Northern Gas Networks

RIIO – GD1 Year 8 Report

July 2021

we are the network

Northern Gas Networks

we are the network

Contents

A. CEO and Board update

1. Chief Executive Officer's Report

This report sets out the details of our performance in 2020/21 and represents the final year of the eight-year RIIO-GD1 Regulatory Period. As such it represents an important 'yardstick' for performance not only in this regulatory period but also in determining the baseline of performance for the next period that will commence in 2021.

It has always been a key objective of our business to be at the frontier of performance in the sector and in doing so set the standard in terms of cost and service levels for the industry and deliver value for gas customers across the UK by setting the benchmark levels for the next period. I am delighted that we have achieved this objective and in continuing to stretch the frontiers of performance in the sector, deliver significant long-term value not only for our own customers, but for all gas customers in the UK.

Our aim has also been to ensure that these levels of performance are sustainable. To achieve this, it has been necessary in to continually challenge traditional practices and seek out and implement new and innovative ways of running our business.

Placing our customers and wider stakeholders at the heart of our busines and decision-making

has been key to this success.

Mark Horsley, CEO, Northern Gas Networks

Covid-19

The resilience of our business has been tested like never before over the last year, as we and the communities we serve have sought to adapt to the impact of the Covid-19 Pandemic. It has highlighted the critical role that the energy network companies in the UK play in supporting individuals, businesses, and the regional and national economies. A safe, reliable and efficient energy system that has the resilience and flexibility to adapt to rapidly changing circumstances and customer requirements is a key feature of our society.

I am incredibly proud of the dedication and commitment shown by all my colleagues across NGN and our

partners who have worked tirelessly to ensure that the gas supplies have been maintained safely and reliably over the period. But also, in responding to the rapidly changing needs, priorities and concerns of our customers as we continued to deliver safety critical services in people's homes and businesses. The now well-established partnerships and links we have across our region also meant that we could play a direct role in supporting those in our communities who were in some way vulnerable and facing a range of challenges arising from the pandemic and the regional and national periods of lockdown.

At a national level there was very strong and effective collaboration between NGN, the other energy network companies in the UK and the energy regulator Ofgem to monitor the impact of the pandemic across the energy industry. But also, to utilise the financial and operational resilience of the network companies to support the wider energy supply chain and provide financial support to those parties who were struggling with the impact on their businesses. These interventions were key to ensuring the long-term impacts on the sector and ultimately customers are minimised.

It is clear that the structural, commercial and cultural change that NGN has delivered over the RIIO-GD1 period has been key in ensuring that bot the short and long-term impacts of Covid-19 have been minimised. For example:

- In many areas of our business, conscience decisions to get ahead of delivery targets meant that we were able to deliver on our commitments such as our Fuel Poor Connection targets, despite the enormous disruption to our operations.
- In other areas such as Mains Replacement, decisions to take a balanced and consistent long-term approach meant we maintained significant flexibility to change the basket of work delivered to minimise customer interaction and the risk of Covid-19 infection. This also ensured that our supply chain and delivery partners maintained their commercial viability on the short and longer term and minimised cost for consumers in the longer term.

As a result, there are only a very limited number of areas where NGN has not been able to fully deliver on our commitments for the RIIO-GD1 period. The majority of these will be addressed early in the next regulatory period. We will continue working with Ofgem to ensure that the overall impact on customers is minimised.

Despite these challenges we have not been distracted from our commitments to support our shared goal of achieving Net-Zero carbon emissions by 2050. We have continued to play our part in identifying and delivering the lowest cost pathway to decarbonisation and the role that gas will play in that transition and beyond. We are increasing the amount of low carbon Biomethane Gas injected into our network each year and are have continued our collaborative research and trialling of projects that look at replacing natural gas with hydrogen. Live trials of blending up to 20% Hydrogen into NGN's network will commence in 2021/22 and is another important step in providing the data and information necessary for government to make informed energy policy decisions on the future rile of as in the UK's energy mix.

Looking Ahead

The challenges for NGN and the wider energy sector remain significant. The RIIO-GD2 period commenced in April 2021 and set out the next set of targets for NGN – reducing customer bills, delivering higher levels of service alongside the significant investment required to deliver Net Zero by 2050.

However, as the frontier company in the sector, NGN remain well placed to meet these challenges head-on. Our track record of delivering frontier levels of performance on a sustainable basis along with continued prudent management of our financial position means we now have a business that is resilient and well placed to meet the challenges of the future.

B. Executive Summary

2. Board Update

The company's business strategy is to provide, develop and maintain a safe, affordable, and secure gas distribution pipeline system, for the provision of gas supplies to the people and businesses within our region.

Underpinning this strategy is a strong compliance culture which the Board directly monitors through its risk management, audit, treasury, and compliance committees.

During 2020/21 we continued to demonstrate strong customer, safety, reliability, and environmental performance. We are pleased with the performance of NGN during this period and in particular the performance against the output targets agreed as part of the RIIO-GD1 price control when faced with the severe impacts of Covid-19 in the UK.

Alongside of continuing to reduce the cost of delivering these services for our customers. Incentive arrangements for the senior management team are directly linked to the safety, customer, and efficiency targets within the regulatory contract. These targets are updated annually.

