**	**31**
Gap as % of totex	6.0%	3.2%

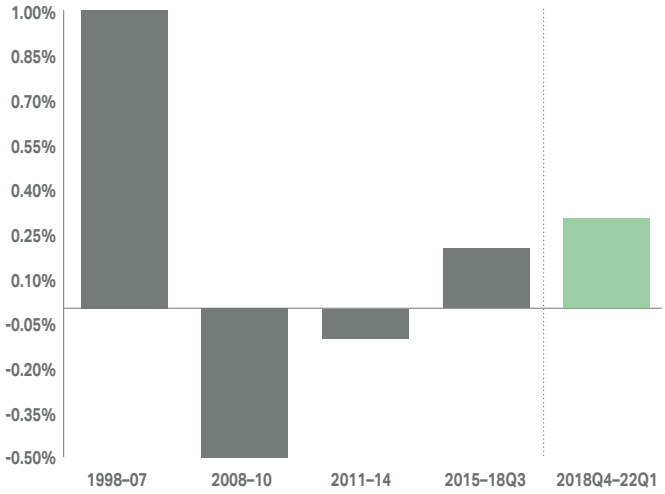
* Given better totex regression fit, using 67% totex, 33% bottom-up weights.

By network, we find that our West Midlands network is on the UQ efficient level, but our other three networks are 3.2% to 4.2% off the pace.

9.2.2 Assessing ongoing efficiency

In order to construct our RIIO-2 Plan, including the provision of an external benchmark against which to compare our forecasts, we wanted an external view about the pace of future productivity improvements. We therefore commissioned a report from First Economics through the ENA that we have submitted alongside our business plan.

Figure 09.04: UK total factor productivity growth



Source: BoE February 2019 Inflation Report

To summarise, the report sets out that productivity growth has been far weaker in the 12 years since 2007 than beforehand as shown in Figure 09.04. Although no one knows how the speed and extent to which productivity growth will improve, authoritative opinion from the OBR and Bank of England would suggest that the most likely outcome is only a small further recovery until 2022 at the earliest.

We have also reviewed Ofwat's Draft Determination of 1.5% p.a. ongoing efficiencies which flows from the combined assessment of long-term historic EU-Klems based assessment of Total Factor Productivity and the opportunity that PR19 might give due to the relatively new totex and outcomes based regimes. We note that the majority of water companies, including some of the fast-tracked companies, are contesting Ofwat's view of the scope for ongoing efficiencies.

In addition to these areas we also considered the potential for innovation to materially shift the efficiency frontier. During RIIO-1 we have used the Innovation incentive mechanism to research new robotic techniques, such as CISBOT. Although the technical development has been successful, and it clearly has benefits on the outcomes we are able to deliver for customers, the low volume of this technology has not materially shifted the efficiency frontier. We have included innovation benefits delivered in RIIO-1 in our cost forecasts and also included forecast benefits in RIIO-2, but these are not material enough to alter our view of sector average productivity.

We consider that a fair central assumption for RIIO-2 period must be below the RIIO-1 assessment and we have thus taken a mid-point of an average 0.53% p.a., equivalent to an eight year ongoing efficiency challenge of 3.4% through to the end of RIIO-2.

9.2.3 Our efficiency ambition

Our ongoing efficiency assumptions are detailed in Figure 09.05. This projection is based on our starting year of 17/18 and assumes flat workload to isolate the efficiencies we are committing to within our RIIO-2 Plan.

Building on our ongoing transformation programme we have assessed further opportunities, including:

- Further efficiencies in operating costs from realising the full benefits of local management accountability, including more flexibility of the workforce to balance more efficiently the different demands.
- Contracting best practice: where changing the contract structures and capturing native competition from our move to local management will drive replacement and capital efficiencies. The level of cost efficiency is however dampened by market price pressures that are protected from our current contracting arrangements.

- Benefits from identifying new best practice, not just from within the industry.
- RIIO-1 innovation.
- A level of unknown efficiencies that will be delivered though future innovation or other, as yet unidentified, improvements.

Overall, in eight years from 2017/18 we are seeking a 11.3% improvement which will reduce our cost base, excluding changes in workload/outputs, by £505m over the RIIO-2 period, with 70% of the savings targeted for delivery before the start of RIIO-2 in order to close the performance gap.

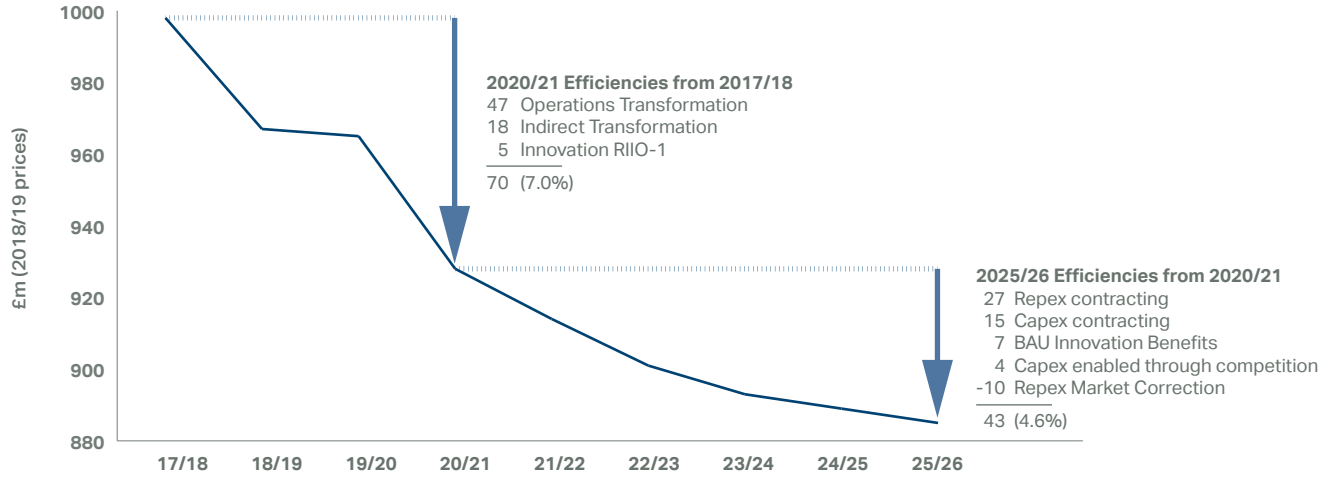
Over the RIIO-2 period we are seeking a 4.6% (0.94% p.a.) cost efficiency improvement, this is above the current UK level of 0.3% p.a. and our assessment of the benchmark for ongoing efficiency improvement of 0.53% p.a.

Table 09.02: Totex efficiency opportunities to 2025/26

17/18 to 25/26		RIIO-2 Period	
8 Year	p.a.	5 Year	p.a.
11.3%	1.5%	4.6%	0.94%

In addition to these ongoing efficiencies our Plan also includes additional output efficiencies where we have committed to deliver new customer commitments at no extra cost to our customers. This provides additional stretch and is the equivalent to delivering **an additional 0.1% annual efficiency** each year in RIIO-2.

Figure 09.05: Totex efficiency forecasts from 2017/18 (flat workload, 2018/19 constant prices)

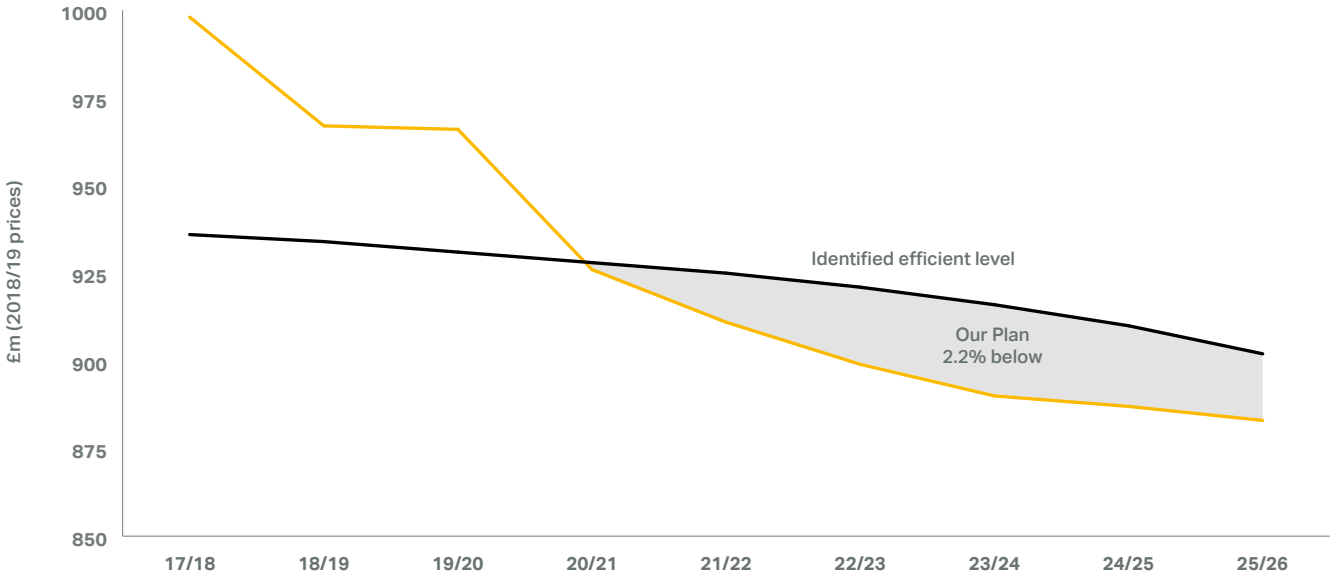


* Based on normalised Totex (i.e. adjusted for benchmarking regional differences)

9.2.4 How we compare to the upper quartile

Using our modelled 2018/19 performance gap of £31m (3.3%) and our assessment of the benchmark ongoing efficiency assumption of 0.53% p.a. our Plan is 2.2% below the efficient level over the RIIO-2 period (and below the efficient level in every individual year). Finally, the Figure 09.06 compares our cost forecasts against our view of an efficient network.

Figure 09.06: Cadent cost efficiency vs efficient level



Costs and efficiency continued

This illustrates that this is an ambitious Plan that is driving significant cost reductions whilst increasing levels of service for our customers. By the start of RIIO-2 our forecasts will close the current performance gap and in RIIO-2 go beyond delivering a plan that is 2.2% ahead of the upper quartile. We have made strong progress against this Plan already closing the gap from 6% to 3.3% in 18/19 (a £29m improvement).

The next section outlines the key cost drivers of our business.

9.3 Understanding our cost drivers

Through our benchmarking and transformation journey it has been important to ensure we have a clear understanding of our cost drivers. This has helped to support Decision-making in RIIO-1 but also to ensure we understand our costs clearly moving into RIIO-2 to ensure we deliver the right outcomes for our customers.

The cost drivers for our business fall under three distinct categories:

- **Price** which reflects the unit cost of performing an individual activity. These unit cost drivers are dominated by our labour rates.
- **Volume** which reflects how much work we need to do, largely driven by the legislation and the condition of our asset base.
- **Work type** which reflects the complexity of different work types we need to complete.

We are clear on the importance of managing all of these drivers to ensure we are executing the right work, at the right level and at the most affordable price for our customers.

Price: Three material factors influence the unit costs of our activities

There are three principal factors that impact our unit cost performance: our transformation programme, underlying labour prices, and the productivity of our direct and contract labour workforce.

These are discussed briefly in turn below:

- **Business transformation and innovation –** Our transformation programme will be a key driver of our cost performance for the remainder of RIIO-1 and in RIIO-2, as will the successful deployment of innovation and competition (described in **Chapter 8**).
- **Labour costs –** The work we undertake is labour intensive. Given this, a key unit cost driver is labour costs. The increasing UK demand for construction resources has an impact on the labour costs we face. We are seeing significant labour market cost pressures and expect this to continue in RIIO-2 given the large number of competing UK infrastructure projects.
- **Productivity –** There are two principal challenges in this area. First, we need to maximise the utilisation of our emergency workforce as traditional meter work drops off due to the roll out of smart metering (discussed in more detail later in this chapter). Second, we are working to increase the number of jobs our teams can complete in a day. For example, in the case of connections, a typical job can take three to five hours. If we can consistently complete jobs in three hours it is possible to deliver two jobs a day.

Volume: There are three principal drivers of work volume

- **Existing or emerging safety requirements** underpin much of our investment plan. As we move into areas of higher service density (terraced streets versus suburban estates) our overall costs increase. New and emerging risks must be addressed, and these can drive additional workload such as high-risk steel pipes or high rise buildings.
- **Economic change** is also a key driver of customer driven work, particularly the volume of connections we undertake and the volume of customer driven work such as diversions and reinforcement (albeit the majority of these costs are recoverable from customers). We are seeing an increase in demand from new customer types such as Compressed Natural Gas filling stations, power generators and shale developers. We are looking at different options for how to manage capacity on the network to best accommodate these customers' needs.
- New initiatives to respond to the **energy system transition** will also drive costs. For example, reconfiguring our networks to allow more sustainable gas sources to be connected is likely to add new costs.

Work type: The mix of work we complete has a material impact on our costs

There will be a change in the mix of **replacement work** that we need to undertake over RIIO-2:

- **Insertion rates –** The extent to which we are able to insert plastic pipes into the existing pipes, rather than having to open cut (dig out an entire new trench) to lay new gas pipes.
- **Project length –** The length of projects that we are able to build impacts on the costs to complete as fixed mobilisation costs are spread over a smaller portion of work or shorter lengths.
- **Material type –** The type of material used in existing pipes has an impact on the techniques we can use. For example, it is more difficult to deploy insertion techniques on steel mains because they cannot be easily cut. Similarly, it can be impossible to insert plastic pipes into existing pipes that have a small diameter.
- **Surface type –** For example, it takes longer to complete work on concrete roads than it does on a suburban grass verge.

Our maintenance and intervention cycles cause peaks and troughs in costs. For example, the mix of work on exposed crossings will change during RIIO-2. We will be intervening on more rail crossings which have a higher unit cost than the canal or road crossings which we have addressed in RIIO-1.

Before we turn to our cost forecasts we will address how we have built our Plan around the industry core scenario.

9.4 How we have adopted the ENA core scenario

We worked with the other gas and electricity networks to determine a Core Scenario that will be adopted by each company in its RIIO-2 Business Plan. We have led an initiative with other networks to understand and communicate how future supply and demand uncertainty impacted our expenditure plans.

The conclusions of this initiative, which was presented to the RIIO-2 Customer Challenge Group, can be found in the **Appendix 09.19 – ENA common RIIO-2 scenarios**. Our Plan is based on this core scenario and where we have identified uncertainty in customer demand we have included appropriate uncertainty mechanisms in our Plan (more detail can be found in **Chapter 10, Managing risk and uncertainty**).

The primary Building Blocks for the gas networks are set out below. In the Tables, materiality was judged to be 'high' if the annual impact was expected to exceed £25m and 'low' if the annual impact was below £5m.

Table 09.03: Supply changes

FES Building Block	Materiality	Network View	2017 reference	GB by 2030	Cadent by 2030
Shale reserves	High	Low	0	5–15bcm	2–6bcm
Low carbon gases	High	Medium	0.25bcm	0.8–1.8bcm	0.39–0.89bcm
Gas vehicles	Low	Medium	1k	48k–104k	24k–51k

Table 09.04: Demand changes

New Building Block	Materiality	Network View	2017 reference	GB by 2030	Cadent by 2030
Hydrogen conversion (including blending)	High	Low	0	0–22bcm	0–11bcm
Gas generation	High	Medium	2.3GW	3.9–9.6GW	2.0–4.8GW
Gas peak demand	Low	High	5.5TWh	>5TWh	1.8TWh

9.4.1 Change in demand over RIIO-2

We assessed the scale of the impact of changes in gas supply and demand on all lines of proposed expenditure. Through this process, we sought to distinguish between baseline costs and costs that will vary in light of uncertain circumstances. Where there is a large range of uncertainty and a significant impact, we have determined volume drivers that can be used to deliver higher or lower revenue in response to actual triggering circumstances.

Our analysis shows that only a very small element of our proposed expenditure has a primary dependence on the future levels of gas supply and demand.

The majority of investment for gas distribution is driven by customers' strong desire to receive a safe and reliable supply of gas. This is supported and underpinned by our safety case obligations. Hence the vast majority of our Business Plan expenditure is non-load related investment. The level of our investment is not particularly sensitive to the level of flows on our network.

9.4.2 Flexibility against future scenarios

Whilst there is broad consensus on the potential ranges for supply and demand changes out to 2030, there is more uncertainty surrounding the multiple pathways to energy transition from 2030 to 2050. We have tested our plans against the ranges of demand and supply forecasts.

To try to help understand future scenarios for the gas network, we have used the four possible stable 2050 End States for the gas network. All these scenarios envisage a substantial change to the way the gas network is used.

Figure 09.07: Possible 2050 End States

Green Gases	The gas network is retained but is delivering low carbon green gases such as biomethane, blended with hydrogen.
Re-purposed for Hydrogen	The gas network is repurposed to transport hydrogen safely to homes, businesses, industry power generators and the transport sector.
Peak and Emergency Energy Store: 'Powerbank'	The gas network is retained to transport hydrogen or green gas to deal with peak and emergency conditions, such as cold spells, or renewable electricity generation shortfalls. Homes would use hybrid heating systems to use clean electricity for most of the year, but an efficient gas boiler on peak days.
Decommissioned	The gas network is decommissioned. This would need close to full electrification of heat and new large scale secure and reliable energy sources for power generation and peak heat. This would require very large scale and highly visible infrastructure upgrades, to at least duplicate the existing electricity grid.

Ensuring flexibility in our plan:

– Use of uncertainty mechanisms

– Targeting innovation

– Investment appraisal

We have assessed the implications of each of these scenarios for the current gas network and hence for our RIIO-2 Plan. We have used uncertainty mechanisms, targeted innovation and adapted our investment appraisal approach to ensure we have the required flexibility in our plan.

Use of Uncertainty Mechanisms:

- We can see a wide range of uncertainty for gas entry (shale and low carbon gases) so we are proposing a re-opener to trigger a revenue driver mechanism to provide financial support for entry enablement. This means that revenues will only be provided if we get a clear signal that these developments are taking place and would be triggered by a charging and access review.
- We are including a flexible revenue driver to support reinforcements for peaking gas generation, and a supporting dedicated customer management service.
- We will undertake connection and reinforcement activities at an earlier stage, but only where there is sufficient risk sharing with the regional authority or other party to avoid asset stranding.

Targeting innovation:

- We have included propositions for a number of projects and other initiatives that will help to develop these pathways, in particular the role of clean gas and further work into hydrogen and hydrogen blending. This ensures our plan is both flexible to develop with the technology and also is proactive in helping to explore these pathways.

Costs and efficiency continued

Investment appraisal:

- Given one of the potential scenarios sees a move away from gas for heating in the long term, we have also tested our plans to minimise the risk of new investments becoming stranded if future policy decisions drive large-scale decommissioning.
- We have not included in our plan any significant discretionary costs that could be avoided or postponed. In our mains replacement plans, we are not proposing a significant level of CBA driven investment beyond maintaining our legal safety obligations.
- We have taken a cautious approach to our investment appraisal using a range of investment indicators such as payback periods, NPV, and NPV spend ratios, to evaluate options, ensuring value for money and a no regrets investment plan.
- We have not identified any anticipatory investment with a sufficiently robust benefits case to justify inclusion in our Plan. Such initiatives will need to be enabled via RIIO-2 uncertainty mechanisms or innovation mechanisms.

9.4.3 Peak demand

Government are expected to deliver the major strategic heat policy decisions in the middle of the next decade, which will be towards the end of the RIIO-2 period, if not later. Until major policy decisions are taken and implemented, we expect to continue to see annual gas demand slowly declining, driven by energy efficiency measures.

However, we do not expect to see a significant reduction in peak demand. The work we have undertaken with the other gas networks shows the impacts of increasing levels of decentralised gas generation in peak conditions. This generation is critical to the secure and reliable operation of the electricity network that cannot rely on intermittent renewables at all times. There is 4.3GW of decentralised gas generation expected by 2030 across our networks indicated by all the energy networks in the ENA's Common RIIO-2 Scenario.

Consumer behaviours may also be changing, and we are commissioning work in RIIO-1 to investigate how to better forecast peak demands. Working from home, and people's prioritisation for personal comfort could result in higher domestic peak demands during very cold spells.

The Chancellor announced earlier this year that he is looking to explore options under which only low carbon fuels can be fitted in new homes post 2025 and hence no traditional gas boilers could be fitted unless they were supported by renewable gas or hydrogen. Whilst this will impact the new connection market as alternatives are assessed, this will not affect the existing heat load which is by far the most material impact on network requirements.

All these demand uncertainties are accommodated by our use of volume drivers for connections and reinforcement capital expenditure.

9.5 Our totex forecast

The following sections describe in turn the key movements and trends in cost across our Business Plan. We have addressed these trends by cost category (operating costs or Opex, Replacement Costs or Repex and Capital Costs or Capex). Before we address Opex, Repex and Capex expenditures we will turn our attention to our totex cost forecasts.

We have set stretching targets across our cost base whilst transforming the services we offer

We seek to deliver the best outcome for our customers by selecting the right interventions, including interventions that increase operating costs, as opposed to capital expenditure. This is demonstrated through our whole life cost investment approach that considers the benefits of enhanced maintenance versus new investment to ensure we are delivering the most effective solution.

Our plans set out a forecast spend of £5,317m totex over the RIIO-2 period. This will allow us to continue to deliver 99.998% reliability, operate a 24/7 gas emergency service for all of our networks and operate the gas emergency number on behalf of the UK as well as a range of new outputs that are set out in **Chapter 7, Our commitments**.

Alongside these services we will continue to invest in our network with £3.1bn of expenditure on our assets to address ongoing deterioration and the increasing risk of some of our aging assets.

Table 09.05 shows our totex forecasts for RIIO-2; we have adjusted these numbers for the purposes of the remainder of this chapter to allow a like-for-like comparison against RIIO-1 – all of these costs have been included in our customer bill modelling. To ensure transparency the adjustments we have made are detailed below:

- **Output cases –** we have removed the additional costs for customer-driven output cases.
- **Xoserve costs –** Xoserve costs are being treated as pass-though in RIIO-2 as confirmed by Ofgem's sector specific Decision Document. We have not included these in our controllable cost forecasts, nor in the RIIO-1 comparison.
- **Pension admin costs –** the treatment of pension admin costs is changing between RIIO-1 and RIIO-2. These costs will be funded as part of our totex allowances in RIIO-2 where previously they were considered as a non-controllable cost. We have therefore excluded them from our like-for-like comparison.

Guaranteed standards

We have not included costs within our totex forecasts for Guaranteed Standards of Performance (GSOP) payments as per the regulatory guidance. However, we do not agree with this approach as it does not reflect the efficient level of costs for our networks. Within **Appendix 09.21** we have set out in full why we believe an efficient level of cost should be funded and our assessment of what that level of costs should be.

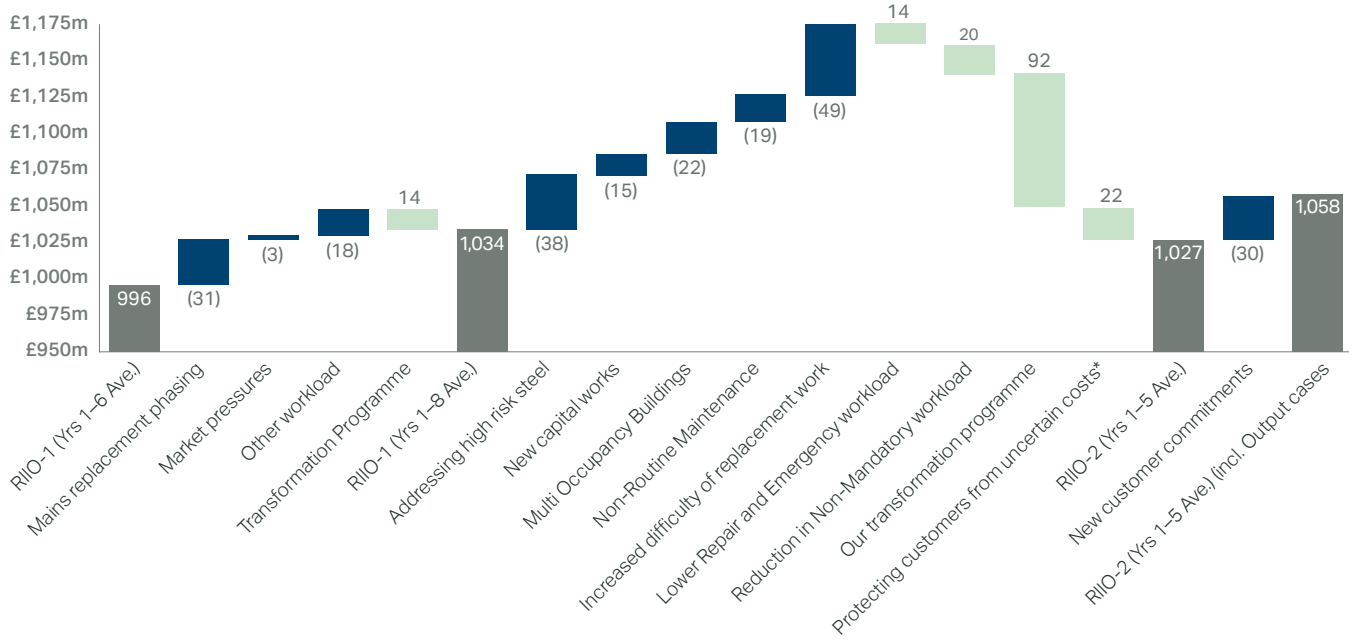
Table 09.05: Like-for-like totex summary

	RIIO-1			RIIO-2						RIIO-1	RIIO-2	Var
£'m (2018/19 price base)	2019	2020	2021	2022	2023	2024	2025	2026	RIIO-2 Total	Av.	Av.	Av.
Opex	423	434	384	415	403	403	385	385	**1,991**	448	398	(50)
Capex	160	218	190	157	180	168	140	109	**754**	153	151	(2)
Repex	432	526	538	478	479	480	478	476	**2,392**	432	478	46
Totex: Adjusted	**1,016**	**1,178**	**1,112**	**1,051**	**1,063**	**1,051**	**1,003**	**970**	**5,137**	**1,034**	**1,027**	**(6)**
Memo items												
Opex: Output Cases	–	–	–	17	18	19	19	20	**93**	–	19	19
Opex: Xoserve	10	13	12	–	–	–	–	–	**–**	15	–	(15)
Opex: Pension Admin	–	–	–	6	6	6	6	6	**29**	–	6	6
Capex: Output Cases	–	–	–	5	5	16	16	17	**59**	–	12	12
Capex: Xoserve	8	10	9	–	–	–	–	–	**–**	6	–	(6)
Totex: Reported	**1,033**	**1,201**	**1,133**	**1,078**	**1,091**	**1,091**	**1,044**	**1,012**	**5,317**	**1,055**	**1,063**	**8**

Our forecast spend represents a decrease in our underlying total expenditure (totex) of £6m p.a. or 1% compared to our RIIO-1 eight year average spend. We have a number of movements within our forecasts that are set out in Figure 09.08 below. We have worked hard to offset the cost and workload pressures by optimising our plan across totex and focusing on delivering the work that matters most to our customers alongside the delivery of a significant and ambitious programme of efficiencies in RIIO-2 (equating to 0.94% p.a.).

We have also been engaging on a number of new and ambitious customer commitments that we have built in after engagement with our customers. Through our engagement and triangulation process the total value of our proposed commitments has reduced from £60m that we set out in July to £30m in our final Plan. If you include these new customer driven costs our average totex in RIIO-2 will increase by £24m p.a. or 2%.

Figure 09.08: RIIO-1 vs RIIO-2 average totex (18/19 constant prices)



* RIIO-1 Totex includes areas of spend which we are proposing become Uncertainty Mechanisms in RIIO-2. We have re-baselined the level of uncertain costs that are being requested via Ex Ante allowances.

Managing demand uncertainty

We have proposed that we use volume drivers and Uncertainty Mechanisms to help us effectively manage demand growth risk for our customers. We have put forward mechanisms for connections, reinforcement and diversions with a low case scenario included in our base plan to guard against windfall gains. We will be required to review the base volumes if our proposed mechanisms are not accepted by Ofgem to ensure we include a most likely cost forecast in our plans.

The key movements (described in more detail below) are reflective of the changing expectations of our customers, stakeholders and community. We have been challenged constantly through our engagement (both internally and externally) to improve service whilst it also remains clear there is no appetite for any reduction in the safety or reliability of the essential service we offer.

To allow a better understanding of our costs in RIIO-2 we have included first the key movements we are forecasting out to the end of RIIO-1, against our average annual costs and then how our total RIIO-1 average annual costs compare against our RIIO-2 average annual cost forecasts. It is important to consider our eight year costs as this gives a true like-for-like position and accounts for the phasing of our investment plans in RIIO-1. We reported in our 2018/2019 Regulatory Financial Reporting an Enduring Value adjustment of c. £400m reflecting the amount of re-phasing of workload into the final two years of RIIO-1.

Table 09.06: Key movements in our average annual costs (Totex)

Source of movement	Category of movement	Comment	Average annual cost
Key movements outlined between RIIO-1 1–6 year average and our RIIO-1 forecast 8–year average spend			
Mains replacement phasing	Volume	We are forecasting to increase our replacement length over the remainder of RIIO-1. To ensure delivery of this workload we have established an alternative contracting arrangement.	£31m
Market pressures	Price	We have seen increases in unit rates for our investment programme. This is a result of a constrained contractor market. However, this impact has been softened by the pain/gain sharing arrangement with the contractors.	£3m
Other workload	Volume	We aim to complete a number of asset health investments, which will increase our average spend.	£18m
Transformation programme	Price	Our transformation programme will offset some of these increases. This will close the performance gap to the other gas distribution networks.	£-14m
Total			**£38m**

Costs and efficiency continued

Source of movement	Category of movement	Comment	Average annual cost
The next step on the trace shows the change in average annual spend between RIIO-1 and RIIO-2			
Addressing high risk steel	Volume	We are proposing to introduce a structured replacement programme for our high risk metallic mains, principally steel mains. December increase due to industry review of risk scores on steel pipes	£38m
New capital works	Volume	We have a number of new capital projects that are built on cost benefit justifications. This has reduced in December as we have refined our investment cases including our pre heating programme and tools and equipment lines	£15m
Multi-occupancy Buildings	Volume	We are continuing with higher levels of MOB workload into RIIO-2 including a proactive replacement programme targeting the highest risk risers. The increase in cost in our December plan represents the results of a tender process for our fault repair programme that points to a higher cost per job.	£22m
Non-Routine Maintenance	Volume	This is a continuation of the increased levels of Non-Routine Maintenance we have experienced at the end of RIIO-1 (e.g. CP and crossings) December increase reflects latest workload and pricing data (e.g. non-chargeable diversions & PRI coatings)	£19m
Increased difficulty of replacement work	Mix	We face a more difficult replacement work mix. In order to mitigate this increasing difficulty, we have optimised across totex including costs for reinforcement to enable insertion. Increased in December due to a detailed review of London MP	£49m
Lower repair and emergency workload	Volume	We are forecasting lower workload volumes in our emergency and repair workloads. As we replace the aged leaky mains we are forecasting a reduction in external escapes and repairs on our network.	£-14m
Reduction in non-mandatory workload	Volume	In RIIO-2 we are proposing a reduction in our non-mandatory replacement volumes. This is intended to support the overall bill position but also ensures that we are focusing on the highest payback projects and minimising any risk of stranding.	£-20m
Our transformation programme	Price	This represents the benefits from our transformation programme.	£-92m
Protecting customers from uncertainty costs	Volume	There is a significant amount of uncertainty on customer driven workload for reinforcement and connections over RIIO-2. In order to protect our customers from this uncertainty we have proposed a revenue driver for this work. We have therefore included a lower volume of this work in our base Plan to ensure that we do not over recover.	£-22m
Total			**-£6m (1%)**
New customer commitments	Volume	We are proposing a number of new services and commitments that we have built on the back of our engagement with customers.	£30m
Total			**£24m (2%)**

Labour costs: managing our most material cost driver

As discussed earlier, our labour costs are the most significant driver of our overall unit rates. We aim to have a reward framework that achieves the right balance between retaining and motivating our employees and providing value for customers.

We have taken a number of actions to ensure that we are managing our labour costs in the most efficient way. For example, at the start of RIIO-1 we revised our T&Cs, introduced an RPI linked pay deal and revised our pensions arrangements among other actions.

More recently, for the latest round of pay deals, we have:

- **Aligned to the market median.**
- **Frozen managers' pay –** For managers, where there is not joint negotiation, we took the decision to implement a 0% pay increase in 2018/19.
- **Introduced new terms and conditions –** In addition, new T&Cs for new starters for field force, staff and managers have been introduced, which are fully aligned to our market median principles. For field engineers it also shifts from a 37 to 42 hour working week.

As we look ahead we are considering how best to secure maximum utilisation of our workforce. This is likely to involve greater integration with other types of work such as replacement and connection as part of our new resourcing and contracting strategy in RIIO-2.

The cost of our output commitments – Delivering standards that all of our customers love

As described in **Chapter 5, Enhanced Engagement** we are completing unprecedented volumes of stakeholder and customer engagement to help us understand what our customers want, need and expect from our services. We have included an ambitious set of customer commitments that will allow us to deliver against these rising expectations and we have tested them with our customers.

In total, we have included £30m p.a., circa £7.5m per network of additional costs to deliver on these commitments in RIIO-2. In summary the costs that we are proposing within our totex forecasts are set out in Table 09.07. All of these costs and commitments have been tested with our customers.

Table 09.07: Cost of our commitments

	21/22	22/23	23/24	24/25	25/26	RIIO2 Total	Average Annual
Deliver a resilient network	–	–	–	–	–	0.0	–
Quality experience	17.1	18.0	18.7	19.3	20.3	93.4	18.7
Environment	4.7	4.8	15.6	15.7	15.7	56.5	11.3
Trust	–	–	–	–	–	0.0	–
Total	**21.8**	**22.8**	**34.3**	**35.1**	**36.0**	**149.9**	**30.0**

The detailed proposals that cover these areas of spend are included in **Chapter 7** and associated appendix.

The £150m of additional costs described above do not include costs that we have agreed our shareholders will bear. For example, we have not included the cost of our community fund (the Cadent Foundation) which represents a commitment of circa £30m over the period within our trusted outcome. We have also not included additional costs for areas such as transparency where we are already delivering best practice enhanced reporting and where the benefits of delivery outweigh the costs (e.g. zero avoidable waste to landfill).

There are a number of areas where we are also committing to deliver additional outputs for no extra cost. We are challenging ourselves to deliver this additional stretch output efficiency as our customers have told us they want these services and expect us to deliver them. This equates to £19m of additional services that we are delivering for free or an additional £3.8m of output efficiency per year in RIIO-2. The Table below breaks these down by area and includes provision of time-bound appointments, measuring and enhancing our services and better road works information. The stretch output efficiencies and shareholder funded commitments are a demonstration of our ambition and commitments to setting the standards that all of our customers love.

Table 09.08: Stretch output efficiencies

	2022	2023	2024	2025	2026	Total	Annual average
Measuring and enhancing accessibility and inclusivity	1.0	1.0	1.0	1.0	1.0	4.9	1.0
Better roadworks information	2.0	2.0	2.0	2.0	2.0	10.1	2.0
Coordinating with others	0.2	0.2	0.2	0.2	0.2	1.0	0.2
Tackling the theft of gas	0.6	0.6	0.6	0.6	0.6	3.0	0.6
Total	**3.8**	**3.8**	**3.8**	**3.8**	**3.8**	**19.1**	**3.8**

9.6 Our opex forecast

We have set ourselves an ambitious target to reduce our operating costs to ensure we deliver value for money for our customers and set standards that others will aspire to. The activities that our operating costs cover are diverse, including our Emergency and Repair processes, our contact centres, our maintenance activities and the majority of our support functions including finance, regulation, HR and procurement among others. These activities ensure we deliver a safe and reliable service for our customers and that we have the business structure behind the scenes to support this. In total we are forecasting to spend £1,991m across our four networks in RIIO-2, an average of £398m p.a. and a reduction of £50m p.a. when compared to RIIO-1. We are stretching ourselves significantly to deliver more for our customers all whilst reducing our annual costs by 11% on average.

Table 09.09: Cadent Opex summary

	RIIO-1			RIIO-2						RIIO-2
£'m (2018/19 price base)	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**RIIO-2 Total**	**Av.**
Emergency	51	49	47	46	45	43	41	40	**215**	**43**
Repairs	79	78	69	65	62	59	57	55	**297**	**59**
Maintenance	77	97	77	105	101	104	94	97	**500**	**100**
Of which: Routine Maintenance	44	44	37	35	35	34	33	33	**170**	**34**
MOBs (Incl. Buy-Outs)	3	7	6	19	19	21	19	20	**98**	**20**
Non-Routine Maintenance	30	46	34	51	47	49	41	44	**232**	**46**
Other Direct Activities (ODA)	13	12	11	10	10	10	10	10	**51**	**10**
Work Execution	221	236	203	225	218	216	202	201	**1,063**	**213**
Work Management	87	84	79	80	77	76	74	74	**381**	**76**
Business Support (Ex IT&T)	51	52	50	47	46	46	47	47	**234**	**47**
IT & Telecoms	50	46	39	45	47	46	46	46	**230**	**46**
Training & Apprentices	14	15	14	17	16	17	16	17	**83**	**17**
Opex: Adjusted	**423**	**434**	**384**	**415**	**403**	**403**	**385**	**385**	**1,991**	**398**
Memo items										
Output Cases	–	–	–	17	18	19	19	20	**93**	**19**
Xoserve	10	13	12	–	–	–	–	–	**–**	**–**
Pension Admin	–	–	–	6	6	6	6	6	**29**	**6**
Opex: Reported	**433**	**447**	**396**	**438**	**427**	**427**	**410**	**411**	**2,113**	**423**

Figure 09.09 details how our operating cost forecast is changing between RIIO-1 and RIIO-2. This demonstrates how we are delivering significant efficiencies to offset a number of workload pressures.

Costs and efficiency continued

Figure 09.09: RIIO-1 vs RIIO-2 average Opex (18/19 constant prices)

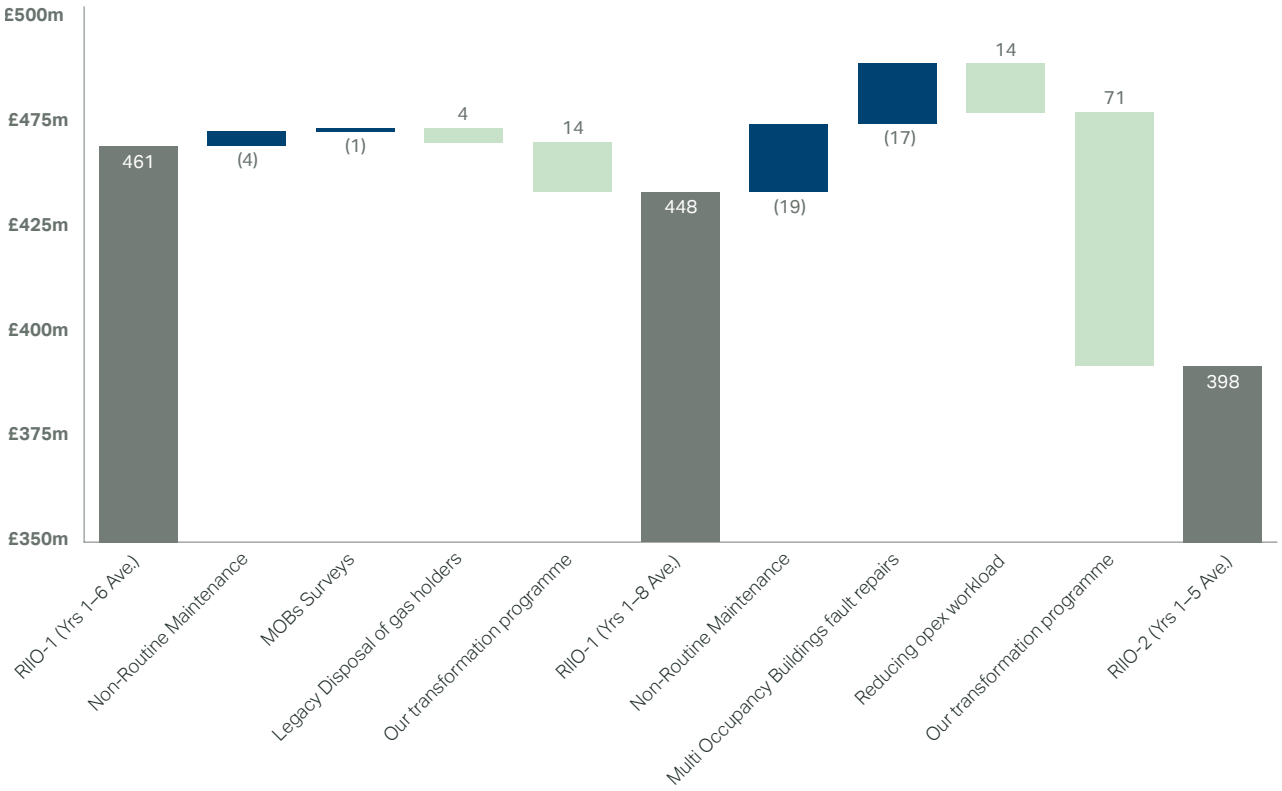


Table 09.10: Key movements in our average annual costs (Opex)

Source of movement	Category of movement	Comment	Average annual cost
Key movements outlined between RIIO-1 1–6 year average and our RIIO-1 forecast 8 year average spend			
Non-Routine Maintenance	Volume	We are seeing increased volumes of non-routine maintenance at the end of the RIIO-1 period. For example we have material increases in activity associated with cathodic protection and crossing maintenance in response to HSE enforcement.	£4m
MOBs Surveys	Volume	We have an increased volume of surveys over the end of RIIO-1 as we address a number of asset data issues that we have identified. These surveys have increased our average costs by £1m as we have accelerated this programme. This structured programme of pro-active surveys will continue into RIIO-2 on a cyclical basis.	£1m
Legacy disposal of gas holders	Volume	We incurred costs disposing of our gas holders in the first part of RIIO-1. These were one off costs and are not therefore recurring in the last two years of the price control. These are discussed further below.	£-4m
Our transformation programme	Price	We have taken the opportunity presented by separations to drive significant efficiencies across our front and back office operations.	£-14m
Total			**£-13m**
The next step on the trace shows the change in average annual opex spend between RIIO-1 and RIIO-2			
Non-routine maintenance	Volume	A continuation of the increased volume of non-routine maintenance we have experienced at the end of RIIO-1. This is described in more detail below.	£19m
Multi-occupancy Buildings fault repairs	Volume	Increased volumes of work as part of our fault repair programme that will progressively remove building safety related faults. This is a continuation of a programme of work initiated in RIIO-1 with additional spend on our Medium Rise assets in response to our RIIO-1 survey programme.	£17m
Reducing opex workload	Volume	Reductions in opex workloads on the back of our investment programme. This includes reductions in our repair volumes as a result of our mains replacement programme.	£-14m
Our transformation programme	Price	The continued implementation of our transformation programme, as described earlier in this chapter, which focuses on our opex performance as this is where we have the largest gap to the industry benchmarks.	£-71m
Total			**£-50m**

9.6.1 Emergency

Our emergency function operates 24 hours a day, 365 days a year to respond to public reported gas escapes. The annual cost of emergency work execution is forecast to reduce from £51m currently to £47m by the end of RIIO-1 and further to £40m by the end of RIIO-2. This reduction is driven by:

- Reduced workload
- Improved productivity through better work management
- Revised T&Cs and changes to DC:DB pension mix
- Fewer engineers
- Changes to our operating model associated with our transformation programme

There are two key drivers of costs within our emergency team, productivity and workload.

Productivity

We have invested a considerable amount in our emergency activities. We have sought to ensure that our teams have access to leading-edge resourcing and scheduling tools. This investment has delivered:

- **A flexible workforce strategy and contracting approach** that enables us to move resources into the Gas Distribution Strategic Partnerships in the summer and then flex resources the other way during the winter when we experience high volumes of public reported escapes.
- **A balance of planned and reactive work –** We use a long-term forecast of workload, including the impact of planned work, to establish a robust forecast of reactive work. We then supplement this reactive work forecast with additional jobs that require a complementary skill set. This generates a balance of plannable and reactive work that allows us to optimise the productivity of our field force. In particular, we undertake both domestic and industrial and commercial metering work. We have also integrated additional services to support customers in vulnerable situations into our processes such as carbon monoxide awareness discussions, and fitting of locking cooker valves for customers suffering from dementia.
- **Flexible and responsive systems –** Should the circumstance arise where the volumes of reactive work do not materialise as forecasted, the emergency resources are able to request additional work be sent out to them in the field.
- **Performance management –** Our dispatch team who are managing 'on the day' performance will continue to monitor productivity levels and will assign additional short duration work to the Field Force where appropriate. This includes additional services to support customers in vulnerable situations such as carbon monoxide awareness discussions.

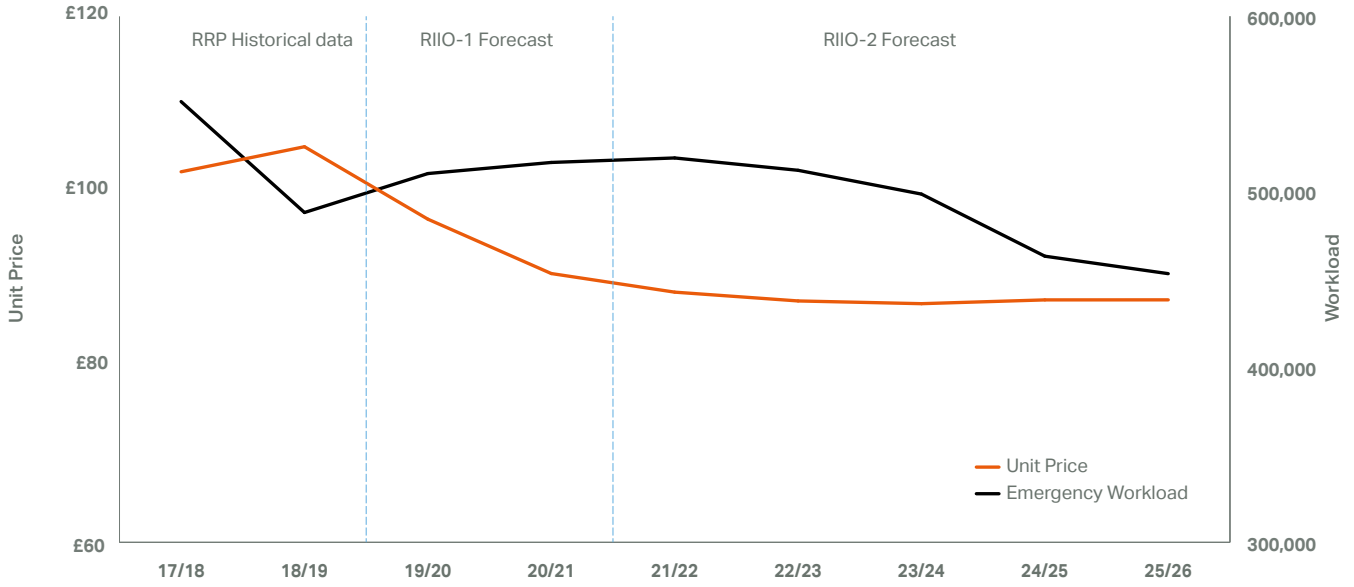
Looking ahead, we are continuing to review how we might get maximum utilisation out of the emergency and repair workforce. This is likely to involve greater integration with other types of work including replacement and connection activities alongside the further development of our services for customers in vulnerable situations. For example, we are exploring how we best use these resources to help reduce safety risks in the home and reduce future emergency situations.

Workload

Emergency workload is driven by Public Reported Escapes. This is reactive, customer-driven work. About 80% of the work relates to issues within a customer's premises. Historical regression analysis shows that this work is reducing by approximately 2% per year. This regression trend has been used to forecast RIIO-2 work.

A minority of workload is driven by gas network escapes. This work is forecast to reduce based on our modelling of the impacts of our mains replacement programme. Our modelling suggests that network escapes will reduce during RIIO-2 and this has been factored into our work forecast (the dip in workload in 18/19 was the result of a particularly warm year).

Figure 09.10: Emergency workload forecast



Costs and efficiency continued

9.6.2 Repair

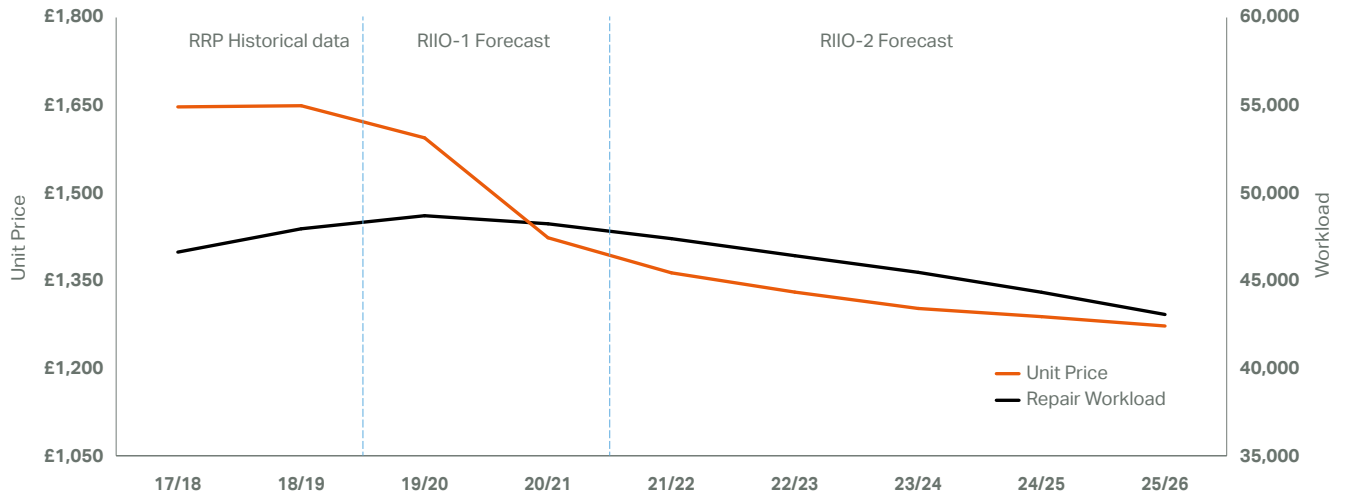
Our repair teams are responsible for remediating external gas escapes from our network. Typically this involves identifying the source of the leak, safely excavating the road, footpath or verge to access the leaking iron main or steel service pipe before repairing the affected pipework. Once the repair and safety checks are complete, the excavated area is appropriately reinstated.

The annual cost is forecast to reduce from £79m currently to £69m by the end of RIIO-1 and further to £55m by the end of RIIO-2. The reductions are partly driven by:

- Reducing workload
- Productivity improvements through the removal of the challenging 'Repair Risk' measure during RIIO-1
- A focus on multi-skilling and utilising resources on capex & repex work wherever possible
- Revised Terms and Conditions and changes to Defined Contribution: Defined Benefit pension mix

The modelling of our mains replacement programme indicates that workload will reduce over RIIO-2 based on a strategy of 'least whole-life asset cost' interventions. Our model has been audited by Costain who made a positive assessment of its quality.

Figure 09.11: Repair workload forecast



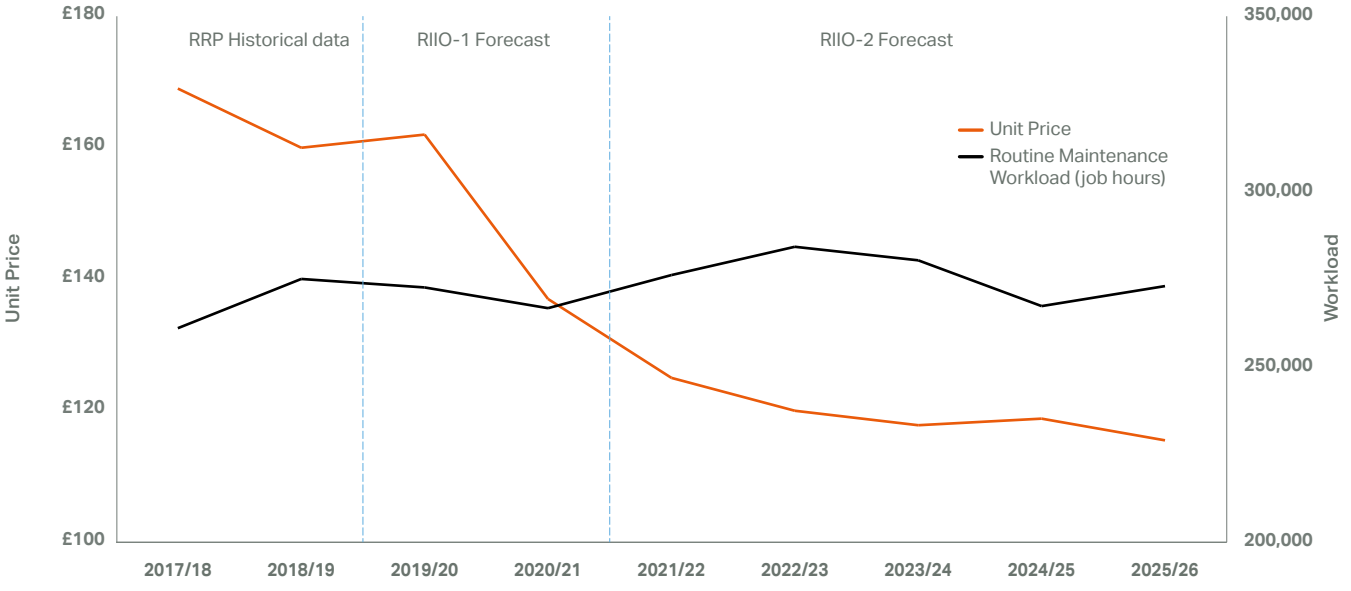
9.6.3 Maintenance

Our maintenance teams are responsible for ensuring we operate the network safely and maintain its reliability and resilience through appropriate interventions based on sound asset data and management decisions. Typically this involves proactively carrying out routine and non-routine maintenance activities in line with our policies.

Routine maintenance spend has, and is expected to, decline over time as we optimise our activities and policies using a risk-based approach to maintenance frequency interventions, improve efficiency and productivity via multi-skilling, innovate and adopt new technology and invest in capital expenditure to replace / upgrade our operational assets as required. Work volumes are forecasted based on our planned cyclical maintenance data.

However, there are two other key movements in our maintenance costs, the impact of MOB fault repairs and our non-routine maintenance programme (which has flattened work volumes).

Figure 09.12: Routine maintenance workload forecast



The impact of fault repairs as part of our Multi-occupancy Building Safety programme

During RIIO-2, we expect to undertake in the region of 275,000 non-gas related asset repairs at a cost of £84.5m. As part of our wider programme of improving safety in MOBs, we have identified a number of faults associated with our assets, which do not directly impact the flow of gas. For example, we have identified valve boxes outside MOBs with broken lids which may amount to a tripping hazard, missing electrical continuity bonds and signs identifying our pipes as gas pipes that have been obscured. We are introducing an extensive repair programme to remedy these types of non-gas related asset repairs, building on work initiated in RIIO-1.

We have estimated fault volumes using the results from previous MOBs surveys and taking into account the volume of MOBs surveys planned to be undertaken through the RIIO-2 period under our rolling survey programme.

In considering how to manage this essential work, we looked at the following options:

1. Do nothing – This is not a credible option. It is the least-cost option but will not ensure compliance with our obligations.
2. Remedy identified faults over the RIIO-2 period – In this option we continue our scheduled surveys and inspections and remedy the faults identified over the RIIO-2 period. Any high risk faults would be dealt with immediately, with lower risk faults scheduled into a larger programme of works based on risk. This is the least-cost option that ensures that we also comply with our obligations.
3. Remedy all faults identified within a short space of time, e.g. within days to a number of weeks – In this option, we would remedy all faults within days or weeks of them being identified, rather than over the longer RIIO-2 period. Were we to adopt this for outstanding faults, we would require higher resource levels and this would impact costs and customer bills.

We have proposed the second option in our Plan. This is the least-cost, reasonably practical solution at this point in time. It is our aspiration to move to fault resolution within prescriptive timescales in RIIO-3. We have confidence that overall this is the best option for customers as lower delivery would not be compliant and higher output would add to costs and may not be deliverable.

In RIIO-1 this type of work has been delivered by our direct labour when they were not engaged on emergency or mains repair activity. In RIIO-2, we are increasing the rate of work delivery significantly, therefore we will be using different business processes and newly contracted resources to deliver it. In light of this we derived a draft cost estimate for our October Plan that was based on our current costs and applied a 40% efficiency factor. We have now completed a tendering exercise to obtain rates for this work which did not support this level of efficiency or indeed any change in historic rates. We have however challenged ourselves and set a 15% reduction in our plan. This work is described in more detail in **Appendix 09.04 – Transforming the Experience for Multi-Occupancy Building Customers – Risers**.

The impact of our Non-Routine Maintenance Programme

Our Non-Routine Maintenance Programme ensures that we have a current understanding of the performance of our assets against our safety and reliability standards and that we are making the correct interventions to meet our customers' and stakeholders' expectations.

The programme includes packages of low-cost high-volume work such as cathodic protection, civils, valves and pipeline inspections among others. We are forecasting an increase of £14m p.a. over RIIO-2 as we continue to spend in line with the enhanced level of investment delivered in the second half of the RIIO-1 period.

During RIIO-1 we have seen a material increase in activity on cathodic protection and crossing maintenance in response to HSE enforcement action. This activity will continue into RIIO-2 as we maintain our focus on delivering to the safety standard that our regulator expects. This work was not fully funded in RIIO-1.

We are expanding our programme of survey and intervention on our civil structures and valve assets to ensure we comply with safety legislation.

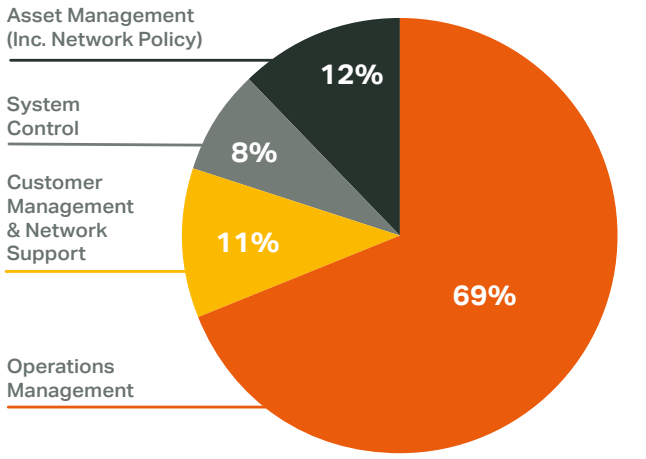
The final area of change is our reduced depth of cover programme. This work ensures that we have appropriate protection around our pipelines to prevent damage from third party activities (in particular agricultural practices). We have significantly stepped up work in this area over the second half of RIIO-1 in response to this emerging risk which we identified via our survey data and are forecasting to continue at this level of activity through RIIO-2.

9.6.4 Other controllable opex

i) Work management

Operations Management drives the majority of costs within our work management activity. This is in turn driven by FTE numbers which are closely linked with the Work Execution activities (emergency, repair and maintenance) described above – it covers supervision and management of the field force, planning, scheduling and dispatch and other centrally co-ordinated activities.

Figure 09.13: Work management cost breakdown



We are forecasting reductions in our work management costs from £79m at the end of RIIO-1 to £74m by the end of RIIO-2. This is a result of reducing workload in emergency and repair, coupled with our ambitious transformation programme.

ii) IS

Through RIIO-1, we have significantly reduced our IS operating costs as we have separated from National Grid and exited from the transitional service arrangements. We are now a standalone business, less complex, with no cost allocation or sharing of our IT estate, wholly reflective of other businesses of a similar size.

For RIIO-2, we have continually challenged the operating costs and level of investment that we will need in technology, aiming to balance the investment needed to realise changes in ways of working, changes in services to customers and data flows, yet maintaining control of the costs of investment to customers. Our RIIO-2 operating costs are lower than in RIIO-1, though our proposed investment in innovative technology, investment in our data, and the need to protect our activity from cyber criminals will inevitably create upward pressure through the period.

Costs and efficiency continued

iii) Business support and Training and Apprentices

Our business support costs include the cost of our support functions including finance, HR, regulation and our other central functions. This category also covers the costs of developing our ongoing stakeholder engagement plan across the business. We are forecasting to spend an average of £47m p.a. on our business support costs for our four networks over RIIO-2. Since the sale and separation of Cadent, we have made significant efficiencies in this area of our business and we have included additional efficiencies in RIIO-2.

Our training and apprentice costs are a critical element of our business plan as we continue to ensure we have the right skills and capabilities not just in RIIO-2 but also into the future. As with most large modern organisations our success depends on us having a broad range of skills and competencies and using them effectively. We are currently identifying an upward trend in employee turnover associated with changing socioeconomic patterns, changing terms and conditions and pensions schemes, and the changing expectations and aspirations that younger workers have. These changes provide opportunity, but also some material risk to our business. Presently we face challenges in: the acquisition and retention of some specific technical skills (including cyber, gas mains layers and niche technical areas of gas engineering); achieving greater diversity and inclusion particularly in field force teams, and; undergoing a demographic shift where our aging workforce retire (typically) and younger, much less experienced people take on responsibility. These challenges can present real risk to our delivery. Our RIIO-2 Plan continues the work done in RIIO-1 by investing £83m strategically to mitigate risks and tackle the several and varied challenges we face to improve the services we offer our customers, through attractive career paths and opportunities for our staff.

9.7 Our repex forecast

We are continuing to invest in our network to keep our customers safe and warm. Our replacement activity forms by far the largest single category of expenditure within our Business Plan and is almost entirely driven by legislative requirements in the form of the Pipelines Safety Regulations and HSE policy. The activities that form part of this cost category include the IMRRP, Other mains replacement including high risk steel replacement and economically justified mains, Multi-occupancy Buildings and other service replacement. In total we are forecasting to spend £2,392m over the RIIO-2 period which represents 47% of our controllable costs.

Table 09.11: Replacement summary

	RIIO-1			RIIO-2						RIIO-2
£'m (2018/19 price base)	2019	2020	2021	2022	2023	2024	2025	2026	RIIO-2 Total	RIIO-2 Av.
Iron Mains Risk Reduction Programme:										
Tier 1 Mains[1]	200	243	247	239	230	224	224	223	**1,140**	**228**
Tier 1 associated services	92	117	115	110	107	105	104	104	**529**	**106**
2" Steel*	4	5	5	4	4	4	4	4	**18**	**4**
Other Mains Replacement										
Tier 2A & 2B mains and associated services	18	43	43	4	5	6	6	6	**29**	**6**
Tier 3: Mains and associated service	35	15	15	20	22	24	23	23	**113**	**23**
Other Policy & Condition*	20	30	29	32	43	51	50	50	**226**	**45**
Multi-Occupancy Buildings (MOBs)	19	29	40	23	23	24	24	24	**118**	**24**
Services Not Associated with Mains Replacement	44	44	44	46	45	43	43	42	**219**	**44**
Repex: Adjusted	**432**	**526**	**538**	**478**	**479**	**480**	**478**	**476**	**2,392**	**478**
Memo items	–	–	–	–	–	–	–	–	**–**	**–**
Repex: Reported	**432**	**526**	**538**	**478**	**479**	**480**	**478**	**476**	**2,392**	**478**

1 All diversions included in this line, as per Business Plan Data Table.

Our Plan requires an increase of average repex costs by £46m p.a. or 11% forecast for RIIO-2 reflecting the introduction of new work types, in particular our high risk steel programme. The cost forecast also incorporates the changing nature of our mains replacement programme introducing a new work mix including lower rates of insertion, a higher proportion of larger mains being replaced and shorter project lengths, which we have already tried to mitigate in our Plan as far as possible, halving the expected cost increase that was originally expected. Finally these workload changes are partially offset by our ambitious ongoing efficiencies of 0.94% p.a.

Figure 09.14 shows the length of mains that we are forecasting to replace over the RIIO-2 period. Table 09.12 shows how the Business Plan data maps against the key drivers of the work. There are three principal drivers of mains replacement that are detailed in turn below; these are the IMRRP, other safety driven work and other economically justified work. In total we are forecasting to deliver 8,525km of mains over RIIO-2 at an average of 1,705km per year. This workload is detailed in **Appendix 09.02 Distribution Mains and Associated Services**.

Table 09.12 Cadent total mains replacement volumes (km) by driver

		Work driver				
			Other mains			
BPDT cat	Sub cat	IMRRP	Safety Driven	CBA	Total	Average length
Tier 1 Mains	IMRRP	7,692	0	0	**7,692**	1,538
Tier 1 Mains	IMRRP Dynamic Growth	93	0	0	**93**	19
Other policy and condition	Steel ≤2"	153	0	0	**153**	31
Tier 2A &2B	Tier 2a	0	37	0	**37**	7
Tier 2A &2B	Tier 2b	0	0	53	**53**	11
Tier 3	Tier 3	0	31	15	**47**	9
Other policy and condition	Tier 1 >30m	0	6	30	**35**	7
Other policy and condition	Steel	0	262	147	**408**	82
Other policy and condition	Asbestos	0	1	6	**7**	1
	Total	**7,938**	**337**	**250**	**8,525**	**1,705**
	Average annual length	**1,588**	**67**	**50**	**1,705**	

The cost trace shown below highlights these changes in more detail.

Figure 09.14: RIIO-1 vs RIIO-2 average Repex

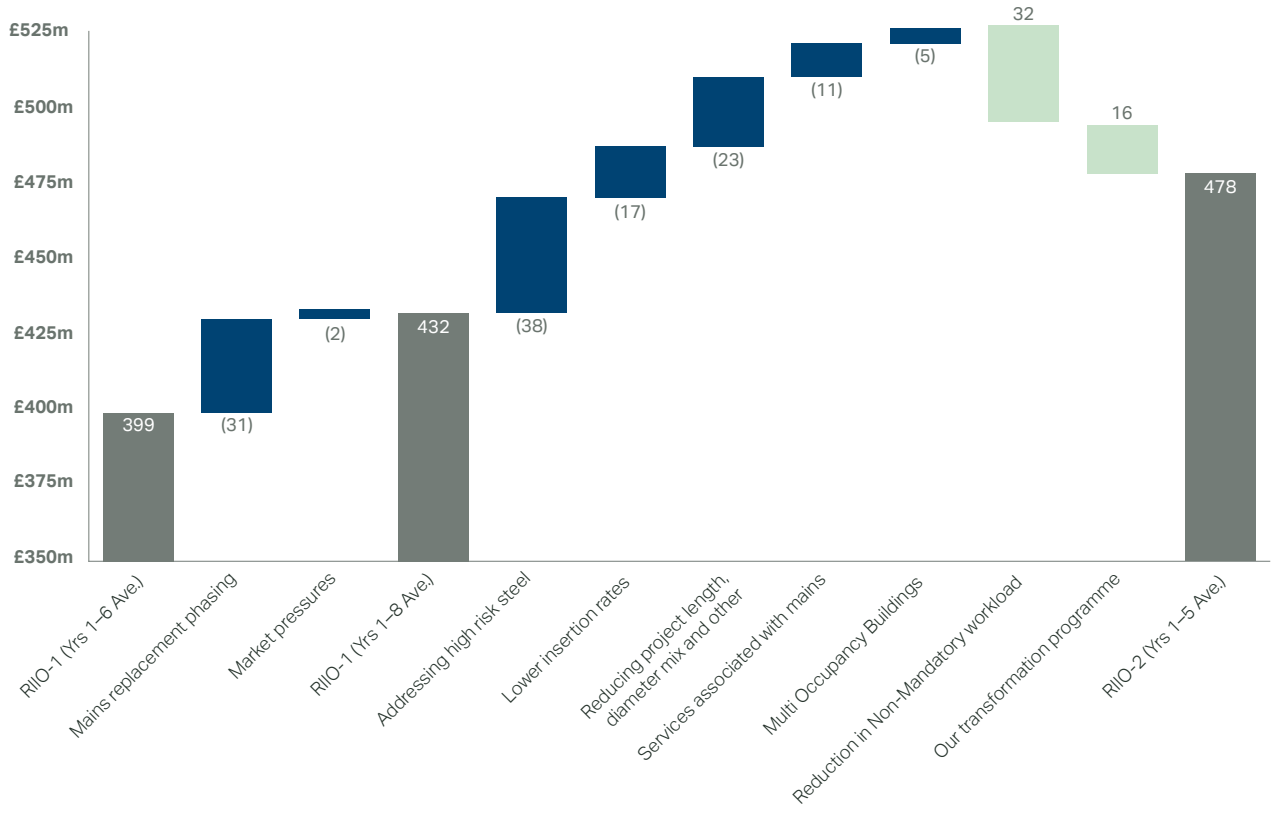


Table 09.13: Key movements in our average annual costs (Repex)

Source of movement	Category of movement	Comment	Average annual cost
Key movements outlined between RIIO-1 years 1–6 average and our RIIO-1 forecast 8 year average spend			
Mains replacement phasing	Volume	We are forecasting to increase our replacement length over the remainder of RIIO-2 in line with our RIIO-1 eight year output targets. We have had a number of challenges in the delivery of our replacement workload including a congested contractor market and an increasingly difficult work mix. To ensure delivery of this workload we have established an alternative contracting arrangement to test our proposed RIIO-2 contracting model. This arrangement ('Construction Services North West') will deliver 150km over the reminder of RIIO-1.	£31m
Market pressures	Price	Over the last 12 months we have seen increases in unit rates for our investment programme, particularly on our mains replacement activity. This is a result of a constrained contractor market with a number of other major investment programmes competing for similar labour pools.	£2m
Total			**£33m**

Costs and efficiency continued

Source of movement	Category of movement	Comment	Average annual cost
The next step on the trace shows the change in average annual repex spend between RIIO-1 and RIIO-2			
Addressing high risk steel	Volume	We are proposing to introduce a structured replacement programme for our highest risk steel mains that addresses continued deterioration of these pipes on our network. Our models of the risk associated with individual pipes show that the highest risk mains in our asset base are almost all steel mains, underlining why this programme is being put in place and its importance. This is partially offset by a reduction in economically justified mains that sit outside of the IMRRP.	£38m
Lower insertion rates	Mix	We are forecasting a reduction in the length of pipe we can insert meaning more open cut work where we have to excavate the entire route of the pipe increasing costs. In order to mitigate these cost pressures we have optimised across totex increasing our reinforcement spend by £7m p.a. therefore allowing an increased volume of insertion providing a lower overall totex cost. We have also optimised for pressure and reflected this in our leakage baselines. In total this has reduced the impact of lower insertion rates from £35m in our July Plan to £17m in our October Plan.	£17m
Reducing project length, diameter mix and other	Mix	We are forecasting increasingly shorter project lengths in RIIO-2 as we address the higher risk mains and have less optionality of work as we approach the end of the programme. This will increase overall cost per metre as the mobilisation costs (site set up) are shared across a smaller length of pipe. Other areas that impact on this work mix include replacing proportionally more large diameter mains in RIIO-2 and the changing nature of our London Medium Pressure programme. The unit cost of completing work on our London medium pressure scheme is increasing as the complexity of the engineering and stakeholder environment increases. This is set out in more detail in our engineering justification for this specific programme of work. We have challenged ourselves to mitigate these cost pressures and have invested in our modelling capability which has reduced the overall impact of work mix from £33m in our July Plan to £17m in our October Plan.	£23m
Services associated with mains	Volume	Our service densities (the number of services per km of main replaced) are changing across our networks reflecting the changing nature of the mains that we are replacing. Service densities are expected to decrease in the EoE network by 7% as we move towards the more rural East Anglia part of the network. However, we are expecting service densities in North London to increase by 23% as we tackle more urban areas, this will also have an impact on the number of planned interruptions. We are not expecting to see a change in service density in either the North West or West Midland networks.	£11m
Multi-occupancy Buildings	Volume	This is an area of work that we have already seen increases in RIIO-1 and are forecasting to continue into RIIO-2. Our MOBs intervention strategy is aimed at improving experiences for our customers in this area through targeted replacement in our highest risk buildings to reduce interruption volumes and increase our service levels.	£5m
Reduction in non-mandatory workload	Volume	In RIIO-2 we are proposing a reduction in our non-mandatory replacement volumes. We have included our minimum statutory lengths for the IMRRP and have proposed a reduction in our other non-mandatory mains (economically justified mains). This is intended to support the overall bill position but also ensures that we are focusing on the highest payback projects minimising any risk of stranding where there is uncertainty over future investment.	£-32m
Our transformation programme	Price	This represents the benefits we expect to deliver through the continued implementation of our transformation programme. For replacement this includes moving to a depot-centric operating model and changing our contracting model which will introduce greater accountability, less overheads and localisation. These efficiencies are also offsetting significant price pressures that are currently absorbed into our contracting arrangements. This equates to £10m of market pressures that are being offset by £26m of efficiency in RIIO-2, leaving a £16m net reduction. This is a 4% reduction over the period or 0.8% p.a. (increasing to 1.2% p.a. if one accounts for the absorbed price pressures). This represents a stretching and ambitious plan for our customers.	£-16m
Total			**£46m**

The remainder of this section outlines in more detail the spend on our Iron Mains Risk Reduction Programme (IMRRP), other mains replacement, Multi-occupancy buildings and services not associated with mains replacement.

9.7.1 The Iron Mains Risk Reduction Programme ('IMRRP')

The Iron Mains Risk Reduction Programme is one of our key safety programmes. Under this programme we work to reduce the risk associated with cast and ductile iron pipes within 30 meters of buildings. Often, this requires replacing the iron pipes, which are prone to fracture and corrosion, with safer, more efficient polyethylene pipes.

Our work in this area is mandated by the HSE and is also necessary to ensure compliance with specific gas safety regulations, including the Pipelines Safety Regulations 1998 (PSR) (specifically Regulations 8, 9, 13 and 13A), the Gas Safety (Management) Regulations (GS(M)R) (specifically in relation to the duty to prepare and comply with a safety case (Regulations 3 and 5)) and more broadly under sections 2 and 3 of the Health and Safety at Work Act (HSWA). The HSE have been clear that it will be necessary to continue with the IMRRP throughout the RIIO-2 period.

In addition to reducing the risk associated with iron pipes, the IMRRP also delivers additional benefits for customers, including reduced leakage (reducing bills and reducing greenhouse gas emissions), reduced reactive repair costs (reducing bills) and greater reliability (reduced chance of interruptions). These wider benefits have been established by the Ofgem and HSE commissioned report by CEPA and AESL and by KPMG more recently, who concluded that the IMRRP would largely remain cost beneficial even if the safety benefits are excluded.

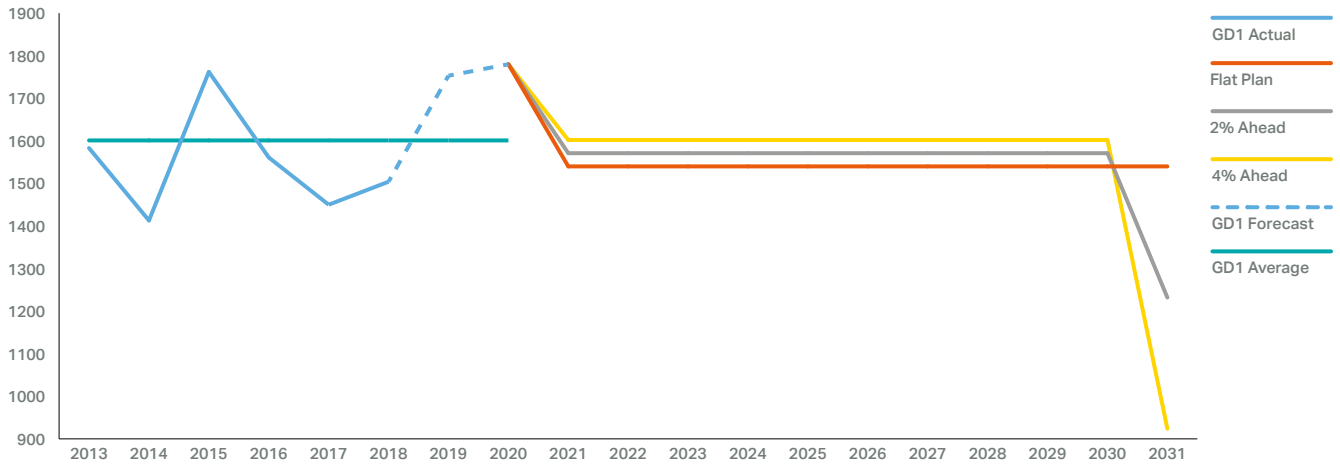
Many of our steel pipes have a risk score similar to, or greater than, our iron pipes. Steel pipes are not covered by the IMRRP but are still subject to the requirements of PSR, GS(M)R and HSWA. We are proposing to introduce a structured programme akin to the IMRRP to manage the risk associated with our steel pipelines and this is covered in the following section (9.7.2).

IMRRP options

Length of mains replaced

We are forecasting to replace 1,557km p.a. of tier 1 iron mains in RIIO-2. This sets us on a flat run rate to 2032. As part of our RIIO-2 options analysis we have investigated the risk that is posed by a hard stop to the programme at the end of March 2032 (the 'cliff edge') by analysing various delivery scenarios. The cliff-edge risk is created where a high volume of work is focused on a fixed delivery date and ends suddenly, at that time this creates challenges in maintaining a large workforce which knows it will be disbanded as well as providing zero margin for error on delivery. The scenarios we considered included the acceleration of delivery to allow a controlled ramp down of investment towards the end of the programme through running at 2% and 4% ahead of programme respectively (see figure below).

Figure 09.15: IMRRP delivery RIIO-1 and RIIO-2+ options



In selecting a flat profile, we assessed the overall delivery of our mains replacement commitments and the relative risk of our asset base. A flat profile mitigates delivery risks in RIIO-2 and difficulty of work is forecast to change (see following section) and also balances affordability for our customers. This ensures we are delivering against our legislative requirements whilst also managing delivery, risk and affordability.

How we have optimised our replacement programme with our customers

Although we have an absolute requirement to complete the IMRRP, we do have some discretion about how we deliver it in a way that delivers maximum benefit to our customers. There are multiple ways that the IMRRP can be prioritised and delivered. Each of the approaches will trade off outputs which include: mains safety risk, delivery efficiency, repair benefit, leakage and customer experience. We have tested these trade offs with our customers and more detail of this can be found in **Chapter 7, Our commitments**.

How the mix of our mains replacement work is changing

As we move towards the end of the IMRRP we are seeing the nature of the work changing considerably. This is a product of a number of things including the various incentive regimes that have been employed over the course of the programme and the simple fact that as you have less work to do there is less choice (and therefore flexibility) in delivery. The key changes in our work mix are:

Costs and efficiency continued

Table 09.14 Changing mix of replacement work

Lower levels of insertion – as we have continued to manage leakage on the network we have managed system pressures as low as practicably possible. This coupled with the profile of the remaining work mix and future growth forecast means that, our ability to insert mains (push plastic mains through the in-situ metallic mains and avoid excavating an entire road) is reducing, causing a significant change in mix and total costs. Typically it costs around twice the rate of insertion to open a main.
The average project length – average project length is a key driver of efficiency. All projects have a fixed cost mobilisation element and the longer the scheme the more this cost is shared driving overall rates down. As we address the most customer beneficial pipes in RIIO-2 this is driving shorter project lengths.
Moving towards larger diameter mains – as we move towards the end of the programme we are completing more large diameter mains (at the top of the tier 1 banding). This has the impact of driving total costs up as generally the larger the main the higher the unit rate (larger mains need greater material costs, larger excavations and more specialist labour).
Work moving into different geographies – as we approach the end of the programme we also have regional variations in rates. For example we must complete more work in East Anglia and central London which is more costly than either the East Midlands or outer London. These changes in location will increase unit rates.

We have innovated to build the tools and capability to help us model this workload allowing us to run multiple scenarios and optimise our programme to the benefit of our customers. We have challenged ourselves to mitigate these cost pressures through considering how we can optimise across totex to deliver the best outcome for our customers and have significantly reduced our totex forecasts as a result from our initial July Plan. Additional detail on worktypes by network and on how the balance of work is changing into RIIO-2 is provided in **Appendix 09.02 Distribution Mains and Associated Services (Iron, PE, Steel & Other)**.

In focus – Insertion rates: optimising our plan to deliver value for our customers

Once we have established that a main is still required and needs replacing, we optimise the design, enabling the use of no-dig techniques such as insertion. Whether we can insert a pipe or not is the most significant driver of total scheme costs and, on aggregate, the most significant driver of cost in our mains replacement programme; we have separate unit costs for insertion and open-cut.

Insertion is generally the most efficient method of replacing mains. This technique, when compared to other options, dramatically reduces the amount of excavation work needed, which in turn reduces cost and disruption to the public. The method does, however, reduce the capacity of the network – the newly inserted pipe is smaller and therefore can transport less gas.

Wherever possible, we will design replacement projects that enable maximum insertion. However, in the following circumstances, it may be more economic to open-cut mains:

- Where capacity and security of supply must be maintained at or near existing levels and reducing the size would compromise customer service (insertion reduces the diameter of the pipe carrying gas).
- Where there are many connections and digging out each connection is more expensive than an open-cut replacement of the entire main (This is particularly relevant for steel pipelines which are more difficult to 'break into' than iron pipes are).
- If mains are in roads with service connections, where it may be more efficient to lay a new pipe in the footpath and abandon the existing main in the road.
- For deep mains, where connections would require large and shuttered excavations.
- For mains with numerous bends and fittings, such as valves and syphons, that must be excavated and removed to allow the insertion of the lengths in between.

RIIO-2 insertion rates

To enable us to have confidence in the assumptions we have made for insertion for RIIO-2 and beyond, we have carried out several studies to test the options available:

- Reviewing pre RIIO-1 delivery and the level of insertion achieved.
- Designing networks using an innovative semi-automated process on a sample of areas.
- Designing networks using a manual approach to validate the automated approach.

Our detailed modelling that we have completed over the summer of 2019 shows that with pressure increases and target reinforcements (where it is cost beneficial to do so), we can achieve higher average insertion rates. For RIIO-2, we have made the planning assumption that an average 86% insertion rate can be achieved on tier 1 mains, given pressure increases and strategic reinforcement.

We do not consider insertion rates above 86% to be as realistic as the level of pressure increases and the reinforcement required would be unsustainable and not cost beneficial for customers. The delivery of this insertion rate will be challenging. However, it is in customers' interests as it equates to a saving of £25m p.a. compared to the 76% baseline. We have reflected this modelling into our leakage baselines and reinforcement volumes within our capital plans.

2" Steel associated with our IMRRP

As part of the IMRRP, we replace all steel pipes ≤2" diameter when found during routine mains renewal operations. This is in view of the marginal cost of undertaking replacement in conjunction with mains replacement activity. The benefit of this investment is an improvement in safety for customers and the avoidance of having to revisit the same location to replace these assets later.

Information about the majority of the ≤2" steel mains is not digitised, and therefore it is not possible to precisely calculate the length we will encounter with routine mains renewal activity. To calculate the volume of ≤2" steel that will be replaced in RIIO-2 we have used previous years' volumes as a function of the length of IMRRP tier 1 being renewed. This is then applied to our RIIO-2 forecast IMRRP mains replacement length.

Table 09.15 2: Steel per km of IMRRP

2" Steel	KM IMRRP (Y5/6)	KM ≤2" Steel (Y5/6)	km ≤2" Steel /km IMRRP
EoE	1064	16	0.015
NL	632	10	0.016
NW	653	18	0.027
WM	526	13	0.025

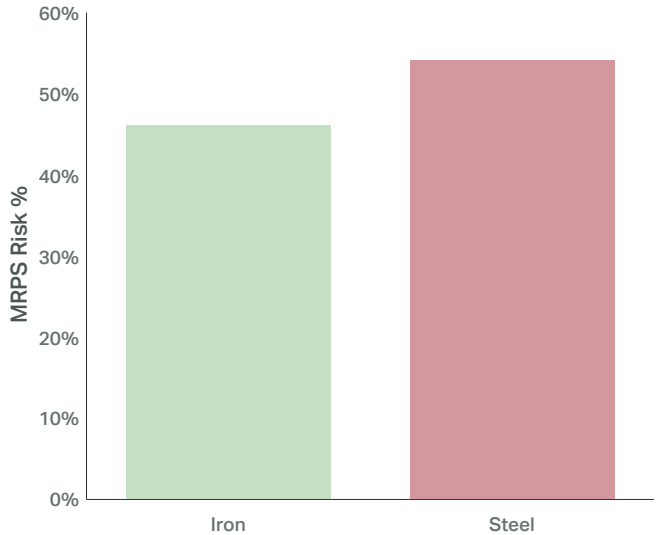
9.7.2 Other safety driven mains (including high risk steel)

We are forecasting to replace 337km of other safety driven mains in RIIO-2 addressing high risk steel or other high risk mains outside of the IMRRP.

We have 5,569km of non-PE assets (metallic, asbestos etc.) which have MRPS risk scores and are not part of a HSE mandated IMRRP programme. 84% of these assets are steel. We have a duty to maintain these assets in an efficient and safe working order.

At the start of the IMRRP the incident risk associated with iron mains was far higher than the incident risk associated with any other category of mains. Over the course of the IMRRP the iron risk has been reduced significantly. We are now at the point where the risks posed by iron is less than that of other materials (see Figure 09.16) The vast majority of these mains are steel mains with a very small volume of asbestos in isolated cases. This has led us to review the risks associated with non-IMRRP assets and propose a new way forward.

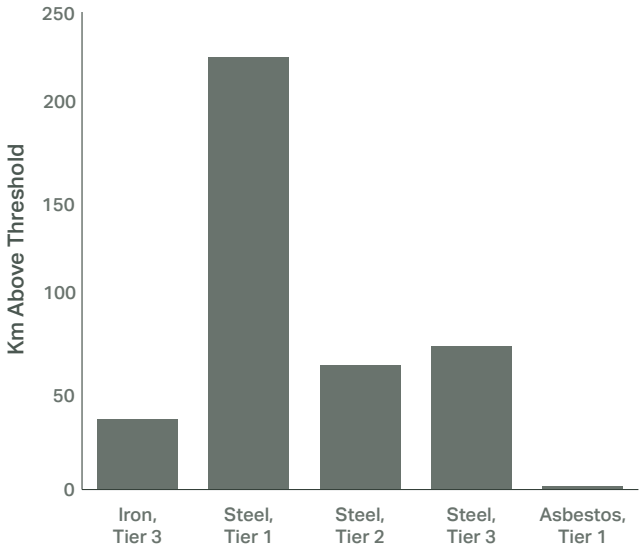
Figure 09.16: MRPS risk for iron and steel



In order to ensure we were able to compare the risk scores of different material types we commissioned an independent expert report by DNVGL. This concluded that 'the mathematical structure and coefficients of the Steel Risk Model are as up to date as the other models used for mandatory replacement. The Steel Risk Model is therefore a valid basis for the risk assessment of steel distribution pipes within 30m of buildings'.

Consistent with the approach to iron mains we have also calculated risk thresholds for mains outside the IMRRP at a level which ensures no individual should be exposed to a risk of more than 1 in 1,000,000 of fatality as a result of being within 30m of such an asset. This creates a risk score at which we should replace the asset to ensure we are appropriately managing the risk. Applying these risk thresholds to the risk scores in MRPS identifies 403km of non-mandatory assets that are above the risk threshold (mains outside of the IMRRP). The majority of these assets are tier 1 steel.

Figure 09.17: Non-IMRRP above threshold



Managing risk in RIIO-2

Our proposed RIIO-2 Plan is to manage all distribution mains using the industry Mains Replacement Priority System and an evolution of the threshold setting approach we have used in RIIO-1.

In order to balance deliverability, keeping customers safe and affordability, we have also looked at options for prioritising the renewal of these high risk mains in RIIO-2. There are three principal options that we considered that are summarised in the table below:

Table 09.16: Mains risk options

	Prioritisation options	Description
1	No prioritisation	This option would see us replacing all mains above the risk threshold
2	Based on qualifying leaks	Replacement of mains that are above the risk threshold and have a leak on the main (as opposed to leaks on adjacent mains that impact on the risk score)
3	Based on age	Replacement of mains above the threshold and laid before 1957

Costs and efficiency continued

DNVGL recommended that we should prioritise based on the quality of manufacture and installation of steel mains through time. This considers improvements in material quality, coating, jointing and installation over time. We agree with this analysis and have included option number three in our plans to renew assets above the pipe specific threshold (for steel only those that were laid before 1957) and all pipes (regardless of age) that are above the community threshold.

The impact of our approach is that we will renew 337km of mains that are above the safety threshold in RIIO-2 which will reduce the overall risk on our networks and ensure we meet our obligations to maintain a safe network. We are continuing to engage with the HSE on this issue, which is supportive of our analysis and proposals, to ensure that we are meeting the expectations of our safety regulator.

9.7.3 Economically justified mains

In total we are proposing to complete 250km (50km per year) of economically justified work across the RIIO-2 period. Under the RIIO framework pipes can be put forward for remediation under cost-benefit principals ('asset management repex'). We consider cost-benefit driven activity a critical element of our asset management strategy as it allows us to deliver maximum value for our customers. Our CBA approach for RIIO-2 is aligned with Ofgem's principles, ensuring that direct and indirect costs are captured; it is transparent in its calculations and follows cost-benefit best practice. For further detail on the CBA approach, please see **Appendix 09.00 Overview: how we have developed our investment plan**.

The investment need and delivering maximum benefit for customers

Selecting mains on a CBA basis allows us to renew pipes that have significant operating costs or other customer impacts associated with them. Costs can be caused by a pipe experiencing leaks, which may be caused by ground movement. Mains that have repeated leaks can have low MRPS risk scores and, therefore, not feature as a safety pipe. Such mains can continue in operation for many years because they do not pose a high safety risk to the public.

Our RIIO-2 CBA approach is a significant improvement over the top-down methodology used in RIIO-1. The approach for RIIO-2 uses a bottom-up assessment of all pipes in the Cadent network to assess their individual CBA attributes. At the same time, the approach aims to group CBA-positive mains activity into larger schemes to improve efficiency.

To establish our proposed lengths for RIIO-2 we tested customers' preferences for additional cost beneficial pipe replacement beyond the safety driven minimum, testing a zero option, with two enhanced levels of investment. The majority of customers chose enhanced investment levels, although some customers selected no additional investment.

9.7.4 Multi-occupancy buildings

Our customers in MOBs are our worst served customers in the event they are interrupted and as we have acknowledged publicly, we must improve the service we offer to them. We have set out in full our strategy for improving performance for these customers in **Appendix 09.04 Transforming the Experience for Multi-Occupancy Building Customers - Risers**. This covers all aspects of our service provision from maintenance, investment and welfare and engagement.

We want to ensure customers are not left vulnerable without gas and are kept safe. This requires us to do work to address the risks to these objectives. We have grouped these risks into three areas:

- Customer service – reduce the number and duration of interruptions and continue to work to mitigate the impact of any interruptions that occur.
- Process safety – preventing a network gas escape causing an explosion or fire: we will invest to ensure that our assets remain broadly acceptable or broadly acceptable if ALARP (as low as reasonably practical) level risks, and by targeted intervention we expect to improve the assets that today have the highest risk profile and reduce the number of interruptions.
- Building safety – protecting customers from non-gas safety risks associated with our apparatus: we will identify and fix faults and work with building owners working closer with them on building safety will also establish relationships that will help if we need to carry out work to restore supplies and mitigate the impact of supply failure.

In producing our plans we have analysed the impact they will have on each of these three areas.

Options considered

We considered several investment options, which we discussed with customers. Detail of these options and our engagement are included in **Appendix 09.04**. Here is a summary:

- Invest to deliver flat monetised risk (monetised risk is calculated using an Ofgem agreed model that takes into account different risks and combines them into a single monetary value). This option was considered because there is an expectation that monetised risk should be flat or decrease over time and we needed to understand the customer bill implications of doing this.
- Invest to minimise numbers of interruptions: modelled as investing to deliver a 4% p.a. reduction in interruptions. This option was considered because interruptions are important and we needed to understand the cost benefit of investing to reduce them.
- Balanced investment: we carried out analysis using an enhanced version of the monetised risk model to determine what combination of actions and investment levels would produce the best NPV for customers and then model the impact on the three risk areas.

In every case we included mandatory work examples which include restoring supplies after interruption and the repair of faults that result in our not complying with buildings and other regulations.

Based on a combination of customer feedback and our analysis of the cost benefit to customers of the different options, we have selected the 'balanced investment' option as the basis of our Plan.

Summary of proposed actions and what they deliver

Our proposed actions are designed to work together as a package. They deliver by improving our assets, dealing with issues more effectively and mitigating the impact of failure on customers. Table 09.17 describes these actions and how they support our customers. Details of these proposals are included in **Appendix 09.04**. In total the proactive replacement of risers equates to £109m of our repex plan over the five years of RIIO-2.

Table 09.17: Our proposals for Multi-Occupancy Buildings

Action	How action improves safety	How action improves customer experience
Improve asset condition by targeted intervention.	Reduces the risk of operating riser pipes by eliminating a trip hazard.	Reduces number of interruptions by: • Better condition assets are less likely to fail. • Repair of faults prevents their impacting customers.
Improve operational response to asset failure.	Reduces risk through faster and more effective repairs that utilise the best possible techniques and innovations.	Reduces number of interruptions and delivers faster restoration times.
Create building specific management plans for all High Rise Buildings (HRBs) to improve delivery of proactive intervention and operational response.	Working with the building owner enables a more holistic approach to safety. This is aligned with the principles being recommended by the Hackitt review.	Improves customer experience by establishing a relationship with the owner and identifying customers in vulnerable situations to anticipating their needs.
Continually work to improve interruption mitigation measures.	Improving welfare provision and response to customers will enhance their safety by avoiding dangerous behaviours such as the use of old standby appliances and avoiding 'cold homes'.	Improved welfare package reduces the impact of interruption on customers.
Energy Exchange Programme, selective elimination of risk where there is cooking only load or very few customers in a large building.	Eliminates ongoing gas related risk from impacted buildings.	Progressively reduces number of inefficient supplies to buildings reducing bills in the long run.

9.7.5 Service not associated with mains replacement

We also complete a number of service replacements that are not associated with mains replacement. These are high-volume, low-cost activities and we have used the RIIO-1 volumes and cost as the basis of our forecast. We have ruled out a do-nothing scenario as this work is customer or safety driven. Except for bulk steel renewals, the activity is reactive.

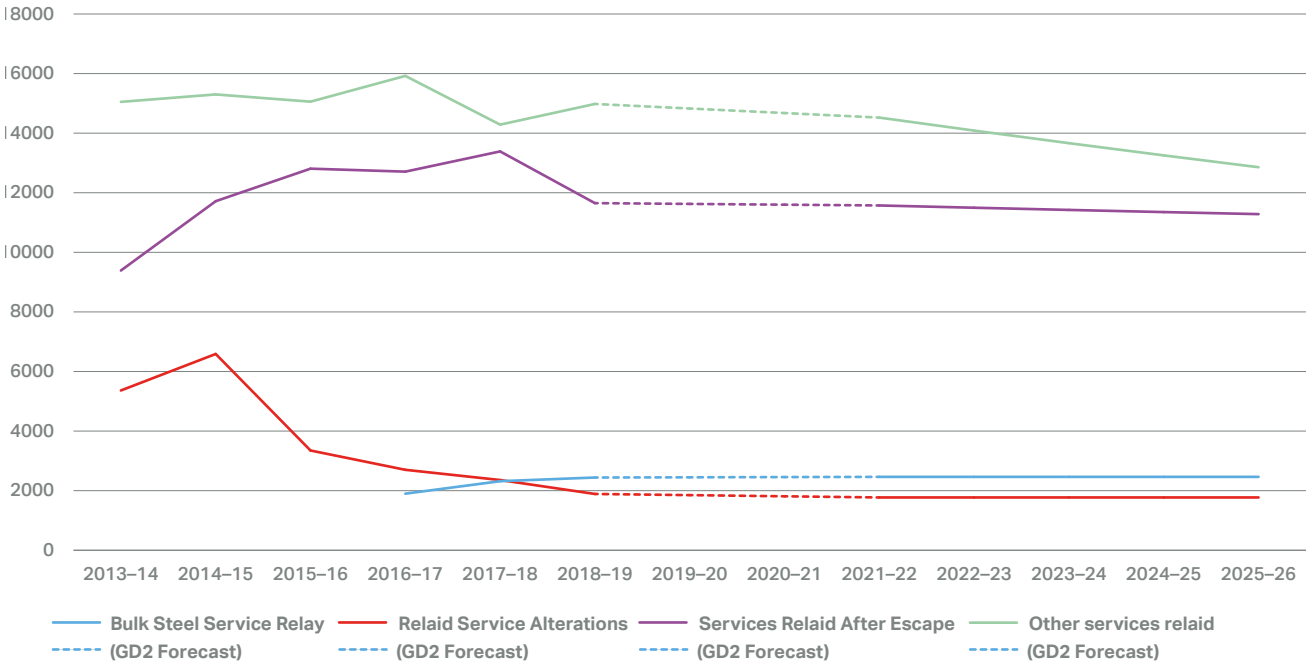
To forecast the number of service repairs we would expect in RIIO-2, we have used historic trends adjusted for the investment we are making in the IMRRP. There are four drivers of work in this area and the methodology we have followed for each of them is set out below:

- **Services Re-laid After Escape –** This work is driven by asset health. As the service pipes age, the rate of failure is expected to increase. However, our mains renewal programme is counteracting this through the renewal of mains-associated services. Over RIIO-1, we have seen year on year variation in the replacement rate, driven by service failure but no overall reduction in failure volume. For RIIO-2, we have taken the average replacement over the past three years and applied a top-down workload reduction to account for the delivery of the IMRRP.
- **Re-laid Service Alterations –** This is a customer-driven activity and is not affected by the replacement of services through the IMRRP. We have observed a decrease in the volume of service alterations over RIIO-1; we have therefore used the last available year of data (minimum volume experienced in RIIO-1) to forecast the work into RIIO-2. Using an average volume over RIIO-1 would have lead to a higher volume in the forecast.
- **Bulk Steel Service Relay –** Regulation 13 of the Pipelines Safety Regulations 1996 ('PSR') requires the operator of a pipeline to ensure that it is maintained in an efficient state, in efficient working order and in good repair. This duty is absolute and, in the case of steel service pipes, maintenance means replacement. The bulk steel process identifies locations with high service-failure rates (service failure is five times more likely than average) and proactively promotes the renewal of the services in that area. This is a new initiative introduced in RIIO-1 and therefore we are not proposing to change the approach until we have delivered the work for a period and have been able to assess the benefits. The volume of services this promotes will not reduce through mains replacement activity and therefore we have used the average volume over the past years to forecast workloads.
- **Other Services Re-laid –** This work is customer driven, with most of the work being to address poor-pressure issues caused by the growth in customers' demand for gas. We saw an increase in workload over the first years of RIIO-1, with a flattening off and decrease in the 2018/19 reported numbers. To forecast RIIO-2 volumes, we have used the last available year of data (minimum volume in recent years) to forecast the work into RIIO-2. This work is split into PE and Non-PE renewal. On the Non-PE workload, we have applied a top-down workload efficiency to account for the delivery of the mains renewal programme.

The volume of interventions forecast can be seen in the chart below. This totals £219m over the RIIO-2 period (circa £44m p.a. across our four networks).

Costs and efficiency continued

Figure 09.18: Forecast non-mains service replacement volume



9.8 Our capex forecast

Our capital investment programme is critical in ensuring security of supply, reliability and safety of our network for our 11m supply points. There are three principal aspects to our investment programme.

First, we invest in our above ground network to ensure it continues to deliver the levels of service our customers expect. This includes a range of investments from complex systems such as our pressure reduction systems and waterbath heaters through to the integrity of civil structures and site security.

The second aspect of our capital programme is all about ensuring we have the right technological and operational assets in place to support our people in delivering a service they and our customers can be proud of. This includes investing in tools, equipment, vans, operational sites and critically the IS infrastructure to allow us to issue, record and measure work for our customers as well as our cyber security programme to keep our operational and non-operational systems safe from a growing number of external threats.

Finally, we invest in the form of new connections to the network. Although this is a competitive market we incur capital spend where we are obligated to subsidise customer driven works through either the domestic load connection allowance (we fund the first ten metres of domestic connections) or where a customer requested diversion or reinforcement means we have to replace an asset that we would have replaced anyway due to its age and/or condition (betterment).

In focus – Enabling UK infrastructure development

UK infrastructure continues to develop and expand, and to meet this need we are required to move our assets if they are constraining growth. The majority of this work is funded by the development company, for example in constructing London's 'super sewer' Thames Water funded £5m of alterations to Cadent's network in London. In RIIO-1 we have already begun work on moving and protecting assets to accommodate the route of HS2 – this work will continue throughout RIIO-2 as the route cuts through our area of operation from London to Birmingham and beyond.

We have a statutory duty to move our pipelines and other assets where they compromise safe development. We have worked closely with infrastructure developers to understand and respond to their needs in a timely and efficient fashion. In some cases the infrastructure provider delivers the required diversion work themselves and we adopt the completed assets.

RIIO-2 will see Heathrow Expansion and work on the new Dartford Crossing as well as a range of smaller infrastructure projects across our regions. We forecast that the workload driven by growth will be 30% higher p.a. in RIIO-2, particularly as a result of HS2. Although the majority of this work is funded by third parties we need to ensure that we are resourced to deliver this increase in addition to other activities.

Not all of our customer-driven diversion work is fully chargeable to the requestor. Hence this category adds to our overall length of replacement work. We anticipate this to be around 24km p.a. for the RIIO-2 period.

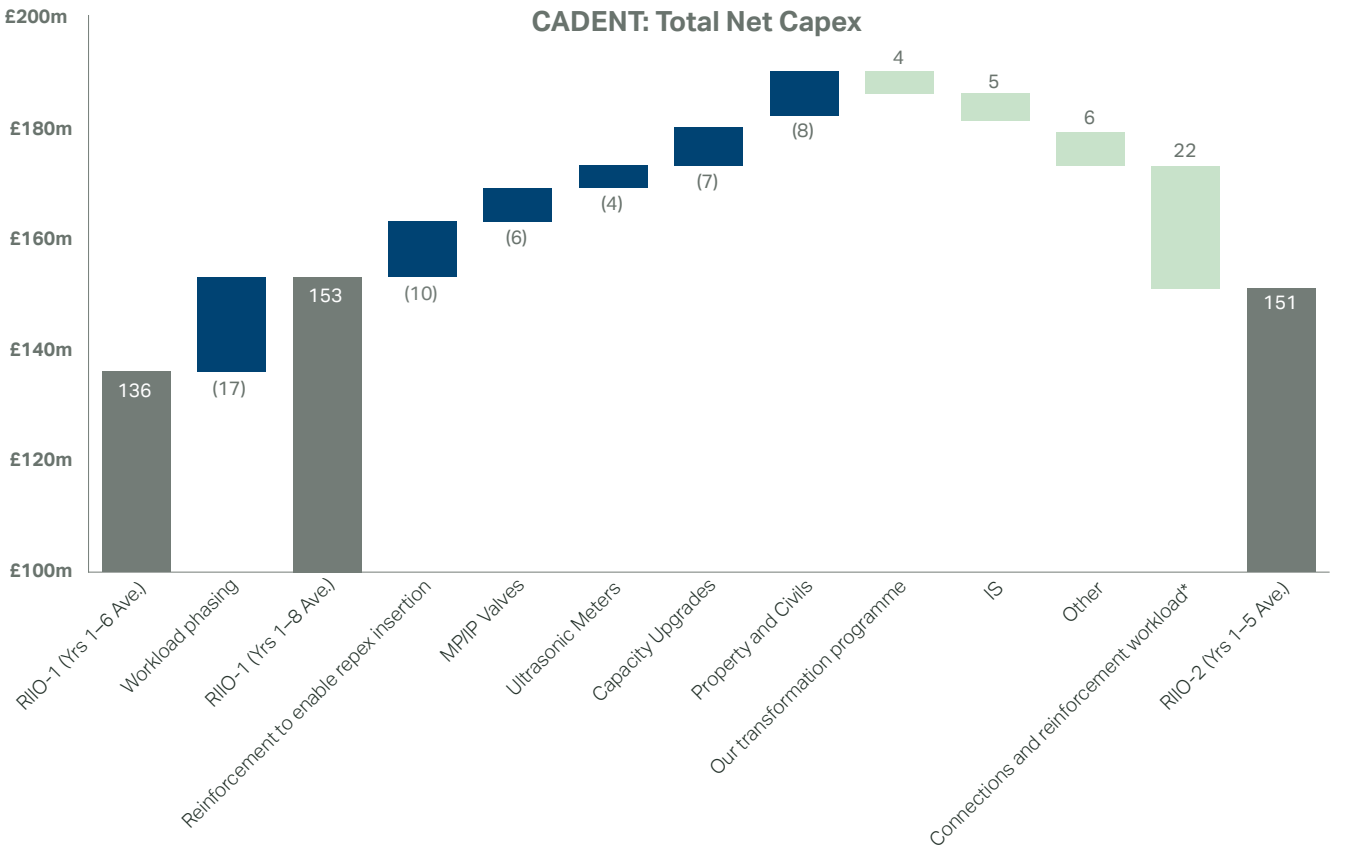
Table 09.18 sets out our forecast capital expenditure for the RIIO-2 period. In total we are forecasting to invest £754m (£151m p.a.) over the period.

Table 09.18: Capex summary

	RIIO-1			RIIO-2						RIIO-2
£'m (2018/19 price base)	2019	2020	2021	2022	2023	2024	2025	2026	RIIO-2 Total	Av.
LTS Pipelines	(2)	3	0	9	6	4	6	1	**27**	**5**
Storage (Non-LTS)	–	–	–	0	1	–	–	–	**2**	**0**
PRS	25	39	40	16	20	21	15	14	**87**	**17**
NTS Offtakes	7	6	6	8	17	13	13	7	**60**	**12**
Embedded Gas Entry Points	0	–	–	–	–	–	–	–	**–**	**–**
LTS	30	49	46	34	46	39	34	23	**176**	**35**
Reinforcement (<7barg)	13	15	18	13	12	12	6	6	**48**	**10**
Governors	10	13	10	4	3	4	3	3	**17**	**3**
Connections	37	38	38	22	22	22	22	22	**112**	**22**
Other Capex	61	94	68	68	79	79	60	50	**337**	**67**
Of which: IT & Related Telecom	30	44	19	26	30	24	23	18	**121**	**24**
Land, Buildings, Furniture & Fittings	5	7	8	1 6	21	21	9	5	**73**	**15**
MP/IP Valves	3	9	6	8	8	9	9	9	**44**	**9**
Transport & Plant	10	9	10	16	17	12	14	5	**65**	**13**
Capex: Adjusted	**160**	**218**	**190**	**157**	**180**	**168**	**140**	**109**	**754**	**151**
Memo items										
Output Cases	–	–	–	5	5	16	16	17	**59**	**12**
Xoserve	8	10	9	–	–	–	–	–	**–**	**–**
Capex: Reported	**168**	**228**	**198**	**162**	**185**	**184**	**156**	**126**	**812**	**162**

The trace shown below shows the key movements comparing our RIIO-2 forecasts with our RIIO-1 average spend.

Figure 09.19: RIIO-1 vs RIIO-2 average Capex



* RIIO-1 Totex includes areas of spend which we are proposing become Uncertainty Mechanisms in RIIO-2. We have re-baselined the level of uncertain costs that are being requested via Ex Ante allowances.

Costs and efficiency continued

Table 09.19: Key movements in our average annual costs (Capex)

Source of movement	Category of movement	Comment	Average annual cost
Key movements outlined between RIIO-1 yrs 1–6 average and our RIIO-1 forecast 8–year average spend			
Workload phasing	Volume	We have a number of asset health investments we are completing over the remainder of RIIO-1 which will increase our average spend. This includes the completion of more complex capital projects to deliver our monetised risk output commitments alongside increased investment in IS and connections.	£17m
Total			**£17m**
The next step on the trace shows the change in average annual spend between RIIO-1 and RIIO-2			
Reinforcement to enable repex insertion	Volume	As described in our repex commentary we have looked to a totex solution to mitigate forecast decreases in insertion rates. By increasing our reinforcement spend we are able to achieve higher levels of insertion and reduce the impact by £18m p.a.	£10m
MP/IP Valves	Volume	In RIIO-1 we began a programme to improve the condition of MP valves – following survey work we have now begun to invest in the region of £7m per year in RIIO-1. This work will continue and expand into GD2 to ensure compliance with our pipeline safety regulations requirements. Valves need to be operable to contain leaks on pressurised pipelines, without these controls the consequence of pipeline failure is greatly increased.	£6m
Ultrasonic Meters	Volume	We will begin a ten year programme to replace all of our 1960s/70s mechanical 'orifice plate' measuring devices with modern ultrasonic units. This will improve metering accuracy and reduce whole life costs.	£4m
Capacity upgrades	Volume	We are investing to increase capacity at a number of our Above Ground Installations to ensure they remain compliant with our 1 in 20 standards. This investment ensures we will continue to deliver the levels of reliability our customers and stakeholders expect.	£7m
Property and civil structures	Volume	We have reviewed our property strategy and have tested options through CBA to ensure we both meet our operational requirements and deliver at the lowest whole life cost. We are also investing to protect civil structures that are in our care and require remediation to ensure they meet current safety standards.	£8m
Our transformation programme	Price	The continued implementation of our transformation programme as described earlier in this chapter, which in capex is focused on delivering further benefits associated with our IS transformation and continual improvement through innovation and competition.	£-4m
IS	Volume	Our IS costs are decreasing when compared with RIIO-1 as we have moved many of our services into the cloud and have completed our separation from National Grid.	£-5m
Other	Volume	Reductions across a number of areas as we have optimised our capital plans, for example implementation of more targeted interventions on our governor population.	£-6m
Connections and reinforcement workload	Volume	We are proposing to include an uncertainty mechanism for our customer driven workload due to uncertainty in our cost forecasts.	£-22m
Total			**£-2m**

In focus – Our approach to asset management

We have applied asset management best practice throughout our Business Plan to optimise our programme and make the right decisions for current and future customers.

Over the last five years we have invested heavily in developing our asset management capabilities through improving the quality of our asset data though surveys and data analytics, developing and implementing risk-based prioritisation and introducing optimisation software that allows us to perform complex scenario analysis. As part of our continuous improvement culture we also seek out best practice and engage with other regulated businesses such as Network Rail, Severn Trent and the Canal and River Trust.

For our investment plan we have a clear process that we have followed which is illustrated in the flow below. This has helped us ensure our investment plan is targeted according to our customers' expectations, presents the most optimal outcome and has the appropriate regulatory treatment.

This is described in more detail in **Appendix 05.02 - Detail of our 6 phases of engagement**. In summary, we first look to establish the need which involves identifying customer expectations, considering asset condition and performance and our legislative requirements. We then develop and analyse options for resolving the issue including build and non-build solutions and supporting cost benefit analysis. We then test these options against our ambition and strategic priorities before assessing the most appropriate regulatory treatment that ensures the risk is managed effectively and customers are protected.

The following section summarises our capital plan by area of spend. All of our Plans have been through detailed review and options analysis. This detail can be found in the Appendices to this chapter and we have pulled out summaries of the main areas of spend below. We have provided the Appendices in the form of Engineering Justification Papers ('EJP') and Major Project Justifications ('MPJ') as set out by Ofgem in their RIIO-GD2 Investment Decision Pack guidance v2. In line with this guidance we will provide the remaining packs as part of our December submission.

9.8.1 Local transmission system (including governors)

Gas is delivered into the Local Transmission System (LTS) of each of our networks via offtakes from the NTS. Gas under high pressure in the LTS is moved around to feed our distribution networks and reduced to lower pressures, before being delivered to customers.

This contains a number of subcategories of spend, the most material of which are Pressure Reduction Stations, Governors and NTS offtakes.

i) Pressure Reduction Stations ('PRS') (including Governors)

Our pressure reduction stations regulate the transition of pressure from the HP network to IP, MP and LP. Investment in this area is required to ensure compliance with Pressure System Safety Regulations and maintain security of supply for our customers. Pressure reduction systems are aged and many are now obsolete with no commercially available spares. Through a refined and improved approach to targeting we will reduce investment in GD2 whilst maintaining the same level of risk.

In building our Plan we considered three options in this area:

Option 1: We also worked with an independent consultant to take a fresh look at how we might deliver work in this area. We provided all of our asset and failure data to Enzen and asked them to produce a risk based response unconstrained by our current way of working. The option they developed combined an understanding of obsolescence, asset performance (both observed maintenance rates and wider industry insight on the performance of different makes/models).
Option 2: We used our risk models to develop a 'maximum whole life benefits' option.
Option 3: We used our risk models to develop a 'hold total monetised risk flat option'.

The preferred approach (Option 1) identified a lower cost, targeted approach focused on replacement of failing components within obsolete systems. Whilst all three options will maintain risk, the targeted approach will do so at lowest cost and we have therefore included this in our Plan. More detail on these investment cases can be found in **Appendices 09.07 and 09.08**. We applied this same approach across all of our pressure tiers (> and < 7barg) which covers investment across both our PRS and Governor investment lines. The solution we have proposed in this area is an example of how we have applied asset management best practice to deliver the best outcome for our customers.

Costs and efficiency continued

ii) NTS offtakes

Within this category there are two main areas of change, meters and capacity upgrades.

Meters (+£4m p.a.) – We will begin a ten year programme to replace all of our original 1960s/70s mechanical 'orifice plate' and 'turbine' measuring devices with modern ultrasonic units. These units have given good service since installation however we can no longer secure spares, engineered to the required standards to guarantee accuracy, to maintain the assets in service.

Replacement will also improve accuracy of recording, a positive outcome for Shippers, and avoiding meter outage due to failures. We have evaluated frequency of failure and consequences. For consequence analysis we have considered the duration of a failure, the size of the sites being impacted and the availability of alternative supplies. This has allowed us to rank our sites on the basis of risk. We have then considered different packages of work within the ranked list.

Option 1: Replacement of entire metering system upon failure over 5 or 10 years.
Option 2: Replacement of asset components upon failure.

Given the low failure rate observed to date we have selected option 1 over a 10 year programme which will see the, replacement of high risk assets in RIIO-2 and medium in RIIO-3.

Capacity Upgrades (+£7m p.a.) – We have identified a number of sites which due to demand increases in their supply networks no longer meet their 1 in 20 obligations for supply resilience. Whilst customer supplies are secure under normal operation, there is a risk of interruption to whole communities under extreme weather conditions – the time at which customers most need to be kept warm. We will invest to ensure a reliable and resilient supply is maintained for our customers.

As part of our response to the capacity constraint we have considered both onsite and offsite solutions. For offsite it is possible to reinforce or upsize assets in the wider network to remove the constraint. For onsite we have conducted a study to identify the specific assets or components which are limiting flows and considered replacement of assets in different combinations to achieve the desired outputs. This work has been supported by design studies to better understand the costs of different options.

Using this approach we have identified the least cost solution to provide the necessary capacity as opposed to a one size fits all approach or full site rebuilds. This has been applied on a site by site, asset by asset basis. This will achieve our legislative requirements at the lowest cost to customers. More detail will be provided in the engineering justification paper for capacity upgrades in line with the requirements set out by Ofgem.

9.8.2 Reinforcement and connections

The Gas Licence Condition 4B outlines that for domestic customers who require a gas connection within 23m of a relevant main that the costs incurred in delivering the work for the first ten meters on public land is paid for by general consumers through transportation charges. Enabling reinforcements are triggered by the need for our network to accommodate new housing, transport, gas fired peaking generation plants, business or industrial developments approved by the Local Authorities.

We are seeing a marked increase in spend to address local developments particularly in the East of England (Oxford/ Cambridge corridor etc.). We have also seen a marked increase in reinforcement for 'peaking generation' (garage sized gas turbines installed to produce electricity during price peak conditions) which we expect to continue.

Within connections our transformation processes and new contracting arrangements are forecast to reduce unit costs. Based on analysis of housing data we are forecasting an increase in connection volumes.

We have conducted external studies to evaluate the impact of growth through time. Given the customer driven nature of this work there is limited optionality. However we recognise the challenges in forecasting demand for new domestic connections. Whilst there is a trend between new housing and new connections, the timing and predictability of housing forecasts is less certain, with delays in planning applications and dependencies on investments from developers. Our options analysis in this area has therefore focused on the most appropriate, and fair, regulatory treatment for our customers. The options considered in this area are outlined below (with more detail provided in **Appendix 10.00 Our approach to managing risk and uncertainty**.

Table 09.20: Summary of uncertainty mechanisms

Mechanism Option	Description
Volume driver	This relies on a relevant unit cost estimate to forecast costs when volumes of work are uncertain. This would effectively address the uncertainty around changing customer demand in RIIO-2. It would also make use of cost information gathered from our existing experience of reinforcements in RIIO-1.
Re-opener mechanism	A re-opener accounts for uncertainty in costs when both the design and requirement for projects in RIIO-2 is unknown. As uncertainty in these areas is driven by volumes, rather than the specification of a project, this is not applicable in this setting.
'Use it or lose it' allowance	This would involve a Price Control Deliverable ('PCD') as part of our RIIO-2 Plan. Whilst this would protect customers from under-delivery, a PCD does not address the challenge we face in forecasting a total cost given uncertainty in volumes. There is also a risk that barriers are created if there are insufficient funds to deliver the required work.

In summary our assessment concluded that the most appropriate treatment for these areas of spend is a volume driver and we have reflected this in our base Plan. This addresses the volume uncertainty and makes use of the established unit costs for these areas of spend. We have included a base level of investment in our totex submission with any growth then being managed through the proposed uncertainty mechanism.

9.8.3 Other Capex

We have a number of other areas of investment including IS, property, vehicles, tools and equipment and valves. The following section summarises the most material changes in these areas.

i) Information Services ('IS')

We are proposing to invest £121m across RIIO-2 in our information technology and services. This includes investing in:

- **Core IS services (£86m)** – Renewal and modernisation of our existing IS estate embracing the latest technology including cloud computing to keep the energy flowing. Further detail on our IS investment plans can be found in **Appendix 09.30**.

Core IS services – Cadent in the cloud

Cloud computing is now widely recognised as providing the best, most efficient way of procuring computing capability. It brings a number of benefits:

- A low-cost, scalable, and highly reliable infrastructure platform.
- By adopting a public cloud platform we are able to secure low variable/pay as you go costs (that can scale with business and applications) instead of the need to invest upfront on infrastructure.
- We do not need to work around long lead times for the provision of services and computing environments as these are now rapidly deployed in the cloud, accelerating business agility.

In the later years of RIIO-1, Cadent is moving to secure public cloud computing, away from traditional enterprise IT supported by in-house or private cloud data centres. The expectation is that the current application landscape will look very different through RIIO-2.

We expect cloud computing can help us radically change things during the next RIIO period:

- Cloud computing is a means by which computing becomes fully commoditised and invisible, driving stability, resilience and availability and a benchmark for performance and cost.
- Data centres will operate like ecosystems. Commoditised hardware and run time environments will converge with value added services offered as standard to combine functionality. We expect that automation (robotics), machine learning and integration will become ubiquitous and connections and changes in this integrated environment will occur automatically.
- Other cloud services, for example data & analytics and the internet of things (which we will seek to utilise to increase our data collection from our networks and improve our decision-making) will become practical propositions. Before cloud, these would require significant effort, time and money to establish and maintain.
- Cadent's IS will continue to mature as an organisation, potentially taking on a larger responsibility, brokering cloud services with a mix of service providers, managing commercial arrangements, multiple cloud services, partners and interactions. This needs investment in new skills (cloud – architecture, system administration, operations management, billing, monitoring, vendor management, business relationship management).

The benefits of this approach are built into our overall efficiency forecasts.

- **Data, Digitalisation and IT innovation (£17m)** – We are investing to support our ambition to become a data driven digital business. This supports the recommendations by the Energy Data Task Force and will ensure we play a full part in the digital energy system of the future. We will set out more detail on our digitalisation strategy in our December Plan. Further details on our data and digitalisation strategy can be found in **Appendix 07.02.02**.

Data, digitalisation and IT innovation – Building a data driven business

Data is central to everything we do as a business. With our renewed focus on our customers, we are investing in data and the effective utilisation and management of data as a key enabling capability to make us the best at what we do – keep the energy flowing to our 11m homes and businesses with exceptional safety and value outcomes.

Following a comprehensive data maturity assessment, and embracing the opportunities presented as we migrate to the cloud and separate from National Grid, we know where we need to invest to realise our vision and set the standards that our customers love and others aspire to.

We have experimented with innovations around Machine Learning and Artificial Intelligence to drive a whole new approach to how we manage our plant protection.

Through this data driven innovation we will be able to improve safety across our network by analysing a broader geographical area of our network than we currently do, all at a lower operating cost. This will mean we can decommission existing practices of using helicopters and line walk crews, further improving safety within our operations.

Part of our roadmap is to explore the development of a Digital Twin of our network, which will provide the flexibility to augment real world scenarios, helping us plan the most effective maintenance works and optimise distribution of gas. In this context we are reviewing the output from the Energy Data Task Force.

Our move to cloud computing has presented a number of fantastic opportunities around the Internet of Things and Big Data, where we plan to invest in a range of innovations, to build on our network and create a sophisticated smart network that generates new data that will provide insights to drive effective planning across our distribution network. In total we are investing £8m in IS projects that either directly or indirectly build increased capability in this area.

- **Cyber security (£18m)** – Investing in the security of our IT and operation technology estates. As we approach RIIO-2, cyber security is an area of increasing focus. New standards are being determined for a wider set of systems as part of the NISR. We need to ensure we make the necessary preparations to protect all of our systems and data, and prevent service failures for our customers. We discuss our cyber resilience and Business IT resilience in section 7.2 of **Chapter 7** in more detail and provide our full strategies in **Appendices 07.02.00 and 07.02.01**.

ii) Ensuring the physical security of our key assets

Alongside our cyber security plans we have also set out our physical security requirements. We have been working with BEIS to understand how threats are evolving and have contributed to the development of their new PSUP document which describes the levels of protection required for sites of different sensitivities. We have presented network analysis showing the number of customers reliant on each of our sites and BEIS have confirmed those sites which need protection and to what standard. The details of this work are restricted but the need to provide and maintain protection at 19 sites has been confirmed at a total cost of £21m.

Costs and efficiency continued

iii) Property and civil structures

Our property costs represent the cost of running our property estate including our central sites and our regional operational depots. In total this represents £58m over RIIO-2 for our property estate and £15m for civil structures (an £8m p.a. increase in average spend). The majority of this increase is driven by our property strategy which we have reviewed for RIIO-2. As we are reducing our headcount through our transformation process we have the opportunity to rationalise our property portfolio. We have considered a number of rationalisation options as part of our decision-making, including a move to a single site, split teams over two sites and retaining existing buildings. We have also considered different levels of refurbishment required through time. Although there will be an increase in spend in RIIO-2 to facilitate change our investment appraisal has identified this as the least cost option with a positive payback in RIIO-3.

iv) MP and IP valves

To ensure we remain compliant with Pipeline Safety Regulation we need to maintain the condition and operability of valves on our medium and intermediate pressure network. These critical valves were installed when the pipelines were originally constructed, up to 50 years ago, and have had limited remediation since. Our inspection programme during RIIO-1 has raised a number of issues around valve operability. Investment will vary from rebuilding of a chamber which has collapsed following third-party work, reinstating pressure points which have aged or been damaged or more comprehensive interventions to replace whole valve units.

We have examined options looking at the rate of delivering this programme. In summary the requirement to comply with PSR and the absence of a delivery constraint we are planning to complete the work over five years. This is a reasonably practicable approach and will see us invest £34m.

9.9 Non-controllable opex

Our non-controllable costs are operating costs borne by networks but not part of totex due to their non-controllable or semi-controllable nature. We expect that these will amount to around 13% of the domestic bill impact in RIIO-2 on average.

By far the largest component of this category is network formula rates. These are based on rateable values periodically assessed by the Valuations Office but are also influenced by the government's 'pence in the pound' decision when targeting rates revenue (i.e. rateable value x pence in pound = network rates bill). Networks actively engage with the Valuations Office in order to minimise costs. The implementation of the next rates review will coincide with the start of RIIO-2. We have emulated the approach taken by the Valuations Office to assess possible rates levels in the next price control period. In theory, we would expect to see reductions corresponding to the average regulatory allowed revenue profile.

Shrinkage is the cost of gas lost from the system, mainly from leakage, but also from theft and use in our own processes. Our Plan assumes shrinkage volume reductions of between 14% and 17% in RIIO-2, mainly driven by our ongoing mains replacement programme and pressure management. However, shrinkage costs are also influenced by the wholesale price of gas, which can be very volatile. The long-term forecast for gas prices combined with our expected volume reductions results in a fairly flat impact to consumers across RIIO-2.

Other smaller elements of pass-through cost are Ofgem licence fees, and Xoserve costs (key activities include transportation billing process and systems, supply point administration and demand estimation).

In total we are forecasting an average annual cost of £334m in RIIO-2 as detailed in the Table below.

Table 09.21: Forecast non-controllable costs

2018/19 Prices	2019	2020	2021	2022	2023	2024	2025	2026	RIIO-2	Average annual
Network Rates	203	202	200	175	175	175	175	175	**874**	175
NTS Exit Costs	89	92	102	106	106	102	99	96	**509**	102
Shrinkage	25	14	18	17	16	15	15	14	**77**	15
Established Pension Deficit Recovery Plan Payment	39	40	40	40	34	0	0	0	**74**	15
Xoserve	0	0	0	14	14	10	10	10	**57**	11
Ofgem Licence	8	8	8	8	8	8	8	8	**41**	8
Innovation (TBC)	4	5	6	7	7	6	6	6	**32**	6
Unfunded Innovation Costs	0	1	1	1	1	1	1	1	**4**	1
PPF Levy Costs	0	0	0	0	0	0	0	0	**0**	0
Pension Scheme Administration Costs	3	3	5	0	0	0	0	0	**0**	0
NTS Pension Recharge	20	0	0	0	0	0	0	0	**0**	0
Bad Debt	0	0	0	0	0	0	0	0	**0**	0
Supplier of Last Resort Claims	3	3	1	0	0	0	0	0	**0**	0
Non-controllable costs	**395**	**368**	**382**	**366**	**361**	**318**	**313**	**310**	**1,668**	**334**

9.10 Cost confidence

A key feature of Ofgem's business plan assessment is the treatment of high and low confidence costs. Within **Appendix 09.21** we have provided our view of Ofgem's ability to set allowances with confidence in more detail. This is a new area of policy and we look forward to working with Ofgem on developing this further up to initial determinations in the summer of 2020.

We have developed a systematic approach to help with this assessment and this is summarised in the figure below. This is a 2 stage approach that first considers the information available to Ofgem based on a number of inputs including for example regression analysis, trend data and market competition. We have then considered mitigations that have been put in place either through the development of the RIIO-2 framework (RPE indexation for example) or through our own business plan proposals (use of volume drivers in connections for example).

Figure 09.20: Cost Confidence for setting allowances

Factors		Developments/Mitigations		
• Totex regression updated • Bottom-Up regressions • Technical reviews • History trends • GDN comparators • Level of market purchased • Advanced project lifecycles	✚	• NARM & CBA developments • Identified inconsistencies • Indexation (especially labour) • Uncertainty mechanisms	▶	95% High Confidence 5% Low Confidences (48% Blended Sharing factor)

Our view of costs at present suggests the vast majority of our totex can be considered as high confidence (94%) which would equate to a blended sharing factor of 48%. This is enabled by mitigations we have put in place including volume drivers, competitive tenders and capturing large uncertain projects such as HyNet North West as re-openers to be considered when we have further developed the project.

9.11 Real Price Effects (RPEs)

We expect Real Price Effects ('RPEs') to be a higher profile issue at RIIO-2 than at RIIO-1 for two reasons. In order to remove a source of potential windfall gains or losses, Ofgem has decided to put in place a system of cost indexation so that certain cost allowances will flex in the period following changes in appropriate indices, which will feed through to allowed revenue in period. Second, because all revenues in RIIO-2 will be indexed by the CPIH measure of inflation rather than RPI, and since CPIH is typically up to 1% lower than RPI, we would normally expect the gap between nominal and real prices to be up to 1% greater than previously under RPI indexation.

We have supported Ofgem's proposal to index RPEs, subject to ensuring any index is representative of network costs, workable in practice and applied to material cost items. We propose the application of indices where the potential price variation for any costs as compared to the Plan is likely to be at least 0.5% of controllable totex, which equates to 0.2% of RoRE for Cadent. Against these criteria at this early stage of the process we propose that RPE indexation should be applied to labour (including contractors), oil which impacts heavily on material costs of PE pipe and plant hire.

Within our Plan, over the period of RIIO-2, we have used the latest forecast from March 2019 from the Office of Budget Responsibility ('OBR'), for labour and oil which are illustrated relative to CPI in Figure 09.21. From a starting point of 2018/19, labour costs are forecast to rise steadily to be 10% above CPI by 2025/26, whereas oil prices are forecast to decline sharply in 2019/20 and only gradually recover, such that by 2025/26 they will have risen by around 20% less than CPI. As discussed RPEs will have a more prominent impact on totex in RIIO-2 compared to RIIO-1 as a result of the switch to CPIH for the purpose of translating costs from real to nominal values. A significant part of the cost base is still strongly correlated with RPI rather than CPI and there is an inherent 1% wedge between the two indices which we have reflected in our analysis. Based on the initial analysis, labour costs through the cost of employees and contractors, account for around 75% of our totex base. Consequently we estimate that the labour RPE will cause an increase in costs of £61m over RIIO-2 assuming that the actuals will be in line with the forecast. PE pipe and reinstatement costs account for around 5% of our costs, which are heavily (circa two-thirds) dependent on the oil price. With the forecast reduction in the oil price this sees a projected reduction in costs of £4.1m over RIIO-2. For plant hire we have assumed zero RPE in our plan assuming it moves in line with CPIH as there is no forecast for the index for these costs (which have historically been volatile although currently in line with CPIH).

These cost impacts are given in the Table below. Overall this sees a 5.7% RPE effect over the seven years to 25/26 which is a 4.4% impact over RIIO-2.

Costs and efficiency continued

Figure 09.21: OBR price forecast

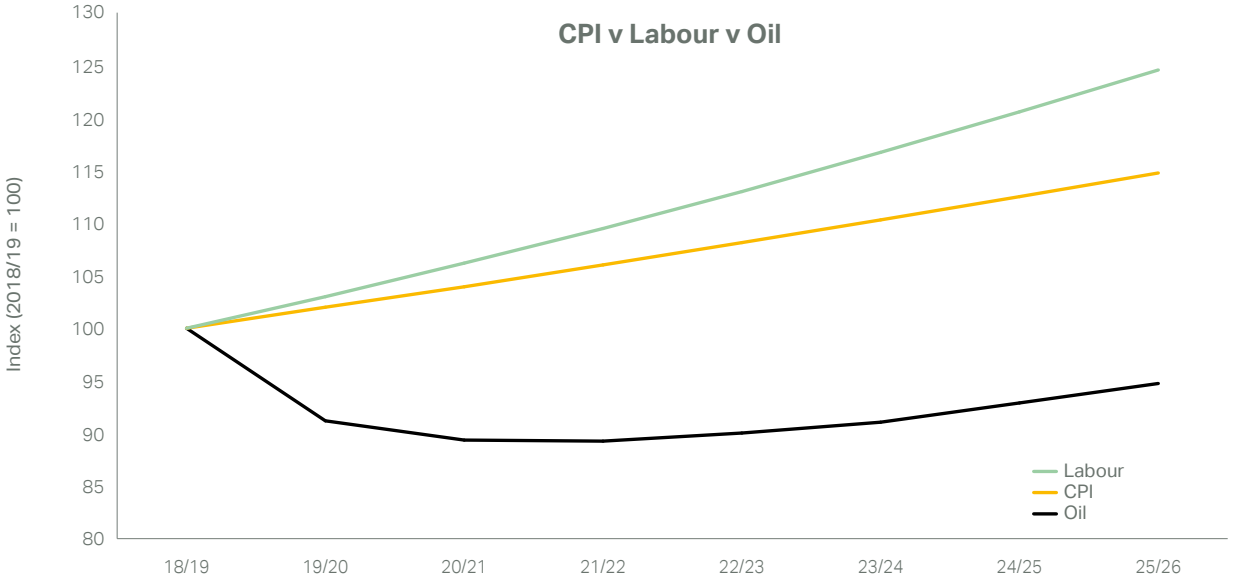


Table 09.22: Impact of RPE forecasts on Totex

£m, 18/19 prices	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Labour RPE Impact	8.3	17.4	25.1	34.9	45.1	53.4	61.4
Oil RPE Impact	-2.8	-3.7	-3.8	-4.0	-4.2	-4.2	-4.1
Overall RPE impact	**5.5**	**13.7**	**21.3**	**30.9**	**40.9**	**49.2**	**57.2**
%increase from 2018/19	*0.5%*	*1.2%*	*2.0%*	*2.8%*	*3.8%*	*4.7%*	*5.7%*
%increase from 2020/21	*–*	*–*	*0.8%*	*1.6%*	*2.5%*	*3.5%*	*4.4%*

We will provide an updated view of RPEs and our proposals for the selection of appropriate indices in December once we have reviewed Ofgem's guidance.

Supporting evidence

The following Appendices set out evidence and supporting information that are relevant to this chapter:

- Appendix 09.00 Overview: how we have developed our investment plan
- Appendix 09.01 Introduction to Investment Decision Packs
- Appendix 09.02 Distribution Mains and Associated Services (Iron, PE, Steel & Other)
- Appendix 09.03 Services Not Associated with Mains Replacement
- Appendix 09.04 Transforming the Experience for Multi-Occupancy Building Customers - Risers
- Appendix 09.05 Offtakes & PRS Pre-Heating
- Appendix 09.06 London Medium Pressure
- Appendix 09.07 Offtakes & PRS Slamshut Regulators
- Appendix 09.08 Governors (District, I&C and Service)
- Appendix 09.09 LTS Pipelines (Piggable and Non-Piggable)
- Appendix 09.10 Offtakes & PRS Metering Systems
- Appendix 09.11 Offtakes & PRS Odourisation Systems
- Appendix 09.12 Security Interventions National Cat2a
- Appendix 09.13 Brunel Bridge Crossing Refurbishment
- Appendix 09.14 Offtakes & PRS Filters
- Appendix 09.15 Holford Salt Cavity E&I
- Appendix 09.16 Winnington Lane Crossing Replacement
- Appendix 09.17 Category 3 Mandated National Security Upgrades
- Appendix 09.18 Mersey Tunnel Access Refurbishment
- Appendix 09.19 ENA common RIIO-2 scenarios
- Appendix 09.20 Resolving our benchmarked performance gap
- Appendix 09.21 Cadent's regional factors
- Appendix 09.22 Real Price Effects
- Appendix 09.23 Capacity Upgrades – >7 bar reinforcements (AGIs)– Base case
- Appendix 09.24 Pipeline / Mains Diversions – Non-Chargeable >7 & < 7 bar – Base Case
- Appendix 09.25 Pipeline / Mains Diversions – Chargeable <7 & >7 bar – Base Case
- Appendix 09.26 Pipeline Reinforcements – Base Case
- Appendix 09.27 Connections – Base Case
- Appendix 09.28 Corporate Property
- Appendix 09.29 Property: Other
- Appendix 09.30 Technology (IT and Telecoms)
- Appendix 09.31 Valves (IP / MP valves)
- Appendix 09.32 Reduced Depth of Cover
- Appendix 09.33 Pipeline Sleeves
- Appendix 09.34 Vehicles & Mobile Plant
- Appendix 09.35 Cathodic Protection
- Appendix 09.36 Pipeline Crossings
- Appendix 09.37 Not Used
- Appendix 09.38 Controllable Opex Costs
- Appendix 09.39 Frontier Productivity Growth
- Appendix 09.40 Understanding the Baseline Level of Efficiency in London

10

Managing risk and uncertainty

This chapter sets out how we have assessed risk and uncertainty. We set out how we propose to address forecast uncertainty through the use of uncertainty mechanisms. Other financial and pass-through-related uncertainty mechanisms are discussed in other chapters within our Plan. We have followed a robust process, shaped by CEG feedback, to assess how risks should be managed to protect our customers.

This chapter has the following structure:

Key messages

We have followed a robust process to assess the risks and uncertainties facing us in delivering for our customers, and we have analysed which risks we are best placed to manage as well as those areas where uncertainty mechanisms have value in protecting the interests of customers and our business from changes to requirements or costs.

- We will continue to manage significant risk and uncertainty on behalf of our customers. The material financial risks that we are managing are discussed in **Chapter 11, Affordability and Financing our Plan**.
- We have proposed nine bespoke uncertainty mechanisms, in addition to the mechanisms that Ofgem have proposed for RIIO-2, and a specific output approach to the London medium pressure scheme.
- We have also assessed each mechanism in line with Ofgem's requirements, the behavioural incentives from the application of these uncertainty mechanisms and how we might manage any drawbacks from their operation.
- Our 'Monte Carlo' analysis estimates that the combined impact of Ofgem's common and our bespoke uncertainty mechanisms ranges from £348m to £895m over RIIO-2 (this is a range of 6% to 13% of totex and would translate to between £1.77 and £5.20 on an average domestic bill).
- A large proportion of the uncertainty relates to the development of heat decarbonisation policy and the resultant impacts. Without the heat policy impact, the range of uncertainty is £288m to £506m, which is just 4% to 8% of overall totex and a range of £1.53 to £3.45 on the domestic bill.
- We have sense-checked our approach with consumers and it received general support. However, there may be merit in further discussion around whether any additional areas could be included in our base plan, potentially through Price Control Deliverables ('PCDs').
- Our plans assume a lower materiality threshold for re-openers and a 1 year lag on revenue recovery for revenue drivers.

Managing risk and uncertainty

10.1 The importance of managing risk for our customers

The management of risk and uncertainty, including those relating to operational, financial and environmental activities, is critical. Learning from RIIO-1 suggests that we need to think carefully about how the impact of external events outside of our direct control are managed; we have been successful in managing the risks and mitigating the impact of events of changes such as the smart metering roll out and changes to Streetworks legislation.

The risk of windfall gains and losses to customers from making ex-ante assumptions around cost forecasts needs to be considered and managed. Ofgem have set out strong penalties (10%) for unjustified cost forecasts where there is low confidence in setting a benchmark, and indeed have indicated that uncertainty mechanisms could be an effective means of managing these situations.

10.2 We have followed a systematic approach to managing uncertainty and risk

The identification of risks and uncertainties is derived from our ongoing stakeholder and customer engagement to assess the likely external factors that may impact on us or our ability to deliver what our customers need. We have also carried out a PESTLE assessment with our Customer Engagement Group which has been used to cross check the risks and uncertainties we have considered.

In addition, we have carried out research with our employees to test their assessment of the risks. We have engaged with customers as part of our acceptability testing phase of engagement to test our approach to using uncertainty mechanisms which has given us confidence in our approach. The figure below shows the process we have followed:

Figure 10.01: Our approach to managing uncertainty and risk

1. Defining our customers' needs	2. Evidencing forecast uncertainty	3. Qualitative assessment of the options	4. Quantitative assessment of the options	5. Quantifying the overall customer impact	6. Setting standards that customers love
• What is the area? • Why is it important to customers and stakeholders? • What insights are shaping our thinking? • Customer insights • Stakeholder insights • Legislative insights • Business as usual operational information • Historic insights • Wider research	• What do we know about future workload and costs in this area? • Why can't expenditure be forecast with sufficient confidence? (For example using historical/independent benchmarks) • Why are levels of expenditure outside of network control? • What customer/ network impacts could there be from a forecast error? • What network behaviours could arise from inclusion within the Base Plan? What would the customer impact be?	• What options other than those included in the Base Plan are available? • Why are they the options? • What option(s) are we proposing and why? • How would the mechanism(s) work? (implementation, triggers, materiality thresholds etc.) • What are the customer benefits and drawbacks of the mechanism(s)? (inc. simplicity) • Why do the customer benefits outweigh the drawbacks? • What network behaviours could the mechanism drive? What would the customer impact be?	• How do we know our 'input variables' are the best available? (e.g. ranges of workload, costs, trigger points, frequency, probability etc.) • How are we assuring our modelling results? • What is the best view of materiality for the area? • What is the modelled cost volatility for the area? • How does the proposed mechanism(s) deliver value for money?	• What is the overall customer impact of all areas of forecast uncertainty – with and without mechanisms? • What does this mean for the balance of forecast risk between customers and networks? • What does this mean for customer bills?	• Are our proposals, and the associated impacts, easy to understand? • Can it be demonstrated that they protect customers and investors? • Is our suite of proposed mechanisms acceptable to customers and stakeholders?

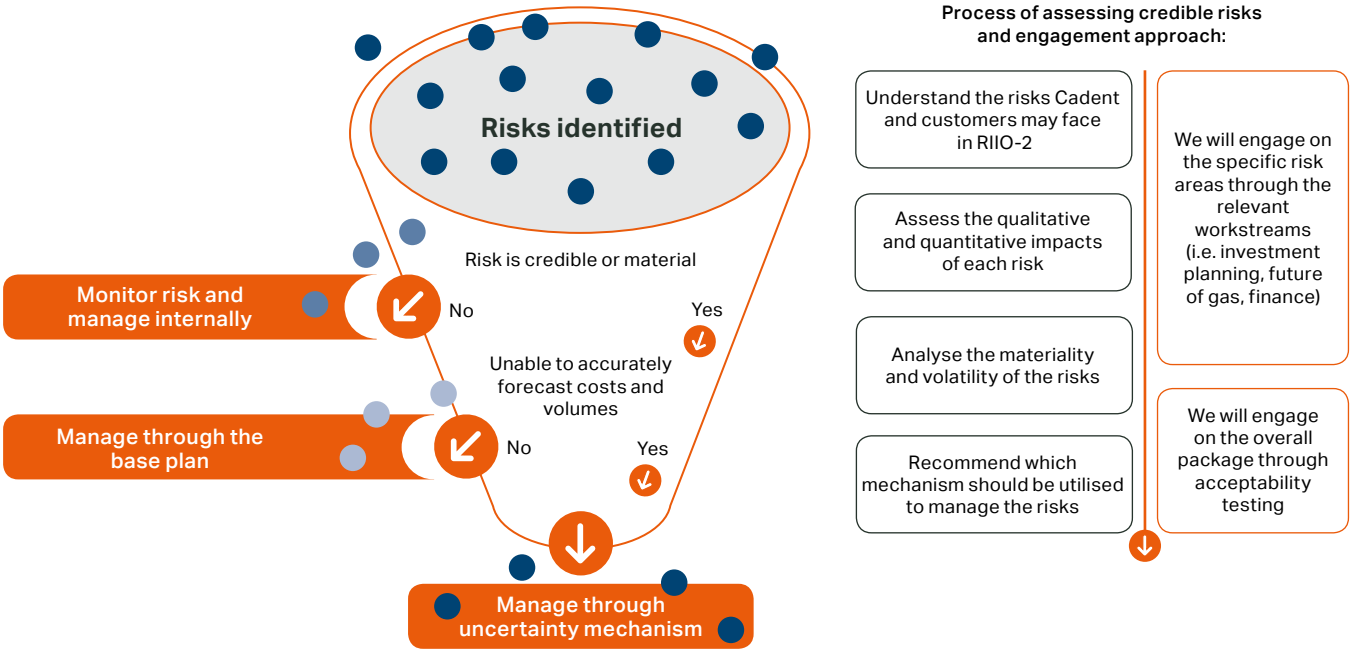
As part of an overall approach to risk management, uncertainty mechanisms play an important role in protecting customers and companies from risk neither can effectively control. These mechanisms enable companies to respond to evolving customer and stakeholder requirements. Without them companies would need to either include their best estimate of future costs, absorb the costs or delay the required work until the next price control period. As such, they protect companies from being exposed to costs they cannot forecast or control and can protect customers from companies having the opportunity for windfall profits if they ultimately do not need to deliver an output or indeed have overestimated the cost. In addition, uncertainty mechanisms can serve to protect both customers and companies from the impact of material external events that are uncertain.

We recognise that uncertainty mechanism can also drive behaviours that might not be in consumers' interests. We have assessed the different behavioural impacts of either setting ex-ante forecasts or using volume drivers, pass-through or re-openers in considering each of the proposed uncertainty mechanisms.

10.3 Where appropriate we are managing uncertainty for our customers

We have assessed a range of uncertainties and identified the areas we are best placed to manage and the areas where the risk is best shared. The diagram below illustrates the process we have been through and our **Appendix 10.00** outlines in more detail the PESTLE analysis we completed with our CEG, as part of the exercise.

Figure 10.02: Defining customers' needs and understanding risk and uncertainties



10.3.1 The uncertainties and risks we are managing for our customers

We will continue to be best placed to manage the predominant risks and uncertainties that face us in delivering our output commitments in the most efficient way for our customers. Our shareholders are managing risks around significant financial uncertainty from Brexit and political and regulatory uncertainty. We are also managing the risk of delivering the stretching efficiency targets we have set for the remainder of RIIO-1 and the RIIO-2 period as well as recalibrated incentive targets. These risks and uncertainties are discussed in **Chapter 11, Affordability and financing our Plan**. This chapter instead focuses on the uncertainties surrounding impacts on costs and customer output delivery. Examples of additional risks that we are proposing to manage for our customers include areas such as legislative risk around fatigue and the treatment of standby time which could significantly increase resource requirements across our emergency response and repair workforce. We also have a number of risks around policy interpretation on our mains replacement programme that could result in an increase in short length expensive work that we are proposing to manage for our customers. The costs for these risks have not been included in our plans.

We have assessed where risks and uncertainties can be managed without the need for additional spend and where risks may result in incurring additional cost. Where additional cost (volume and unit cost requirements) can be known with some certainty, the funding requirements have been included in our baseline plan. However, where there is a very high degree of uncertainty (in either volume or costs), it may not be in our customers' interests for these to be built into the baseline plans, instead, we have considered whether the risk is best addressed through an uncertainty mechanism.

We have assessed these risks and uncertainties against four key criteria:

Volume risk – how uncertain is the amount of work or activity that will be required to be delivered?
Unit cost risk – how uncertain is the cost of delivering the activity or work?
Impact on outputs – how strongly does the uncertainty impact on the outputs we have committed to deliver?
Materiality – how material is the uncertainty in terms of impact on customer bills and on the networks cashflow?

In addition to the four tests outlined above, we have also sought to ensure that:

Our proposals mirror Ofgem's desire to set simple price controls by avoiding unnecessary complexity:
Uncertainty mechanisms add a degree of complexity to the plan and to the way the regime is operated in practice. Ofgem recognises that some complexity is in the interests of consumers. We have identified the benefits for consumers of each of the uncertainty mechanisms we are proposing and believe the benefits outweigh the cost in terms of complexity. These benefits include avoiding the possibility that consumers pay for uncertain work that isn't needed and avoiding adjustments at the end of the price control (leading to a spike in bills or future customers paying for past work). This improved accuracy in our cost estimates will help protect customers from undesirable outcomes.

Managing risk and uncertainty continued

We promote the accuracy of the price control and minimise the risk of windfall gains and losses:
Ofgem and customer groups are very clear that they want to remove the potential for windfall gains and losses in the price control and Ofgem are keen for RIIO-2 to be a low-risk, low-return price control. Ofgem has reiterated this ambition through the design of their business plan incentive which will penalise any companies that include low-confidence costs in their base plan which are subsequently disallowed. These objectives have shaped our approach to managing risk and ensuring customers are protected.

We propose:
- to increase the accuracy of the price control by removing costs from ex-ante allowances where we do not have high confidence in the workloads and/or unit costs; and
- to use indexation, volume drivers and use-it or lose-it allowances.

We drive desired network behaviours and deliver positive outcomes for consumers:
Badly designed incentives can give rise to poor outcomes for consumers. A notable example of this is the Northern Ireland Renewable Heat Incentive, which was poorly designed and resulted in a situation where applicants could earn money by heating empty buildings.

10.4 Exploring uncertainty mechanisms

10.4.1 Ofgem proposed uncertainty mechanisms covered elsewhere in the plan

We have assessed Ofgem's proposed uncertainty mechanisms in the sector specific methodology decision documents (SSMD). These span all areas of our plan and hence for the areas shown in Table 10.01 we have covered the impact of these in other chapters and hence to avoid repetition we have not covered these further in this chapter.

Table 10.01: Summary of Ofgem proposed uncertainty mechanisms not discussed in this chapter

Risk	Proposed mechanism for RIIO-2	Where discussed in our plan
Ofgem licence fee	Pass-through	Chapter 11 – Affordability and financing our plan
Business rates	Pass-through	Chapter 11 – Affordability and financing our plan
Inflation indexation of RAV and allowed return	Indexation	Chapter 11 – Affordability and financing our plan
Cost of debt indexation	Indexation	Chapter 11 – Affordability and financing our plan
Tax liability allowance	Re-opener	Chapter 11 – Affordability and financing our plan
Pensions (pension scheme established deficits)	Re-opener	Chapter 11 – Affordability and financing our plan
Cost of equity indexation	Indexation	Chapter 11 – Affordability and financing our plan
Real Price Effects	Indexation	Chapter 9 – Costs and efficiency
Whole system 'Coordinated Adjustment Mechanism'	Re-opener	Chapter 6 – Net Zero and a whole system approach
Pension deficit charge adjustment	Pass-through	Chapter 11 – Affordability and financing our plan
Miscellaneous pass-through	Pass-through	Chapter 11 – Affordability and financing our plan
Cost related to theft of gas	Financial ODI*	Chapter 7 – Our commitments

* Ofgem SSMD proposed a pass-through uncertainty mechanism.

10.4.2 Four themes that we are proposing to manage through uncertainty mechanisms ('UMs')

Through the process we have identified a small number of areas that we believe are best managed through the use of Uncertainty Mechanisms. These areas are:
- **Demand Uncertainty** – there is uncertainty over demand growth on the gas network with a range of possible outcomes that can be effectively managed using volume drivers
- **Legislative Uncertainty** – there area areas where changes in legislation could have a significant impact on the activities we need to complete in RIIO-2
- **Cost Confidence** – we have identified areas that we believe are low-confidence costs and have proposed uncertainty mechanisms to manage this and protect customers from windfall gains
- **Heat Policy** – key heat policy decisions could have a significant impact on our activities and cost base and are best managed via uncertainty.

Ofgem have proposed some uncertainty mechanisms in this area too which we discuss under each theme.

For our bespoke proposals we have set out: the area of risk being managed, the uncertainty that is faced, our assessment of who is best placed to manage the risk, the materiality of the risk, the proposed uncertainty mechanisms, and how any drawbacks from the mechanism are being managed.

10.5 Our proposed uncertainty mechanisms

10.5.1 Demand uncertainty

Ofgem proposed mechanisms

Smart meter roll out costs

The roll out of smart meters has not yet been completed and will continue into the RIIO-2 period. Although we have worked hard to minimise the impact of the smart meter programme on the emergency response process, we have incurred incremental costs as a result of the roll out. We have yet to reclaim these additional costs through the re-opener mechanism in RIIO-1.

Based on the extensive work we have done in the current period, we have enough information to make a robust forecast of these incremental costs in our baseline totex forecasts (which are discussed in Chapter 9). For example, we can forecast the cost per intervention using information from the work carried out in the current price control.

However, in addition, we may have to interact with the Data Communication Company ('DCC') in RIIO-2. We may need to incur costs associated with system integration which we are not able to forecast accurately at this time as it is unclear when or whether this event will be triggered. If we do become a data user of the DCC, we would face significant ongoing operational costs. Hence, we would anticipate that the Ofgem proposed uncertainty mechanism should cover these costs.

We forecast this to be in the range £0m to £13m over RIIO-2 with a mean of £5m and with a bill impact of between 0p and 48p p.a. by the end of RIIO-2.

Full details are presented in **Appendix 10.06 – Smart meter roll out costs**.

Table 10.02: Cadent bespoke mechanisms - Demand uncertainty

Connections: Providing new connections at the request of customers. Supporting infrastructure growth.		**Uncertainty:** Volume is influenced by macroeconomic factors and future heat policy. **We have assumed a minimum level in our baseline totex but there is a range of potential outcomes.**	
Volume risk **High** – driven by external customer demand	**Unit cost risk** **Low** – insight from RIIO-1 on unit costs	**Impact on outputs** **Medium** – impact on customer service	**Material cost / bill impact** **High** – potential for significant costs, unknown timing
Cost £m, RIIO-2 total	**P10 cost:** £25.8m	**Mean cost:** £33.6m	**P90 cost:** £40.1m
Bill impact £, End of RIIO-2	**P10:** 10 pence p.a.	**Mean:** 13 pence p.a.	**P90:** 15 pence p.a.
Proposed mechanism: Volume driver, calibrated on the number of connection services undertaken and associated mains pipe laid (km). Assuming a one year lag on revenue recovery. Alternative would be a higher base plan number to set revenue driver from.		**Overcoming drawbacks:** Incentive to find efficiencies against unit cost. Volumes are determined externally by customers.	
Full details are presented in **Appendix 10.11 – Connections**			
Diversions: Undertaking diversions to support development and maintain network safety that are not paid for by the requestee.		**Uncertainty:** Volume is influenced by macroeconomic factors and site access with a number of large infrastructure schemes impacting our networks such as HS2 and Heathrow, unit cost risk for unknown workload.	
Volume risk **High** – driven by external customer demand	**Unit cost risk** **Medium** – element of costs is specific to each site	**Impact on outputs** **Medium** – impact on safety of supply	**Material cost / bill impact** **Medium** – potential significant costs, unknown timing
Cost £m, RIIO-2 total	**P10 cost:** £15.0m	**Mean cost:** £20.6m	**P90 cost:** £25.9m
Bill impact £, End of RIIO-2	**P10:** 6 pence p.a.	**Mean:** 8 pence p.a.	**P90:** 10 pence p.a.
Proposed mechanism: Re-opener applied to chargeable and non-chargeable workloads. Work triggered by external customer demand. **This mechanism is only proposed assuming the materiality threshold is reduced from 1% to 0.4% as discussed later in this chapter.**		**Overcoming drawbacks:** Incentive to present only efficient and relevant costs through re-opener process as ex post regulation.	
Full details are presented in **Appendix 10.12 – Diversions**			
Reinforcements: Undertaking general and specific reinforcements, and capacity upgrades. Maintaining the resilience of our network and delivering capacity.		**Uncertainty:** Volume is influenced by macroeconomic factors and future heat policy.	
Volume risk **High** – driven by external customer demand	**Unit cost risk** **Low** – insight from RIIO-1 on unit costs	**Impact on outputs** **High** – impact on safety of supply / network resilience	**Material cost / bill impact** **High** – potential for significant costs, unknown timing
Cost £m, RIIO-2 total	**P10 cost:** £41.8m	**Mean cost:** £62.0m	**P90 cost:** £84.8m
Bill impact £, End of RIIO-2	**P10:** 15 pence p.a.	**Mean:** 23 pence p.a.	**P90:** 31 pence p.a.
Proposed mechanism: Volume driver, calibrated on length of reinforcement undertaken (km) and number of capacity upgrades.		**Overcoming drawbacks:** Incentive to find efficiencies against unit cost. Volumes are determined externally by customers.	
Full details are presented in **Appendix 10.08 – Reinforcements**			

Managing risk and uncertainty continued

10.5.2 Legislative change

Ofgem proposed mechanisms

Specified streetworks – lane rentals (identified by Ofgem)

We are expecting changes in legislation on lane rentals and permits, potentially by the end of RIIO-1. However, at this stage, we are not clear on where and how these changes might apply. For example, we will be unable to confirm which Local Authorities will adopt the changes, whether Local Authorities will be able to opt in voluntarily, which roads the legislative changes will apply to, and when this will be enforced.

We forecast this to be in the range £26m to £35m over RIIO-2 with a mean of £30m with a bill impact of between 35p and 49p p.a. by the end of RIIO-2.

Full details are presented in **Appendix 10.07 – Specified streetworks (lane rental).**

Cyber resilience (identified by Ofgem)

Our plan includes actions and estimated costs to address cyber security risks. However, like other companies, we face cyber-related threats from increasingly sophisticated sources. Organisations and individuals continue to develop malware and bring targeted attacks. Moreover, there has been an escalation in attacks sponsored by nation states. Moreover, attacks have not been confined to the corporate IT estate: there is an increasing trend for attackers to target Operational Technology.

The less predictable elements of cyber resilience spending relate to the emergence of new threats or threat actors, and the extent to which such actors focus upon the UK or our utility industry or Cadent specifically. It is possible that unanticipated risks can only be mitigated by a significant investment on our part.

We forecast this to be in the range £12m to £15m over RIIO-2 with a mean of £13m with a bill impact between 6p and 8p p.a. by the end of RIIO-2.

Full details are presented in **Appendix 10.05 – Cyber resilience.**

Physical security upgrade programme ('PSUP') (identified by Ofgem)

We are focused on maintaining the security of supply for our customers and have requirements to comply with government regulations on the security of critical national infrastructure. The government's understanding of security risks is evolving over time. A resulting policy change in this area could impact the number of our assets that we would be required to protect and the nature of that protection.

We forecast this to be in the range £0m to £2m over RIIO-2 with a mean of £0.8m with a bill impact between 0p and 1p p.a. by the end of RIIO-2.

Full details are presented in **Appendix 10.03 – Physical security.**

Repex – Health & Safety Executive ('HSE') policy changes (identified by Ofgem)

If the HSE makes any changes to relevant policies during RIIO-2, this may drive changes to our repex work. This would have a cost impact on Cadent and its customers that we would not have been able to forecast in advance.

We forecast this to be in the range £0m to £14m over RIIO-2 with a mean of £6m with a bill impact between 0p and 5p p.a. by the end of RIIO-2. The small P10 to P90 range reflects our ongoing engagement with the HSE on the IMRRP and a low probability of any change being required in RIIO-2.

Full details are presented in **Appendix 10.02 – Repex – HSE policy changes.**

Table 10.03: Cadent bespoke mechanisms - legislative change

Obligations with respect to MOBs: The Hackitt review of building regulations could drive new or further work across our MOBs assets in response to policy changes. This will be in the area of maintaining safety and network resilience.		**Uncertainty:** The scope of requirements that may be introduced through new policy is currently unknown but could make fundamental changes to the high rise building management and requirements for our assets.	
Volume risk **High** – driven by future unknown policy decisions	Unit cost risk **High** – driven by any new future requirements	Impact on outputs **High** – impact on customer service and interruptions	Material cost / bill impact **High** – potential for significant costs, unknown timing
Cost £m, End of RIIO-2	**P10 cost:** £5.5m	**Mean cost:** £15.2m	**P90 cost:** £38.9m
Bill impact £, RIIO-2 average	**P10:** 11 pence p.a.	**Mean:** 31 pence p.a.	**P90:** 80 pence p.a.
Proposed mechanism: Re-opener applied to new or additional MOBs workloads, triggered by external legislative or policy changes.		**Overcoming drawbacks:** Incentive to present only efficient and relevant costs through re-opener process.	
Full details are presented in **Appendix 10.10 – Multi-occupancy Buildings**			

Table 10.04: Cadent bespoke mechanisms - legislative change continued

Traffic collision protection: We may be required to further intervene across our governor assets to install traffic collision protection. Maintaining safety of our people, customers and assets.		**Uncertainty:** The volume will be determined by future identified risk levels which are subject to further work to assess and through HSE policy.	
Volume risk **Medium** – driven by risk criteria and HSE policy	**Unit cost risk** **Low** – insight from RIIO-2 planning on unit costs	**Impact on outputs** **Low** – impact on asset safety	**Material cost / bill impact** **Low** – potential for some costs, unknown timing
Cost £m, RIIO-2 total	**P10 cost:** £10.4m	**Mean cost:** £15.2m	**P90 cost:** £20.4m
Bill impact £, End of RIIO-2	**P10:** 3 pence p.a.	**Mean:** 4 pence p.a.	**P90:** 6 pence p.a.
Proposed mechanism: Volume driver calibrated on number of interventions undertaken.		**Overcoming drawbacks:** Incentive to find efficiencies against unit cost. Volumes are determined objectively by risk or HSE policy.	
Full details are presented in **Appendix 10.14 – Traffic collision protection**			

10.5.3 Cost confidence

Ofgem proposed mechanisms

Repex – Tier 2A iron mains (identified by Ofgem)

The RIIO-1 framework provided for a volume driver to fund the replacement of Tier 2A mains and ductile iron mains which meet a certain risk criterion. Cost-benefit analysis is used to determine which of these pipes should be replaced. We anticipate the need to continue this mechanism as the mains replacement programme will continue into RIIO-2.

For RIIO-2, we are also exploring whether there is a requirement to expand this volume driver to cater for replacement of other metallic mains (higher-risk steel pipes and Tier 3 iron).

We forecast this to be in the range £6m to £8m over RIIO-2 with a mean of £7m with a bill impact of 3p p.a. by the end of RIIO-2.

Full details are presented in **Appendix 10.01 – Repex – Tier 2A iron mains including PAST.**

Table 10.05: Cadent bespoke mechanisms - cost confidence

Pipes above safety threshold: Replacing high risk pipes above a safety threshold that are not part of the existing Iron Main Risk Replacement Programme. Maintaining network safety.		**Uncertainty:** Volume determined by future asset health, which is challenging to forecast as dynamic.	
Volume risk **Medium** – driven by pipes meeting a risk criterion	**Unit cost risk** **Low** – insight from RIIO-1 on unit costs by work type	**Impact on outputs** **Low** – impact on network safety and reliability	**Material cost / bill impact** **High** – potential for significant costs, unknown timing
Cost £m, RIIO-2 total	**P10 cost:** £122.6m	**Mean cost:** £136.2m	**P90 cost:** £150.5m
Bill impact £, End of RIIO-2	**P10:** 53 pence p.a.	**Mean:** 59 pence p.a.	**P90:** 65 pence p.a.
Proposed mechanism: Volume driver, calibrated on the lengths of pipe replacement undertaken by diameter (km)		**Overcoming drawbacks:** Incentive to find efficiencies against unit cost. Volumes are determined objectively by risk considerations.	
Full details are presented in **Appendix 10.01 – Repex – Tier 2A iron mains including PAST**			

High pressure valves: Intervening across the HP valve population. Maintain asset safety and operability.		**Uncertainty:** Volume determined by future asset health, which is challenging to forecast.	
Volume risk **High** – driven by asset health measures	**Unit cost risk** **Low** – volume of future work unknown	**Impact on outputs** **Medium** – impact on interruptions / safety	**Material cost / bill impact** **Medium** – potential for significant costs, timing known
Cost £m, RIIO-2 total	**P10 cost:** £17.3m	**Mean cost:** £21.5m	**P90 cost:** £25.9m
Bill impact £, End of RIIO-2	**P10:** 6 pence p.a.	**Mean:** 8 pence p.a.	**P90:** 9 pence p.a.
Proposed mechanism: Volume driver calibrated on the number of interventions undertaken.		**Overcoming drawbacks:** Incentive to find efficiencies against unit cost. Volumes are determined objectively by risk considerations.	
Full details are presented in **Appendix 10.15 – HP valves**			

Managing risk and uncertainty continued

Lowestoft project: Interventions to address historic network health issues at Lowestoft Harbour. Maintaining safety and network resilience.		**Uncertainty:** Optioneering still underway to conclude on the most appropriate solution. This is an atypical scheme with underwater assets and complexity.	
Volume risk **Low** – certainty on need for intervention	**Unit cost risk** **High** – optioneering ongoing to identify solution	**Impact on outputs** **Medium** – impact on safety and resilience	**Material cost / bill impact** **Medium** – potential for significant costs, timing known
Cost £m, RIIO-2 total	**P10 cost:** £14.0m	**Mean cost:** £23.7m	**P90 cost:** £33.4m
Bill impact £, End of RIIO-2	**P10:** 7 pence p.a.	**Mean:** 11 pence p.a.	**P90:** 16 pence p.a.
Proposed mechanism: Re-opener applied to specific project at Lowestoft, triggered once preferred engineering solution identified.		**Overcoming drawbacks:** Incentive to present only efficient and relevant costs through re-opener process.	
Full details are presented in **Appendix 10.13 – Lowestoft Project**			

10.5.4 Heat policy

Ofgem proposed mechanism

Government heat policy (identified by Ofgem)

During RIIO-2, we expect an announcement on decarbonisation as part of the government's Heat Policy. This may influence work such as: the large-scale transformation to clean gas, infills where we extend the gas network to off gas grids, the role of electrification and hybrid technology and more. If government policy resulted in legislative changes, the business would have to comply. However, there would be great uncertainty in the costs and volumes associated with these actions. We have set out four possible End States in **Chapter 6, Net Zero and a Whole system approach**, and our Environmental Action Plan sets out the commitments we are undertaking to prepare for different pathways to decarbonisation.

We forecast this to be in the range £0m to £282m over RIIO-2 with a mean of £162m with a bill impact between 0p and £1.34 p.a. by the end of RIIO-2.

Full details are presented in **Appendix 10.04 – Heat policy (including Fuel-poor network extension scheme).**

Fuel Poor Network Extension Scheme (identified by Ofgem)

The Fuel Poor Network Extension Scheme helps households that are not connected to the gas grid switch to natural gas by providing funding towards the cost of the connection, in the form of a voucher. Future government policy, in response to any decision on the future role of gas in heat, may result in changes to the level of targets associated with the scheme. Therefore, a re-opener has been proposed by Ofgem to ensure that funding is returned to customers in the eventuality that the scheme is amended or ended.

We forecast this to be in the range (£9m) to £0m over RIIO-2 with a mean of (£3m) with a bill impact between (2p) and 0p p.a. by the end of RIIO-2.

Full details are presented in **Appendix 10.04 – Heat policy (including Fuel-poor network extension scheme).**

Table 10.06: Cadent bespoke mechanisms - heat policy

Entry charging and access review: Reviewing charging policy to encourage greater connections of clean gas. This will support environmental benefits through reduced carbon impacts.		**Uncertainty:** A charging regime change may increase demand for entry connections, triggering the need for reinforcement work; volume and timing uncertain.	
Volume risk **High** – dependent on future charging review	**Unit cost risk** **Medium** – uncertainty over reinforcement cost	**Impact on outputs** **Low** – potential environmental impacts	**Material cost / bill impact** **High** – potential significant costs. Charging review
Cost £m, RIIO-2 total	**P10 cost:** £60.5m	**Mean cost:** £83.8m	**P90 cost:** £107.5m
CVP: not included as already covered through social return on investment calculation			
Bill impact £, End of RIIO-2	**P10:** 24 pence p.a.	**Mean:** 33 pence p.a.	**P90:** 42 pence p.a.
Proposed mechanism: Initial re-opener triggered following a charging methodology change. Then, volume driver calibrated through actual work costs over time.		**Overcoming drawbacks:** Incentive to find efficiencies against unit cost. Volumes are determined externally. Spare capacity can be signaled to producers through charging review. Revenue driver recalibrated based on actual costs periodically.	
Full details are presented in **Appendix 10.09 – Entry charging and access review**			

10.5.5 Summary of our proposals

The table below sets out our proposals.

Table 10.07: Summary of proposed uncertainty mechanisms

	Risk	Range of impacts*	Proposed mechanism for RIIO-2	Identified by	Comparison to RIIO-1
Demand uncertainty	Smart Meter Roll Out Costs	£0m to £13m 0p to 48p	Pass- through mechanism (for system integration)	Ofgem	Re-opener
	Connections	£26m to £40m 10p to 15p	Volume driver	Cadent	Baseline allowance
	Diversions	£15m to £26m 6p to 10p	Re-opener (subject to materiality)	Cadent	Baseline allowance
	Reinforcements	£42m to £85m 15p to 31p	Volume driver	Cadent	Re-opener (for large loads)
Legislative change	Specified streetworks (lane rentals)	£26m to £35m 35p to 49p	Re-opener (subject to materiality)	Ofgem	Re-opener
	Cyber Resilience	£12m to £15m 6p to 8p	Re-opener (subject to materiality)	Ofgem	New for RIIO-2
	Physical Security	£0m to £2m 0p to 1p	Re-opener (subject to materiality) (engaging with BEIS[1] on risks)	Ofgem	Re-opener
	Repex – Health & Safety Executive ('HSE') Policy Changes	£0m to £14m 0p to 5p	Re-opener (subject to materiality)	Ofgem	Mid-Period Review Re-opener
	Obligations with respect to Multi-occupancy Buildings	£6m to £39m 11p to 80p	Re-opener (subject to materiality)	Cadent	Mid-Period Review
	Traffic collision protection	£10m to £20m 3p to 6p	Volume driver	Cadent	New for RIIO-2
Cost confidence	Repex – Tier 2A iron mains	£6m to £8m 3p	Volume driver	Ofgem	Volume Driver
	Pipes Above Safety Threshold (PAST)**	£123m to £150m 53p to 65p	Volume driver	Cadent	New for RIIO-2
Heat Policy	Lowestoft project	£14m to £33m 7p to 16p	Re-opener (subject to materiality)	Cadent	New for RIIO-2
	High pressure valves	£17m to £26m 6p to 9p	Volume driver	Cadent	New for RIIO-2
	Heat policy	£0m to £282m 0p to £1.34	Re-opener (subject to materiality)	Ofgem	New for RIIO-2
	Entry charging and access review	£60m to £108m 24p to 42p	Re-opener to trigger volume driver	Cadent	Re-opener
	Fuel poor network extension scheme	(£9m) to £0m (2p) to 0p	Re-opener	Cadent	Re-opener

* Range of costs per uncertainty mechanism over RIIO-2 (18/19 prices, pre sharing (Totex Incentive Mechanism (TIM)) basis). Range reported on a P90/P10 basis
** To be combined with Repex – Tier 2A iron mains.
1 The Department of Business, Energy and Industrial Strategy.

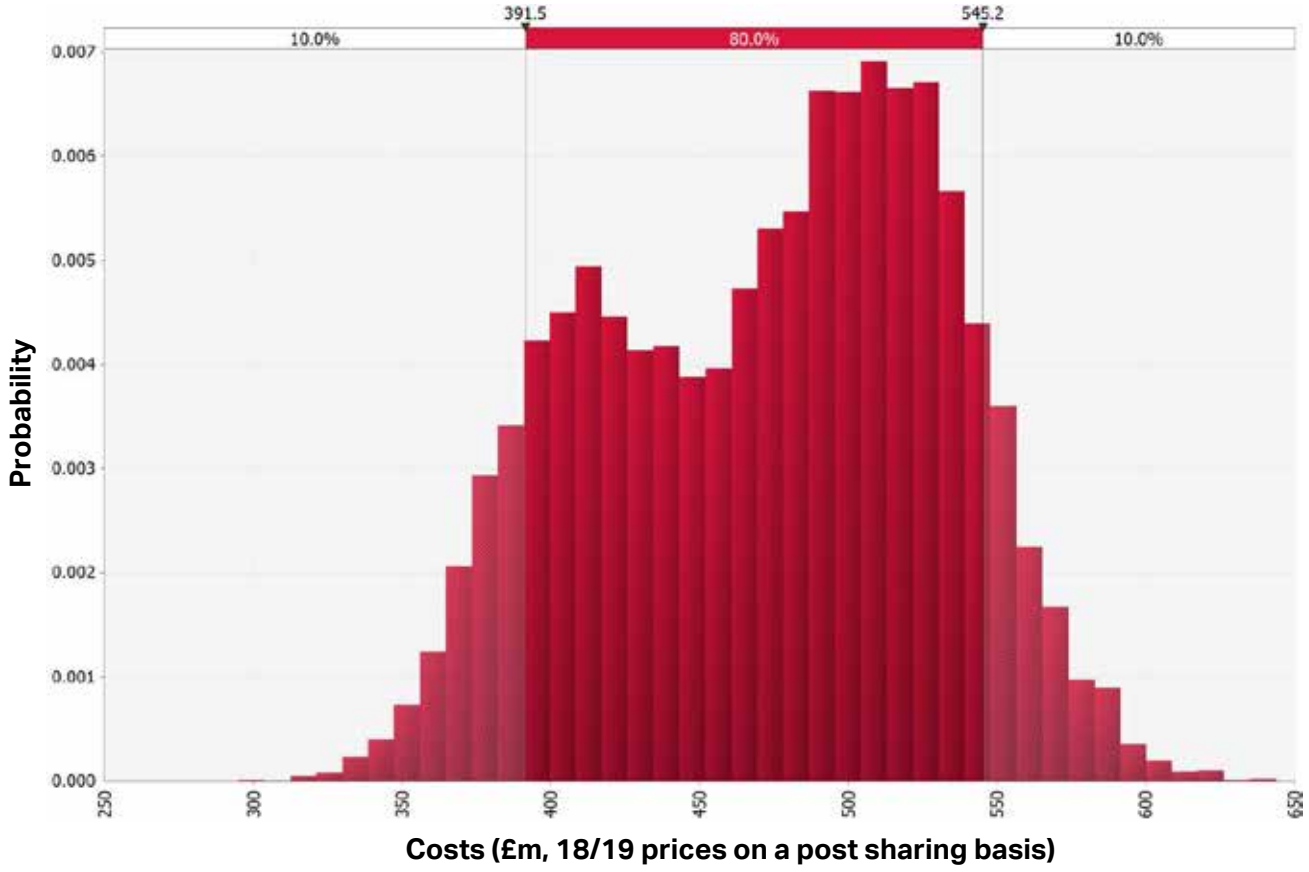
Managing risk and uncertainty continued

10.6 The impact on customers

10.6.1 Monte Carlo analysis

Our uncertainty mechanism cases, appended to this document, provide further detail on the specific inputs into our analysis across our proposed uncertainty mechanisms.

Figure 10.03: Monte Carlo analysis of the range of uncertainty



The full results of our 'Monte Carlo' analysis, including the distribution of potential outcomes across our uncertainty mechanisms package as illustrated here, are discussed in **Appendix 10.00**. This includes analysis on a post sharing basis to consider the implications of materiality thresholds on the cost risks that we have identified.

10.6.2 Overall bill impact

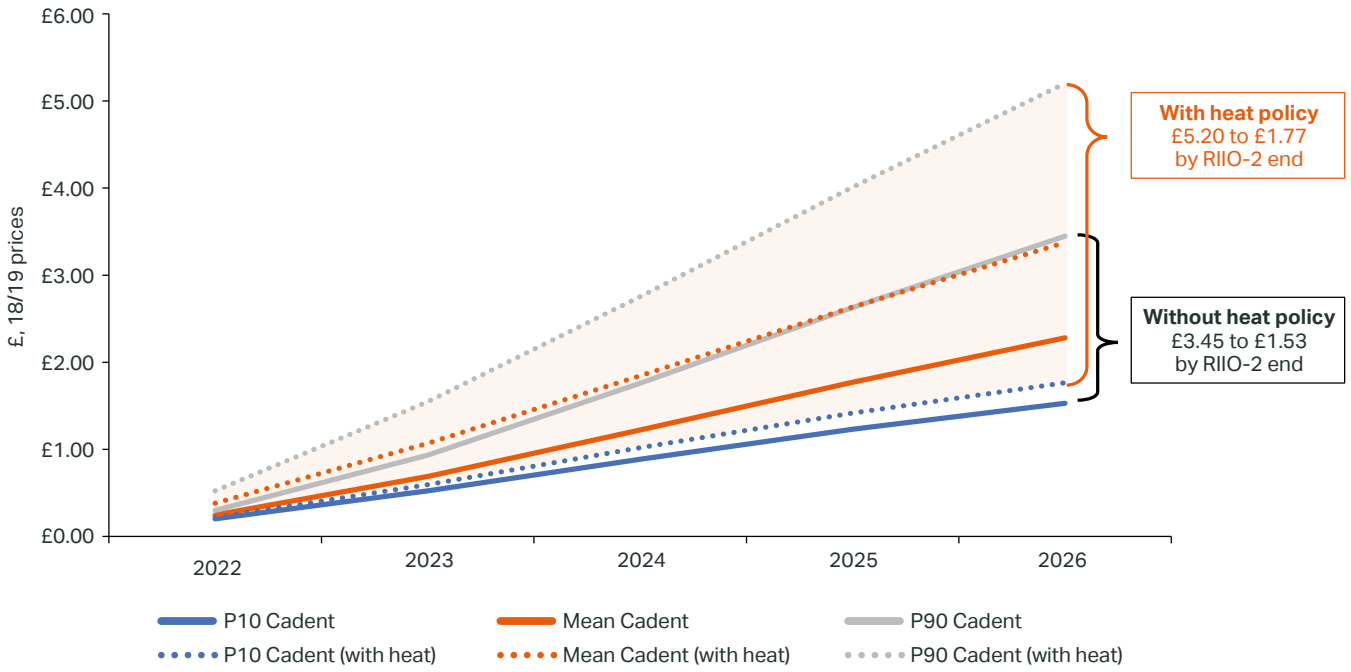
The core customer bill scenario presented in **Chapter 11** of our business plan includes the modelled mean of the volume drivers shown earlier in this chapter.

Our 'Monte Carlo' analysis estimates that the combined impact of Ofgem's and our bespoke uncertainty mechanisms ranges from £348m (P10) to £895m (P90) with a mean of £633m over RIIO-2 (this is a range of **5% to 13% of totex (mean 9%)** and would translate to **a range of impact of £1.77 to £5.20 on an average domestic bill**. This is a worst case scenario as it assumes that all materiality thresholds are hot for the uncertainty mechanisms and hence revenues flow through to bills. This overall level of impact does not seem unreasonable given the wide range of uncertainties that have been considered and shows why it is important to consider how to manage the impact on bills. Without the introduction of relevant uncertainty mechanisms, we would need to estimate these costs in our plan and seek funding to compensate us for greater risk exposure. This might result in higher bills for our customers than are needed given the range of uncertainty.

A large proportion of the uncertainty relates to the development of heat decarbonisation policy and the resultant impacts. Without the heat policy impact, the range of uncertainty is £288m to £506m with a mean of £387m, which is just 6% of overall totex and a range of £1.53 to £3.45 on the domestic bill.

Figure 10.04: Domestic bill impact for all uncertainty mechanisms

Domestic bill impact ranges from Uncertainty Mechanisms, with and without Heat Policy



Our analysis shows a central estimate of approximately £633m over RIIO-2 from the uncertain areas we have identified. The cost allocation is forecast to be:

- £364m associated with volume drivers (or pass through for smart meter costs).
- This leaves £269m associated with re-openers.
  - £161m would be recovered through the totex incentive mechanisms (assuming a 40% incentive rate).
  - £41m would be recovered through re-openers where a 1% materiality threshold is breached.
  - £42m would be additionally recovered through re-openers if the threshold was adjusted downwards to 0.4% (as discussed in 10.6.3 below).

This would leave a residual cost of risk of £24m over RIIO-2. This suggests with the operation and management of the uncertainty mechanisms the residual risks that the customers and the networks face could be much more contained.

10.6.3 Review of re-opener materiality threshold

The RIIO-1 framework uses a materiality threshold of 1% of average annual revenue (post sharing) that can be logged up over the length of the 8-year price control.

In their Sector Specific Methodology Decision document, Ofgem has set out that they intend to consult on the materiality threshold at draft determinations. We agree that this needs to be consulted on at that stage of the RIIO-2 price control review process, once more information on the package as a whole is available, including the financeability of companies' plans.

A decision has already been made on shortening the duration of the price control from 8 years to 5 years. This reduction will mean companies have less time to reach the materiality threshold and are thus less likely to trigger it and would need to absorb residual costs. As such, we believe that the materiality threshold should be adjusted in line with the reduction in control length from 1% of average annual revenue to around 0.6%.

It is also expected that the RIIO-2 sharing factors ('TIM') will be lower than in RIIO-1, this would also reduce the likelihood that a company will reach the materiality threshold and increase the likelihood that their shareholders will need to absorb costs. As such, we would suggest that a reduction in the materiality threshold would be required. If the sharing factor for GDNs was set at 40%, compared to c. 63% in RIIO-1, then this would suggest a further reduction in the materiality threshold from around 0.6% to just under 0.4% of average annual revenue.

Using a materiality threshold of 1% could leave a residual mean risk of more than £40m that our shareholders would need to bear.

Our proposed uncertainty mechanisms are built on the assumption that the re-opener materiality threshold will be materially reduced to c.0.4% of revenue. If this was not the conclusion of Ofgem's consultation we would need to adjust our plan accordingly.

10.6.4 Revenue driver recovery

In some of cases (such as Connections volumes) we have included a minimum volume of work within our base plan and have proposed a revenue driver for additional volumes that may be seen in RIIO-2. Given the scale of revenue drivers required to manage uncertainty, we believe that it is important that the licence drafting allows a one-year lag for recovery of revenue through these drivers rather than the 2-years that was introduced in RIIO-2. If this was not to the case we would reconsider our base plan and hence where the base for the revenue driver would be set.

Managing risk and uncertainty continued

10.6.5 Acceptability testing

We tested our approach to risk and the business plan proposals in our qualitative and quantitative survey as part of business plan testing. As part of the quantitative business plan consultation (led by Verve), the way that we plan for risks and uncertainties is felt to be acceptable and individuals trust that we can deliver the Plan given its thoroughness and a robust set of different mechanisms. Customers found this topic difficult to grasp and did not feel that they needed to 'see under the bonnet' to understand how risks and uncertainties are calculated - they want us to 'get on with it'. When offered the choice between infrequent, unpredictable costs / bills that are cheaper overall, and an up-front regular cost that is slightly more expensive, customers were attracted to any option that was lower cost, but on balance, there was a preference for greater certainty and predictability.

Uncertainty mechanisms were also discussed at our acceptability testing customer forums. The lead facilitator, along with a Cadent SME, began by presenting an overview on the 'pay now or pay later' options for uncertainties along with real life examples of the numbers of gas connections and government heat policy. Then, participants discussed their reaction to Ofgem's and Cadent's approaches.

Overall, most customers were supportive of receiving a stable bill from Cadent. They do not want their bill to drastically increase and they would prefer less difficulty in the process. The main findings from this session were:

- Customers recognised the pros and cons of both options.
- However, they preferred to ' pay now versus 'pay later' in most instances, whilst others said that the pay now' option was more 'transparent' and 'honest'.
- There were some customers who supported this option with a caveat as they highlighted concerns over whether any return of revenues would be passed on by their supplier.

However when the quantum of potential bill volatility of £1 to £3 per anum was discussed, all customers were less concerned over instability in the bill and hence had less of a strong preference between the options. Given this and the fact that this is not a direct impact on the customer bill as it will be amalgamated with the rest of the suppliers costs into the final bill to consumers, we believe that on balance we should maintain the bespoke mechanisms outlined. The risk analysis we have carried out shows clear benefits to managing the risk of windfall losses and gains and in reducing the residual risk to customers and networks. We recognise however that this is dependent on the level of materiality and other incentives in the price control such as the strong penalty incentive on low confidence costs. Hence we are open to further discussion with Ofgem over alternative approaches. There may be further information available in some areas ahead of final determinations that allows ex ante allowances to be set. For other areas it may be decided that using PCDs may be more appropriate. For example on reinforcements a PCD could be set at the best estimate level, so that if the demand is not realised costs are returned automatically to customers, with an accompanying volume driver for demand beyond this best estimate level.

10.6.6 Bespoke mechanisms contribution to the Consumer Value Proposition

These mechanisms reduce both the materiality and volatility of the risks we face from identified uncertainty. Customers benefit from the introduction of mechanisms, compared to including significantly uncertain costs in our base plan. Ensuring we have a mechanism to recover costs for future needs and requirements that are currently uncertain also means we will be able to continue to deliver for our customers in RIIO-2.

The Ofgem business plan guidance document suggests that "uncertainty mechanisms that highlight risks to consumers of which Ofgem would not otherwise have been aware" is an example that could constitute part of a Consumer Value Proposition (CVP). We discuss our CVP in **section 7.1 of Chapter 7**.

The value of a bespoke uncertainty mechanism to customers does not obviously lend itself to be monetised in the same way as some of the outputs commitments where we have calculated a social return on investment or have clear willingness-to-pay data. One way the value could be calculated is to look at the value that might otherwise have needed to be forecast into the base expenditure plan that may not have been subsequently needed if the uncertainty did not arise. For example, by taking either the low, medium or high case estimates of the uncertainty and multiplying this by the totex incentive sharing factor that the customer would be faced with (e.g. 60%). This gives a range of potential values. This is not as robust a method as SROI or willingness-to-pay; we have separated this out in our summary of the CVP and quoted the mean value in our analysis. This is shown in the summary section below and in more detail in **Appendix 07.01.00**.

10.6.7 Treatment in business plan data tables

In response to requirements in Ofgem's latest business plan guidance, we confirm that these modelled costs have been excluded from our base cost and volume Business Plan Data Table ('BPDT') submission. We have ensured there is no overlap between the costs associated with the uncertainty mechanisms we have proposed, and expenditure in our base plan. Instead, we have modelled the potential financial impact of our proposed uncertainty mechanisms as deviations from the base plan costs. We have included these uncertain costs within **BPDT 5.18** in line with requirements.

11 Affordability and financing our Plan

This chapter covers the financing and affordability of our Plan. We have followed Ofgem's guidelines for assessing financeability, including the regulator's working assumptions for expected returns. We set out our own estimate of the cost of capital.

This chapter is structured as follows:

Key messages

- We have analysed our financeability, on an actual and a notional company basis, using the assumptions that Ofgem has prescribed.
- The notional company is financeable based on Ofgem's working assumption (of 4.8% expected return on equity), but will face reduced financial headroom and a significant deterioration in the risk-return balance.
- The full transition to CPIH indexation masks underlying financial pressures in RIIO-2. This raises concerns about the sustainability of equity finance and the ability to maintain credit ratings.
- Being financeable is not a reflection of earning fair returns. We disagree with Ofgem's methodology for calculating allowed cost of equity. Our central estimate for cost of equity is 5.6% (CPI Real), around a 30% reduction compared to RIIO-1. We see no evidence to support Ofgem's downward adjustment of 50 bps reflecting a wedge between allowed versus expected returns to shareholders.
- Our shareholders have taken actions which have contributed to our financial resilience and sector-leading financial position. As a result, we are confident we will be able to ensure financeability for our actual company in RIIO-2.
- At this stage we do not foresee using depreciation rates or capitalisation rates as a tool to address financeability concerns.
- Our Base Plan shows domestic bills are expected to reduce by more than 10% compared to current charges. There remains uncertainty over our bill projections which will evolve once we have agreed totex and other parameters such as Cost of Capital with Ofgem at Final Determination.
- The Cadent Foundation, which is funded by shareholders, will divert cash from shareholders to the communities we serve. It is a long-term output commitment funded in part through our sector-leading financial performance.

Affordability and financing our Plan continued

11.1 Overview of our RIIO-2 Business Plan financeability

Financeability is a cornerstone of any regulatory framework and a key enabler that provides networks stability to deliver ambitious plans for our customers. To achieve the right outcome for customers, companies must have access to competitively priced finance now and in the future. Regulatory settlements should strike the right balance between the lowest costs for current and future customers while allowing regulated companies to recover sufficient revenue to remunerate providers of debt and equity capital. It is not in the interests of customers that network companies face challenges in raising necessary financing, experience capital rationing or become non-financeable.

Our ambition is to deliver a Business Plan that drives value for present and future customers, ensuring the fair allocation of costs between generations, and offering all of our customers the performance standards that they expect at a level of cost that is more efficient than ever before. **Our Plan for RIIO-2 is based on our most efficient ever operating model**, and this will result in lasting long-term savings for customers. Furthermore, our Plan ensures that both debt and equity holders continue to be able to support the business, today and in the future. This will allow us to drive the ambitious outcomes and investment programme outlined in this plan including 1,705km of mains replacement per year, 36,500 fuel poor interventions and distribution of 3 million CO alarms among many more.

In our engagement with customers, we extensively tested the bill impact of our Business Plan. This included assessing the impact of more than 20 of our output commitments with over 5,000 customers, stakeholders and industry experts, along with consideration of alternative options. We then tested the overall Business Plan for acceptability of its content and its affordability with a further 5,300 customers (across segments) and stakeholders, in our acceptability testing. **Over 75% of customers confirmed that they believed our Plan was affordable** with only 2% stating that it was not considered affordable. We worked with Britain Thinks to advise on engaging customers on critical decisions such as target credit rating. We also consulted with our investor community who supported a number of the key assumptions in our Plan.

In considering financeability for RIIO-2 **we have adopted a robust, transparent and reliable methodology for testing and ensuring financeability both on a notional and actual basis.** We agree with Ofgem's focus on ensuring that the notional company is financeable, while placing the responsibility on companies to demonstrate financeability based on the actual capital structure.

In determining key regulatory parameters, including cost of capital allowances, **it is critical that Ofgem allows for the notional company to be financeable at least at a solid investment-grade rating, and provides for the required expected level of equity returns.** This will ensure that the notional company can continue to borrow the money required to fund the business at an efficient and sustainable cost of capital and risk margin, and for us to be able to retain and attract equity capital for the benefit of current and future customers.

We have used the business planning assumptions required by Ofgem, and subject to a fair and balanced Final Determination by Ofgem on totex, outputs and incentives conclude that, overall, **our Plan is financeable despite reduced financial headroom** and a significant deterioration in the risk-return balance.

We are confident that we will be able to raise the new debt our Plan requires, despite the reduction in key credit metrics driven by a significant reduction in the allowed rate of return. Our confidence in the financeability of our actual structure is driven by the mitigations already put in place by our shareholders, to achieve a competitive cost of debt while maintaining a solid investment-grade credit rating. KPMG has independently assessed the financeability of our plan and confirmed that we are projected to remain financeable in both notional and actual structures under the base case, but with reduced headroom. KPMG noted that for the notional company the significant reduction in the allowed cost of equity, along with a fundamental change in the risk-return balance, is projected to result in a materially reduced RORE (on expected basis) and lower dividend yield, with reduced scope for outperformance, based on the current working assumptions.

A solid investment-grade credit rating position is necessary for a utility business, to ensure we can continue to access the significant amounts of capital we require to fund our extensive investment programme. At the same time, despite strong commitment from existing shareholders and the long-term nature of the equity already invested in the business, we expect our attractiveness to new equity investors to deteriorate significantly as a result of Ofgem's proposed framework. Increased risk for equity investors could have an adverse impact on customers in the longer term. The scale of change appears to contradict Ofgem's objective to ensure the sector's strong financial resilience.

Ofgem has halved the allowed regulatory cost of equity, on a like-for-like RPI basis. Alongside a historically low cost of capital allowance, **the proposed incentive package for RIIO-2 will be tougher than ever, pushing companies to achieve increasingly stretching levels of performance alongside significant cost reductions.** We have significant concerns over Ofgem's approach to establishing the underlying cost of capital parameters, including the introduction of a 50bps outperformance wedge (for which we see no evidence to support). The current assumptions do not represent the best estimate of the key parameters and instead repeatedly tend to the low end.

The proposed RIIO-2 incentive package appears to be negatively skewed for the average company or multiple network operators, and **the low returns proposed by Ofgem are not commensurate with the level of risk inherent in RIIO-2.** While Ofgem's approach to a full transition to CPIH from RPI is effective in partially mitigating the significant negative cashflow impact of reduction in cost of equity in the near term, this only brings forward revenues which masks the underlying financeability constraints created by the lower cost of equity.

The margin of headroom for the notional company to absorb downside risk is critical for financeability assessment. **The risk of headroom being eroded below the levels that capital providers (debt and equity) consider reasonable is significant.** This poses a challenge to the notional company with returns on equity not commensurate with the increased downside risks, and not in line with the market benchmarks. The reduced headroom for key credit metrics for the notional company will create financeability concerns where there is no protection against downside shocks. Capital providers may permanently reset the risk profile of the sector, resulting in increased risk premium expectations and higher customer bills in the future.

We have completed detailed stochastic risk modeling as part of our cost and incentive analysis. The analysis concludes that **there is no evidence to support Ofgem's assumption that we will be able to achieve a 50bps outperformance**. In our view the approach taken by Ofgem is internally inconsistent and our analysis suggests that there is limited probability that investors will be able to achieve an incentive bias. As such we believe the focus should be on setting an accurate price control for a notionally efficient company.

The results of our analysis is consistent with our earlier submission on RIIO-2 risk-return balance, based on a KPMG report to Cadent, noting the overall asymmetric downward bias on returns of the RIIO-2 mechanisms[1].

The negative skew in the proposed incentive package is driven by the potential penalties for low-confidence costs that are based on Ofgem's judgement, removal of the stakeholder engagement incentive and the discretionary reward scheme, both of which offered some upside potential in RIIO-1. There is also considerable uncertainty over other incentives in terms of target setting and scope – for example, on the NTS exit capacity incentive where a decision has not yet been made. Our stochastic risk analysis focused on totex costs and other uncertainty mechanisms. There are a number of other risks that we are exposed to outside of this modeling including the actual form of the final determinations (i.e. totex allowances, incentive targets, uncertainty mechanisms) and other external factors which are all likely to be negatively skewed. We will review this analysis in detail when we have more clarity on these key elements of the framework.

Sustainable investment is critical at a time when the energy sector is going through fundamental changes, such as decarbonisation, decentralisation and digitisation, all acting to reshape the future energy landscape. We have a large capital programme across RIIO-2, with planned totex in excess of £5bn to ensure security of supply, reliability and safety of our network for our customers. Availability of financing at an efficient cost is key in enabling the delivery of investment, innovation and change required to unlock the UK's Net Zero ambition.

We believe that **Ofgem's framework should aim to optimise bills for both existing and future energy customers whilst also demonstrating that long-term risks to capital providers are stable.** Despite the challenges, our Plan aims to achieve a real terms bill reduction of more than 10% by the end of the RIIO-2 period, driven by ambitious transformation plans that will reduce our costs whilst providing more of the services that our customers value.

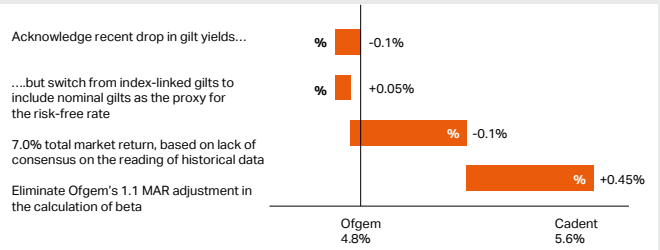
Cost of capital: a central estimate

Ofgem Business Plan guidance has promoted the inclusion of alternative views on cost of capital to be submitted in a separate document. We refer to **Appendix 11.03 (Our view on cost of capital)** which provides additional detail. We provide a summary below and **confirm that financials presented in this document are based on Ofgem's working assumptions. Our central estimate cost of capital is consistent with our empirical evidence submitted as part of our Sector Specific Consultation Response.**

We recognise that a legitimate cost of equity within price controls is important, and the efforts Ofgem has made to provide stakeholders with a considered and objective 'early assessment' of the cost of equity for RIIO-2. We agree with Ofgem that the return that shareholders require has fallen since RIIO-1 returns were set in 2012. However, when calculating its baseline cost of equity of 4.8% (CPI-stripped), we consider that Ofgem has repeatedly tended towards the low end of possible parameter values rather than identify best central estimates. This can be seen most clearly in the specific items noted below and summarised in **Figure 11.01**:

- Ofgem's proposal to focus only on index-linked gilt yields in its estimation of the risk-free rate, to the exclusion of contradictory evidence from nominal gilts;
- Making a contentious adjustment to published estimates of the real return that investors earn when they invest their money in the stock market
- The use of a novel overlay within Ofgem's beta computations

Figure 11.01: Cost of equity: comparison to Ofgem assumptions



Source: Management analysis

In addition to these points we strongly disagree with making an allowance for the "outperformance wedge" that Ofgem believe necessitates a further downward adjustment to returns of 50 bps. This is commented on elsewhere in this chapter.

We agree the indexation of allowed cost of debt in line with market interest rates has worked very well during the RIIO-1 period, delivering significant savings for customers. To avoid the regional customer bill impacts that would arise from setting debt allowances at network level, we remain supportive of Ofgem's approach of setting the cost of debt based on sector-level expectations. Our analysis suggests that Ofgem's working assumption for allowed cost of debt is not going to match the sector average interest costs, and we therefore propose an alternative assumption of 14 to 18 year 'trombone' index which captures market average cost of debt demonstrably more accurately.

Furthermore, analysis by NERA of the network companies' recent actual additional costs of issuing debt, including credit rating agency fees, bond issuance fees and the costs of maintaining essential liquidity, reveals a figure of 0.68%, notably higher than the regulator's typical assumption of c.0.2%.

Our central estimate is a cost of equity of 5.6% (CPI real) and an extending 'trombone' index (14-18 years), with appropriate adjustment to reflect the costs associated with financing that are not factored into the index.

These assumptions provide a better outcome for customers as they provide greater resilience, are internally consistent with the framework, reduce risk, and support a sustainable robust framework in the long term. We intend on engaging on this and related issues with our customers and stakeholders ahead of Final Determination (when we have more clarity on the final outcome) around the overall framework including the cost of capital and overall financability.

1 KPMG report "Risk-return balance under RIIO-GD2" submitted by Cadent, and Ofgem comments "RIIO-2 Sector Specific Methodology Decision – Finance" page 137. Ofgem noted, inter alia, that the "analysis is a positive attempt to understand the RIIO-2 framework, and in places we agree with KPMG's assessment." **See Appendix 11.10**.

Affordability and financing our Plan continued

11.2 How we are financing the business

During the course of RIIO-1, we are working hard to improve our quality of service and have achieved competitive financing of our activities to the benefit of consumers. Since the reorganisation of the company following the separation from National Grid, **we have demonstrated a sector-leading commitment to financial resilience. We have maintained a solid investment-grade credit rating (of Baa1 by Moody's and BBB+ by Fitch and Standard and Poors).**

With support from its equity providers, we refinanced our high cost debt in 2016, taking advantage of the prevalent lower cost of debt. The refinancing included a part-novation and part-repayment of expensive pre-existing debt as well as raising new debt, and was achieved through significant one-off cash costs incurred at the time of refinancing. **KPMG estimated the true economic cost of this refinancing at circa £842m, based on a comparison of the cash flows with estimated costs if the refinancing activity had not occurred**. This amount has been acknowledged by Ofgem (through our Regulatory Financial Performance Report submissions). This is equivalent of the cost of existing debt increasing by about 120 bps.

As a result of the equity support and investments that enabled refinancing, **we now have sector-leading cost of debt and headroom on key financial metrics under the actual structure, creating strong medium-term, financial resilience.**

Moreover, we continuously work to secure debt financing in the most optimal way. We have proactively sought opportunities to raise well-priced new debt and diversify our funding sources, including from insurance companies in Japan (Japanese Yen denominated 15 years debt) and private placements in the United States. We have targeted the most efficient markets and products and diversified our issuances across maturities, to balance our debt maturities against the existing asset base. Our sterling and Euro issuances in the last few years are across maturities of up to 30 years. In 2019 we issued in USPP format 12, 15 and 20 year GB debt as well as 12 year USD debt. **The competitive rates achieved in our new debt issuances are reflective of the long-term solid investment-grade financial standing maintained by the company.** However, during our more recent engagements with capital providers, we have been challenged over the threats of nationalisation and regulatory uncertainty.

While our performance and relatively low cost of debt will allow us to better withstand some shocks compared to a notional company (such as a moderate increase in construction costs for the iron mains replacement programme and higher near-term interest rates), there are other challenges we face that should be considered in Ofgem's determination. **We have a greater operational efficiency gap relative to other gas distribution networks as well as a greater risk of downside performance on the proposed incentive package as a result of the scale of transformation we are aiming for, to address our historical underperformance.** Hence our comparative financial efficiency should be seen in the context of a larger operational challenge, and hence potentially higher operational risks.

Against this backdrop, we have set out a financing strategy for RIIO-2 based on the financing requirements implied by the RIIO-2 Plan. To achieve this, a steady flow of private capital for debt is a fundamental requirement. **We and our investors have taken a number of steps to preserve our low cost debt, diversified pool of capital, solid credit rating (currently Baa1/BBB+), and robust levels of liquidity.** For example, we recently renewed our existing bank facilities that were due to expire in 2021, including a £500m revolving credit facility and £300m of floating rate term debt that will now have a tenor up to 2024. This is in addition to the £675m of USPP issuances mentioned above. These are long-term measures that provide sustained benefit to customers, but which can only be achieved through maintaining a solid investment-grade credit rating.

Our dividend policy balances the distribution of available surplus funds to shareholders, after having considered the forward committed cash requirements of the business to support our investment programmes and managing to an appropriate level of gearing. As we continue to invest in excess of £1bn each year in totex, a significant portion of which is capitalised, our RAV is forecast to increase by circa 1% p.a. over the RIIO-2 period. This requires the existing investors to take a longer term view and forfeit some of the cash yield in return for longer term returns. The higher the growth in RAV, the lower is the cash yield is for investors. This is a key consideration for long-term investors, especially where the allowed returns are already forecast to reduce to all-time lows.

The increased risk of downside performance associated with the proposed incentive package, reduced dividend yield and a skewed risk-return balance mean the attractiveness of network companies to equity investors will be significantly reduced in RIIO-2. In the long term this can increase our cost of equity capital.

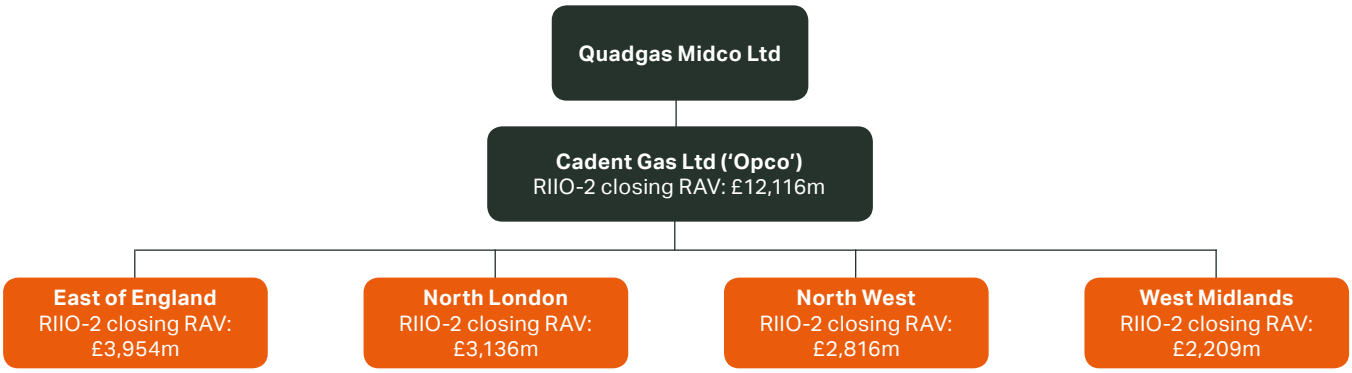
Our historical dividends are summarised in **Chapter 4, Learning from past performance**. Looking forward to the end of RIIO-1 and into RIIO-2, dividends are forecast to be significantly lower than the average paid in RIIO-1 to date, as the cost of delivering our eight year RIIO-1 output commitments increases and allowed returns significantly reduce. **We are also committed to investing over 1% of our profits every year in the Cadent Foundation, diverting cash from our investors to the communities we serve.**

Despite our sector-leading financial resilience, the signalled reduction in the allowed cost of equity for RIIO-2 and other changes in the regulatory regime pose a significant challenge. **The cash dividend yield in the notional company will be materially lower than long-term investors' expectations in this sector.** While we are implementing a robust and efficient approach to financing our operations, it is very important that Ofgem's assumptions and stress tests for the notional company are properly calibrated and include measures to address the risk-return imbalance and hence ensure the financeability of both debt and equity. It is essential that through the remainder of the price review process Ofgem fairly assesses the business risks on the notional company profile and takes a fair and balanced approach to financial and operational risks faced by companies.

11.2.1 Cadent MidCo structure

Cadent comprises a simple structure where all of our four networks are operated through a single company that is currently geared slightly below the RIIO-1 regulatory assumption of 65% of RAV.

Figure 11.02: Organisation structure: KPIs reflect RIIO-2 (notional company)



Amounts in nominal terms based on the notional company at 4.8% Return to Equity

Notional average RIIO-2 credit metrics at 4.8% Return to Equity	East of England	North London	North West	West Midlands	Cadent
Net Debt/RAV	59%	62%	60%	60%	60%
FFO (Funds From Operations)/ Net Debt	10.2%	9.3%	10.2%	9.9%	9.9%
AICR	1.51	1.41	1.51	1.49	1.48
RCF (Retained Cash Flow)/Net Debt	8.2%	7.3%	8.2%	7.9%	7.9%

Source: LiMo model and management information

Our immediate parent company, Quadgas Midco Limited has a further level of debt within the overall capital structure which means that a proportion of the dividends paid by Cadent Gas Ltd. are used to service this debt before dividends are paid to ultimate equity shareholders. **The financing agreements at Quadgas Midco provide additional benefits to customers** in the form of additional protection to business activities and formalise good treasury practice within the consolidated Group.

11.3 Our approach to financeability assessment

Financeability relates to an efficient company's ability to raise finance readily and at reasonable cost in order to deliver services and improvements expected by its customers, as well as continuing sustainable capital investment.

It is critical that notional financeability tests are meaningful and robust as a cross-check on the calibration of the RIIO-2 package. The implied financial headroom will need to be consistent with the risks to which the business is exposed. A notional company's inability to pass such tests post any mitigations available would indicate that the allowed returns set by the regulator are not commensurate with the risks that the efficient licensee is exposed to.

Whilst the focus of the financeability assessment, as a check to the price control financial package, is on the notional company, licensees are required to provide assurance that they are financeable on both a notional and actual basis. Companies remain responsible for their financing decisions and choice of actual capital structure, with the risks associated with these decisions remaining with shareholders.

Financeability needs to be assessed 'in the round' in order to capture its multi-dimensional nature. In practice this means that the assessment needs to cover (1) all sources of capital that the company would use to raise finance; (2) both short-term and longer time horizons to ensure that a short-term focus does not create risk in the long run; and (3) consider the liquidity position of the company to overcome unexpected cash shortfalls or downside shocks. Financeability analysis over multiple time horizons is key as large capital investment in the short term delivers outcomes for customers over the long term. This requires longer term capital solutions with capital providers needing to take a long-term perspective.

In this chapter we use key metrics and thresholds as per Moody's Rating Methodology for Regulated Electricity and Gas Networks. We do this as these are well defined and support a mechanistic application of the quantitative factors. Moody's uses four key financial metrics as set out in the table above. Together, the four ratios carry 40% weighting in Moody's rating grid. Further details on these key metrics and thresholds are set out in **Appendix 11.01**. This chapter along with **Appendix 11.01** also includes all the Ofgem specified ratios.

Credit rating methodologies are based on a number of constituent sub-factors – quantitative and qualitative – which are holistically assessed to determine the overall creditworthiness of regulated companies. Qualitative factors are as significant as quantitative factors (based on key credit metrics). Qualitative factors (including factors such as stability and predictability of regulatory regime, revenue risk, and financial policy) carry 60% weighting of the overall rating for Moody's. Stability of regulatory regimes will play a major role in rating agencies' overall assessment. In our analysis we have focused mainly on the quantitative factors due to the subjective nature of the qualitative factors.

Affordability and financing our Plan continued

Financeability assessment cannot be solely focused on debt metrics. Sufficient coverage implied by financial ratios for debt cannot on their own be assumed to imply that returns on equity will be adequate. We agree with Ofgem's view that 'financeability should refer to the licence holder being able to finance activities that are the subject of obligations imposed under relevant legislation and hence is applicable to both equity and debt'.

Any conclusions on financeability are subject to change in the key parameters of the Final Determination to be proposed by Ofgem in 2020 relative to the working assumptions.

11.3.1 Approach to the financeability assessment of debt

A company's ability to raise debt finance at a reasonable cost depends on its ability to remain financially healthy and maintain solid investment-grade credit rating. The rating represents forward-looking judgements from the rating agencies about the creditworthiness and credit risk of an issuer (or a security) and determines a utility company's access to debt capital markets.

A solid investment-grade credit rating in particular is necessary for the company to be able to comfortably meet its liabilities and be able to access financial markets and liquidity even in tougher macro-economic conditions. A key aspect of the financeability test is therefore the review of the projected levels of key financial ratios against threshold levels that are consistent with the target credit rating and a 'stable' rating outlook.

The target credit rating we have adopted for RIIO-2 for the notional company is Baa1/BBB+, two notches above the minimum investment-grade rating. A number of factors inform the choice of the target credit rating and the underlying trade-offs:

- Targeting a solid investment-grade credit rating provides companies with the financial headroom and flexibility to manage challenges and risks of RIIO-2 (and beyond) and deal with downside shocks (leading to a downgrade from the target rating).
- The benchmarks and the weighting of the proposed indices to be adopted by Ofgem in setting the allowed cost of debt, imply a solid investment-grade credit rating. Ofgem set the cost of new debt using an average of the iBoxx 'A' and 'BBB' rated GBP non-financials indices for bonds with ten years or more to maturity. The combination of the 'A' and 'BBB' indices suggests a rating of Baa1/BBB+ or A3/A-. In order to achieve the regulator's allowance, companies need to ensure that they can maintain the key financial ratios at levels commensurate with this implied rating.
- The financeability test is in part designed to check that the notional company is able to achieve the credit rating of the index used to set the cost of debt allowance. Where this is not the case, cost of debt allowance set by the regulator underestimates the cost of debt achievable in practice for an efficient licensee and the allowed returns based on the regulator's financing assumptions are not consistent with the cost of capital.
- Historical precedence indicates a long-term investor preference for a solid investment-grade credit rating of Baa1/BBB+ or higher in UK regulation. The target credit rating of Baa1/BBB+ is at the lower end of the historical precedence.

Stakeholder engagement on credit rating

The maintenance of solid investment-grade credit rating is in the customers' interests as it reduces bills and enables delivery of key outcomes through securing sustainable solutions in and for the sector. Targeting a lower credit rating (e.g. marginal investment-grade rating of Baa3/BBB-) would result in both a higher cost of debt (and higher bills) and lower headroom leaving customers exposed.

We consulted with our consumer engagement specialists Britain Thinks specifically on this issue. Their views are provided in **Appendix 11.01**, but in summary they conclude that customers cannot be reasonably expected to comment on highly technical / abstract subjects such as target credit rating.

We engage regularly with the three main credit rating agencies, who act as a proxy for debt investors' interests. We also meet directly with the main institutional debt providers in the UK and internationally. This open dialogue ensures we are well aligned with the concerns and views of these important stakeholders, on which the energy sector is dependent for continued funding of new and refinanced debt requirements.

Appendix 11.01 provides a snapshot of discussions held with over 10 institutional investors.

It is critical that the financeability assessment is undertaken on the market-based tests that reflect the approach taken by the rating agencies as their assessments are key in determining whether or not the companies meet their licence requirements in this regard.

The Moody's grid-simulated rating is not necessarily applied mechanistically and it is likely that the relevant rating agency will override the grid-implied rating based on the importance they apply to certain key credit metrics. Moody's grid-implied rating is likely to be constrained to the rating indicated by the level of its preferred key metric – Adjusted Interest Coverage Ratio ('AICR').

Moody's ratio guidance: Baa1

Moody's has, in its UK Regulated electric and gas networks sector comments, issued in May 2018, reconfirmed its ratio guidance for energy companies with a minimum AICR of 1.4x for a Baa1 rating. Commentary from the major UK rating agencies is provided in **Appendix 11.01** in summary format. Key to note is that overall, **rating agencies point to RIIO-2 being credit negative, the risk-return balance is skewed to higher risk and lower returns, and changing depreciation rates and capitalisation will not benefit credit rating**.

11.3.2 Approach to the financeability assessment of equity

Equity financeability is focused on the availability and sustainability of returns for equity investors and is intended by Ofgem to act as a cross-check to ensure that the regulator's cost of equity assessment is robust and hence sufficient for the equity financeability of the notional company.

Our ownership structure, where the ultimate equity is held by a relatively small consortium of specialist infrastructure investors and sovereign wealth funds, ensures that we have very direct and regular engagement with our shareholders.

Investors in UK infrastructure are by their very nature long-term holders. Investors typically comprise pension funds, sovereign wealth funds, insurance companies and infrastructure investment funds (who in turn may have pension funds as their ultimate investors). This is reflected in the mix of ultimate investors in Cadent.

The underlying sources of capital for these investors are the savings and retirement vehicles which typically seek out stable and predictable income streams with moderate to low levels of risk.

However, this low-cost source of capital has its limits, and nil or **low yield with levels of returns below the required returns, compared to the changing risk profile of the sector could drive down available investment and innovation appetite in the long term.**

We have analysed the metrics identified by Ofgem to inform the assessment of equity financeability including Dividend/ Regulatory Equity, Dividend Cover and RORE. These are shown in **Appendix 11.01**.

Financial resilience as a cornerstone of our Plan

Financial resilience addresses the extent to which an organisation's financial arrangements enable it to avoid, cope with and recover from disruption. This is measured through the headroom available on credit rating and key metrics to withstand plausible downside shocks.

In order to deliver sustainable outcomes to customers and the environment, companies need to be able to maintain sufficient financial headroom and flexibility to preserve liquidity and investment-grade rating in the face of plausible downside shocks. We have modelled a range of scenarios prescribed by Ofgem as well as identifying other key plausible risk exposures for the company during RIIO-2 period and scenarios to assess the company's ability to withstand individual or combined shocks, taking into account all available mitigations.

11.3.3 Assumptions underlying our financeability assessment

The assumptions underlying our financeability assessment are in line with Ofgem's requirements set out in the table below.

Table 11.01: Notional Company Financeability base case: key assumptions

Key assumptions		2022	2023	2024	2025	2026
CPIH		2.00%	2.00%	2.00%	2.00%	2.00%
Cost of debt	real, CPIH	2.03%	1.96%	1.91%	1.88%	1.86%
Expected return on Equity*	real, CPIH	4.77%	4.79%	4.80%	4.81%	4.82%
Gearing		60.00%	60.00%	60.00%	60.00%	60.00%
Capitalisation rates						
Capex and opex		27.68%	27.70%	27.70%	27.69%	27.68%
Repex		100%	100%	100%	100%	100%
Notional						
Dividend yield		3.00%	3.00%	3.00%	3.00%	3.00%
Index linked proportion		25.00%	25.00%	25.00%	25.00%	25.00%
Equity issuance costs		5.00%	5.00%	5.00%	5.00%	5.00%

* Expected return on equity of 4.8% modelled in line with Ofgem working assumptions.
Source: Ofgem LiMO model and BP Guidance.

Our cost of capital assumptions are consistent with Ofgem's working assumptions.

We have complied with the financeability guidance and tested financeability against an expected return to equity of 4.8% (CPIH, real). We have used Ofgem's assumptions on cost of capital in line with the Business Plan Guidance Document requirement which prescribed an allowed cost of equity of 4.3% on a CPIH stripped basis and an incentive bias of 50 bps of equity portion of RAV. We set out above our view on cost of capital on page 177.

Allowed vs expected returns adjustment

As part of the RIIO-2 price control, Ofgem has adopted a working assumption that there will be expected outperformance of 0.5% of the allowed cost of equity.

Ofgem proposes to implement an adjustment to allowed equity returns to reflect this expectation, i.e. the working assumption involves setting an allowed cost of equity at 0.5% lower than the estimated cost of equity. The working assumption we have used is in line with Ofgem's guidance (4.3% allowed cost of equity converting to 4.8% expected returns to equity assuming an incentive bias).

This is a significant issue for Cadent and, ultimately, for our customers. It requires material outperformance before companies earn their cost of equity. We disagree with including an outperformance wedge due to a number of points of principle as well as detail. Incentive based regulation has been a success in delivering value for consumers. The building block approach (i.e. correct calibration of totex allowances, output delivery incentives, etc.) has provided transparency to each price control parameter. There is a risk that this transparency will be eroded by the way that Ofgem has imposed a high level adjustment to returns.

Ofgem has noted that if a performance is calibrated above zero then there should be sufficient evidence to provide comfort that the additional return will be earned and should be included in the base case. However, if the wedge is calibrated at zero or below, then the allowed return could be expected to be set at the middle or upper end of the cost of equity range respectively (i.e. 4.8% or above). A poorly calibrated adjustment could have negative implication for financeability, is likely to be imprecise, result in inefficiency and reduce incentives on performance.

Based on our analysis and information provided by Ofgem, we have not seen evidence supporting the 50 bps incentive adjustment, which equates to a cash flow of c.£25m p.a. over the RIIO-2 period. This is partly driven by the downward skewed incentives, significant stretch in our totex plans (through ongoing efficiency and risk included), and low sharing factor, but also other cash flow risks including reaching materiality levels to trigger Uncertainty Mechanism cost re-openers.

Repex in RIIO-1 is forecast to outperform allowances but proposed new mechanisms such as Price Control Deliverables and increased cost pressures means this level of outperformance is unlikely in RIIO-2.

The detailed stochastic risk modelling presented below demonstrates that there is no evidence that we will be able to achieve a 50 bps outperformance incentive. We have tested the variability across specific cost categories across totex costs and uncertainty mechanisms. **None of the simulated iterations achieve the 50 bps outperformance, suggesting Ofgem's framework is internally inconsistent.**

It is also unlikely that rating agencies will take into consideration any ex ante incentive bias in their rating analysis, and hence any such incentive bias is not expected to benefit the credit rating.

We firmly believe that if the RIIO-2 framework is appropriately calibrated then the proposed 50bps allowed versus expected return adjustment should not be required.

For equity we have assumed the notional structure an initial target level of gearing of 60% and a dividend yield of 3%, as proposed by Ofgem. This assumption relies on continued liquidity in the market for new equity, which is uncertain given the low level of returns proposed at RIIO-2. The dividend yield is lower than the required level expected by a typical utility investor. The consequences of such low dividend yield is analysed further in following sections. For our actual company financial profile we have assumed gearing of 63.75% for RIIO-2 which is consistent with our current levels.

Affordability and financing our Plan continued

11.4 Our financeability analysis

11.4.1 Results of our financeability analysis: notional company

The notional company is financeable, but with increased risks and unsustainable low levels of return to equity.

Under the notional financial structure with a return on equity of 4.8% and in the current market conditions, we expect to be able to raise necessary debt and equity to finance our Plan. However, we believe Capital Asset Pricing Model ('CAPM') related assumptions assumed by Ofgem are incorrect. Long-term equity financeability will be dependent on the correct calibration of the CAPM parameters in Final Determination.

Our analysis is based on Ofgem working assumptions, and analysis of key credit metrics and stress testing scenarios are as set out by Ofgem. Outputs of stress testing are included in **Appendix 11.01**.

Table 11.02 shows credit metrics are forecast lower than the thresholds for target credit rating in FY2022 due to the impact of disposal proceeds pertaining to RIIO-1 period. Excluding the impact of this will result in a higher AICR of 1.48x and a higher FFO to Net Debt of 9.7% in FY 2022, broadly similar to FY2023.

The resilience of the financial ratios is likely to bear weight on a rating agency's perception of the qualitative assessment which places further emphasis on the simulated numerical rating assessment.

Table 11.02: Key metrics: base financeability case: notional company[2]

Notional 4.8% return to equity	RIIO-2					
	2022	2023	2024	2025	2026	RIIO-2
Net Debt/RAV	60.3%	60.3%	60.2%	60.0%	59.7%	60.1%
FFO/Net debt	9.4%	9.8%	9.9%	10.1%	10.3%	9.9%
AICR	1.39	1.49	1.50	1.51	1.52	1.48
RCF/Net Debt	7.4%	7.8%	8.0%	8.1%	8.3%	7.9%
Numerical assessment	**Ba1**	**Baa3**	**Baa3**	**Baa3**	**Baa3**	**Baa3**

Source: Ofgem LiMO model. FY2022 includes the impact of disposal proceeds pertaining to RIIO-1 period.

* 4.8% returns to equity modelled as 4.3% allowed return on equity plus 50 bps outperformance resulting in additional return to equity in line with Ofgem guidance.

** The FFO/Net Debt is below threshold at individual ratio level with no headroom in the base case.

*** AICR is the preferred metric used by Moody's. For Baa1, minimum required AICR is 1.4x. AICR is expected to constrain the overall implied credit rating.

Our projected metrics under the notional financial structure are consistent with the target credit rating of Baa1/BBB+, but with little headroom over the minimum requirements for key financial ratios.

The overall credit rating is based on financial metrics and qualitative factors. The qualitative factors, which primarily reflect the characteristics of the regulatory regime, would move in line with rating agencies' assessment of the regime. For example, Moody's in May 2018 lowered their assessment of the UK water regulatory regime following changes proposed under PR19. **Our notional company rating expectations are on the assumption that there is no change to the regime which would trigger such a reassessment of the RIIO-2 regime by rating agencies.**

Table 11.03: Headroom on key metrics: base financeability case: notional company

Key Metrics	RIIO-GD2 Average	Baa1/BBB+ Threshold	FFO Headroom £m	FFO Headroom %
FFO / Net Debt	9.9%	11%	(73.1)	(10.3%)
Adjusted Interest Coverage Ratio ('AICR')	1.48	1.4	18.9	2.7%

Source: Ofgem LiMO model and Management information.

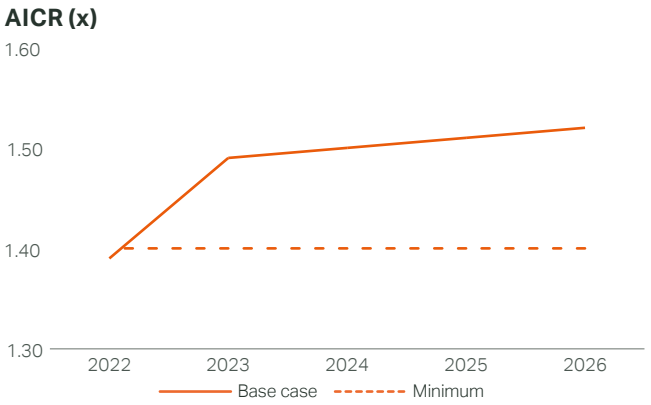
In addition to the retention of existing equity through a competitive yield we require the ability to issue further debt of over £2bn to finance our plan in RIIO-2. It is critical that the notional regulatory framework is sufficiently able to withstand downside risk, in order to remain an attractive prospect to both debt and equity holders.

The target credit rating allows us limited headroom for the allowed "guaranteed" return on equity of 4.8%. Even at 4.8% there is also limited headroom to withstand downside shocks. **At a totex overspend of about 10%, the notional company would lose its ability to maintain its target credit rating.**

Figure 11.03 below shows the lack of headroom over minimum threshold for key credit metrics.

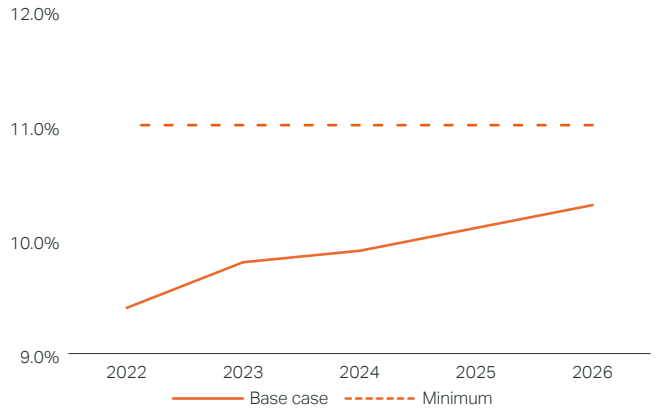
We have also considered the scenario of cost of equity at 4.3% without any incentive bias. The results of this scenario along with a number of sensitivities on this scenario are included in **Appendix 11.01**. **The AICR in this scenario shows an average 1.37x over RIIO-2, lower than required by Moody's for Baa1 rating implying a significant risk Cadent (notional company) would suffer an implied rating downgrade.** The key metrics for the notional company are stressed in most of the downside cases with AICR as low as 0.95x. This scenario, along with the associated sensitivities, demonstrates that the allowed cost of debt based on average of A/BBB iBoxx indices will be inconsistent with the forecast financial strength of the notional company, creating potential long term financeability challenge.

Figure 11.03: Base financeability case: notional company: RIIO-2 key financial ratios

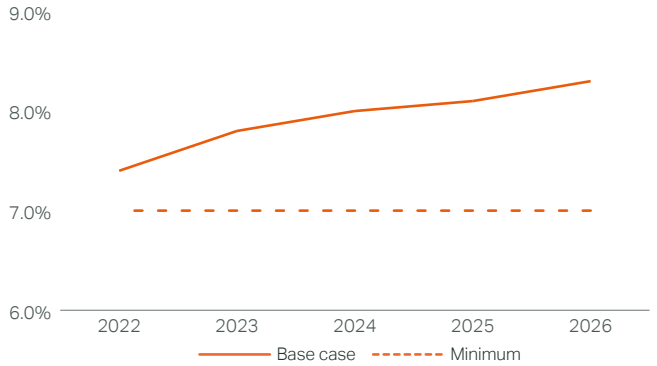


Based on Moody's thresholds. Red denotes individual metric is in the Ba range as per Moody's for this sub factor. Green indicates the key metric is in the A range and amber indicates the key metric is in the Baa range.

FFO/Net Debt



RCF/Net Debt



Source: LiMO model. FY2022 metrics impacted by disposal proceeds pertaining to RIIO-1 period.

Assuming 4.3% cost of equity is set ex ante, totex outperformance will need to be in the range of 4% to 12% (i.e. an outperformance of £200m to £650m) in order to benefit from the 0.5% incentive bias. This is on an already stretching totex forecast set against the upper quartile – confirming the low probability of being able to benefit from any incentive bias.

Table 11.04: Outperformance required to achieve a 0.5% incentive bias via totex incentive mechanism

	Outperformance Required		
Cost Category	15% Sharing Factor	32.5% Sharing Factor	50% Sharing Factor
Totex	12.2%	5.7%	3.7%
Opex only	31.0%	14.3%	9.4%
Repex only	26.9%	12.5%	8.3%
RIIO-2 Totex (Pre-sharing, 2018/2019)	**£649m**	**£302m**	**£198m**

Source: management analysis

Based on our risk analysis, it is not reasonable to assume we will earn an additional return of 50 bps. As such we would expect rating agencies to exclude the 50 bps assumption in their assessments.

The results of the financeability test as prescribed should be treated with caution as the evidence does not support the working assumptions. With AICR below 1.4x as an adjusted base case, downside scenarios show an implied notional company rating at risk of downgrade. These scenarios are presented in the **Appendix 11.01** as requested by the RIIO-2 Challenge Group.

The following section shows that due to the actions taken by shareholders, our **actual** company position is more resilient.

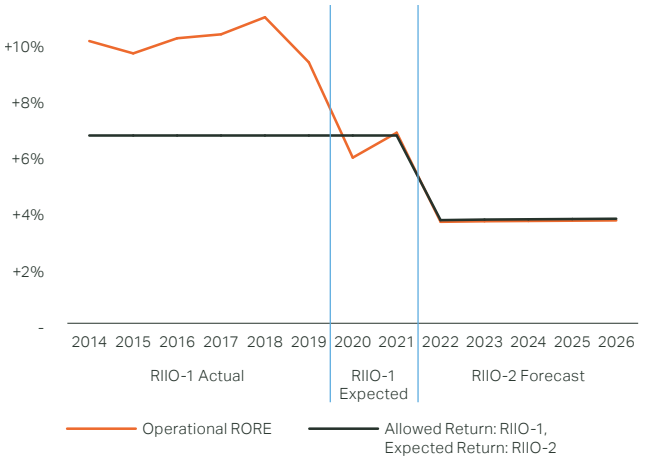
11.4.2 Results of financeability analysis: actual company

Our actual company is resilient as a result of shareholder actions to refinance debt in 2016; however, the allowed level of equity returns are not sustainable.

Our primary focus on financeability is on the notional structure. In addition, we have analysed the actual company financeability and conclude that we should remain financeable as a result of the actions taken by shareholders in the past, as set out in section **11.2 (How we finance our business)**. We have confidence in our financing policy and our ability to raise required new debt on an actual company basis. At the same time, we expect our attractiveness to equity investors to deteriorate significantly based on Ofgem's proposed returns.

Equity returns have halved on a like-for-like basis from RIIO-1 to RIIO-2 which does not support sustainability of equity finance and our ability to maintain credit ratings. The chart below shows the movement in operational RoRE from RIIO-1 based on actual performance / forecast performance, and the expected RoRE during RIIO-2.

Figure 11.04: Illustrative RORE (RPI basis)



Source: Cadent Regulatory Model

As noted earlier, our shareholders have invested an implied equity premium of £842m in order to support refinancing of pre-transaction expensive debt. This has enabled a saving of about 1.2% in the cost of existing debt. In order to ensure the analysis is comparable to a typical company using market based rates for cost of debt, we have adjusted (increased) our actual cost of debt by this amount, similar to the approach we have taken in our Regulatory Financial Performance Reporting. Our projections indicate that we would remain financeable under the actual company, after adjusting to reflect the all in economic cost of our debt and associated benefits of refinancing in 2016. The key forecast metrics, based on Moody's thresholds (**Table 11.05**), are broadly consistent with a Baa rating, and while FFO/Net Debt measure is forecast marginally below the thresholds for Baa rating, AICR has a comfortable headroom over the Baa requirements.

Table 11.05: Actual 4.8% Allowed Return to Equity with cost of debt adjusted for refinancing

'Actual adjusted for financing', 4.8%	RIIO-2					
	2022	2023	2024	2025	2026	Average
Net Debt / RAV	63.75%	63.75%	63.75%	63.75%	63.75%	63.75%
FFO / Net Debt	10.00%	10.62%	10.34%	10.18%	9.79%	10.19%
AICR	1.83	2.04	1.97	1.78	1.56	1.83
RCF / Net Debt	7.62%	7.91%	7.95%	7.63%	7.28%	7.68%
Numerical assessment	Baa3	Baa3	Baa3	Baa3	Baa3	Baa3

Source: Cadent Regulatory Model

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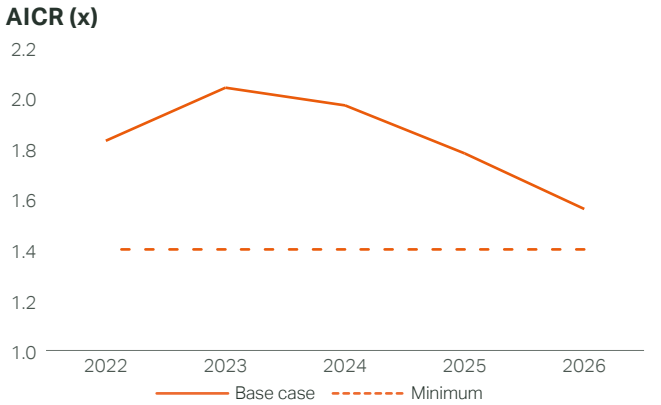
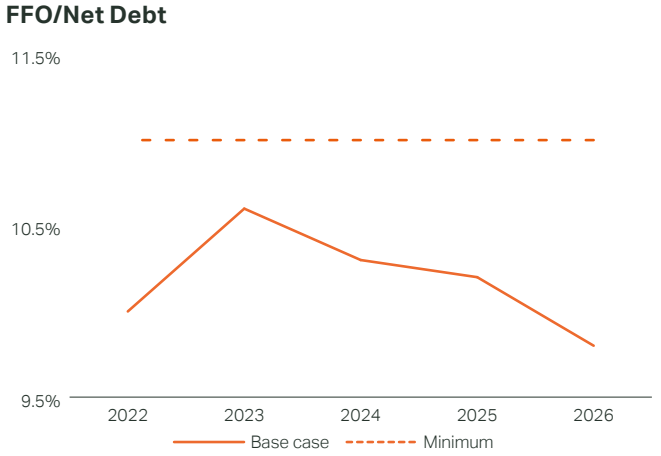
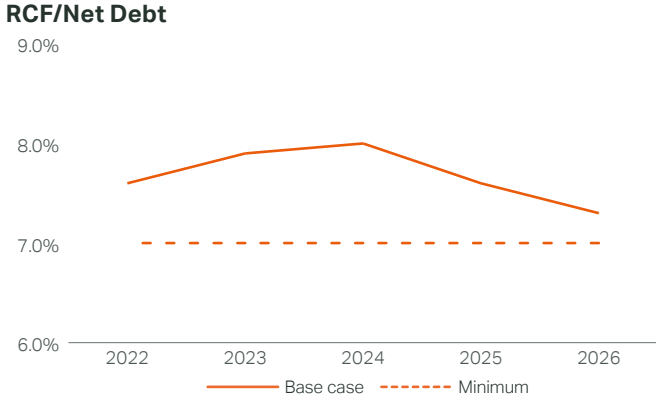
Gearing is assumed to be kept constant in the actual company at around 63.75% throughout the RIIO-2 period (in line with our current gearing). We note Ofgem's intention to review notional gearing in light of the risk level included in the price control settlement and the ability of the notionally efficient company to sustain downsides, and that Ofgem will decide on the level of notional gearing after Business Plans have been assessed and the overall price control package is known.

Figure 11.05: Base financeability case: actual company: RIIO-2 key financial ratios







Source: Cadent Regulatory Model

Our analysis of the actual structure assumes that we are performance-neutral. Given the scale of transformation we are committing to on both efficiency and service levels within our RIIO-2 Plan we believe that there are significantly more downside risks for our business than other networks.

To reflect this, we summarise a sensitivity with 5% opex and 1% incentive underperformance which reflects a plausible base case for potential debt and equity financiers. This shows that the implied credit rating is challenged in later years of RIIO-2. This does not include an adjustment to the cost of debt for refinancing, reflecting the approach that would have typically been taken by a rating agency. However, we consider it likely that rating agencies will form their views on the basis of an 4.3% cost of equity, excluding the incentive bias. This scenario is presented in **Appendix 11.01**.

Overall, our simulated rating assessment suggests that under the actual company structure we are expected to maintain our current Baa1 rating including qualitative factors, albeit without any significant headroom. For the purpose of actual company analysis we used the expected profile for non controllable costs and the reimbursements expected from RIIO-1, to make our exposure neutral, in line with Ofgem guidance.

Table 11.06: Actual company: 4.8% returns on equity: alternative base case

Actual structure, 4.8%: Financier +5% Opex, -1% RORE	RIIO-2					
	2022	2023	2024	2025	2026	RIIO-2 average
Net Debt / RAV	63.75%	63.75%	63.75%	63.75%	63.75%	63.75%
FFO / Net Debt	10.53%	11.03%	10.19%	9.90%	9.49%	10.23%
AICR	2.60	2.78	2.26	1.87	1.56	2.21
RCF / Net Debt	7.58%	7.86%	7.91%	7.59%	7.24%	7.63%
Numerical assessment	Baa3	Baa1	Baa3	Baa3	Baa3	Baa3

Source: Cadent Regulatory Model

11.5 Further observations

11.5.1 Equity returns and dividend yield

Although our Plan appears financeable for debt on both a notional and actual basis, **more than halving the returns on equity from 6.7% to 3.7% (RPI basis) significantly reduces cash returns on equity.** Equity capital would be severely exposed and returns would not be consistent with the risk profile implied by the regulatory regime and the macro conditions.

In the notional company, there is a significant challenge to equity returns (at 4.8% CPI real) due to a low cash dividend yield. A low dividend yield (at 3% for notional company as per Ofgem working assumption) would result in deferring benefit to shareholders into the longer term which adds risk to equity.

An appropriate dividend yield

In addition to a wide range of financial literature and empirical evidence that shows that dividend policy matters to investors, **utilities are generally considered as income or dividend-paying stocks**. Utilities pay out a dividend yield that is at the top end of the range compared to other sectors. For example, Ofwat has noted that the 'water utilities are typically considered to be income stocks' and assume a dividend payout ratio in the upper end of the European market average payout range. As shown in **Appendix 11.01**, the dividend yield for the majority of the listed UK water and energy companies has generally been in the range of 4–6% and averaged around 5% for the past ten years.

There are a number of regulatory precedents supporting a dividend yield of around 5%. At PR19, Ofwat expressed a view that 'the maximum level reasonable for the base dividend was equivalent to a nominal base dividend yield of 5%'. At RIIO-1, Ofgem assumed a dividend yield of 5% of regulatory equity for the notional company.

The UK energy sector relies on equity, and has done so since privatisation. The characteristics of investors in the sector mean that they expect utility investments to deliver long-term, stable cash flows that match their liabilities. This is the essence of private capital investments in regulated utilities and underpins one of the lowest costs of capital when compared to all other industries. The UK energy sector relies on this low cost of capital to help keep bills to acceptable levels. It is the ability of the energy sector to attract such long-term equity holders that has enabled large amounts of investment to be financed. A lower dividend yield has the effect of reducing the appeal of the sector to long-term investors.
Details of key equity metrics under different scenarios are included in the **Appendix 11.01**.

Targeting a notional dividend yield of 5% has the effect of materially reducing the headroom on various key credit metrics. This will have the effect of increasing gearing that cannot be sustained over time as shown in **Table 11.07**.

Table 11.07: Notional company: 4.8% returns on equity: 5% dividend yield

Notional 4.8% return to equity with dividend yield fixed at 5%	RIIO-2					
	2022	2023	2024	2025	2026	RIIO-2 average
Net Debt / RAV	61.10%	61.92%	62.68%	63.31%	63.85%	62.57%
FFO / Net Debt	9.22%	9.46%	9.43%	9.43%	9.45%	9.40%
AICR	1.38	1.46	1.45	1.44	1.43	1.43
RCF / Net Debt	5.95%	6.23%	6.24%	6.27%	6.32%	6.20%
Numerical assessment	Ba1	Ba1	Ba1	Ba1	Ba1	Ba1

Source: LiMo

On an actual company basis, we are able to achieve a relatively high dividend yield relative to the notional company assumptions, mainly due to the significant actions supported by equity in the past. However equity has incurred a significant cost which is not remunerated via the framework. Equity support in the past that enabled the refinancing of relatively expensive debt in 2016 results in improved cash flow available to equity.

While customers have benefitted through improved debt metrics and lower cost of debt it will take several years for equity to achieve payback of the upfront investment made (via the implied premium), effectively creating a long-term dividend holiday for the equity.

As discussed above, our shareholders have contributed £842m to support our refinancing. It will take a dividend holiday of four years to recover these costs.

Customers have benefitted from low-cost equity attracted to the sector for its reliability and stable, predictable cash flows. However, the increasing regulatory changes impacting cash flows have resulted in a change in sector outlook, which is evidenced through lower liquidity in recent transactions within the sector. In the short term, the misalignment could result in additional capital providers favouring other sectors, thus **reducing the available funds for companies to finance their capital requirements.**

While it is unlikely that existing investors will exit immediately, a reduction in discretionary investment, unobservable effort, or a delay in deployment of capital could ensue. Over time this could lead to a **change in investor profile with a more passive asset management approach that does not align closely with the needs of networks for innovation, efficiency and transition to Net Zero.**

11.5.2 CPIH indexation

Immediate transition to full CPIH indexation increases customer bills but supports short-term financeability. We support the long-term transition to CPIH as we believe there are valid concerns over the validity of RPI as a measure of inflation. However Ofgem's approach of a full and immediate transition to CPIH has the effect of significantly accelerating revenues from future periods, such that current customers will pay more to the benefit of future generations.

Short-term benefits to cash flow which solve financeability constraints mask underlying sustainability issues. By not implementing a phased transition, more revenues are accelerated from future price control periods implying long-term vulnerability from RIIO-3 onwards.

To illustrate the impact, in **Table 11.08** we have produced a counterfactual scenario of our RIIO-2 forecast under 65% gearing and RPI-indexed cost of capital. The performance metrics show a drastic decline in our implied credit rating.

Table 11.08: Counterfactual RPI scenario

		RIIO-2 AVERAGE		
Return to equity ('RPI')	3.7%	Notional	Actual	Actual adjusted for refinancing
Net Debt / RAV		64.25%	63.75%	63.75%
FFO / Net Debt		8.24%	8.87%	8.23%
AICR		1.22	1.72	1.26
RCF / Net Debt		6.61%	6.68%	6.68%
Numerical assessment		Ba1	Ba1	Ba1

Source: Cadent Regulatory Model

We don't believe the immediate switch to CPIH represents the optimal solution for our customers given the resulting increase in bills. Notwithstanding our concerns, our working assumption is a full transition to CPIH, consistent with Ofgem's requirements.

11.5.3 Financeability enhancements are likely to be reversed by rating agencies.

In RIIO-1 Ofgem increased the capitalisation rates for repex, from 75% (RIIO-1 average) to 100%. This created financeability concerns which could only be resolved by increasing depreciation. In RIIO-2 we have assumed repex and all of our capex will be treated as 'slow money', and all opex as 'fast money'. This will result in the share of 'slow money' increasing from 50% of our cost base in FY2019 to 60% of our cost base in FY2026. We are only able to support this increase due to the strong resilience driven by equity support over the last three years. This ensures costs are appropriately allocated between current and future customers.

We have avoided any adjustment of asset lives to address financeability concerns. This ensures consistency between RIIO periods and networks, and supports sustainability and longer term financial resilience. We continue to consider it is appropriate to adopt a "sum of digits" approach to calculating depreciation which accelerates depreciation of the RAV in the short term, mitigating asset stranding risk.

We are monitoring the risks associated with the future of gas and the potential implication of this for asset lives and depreciation. Based on our assessment of the future of gas pathways, we do not believe now is the right time to make any such adjustment to asset lives. We have analysed and included the impact of changing asset lives in **Appendix 11.00**.

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Rating agency views on financeability levers

Rating agencies will 'see through' or disregard the benefit of any financeability enhancements (e.g. changes to capitalisation rates and depreciation periods) which negates the benefit of such measures.

Fitch in its note on the 'Importance of Post-Maintenance Interest Coverage Ratios 'PMICRs' for Credit Analysis of UK Regulated Networks' in January 2019 observed that as 'PMICRs' use the economic asset maintenance concept, which focuses on the RAV rather than an engineering asset valuation, they should not be affected by regulatory financeability adjustments. For example, accelerated regulatory depreciation will not boost post-maintenance cash flows, as our maintenance capex would reflect the accelerated regulatory depreciation. We would also try to strip out the impact of a lower totex capitalisation rate from the reported EBITDA, if appropriate information is available. As a rule, forecast EBITDA would be based on the regulatory totex expense rate.'

A similar view has been expressed by Moody's in its Rating Methodology where it notes that a regulator has significant ability to alter the timing of a network's cost recovery by changing specific parts of the regulatory formula. The adjusted ICR attempts to normalize for these 'regulatory levers' by adjusting FFO by an amount of money that can be influenced by regulatory decision-making in the allowed revenue calculation.

When we designed our enhanced engagement programme with customers we did not originally intend to directly engage customers over our approach to depreciation of assets or capitalisation rates and their impact on the bill. The sum of digits methodology already accelerates cost to current customers and we consider it unfair to charge current customers even more to the advantage of future customers, when the useful economic life of the assets potentially extends to these future customers. However, we have noted RIIO-2 Challenge Group feedback on our October draft Plan asking us to reconsider our approach to engagement on this issue. We are also aware that other organisations have attempted to engage on this. We plan to engage with customers on these issues in 2020, including in response to decisions made by Ofgem. This is detailed further in **Appendix 05.01 Stakeholder Engagement Strategy**.

Customer feedback based on current engagement has been such that we should be targeting lower bills as long as safety is not compromised. We believe our current approach achieves this whilst maintaining a sold investment-grade credit rating.

11.6 Risk exposure and resilience

We have completed detailed risk analysis and applied the Ofgem and RIIO-2 Challenge Group guidance on sensitivities. This includes a detailed assessment and careful analysis of risk exposure at the company level due to the continued underlying exposure of the business to risk and the introduction of new regulatory mechanisms that increase risks. **We believe that there is strong evidence demonstrating the balance of risk and return is significantly negatively skewed.**

The regulatory framework should be designed to fairly reward the risk taken by companies while balancing the cost to consumers. The framework should provide the financial capacity and headroom to enable companies to invest in the network, without which customer bills will increase over the longer term. In addition to this, RIIO-2 needs to be underpinned by an effective incentive framework to ensure companies' interests are aligned to the effective and efficient operation and investment in the network.

Through our detailed assessment, we have identified the impact of a number of new regulatory mechanisms introduced by Ofgem which can have a skewed incentive impact.

- Allowed returns outperformance wedge: changing of the allowed returns from 4.8% to 4.3% resulting in an ex ante assumption of an incentive bias of 50 bps
- Return Adjustment Mechanisms
- Cost of equity indexation
- Business Plan incentives (with asymmetric penalty only calibration for most of the stages)
- Changes to sharing factors with outperformance: implications for risk exposure
- Acceleration of cash flows resulting from (non-phased) introduction of CPIH

Our analysis is supported by extensive stress testing including the prescribed Ofgem scenarios. We have analysed a select set of stress tests against the proposed cost of equity including the outperformance wedge (4.3% CPIH-stripped). These can be found in **Appendix 11.01**.

In downside scenarios, we have carefully considered and tested Ofgem's suggested remedies as well as applying our own permissible remedies. The requirement for additional mitigations is limited as equity has already provided extensive mitigations. Set out below in **Table 11.09** are the various mitigations we have considered and the impact of those mitigations.

Table 11.09: Mitigations considered and impact analysis

Ofgem's suggested levers for ensuring financeability	Impact analysis
Restriction of dividend	The notional company working assumption is to fix a dividend yield of 3%. Sustained disruption to a steady dividend yield or resetting the dividend yield to a lower level will impact this class of investors who rely on a steady stream of cash flow. The resultant impact on the cost of equity will lead to higher bills for both current and future customers.
Equity injection	The premium paid to refinance the debt at segmentation has the effect of a dividend holiday for equity so a form of equity injection has already been made to provide us with the sector-leading cost of debt and related financial resilience.
Refinancing of expensive debt (using equity injection or dividend restriction)	As noted above, at significant cost to equity, expensive debt was refinanced and replaced with low cost debt at the point of separation from National Grid. We have a sector-leading financial profile. In 2016, there was an equity support estimated at £842m to enable refinancing of our higher cost of debt, taking advantage of the prevalent lower cost of debt.
Adjust capitalisation rates	We have revisited and decided to maintain the current policy in the interests of intergenerational fairness. We have assumed all investment spend (capex and repex) is slow money and all operating costs are funded via fast money.
Adjust depreciation rates	We do not believe this is required for RIIO-2 at a minimum return on equity at 4.8%. As government policy to decarbonise heat becomes clearer there may be more compelling arguments for the sector to adjust the asset lives of existing and new network assets to ensure intergenerational affordability. We will continue to review this ahead of final proposals for RIIO-2 alongside Ofgem's final view on the cost of capital and any updated financeability analysis.
Adjust notional gearing	We have maintained the notional gearing at the level of Ofgem's working assumptions. Our analysis shows that the notional company cannot confidently be assumed to achieve the 0.5% outperformance and therefore the base cost of equity needs to be a minimum of 4.8% to ensure a resilient financial profile at 60% gearing. We have modelled scenarios at 60% gearing and other scenarios and results are presented in **Appendix 11.01**.

Source: Financeability Assessment for RIIO-2: Further Information, p11 (26 March 2019).

Our analysis highlights the fact that further mitigations will not address the most pervasive challenge of financeability to equity because **the problem is rooted in the low cost of capital proposed**.

Detailed stochastic risk modelling demonstrates that there is no evidence that we will be able to achieve a 50 bps outperformance incentive. We have tested the variability across specific cost categories across totex costs and uncertainty mechanisms. None of the simulated iterations achieve the 50 bps outperformance suggesting Ofgem's framework is internally inconsistent. Also, AICR has a significant risk of fallings below the threshold 1.4x for Moody's Baa range.

A key mitigation we considered was adjustments to the capitalisation and depreciation rates. As part of our Plan we have adjusted the capitalisation rates as set out earlier in this chapter to reflect the mix of work forecast in RIIO-2. We consider that it is difficult to rationalise any justifications for moving away from our assumed fast/slow money split and depreciation rates, which reflect our Business Plan expenditure and investment plans. We aim to balance affordability and financeability, the resulting implication for RAV growth and dividend yield, and the trade-off between current and future customers.

As part of our scenario analysis we have included in **Appendix 11.00** the bill impact of alternative asset lives. In addition to revenues already brought forward to the extent of 8.4% during RIIO-2, following the change from straight line method to sum of digits method, a reduction in asset life by five and ten years will further bring forward revenues to the extent of 1.7% and 3.4%, creating significant additional intergenerational issues.

The reduced allowed cost of equity will lead to significant reductions in overall cash flows. Reduced cash flows imply a major challenge to equity and reduced headroom to accommodate shocks and downsides. Projected equity metrics are also contingent on a number of assumptions, which if they do not hold mean a significant negative impact on equity.

11.7 Achieving a balance between delivering compelling bill reductions and maintaining financeability

Our approach to financeability of the RIIO-2 package has been to consider it in tandem with customer bill impacts, given that both are directly influenced by the regulatory framework, economic conditions, and cost and revenue levels. Based on the current estimates of costs and workload, we have set out our assessment of the key drivers to changes in customer bills from the current (FY18/19) RIIO-1 bill levels to closing (FY25/26) RIIO-2 levels.

We have applied our standard methodology for calculating customer bills that is recognised across the sector. Further details are provided in **Appendix 11.00**. All charts are presented in today's prices (2018/19).

Our base plan shows a greater than 10% reduction in domestic customer bills compared to current charges, however, there is significant uncertainty which could increase or decrease this central case estimate. This position will ultimately vary as the regulatory framework develops, but even against an upper range scenario, our Plan shows an even greater expected percentage reduction in domestic bills than will be delivered in RIIO-1.

We are delivering customer bill savings through totex efficiencies, control of pension scheme liabilities and equity holders bearing increased risk and lower returns summarised in **Figure 11.06**.

Affordability and financing our Plan continued

Figure 11.06: Annual domestic bill forecast: FY25/26 compared to current (FY18/19) charges (4.8% Return to Equity)

Source: Cadent Regulatory Model. Note: Customer bill analysis excludes the potential upward movement from Real Price Effects, inflation (as based on real prices), performance factors (incentive income / penalty), differences on Uncertain costs and cost of capital relative to the Base Case and other variables as these will not be finalised until Final Determination. These variables are described and quantified in Appendix 11.00 to enable Shippers to understand the range of potential impacts for future price setting.

Key actions taken to support customer bill reductions:

1 Removing the need for sculpted depreciation profiles used in RIIO-1 to address financeability issues, which we believe is not sustainable over multiple price control periods, has resulted in savings of £3 in bills.

2 We will generate savings in pass-through costs driven by improved management of shrinkage (volume of gas leaks as a consequence of strategic repex delivery model) and driving costs and revenues down which has a consequential impact on business rates payable.

3 Our drive for higher efficiencies through totex savings and our transformation programme is estimated to deliver a £6 reduction in consumer bills. **Chapter 9** provides further details of the transformation, innovation and ongoing efficiency assumptions driving these cost reductions.

4 The reduction in bills is expected to be partly offset by a small increase of £2 due to our enhanced commitments on service standards. This is mainly in relation to additional funding to support customers in vulnerable situations.

5 As we do not require incremental funding for the defined benefit pension scheme from FY22/23, customers benefit from a £5 per year reduction in bills. We have worked with the Pension Trustee to take steps to de-risk the assets and this has enabled the assets to more closely match movements in the liabilities and so reduce the need for customer funding. Accordingly the present schedule of deficit repair payments ends four years earlier than the original plan.

6 Ofgem's proposals for more than halving the cost of equity will result in a saving of £7 on bills.

7 Offsetting this reduction is Ofgem's decision to fully transition to CPIH based inflation and a capital structure that includes more equity (at a higher cost to consumers) and less debt.

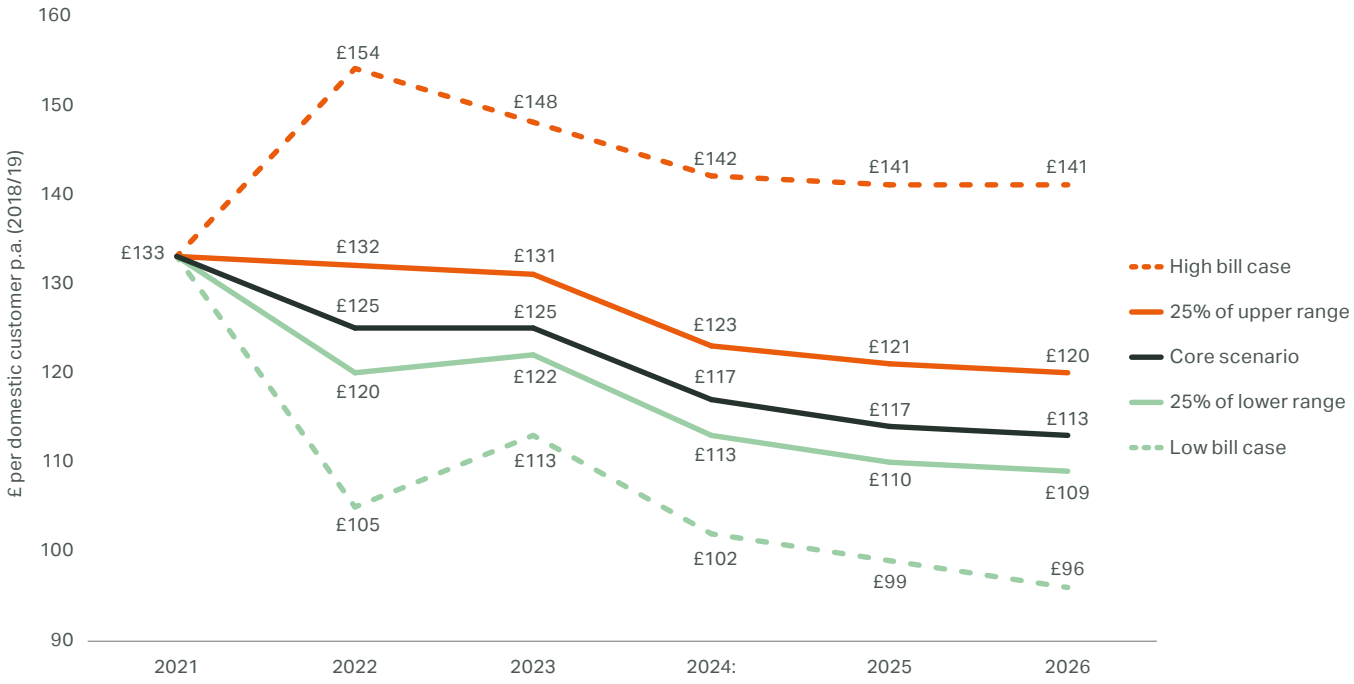
As a result of equity support and our improved financial resilience we do not need to use capitalisation or depreciation levers as additional tools to achieve financeability, beyond the increases in capitalisation rates (driven by a continuation of a 100% capitalisation rate for repex) in our Plan.

The bill in nominal terms in 2026 is estimated at £139, an annual increase of less than 1% relative to current charges; significantly below the inflation assumption.

We have also analysed in **Figure 11.07** two extreme bill scenarios by flexing the cost of capital, economic conditions, uncertainty mechanisms and cost and incentive performance. Naturally, the likelihood of all the positive or negative scenarios happening simultaneously is low, however the range of -£17 to +£28 largely illustrates the effect of incentive performance scenarios and uncertainty mechanism outcomes. The analysis indicates, even in an extreme high bill scenario, the average customer bills are expected to be not more than 5% higher than the 2021 forecast bills.

Appendix 11.00 provides more details on bill impacts including commentary on distributional impacts, and different user groups.

Figure 11.07: Range of potential RIIO-2 domestic bills (2018/19 prices)



Source: Cadent Regulatory Model

11.8 Intergenerational bill assessment and distributional impacts

11.8.1 Intergenerational bills

The depreciation methodology we have proposed (which maintains Ofgem's prescribed RIIO-1 sum of digits profile) results in current customers paying more than future customers and a declining bill profile over time. In a world where we see opportunity for progressively reducing bills in real prices, there is capacity to increase returns to a central case which would support stability and sustainability of the framework, whilst maintaining affordability.

Our strategy on customer bills is to balance affordability between current and future generations. We have sought to avoid making decisions that could increase bills for current customers when the future of gas and UK heat policy decisions have not yet been made. In lieu of these key decisions we see no firm basis to change approach and re-balance the current framework. We aim to deliver reducing bills to current and future customers, by supporting Ofgem to maintain a stable and predictable regulatory framework that enables us to pass on our component of the gas bill to Shippers with confidence and certainty.

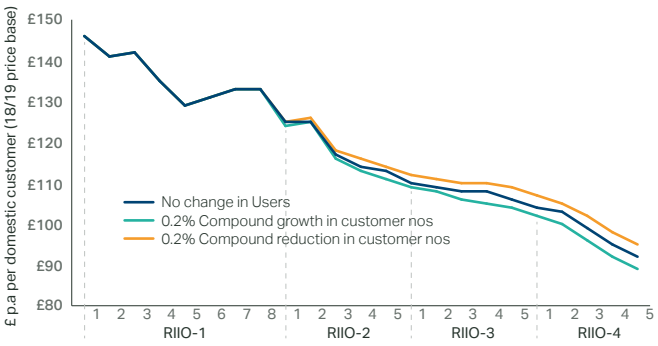
Ofgem's objectives relate to both existing and future customers. Ofgem rightly states: "Our duty to current and future customers is to protect their 'interests taken as a whole, including their interests in the reduction of greenhouse gases and in the security of the supply of gas and electricity to them".

The speed of change in this area is high and the future is uncertain. We continue to review and assess as we move through RIIO-2 with a view to having a clearer pathway to support amending policy for RIIO-3 and beyond if required. We explain in **Chapter 6** that we see no credible scenario where there is no requirement for a gas network. Further details can be found in the Environmental Action Plan – **Appendix 07.04.00** and **Chapter 6** provides further comments on the future of gas and our approach to whole systems solutions. Based on our assessment of the future of gas pathways, we do not believe now is the right time to make adjustment to asset lives.

Initial indicative estimates shown in **Figure 11.08** below show that bills are reducing into RIIO-4 based on two estimates of customer numbers, a base case with no change, and either a 0.2% compound growth or decline that could arise from policy decisions. Should policy decision evolve to accelerate depreciation of the RAV there is room to increase bills above this baseline without increasing bills to customers relative to today's levels.

Any future policy decision will require a whole sector review of charging to consider balance of bills cross-sector and the role of other funding mechanisms (taxation, innovation funds, etc.). This is beyond the scope of what can be covered in this report. However, we analyse in **Appendix 11.00** the impact of changing asset lives and capitalisation rates that are levers available to us to de-risk asset stranding and change the profile of bills between generations.

Figure 11.08: Indicative estimate of bills into RIIO-4 (2018/2019 prices)



Source: Cadent Regulatory Model

We do not assess financeability into the longer term. We comment above how the low cost of capital proposed, in combination with the conversion to CPIH indexation, increases the risk to sustainability for the industry.

Affordability and financing our Plan continued

11.8.2 Distributional impact of bills

Appendix 11.00 provides commentary on how we manage and contribute to ensuring a cost distribution reflective of its component of the gas bill to customers. We do not directly control customer bills or have the ability to target different unit prices to different categories of domestic or business user groups. This is managed by Shippers. Our charges are governed by the Uniform Network Code and Ofgem licence conditions.

The charging methodology does not allow intervention via the customer bill to support vulnerable user groups, but we comment below on how we are working to ensure a predictable, stable regulatory framework to enable accurate forecasts that support Shippers to pass through our component of the bill accurately. We make significant effort and have a strong track record of communicating accurate forecasts to Shippers to enable a pass through of our cost savings to end customers without risk adjustment.

We acknowledge that the metric of domestic bill p.a. does not get to the heart of affordability and our strategy to support customers in vulnerable situations. The table below shows the indicative range of bills based on different usage.

Table 11.10: Indicative bill impact based on usage (2018/2019 prices)

Usage category	Low	Mid	High
KwH - consumption	8,000	12,000	17,000
£ p.a. (indicative)	75	113	160

Source: Ofgem Typical Domestic Consumption Values and management information (Assume mid usage equivalent to average customer bill for presentational purposes)

We note and agree with Ofgem in their recent charging announcement that "We carefully considered the impacts of reforms on vulnerable consumers, but found them to be present in all consumption categories. We think targeted approaches for supporting vulnerable consumers are more appropriate than changes to the network charging".

Domestic charges are based on the same unit cost regardless of consumption, i.e. a variable cost. It is not possible for us to directly influence the cost of our services for customers in vulnerable situations, including fuel poverty. However, we are offering stretching customer-tested commitments to these user groups as documented in **Chapter 7** of this Plan that will support moving them out of fuel poverty through various measures including energy efficiency. Table 11.10 illustrates the impact of living in an energy-inefficient home and therefore the value to customers of support in this area. **Appendix 07.03.11** details how we are tackling affordability and fuel poverty with specific commitments and direct intervention to over 25,000 Fuel-poor customers.

We promote our position by actively participating in industry groups to ensure charges are cost-reflective and make recommendations to charging methodology changes in support of this objective. Changes to charging methodology are not restricted to the timing of price controls which set the total "pot" of charges to be allocated to our customers. How this "pot" is divided up is not covered in detail in scope of this Plan but we provide commentary in our **Appendix 11.00** on the existing methodology.

Customers in different networks receive different charges related to the cost of the infrastructure (RAV) per customer in these networks. This variability is linked largely to historic expenditure levels (RAV) relative to the number of customers in the geography. We are not able to cross subsidise customers between our networks but focus on ensuring costs are accurately recorded to each distribution network to mirror the cost to serve.

Supporting evidence

The following Appendices set out evidence and supporting information that are cross referenced in this chapter:

- **11.00 Affordability**
- **11.01 Financeability**
- **11.03 Our view on cost of capital**

12 Assurance

This chapter explains how we have assured our business plan to ensure our forecasts are accurate and our plans deliverable for our customers. We outline the process we followed, how we have assessed and prioritised risk, and the governance framework we established with our Board and Customer Engagement Group (CEG).

This chapter has the following structure:

Key messages

- We have taken a risk-based approach to developing our assurance plan, built on the internationally recognised 'three lines of defence' model and best practice observed in other industries.
- Our assurance approach has been designed to be dynamic, enabling us to respond to evolving requirements and changes in risks as they occur.
- Our assurance has been provided by a combination of internal processes and subject matter experts to give confidence to our Board and enable them to provide Ofgem with the assurance required in the RIIO-2 Business Plan Guidance Document.

Assurance continued

12.1 Our plan is based on best practice and tailored to us

Our Board is committed to our vision. A high quality RIIO-2 Business Plan is integral to achieving this vision. As a consequence, our Board has been heavily engaged in the development of our Business Plan, challenging management on all aspects of its development through dedicated all-day challenge sessions, Board meetings and focused reviews.

Our Board has provided assurance statements in line with Ofgem's expectations, which have been submitted alongside this Plan.

We have a robust assurance programme which has tested that our Plan is built on customer feedback as well as its accuracy, ambition, efficiency, deliverability and financeability. This underpins the assurance statement that our Board has made. This programme is based on the internationally recognised 'three lines of defence' assurance model, which is deployed across Cadent. Our approach to assurance also draws on best practice from other sectors, including the approach to assurance adopted by leading water companies during the ongoing price control review (PR19).

Our approach to assurance has been designed to be dynamic, enabling us to respond to changes in risks as they occur. It was developed by our internal Assurance Team and reviewed by PwC, who supported Severn Trent in achieving 'fast track' status in their recent PR19 submission. The model is outlined in the table below, with an outline of how this was applied in practice to the key area of replacement expenditure, which was highlighted as a critical risk area due to its criticality in delivering a resilient network to our customers:

Table 12.01: Our three lines of defence

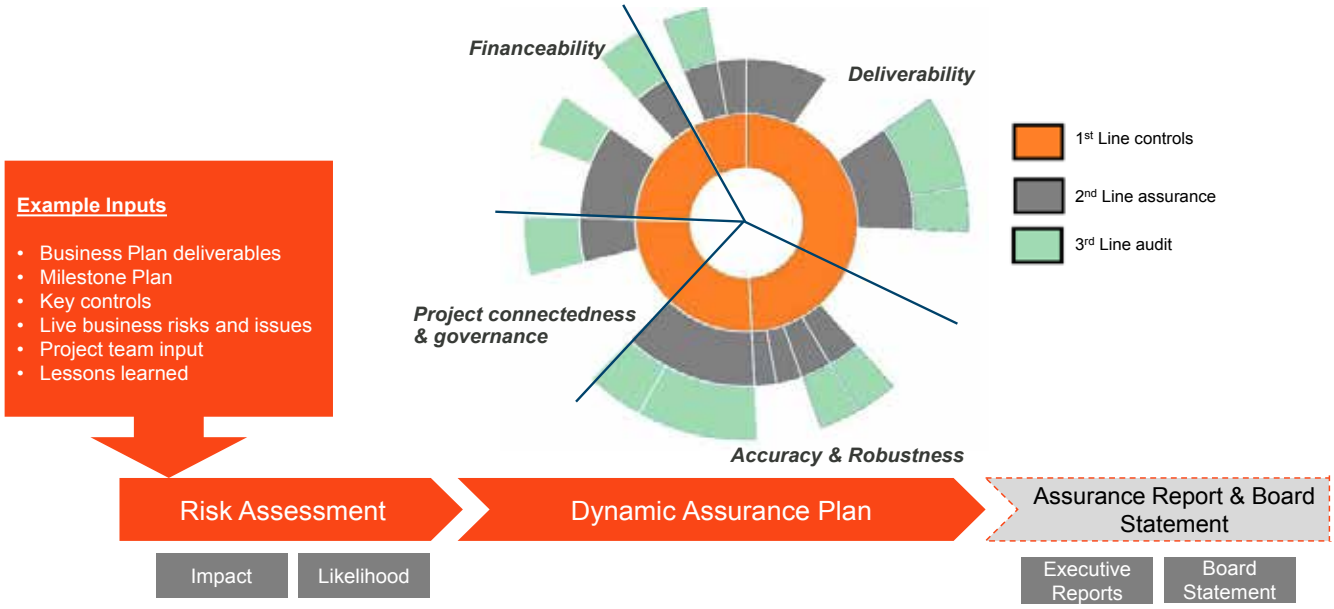
Line of Defence	Their activity	How this was applied to Replacement Expenditure
First Line of Defence *Management, project team and advisors*	• Responsible for designing and implementing controls, based on risk assessments. • Supported by specialist advisors to identify best practice e.g. development of engagement framework and lessons learned from PR19.	• Develop end-to-end process for analysing and forecasting replacement expenditure. • Customer engagement around options. • Key checks and balances over key inputs, calculation and outputs. • Develop documentary evidence packs to facilitate quality assurance. • Internal subject matter expert review.
Second Line of Defence *Performed by Cadent and PwC*	• Review effectiveness of first line controls. • Review documentation and perform quality checks.	• Walkthrough of end-to-end process. • Sample testing of key checks and balances. • Review of documentary evidence packs. • Sample testing of data and spreadsheet integrity checks.
Third Line of Defence *Internal audit and independent subject matter experts*	• Provide independent assurance on high risk areas, informed by risk assessment and second line assurance findings. • Reviews undertaken as required by expert third parties to assure specialist subject areas (e.g. cost and engineering methodologies).	• Sample testing of calculations and spreadsheet integrity checks by KPMG and internal audit. • Approach to asset management and costing, including sample testing undertaken by independent third parties. • Review of Cost Benefit Analysis approach and compliance with Ofgem model undertaken by independent third parties.

The assurance Plan was designed to provide assurance across all our business planning activities. To enable the assurance programme to be delivered effectively, we split the Plan into four key areas:

- Accuracy and robustness
- Financeability
- Deliverability
- Project connectedness and governance

Across these four areas, we adopted a risk-based approach to developing our assurance framework, which is shown in Figure 12.01 below:

Figure 12.01: Assurance Approach



The first step in our risk-based approach was forming a 'level 1' assurance plan. We used a broad set of inputs to perform a 'top-down' risk assessment to identify the key areas to be assured. This was carried out against the risk factors set out in table 12.02 below:

Table 12.02: Business Plan risk factors

Category	Description	Related Data Assurance Guidelines ('DAG') criteria
Likelihood		
Complexity	Based on the number of potential failure modes, their interdependence and predictability	Complexity, completeness, manual intervention
Change	The extent to which the component requires change from our RIIO-1 approach or performance	Complexity and maturity
Roles and responsibilities	Degree of clarity about who is responsible for the component	Not covered by DAG – new criteria
Subjectivity	The extent to which development of the component involves subjectivity	Not covered by DAG – new criteria
Impact		
Value	How significant the component is in our plan, especially financially	Financial, comparative efficiency
Customer/ stakeholder impact	How material any errors would be for customers and for other stakeholders	Customers
Regulatory requirement	Whether or not the component is a regulatory requirement	Competition
Reputation	The extent to which errors are likely to reflect poorly on Cadent	Not covered by DAG – new criteria

The risk factors build on the DAG framework, but also reflect the specific characteristics of the business planning process (e.g. the greater level of uncertainty in forecast, rather than historic data) and draw on lessons learned from the past. They also reflect the need to have compelling evidence to support our proposals and the potential reputational impact of errors.

In the case of the data tables, NARMs and Cost Benefit Analysis models that accompany our Plan, we have performed our risk assessment in line with Ofgem's Data Assurance Guidelines ('DAG')[1]. The DAG requires companies to assess the inherent risk of data errors and the extent to which these inherent risks are altered by the controls that the company operates. Details of this assessment are also set out in our Irregular NetDAR submission which has been made alongside the December Plan. This has allowed us to combine a top-down and bottom-up risk assessment to form our more detailed 'level 2' assurance plan.

1 Ofgem, Data Assurance Guidance for Electricity and Gas Network Companies.

Assurance continued

As the assurance programme developed, the lessons learned and feedback were used to iteratively develop the control framework and also target more detailed assurance activity. As a consequence, assurance was not a 'one size fits all' exercise, as the different size 'spokes' in Figure 12.01 (Our risk-based, dynamic assurance programme) above show on an indicative basis.

Our initial assessment identified the need for specific external assurance which has been provided by independent experts over the following areas:
- Financeability, including stress testing of the Business Plan.
- Engineering and cost methodologies.

Advice has also been sought on the robustness of the assurance plan.

The table below summaries the external third party assurance which supports our plan.

Table 12.03: Summary of external assurance

Assurance Provider	Scope
CEG	The extensive input and challenge from our independent Customer Engagement Group is set out in Appendix 01.01 and will be visible in the challenge log where we have responded to over 200 separate challenges.
R2CG	Our response to the feedback from Ofgem's independent RIIO-2 Challenge Group is set out in Appendix 01.01.
PwC	Provided second line assurance over the robustness, accuracy, triangulation methodology and deliverability of our plan. This included process walkthroughs to identify and understand controls and detailed sample testing to verify whether controls were implemented effectively.
NERA	Technical review of a sample of CBA models to ensure they complied with Ofgem's guidance and expected good practice.
ICS	Technical review of the production and completion of the NARMs models to ensure they complied with Ofgem's guidance.
Costain	Technical review of our approach to investment costing.
Lloyd's Register	Technical review of our methodology and asset management approach to investment planning.
KPMG	KPMG provided a review of specific input files that feed data to BPDTs covering the structure of the files, linearity, hard coded inputs in these files, and a detailed review of unique formulae where required.
KPMG	Financeability of our RIIO-2 Business Plan under notional and actual structures based on our forecasts. Stochastic risk modelling and scenario analysis to analyse financeability and financial resilience under downside risk scenarios.
Internal Audit	Internal Audit reviewed a number of areas including a deep dive into repex and reviews over the second line assurance work carried out by PwC.

A more detailed summary of the assurance undertaken and the assurance provided is included in our assurance **Appendix (12.00)**.

12.2 Our deliverability programme provides further confidence in the Plan

In **Chapter 7, Our Commitments**, we set out the four outcomes areas that our insight tells us are the most important for our customers. We also set out the key priorities in each area. We have then set out the commitments we are making to address each priority area. In doing so, we explain for each priority area how we are addressing the associated delivery risks, as well as how we are mitigating the risk for customers of non-delivery (see in Chapter 7, priority areas summaries in sections 7.2 to 7.5).

In **Chapter 4, Learning from past performance**, we discussed the areas where we have faced particular challenges during RIIO-1. In **Chapter 9, Costs and Efficiency**, we detailed the ambitious transformation programme we are actively pursuing and that will make step-changes to several aspects of our business performance and culture.

These narratives underline the significant level of ongoing change in our business. However, the demanding commitments we are making in our RIIO-2 Plan require further, additional change activity. The scope of our RIIO-2 deliverability programme includes:
- Ensuring the alignment of our ongoing transformation activities with the riio-2 plan;
- Ensuring our legislative obligations are covered in full;
- A programme of readiness assessments and early mobilisation of key commitments, and
- A programme of capability assessments to ensure the resources we require are in place.

To support the development of our plan, we appointed an operational Director to test our emerging thinking with our operational teams. The focus was on identifying areas which might give risk to delivery risks, for example, because delivery:
- Required a major change to the competency of our workforce;
- Relied upon a major or core system change;
- Will go beyond known operational or technological solutions;
- Might distract attention from the efficient delivery of core services;
- Might undermine our ability to comply with our obligations, or;
- Relies on a more risky contracting route.

We undertook delivery risk assessment surveys and developed high level plans which were tested by our operational teams. Our Board spent time with these teams to challenge them and test their understanding of how they plan to deliver our commitments.

Our RIIO-2 submission is made sixteen months before the commencement of the new regulatory period. There are limitations to the extent to which it is possible to assure future events and activities. Hence, assurance work on deliverability has focused on assessing the processes we followed to assess deliverability risks, together with detailed scrutiny of our plans for five outcome areas.

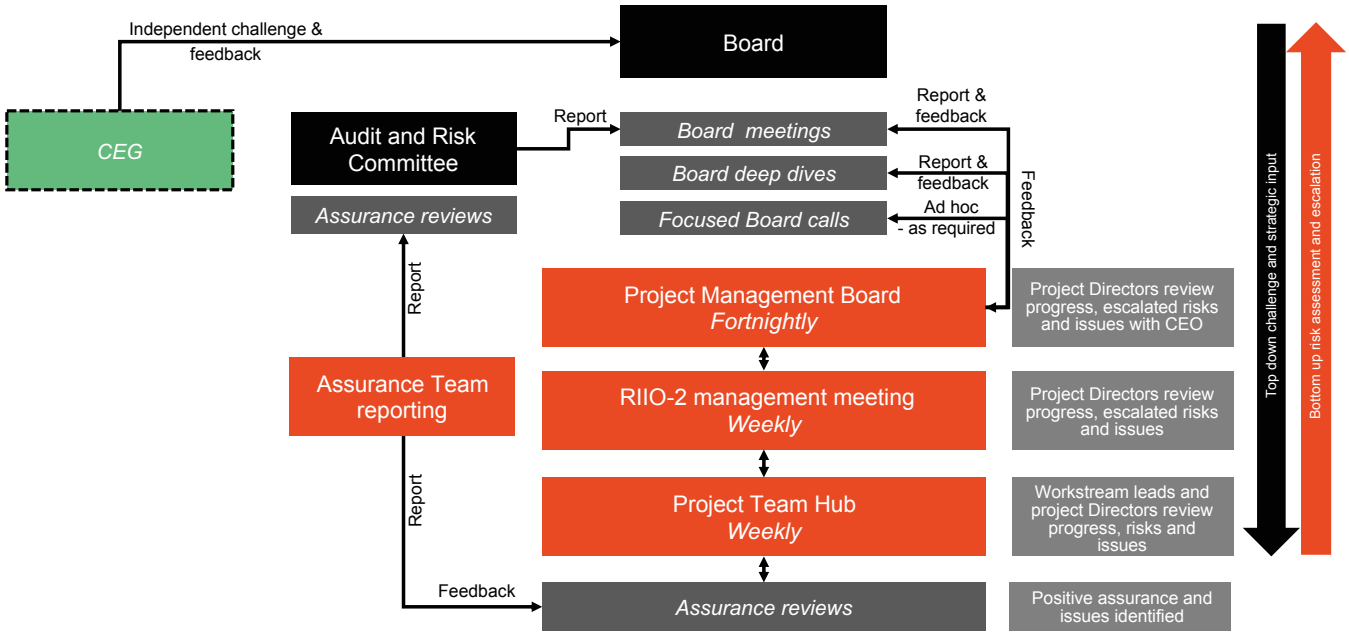
We are required to operate under a Health and Safety Executive-approved safety case and, given the significant changes that our transformation and the RIIO-2 Business Plan require, we will need to ensure that the Health and Safety Executive are comfortable with what we propose to do.

12.3 We have engaged with our Board and CEG

The assurance Plan has developed to deliver fast feedback to ensure issues can be addressed and assurance is provided as risks change. It was aligned to the overall project plan to ensure that assurance activities coincided with project milestones.

We established a reporting and governance framework to ensure that there was appropriate oversight of risks and issues and that our senior leaders and Board remain informed of emerging issues, including the challenges raised by our CEG. This is depicted in Figure 12.02 below:

Figure 12.02: Reporting lines and governance framework



Our Board has been involved throughout the development of our Business Plan to date. The Board has:

- Led the development of our ambition and vision;
- Challenged our emerging thinking through workshops and Board discussions;
- Reviewed and challenged costs and outputs set out in our Plan;
- Challenged the Executive Team to build our confidence that the Plan is stretching but deliverable;
- Reviewed and commented on successive drafts of our Plan;
- Ensured suitable assurance processes have supported the Plan and its data; and
- Provided members to attend meetings of our CEG and have invited our CEG Chair to brief them on the CEG's views about our Plan.

The governance framework and assurance plan were designed to ensure that the Board retained close oversight of the development of our Plan and a high level of assurance over the business plan. The Board have also had visibility of the output of our assurance programme which has enabled the Board, including our Sufficiently Independent Directors, to confirm their approval of and commitment to the business plan.

Assurance continued

12.4 Board statement

The statement below has been approved by our Board.

On 11th June 2019, the Prime Minister committed the United Kingdom to a target of Net Zero greenhouse gas emissions by 2050.

It is against this background that we, the Board of Cadent, are pleased to submit our RIIO-2 Business Plan.

A Net Zero commitment necessitates radical changes in the country's energy mix and presents profound investment challenges. We are convinced that gas has a central role to play in a Net Zero future, but only if it can meet head-on the challenges of decarbonisation.

As the operator of the largest gas distribution network, Cadent will take a leading part in the debate. Through selective investment, during RIIO-2 we will demonstrate the pathways to decarbonisation. In refreshing our innovation strategy, we will seek to leverage the skills and capabilities of our employees, our supply chain partners, and ideas from multiple industries, so that, by the end of RIIO-2, the contribution of clean gas to a net zero environment is evident.

To play our part in this process, Cadent must demonstrate that it is 'match fit' and has earned the trust and respect of its consumers, regulators and other stakeholders. We will do this by achieving our plan, which sets out to deliver our most stretching and tailored output commitments, underpinned by our vision for setting standards all of our customers love and others aspire to. Our plan for 2021-2026 is an important step on this journey to transform experiences and set stretching ambitions for the outputs we will deliver for our customers whilst reducing our bills in real terms over the period. Trust is earned, not claimed, but by the end of RIIO-2 we want to be recognised through our performance as both a trusted network operator and as a respected leader in the net zero debate.

We have actively engaged with customers and stakeholders during RIIO-1. This has been extended so that our plan has been built on insight from the most tailored and extensive customer and stakeholder engagement process we have ever undertaken, building trust that we are acting in the best interests of society and embracing whole system thinking. Our Plan will maintain the levels of safety and reliability that our customers rely on, and focuses on improving the experience for all our customers including a targeted consumer vulnerability strategy. We are committed to continuing engagement through RIIO-2, to ensure we continue to deliver what our customers need and to inform decisions.

Our Plan is underpinned by a cultural and operational transformation designed around delivering for all our customers and creating an environment for our employees to thrive and be proud of the service they deliver.

Testing our Plan

To support our Plan we, the Board have:

- led the development of our ambition and vision;
- challenged our emerging thinking through workshops, dedicated reviews of key topics and Board discussions;
- reviewed and challenged the costs and outputs set out in our Plan;
- challenged the Executive Team to build our confidence that the Plan is stretching but deliverable;
- overseen a robust governance structure to ensure we maintained oversight of the Plan and any emerging issues in relation to the Plan;
- reviewed and commented on successive drafts and the final versions of our Plan;
- put in place suitable assurance processes that have supported the Plan and its data.

Alongside this, Members of the Board have participated in meetings with our Customer Engagement Group.

In giving this statement, we are acting as one Board, including the Sufficiently Independent Directors.

We have delivered a risk-based assurance programme, based on the internationally recognised 'three lines of defence' model to verify that the Plan is accurate and efficient. Where appropriate, specialists have also been engaged to provide assurance that our Plan is robust in the approach we have taken to asset management, and provides value for money to customers through cost benchmarking. Specialists have also been engaged to provide assurance in relation to the financeablilty[1] of our Plan through a number of techniques including stress testing analysis. In addition to our own review, PwC have also reviewed the robustness and deliverability of our commitments.

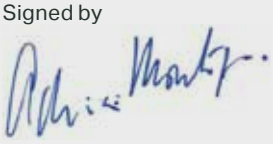
We are satisfied that our Plan meets Ofgem's minimum requirements. This has been assured both for completeness and quality through sample testing conducted by our second line assurance providers, PwC.

We have high expectations for what we want to achieve, and we have challenged all aspects of our Plan throughout its development, including our cost and efficiency projections. We have commissioned independent assurance of those projections and are satisfied that our Plan uses efficient and robust expenditure forecasts.

The integrity of our data is a priority for us as a Board and essential to deliver an accurate Business Plan. We have applied Ofgem's Data Assurance Guidance for Electricity and Gas Network Companies to the information contained within our Plan and in the Business Plan Data Templates, NARMS tables and Cost Benefit Analysis Templates. The data in our Plan has been subject to assurance by our external assurance provider, PwC, and we have reviewed the outputs of the assurance work with them. We have taken all reasonable steps to test the accuracy of the data in our Plan, including reviewing the work carried out by external assurance providers.

We, as a Board are satisfied that our Plan demonstrates the right degree of ambition for the business to deliver for current and future customers.

Signed by



Sir Adrian Montague, Chairman, on behalf of the Board

Statement approved by the Board
4 December 2019

1 Our financeability assessment has assumed base returns to equity of 4.8% (CPIH real)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