Andrew Hunter, Chairman, Northern Gas Networks

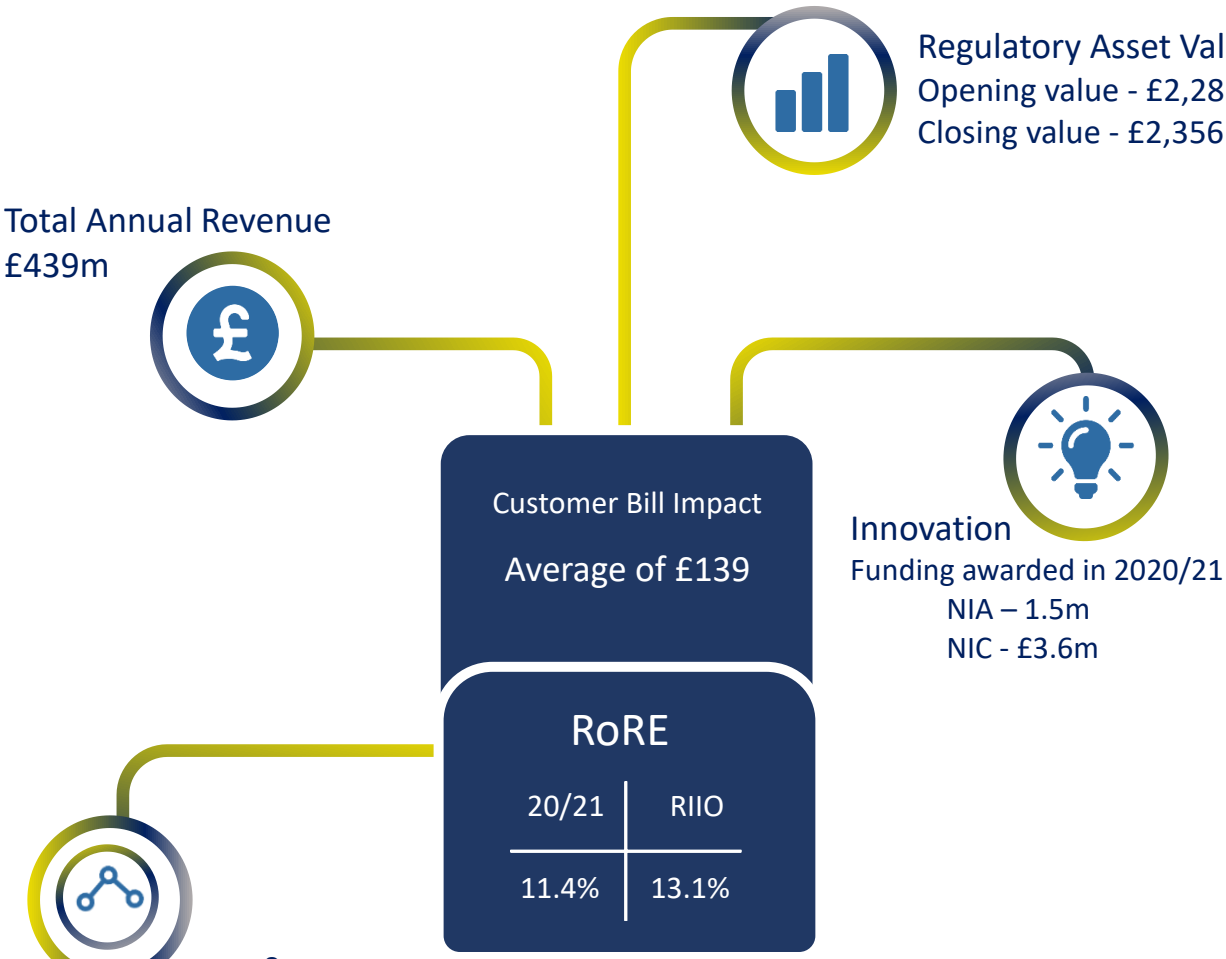
The focus of the Board continues to support NGN in its ambition through significant investments and innovations in the network, supporting infrastructure and people aimed at improving the performance of the business in both the short and longer term.

3. RIIO Performance Review

Northern Gas Networks Outputs

3. RIIO Performance Review

Northern Gas Networks Financials



TOTEX Incentive	£m 20/21	RIIO
Actual	229	1968
Adjusted allowances	277	2266
Outperformance	49	299
Outperformance %	17.5%	13.2%
Return to customers	18	107.5

Other Incentives	£m 20/21	RIIO
Customer Service	2.4m	19.7m
Shrinkage	0.3m	4.5m
Leakage	3.1m	24.2m
Exit Capacity	0.2m	8.1m
Total	6.0m	57.9m

4. Totex Drivers

The table below provides a high level summary of our Totex cost drivers for the RIIO-GD1 period. Further details and explanation are then provided in Section 5 – Performance Summary.

Driver	Category	Estimate of RIIO Totex under / overspend (£m estimate)				% of Totex Allowance
		Opex	Capex	Repex	Totex	
Allowance		**894.7**	**455.2**	**916.5**	**2,266.4**	
Efficiency	Efficiency	(127.6)	(81.3)	(127.1)	(336.0)	(15%)
Land Remediation	External factors	(2.8)			(2.8)	0%
Holder Demolition	Price control assumption	0.6			0.6	0%
Weather impact	External factors	(20.4)			(20.4)	(1%)
Maintenance workload	Price control assumption	22.2			22.2	1%
Interruptions	Efficiency	(37.1)			(37.1)	(2%)
Xoserve	External factors	(8.0)			(8.0)	0%
Connections workload	External factors		(18.9)		(18.9)	(1%)
Connections efficiency	Efficiency		17.7		17.7	1%
Fuel Poor workload	External factors		2.3		2.3	0%
Fuel poor allowance	Price control assumption		10.9		10.9	0%
Reinforcement workload	Efficiency, External factors		(22.2)		(22.2)	(1%)
Governors workload	Price control assumption		1.8		1.8	0%
IT and Building investment	Price control assumption		69.4		69.4	3%
Unforeseen Capex	External Factors		14.0		14.0	1%
Risers and Subdeducts	Price control assumption			(11.4)	(11.4)	(1%)
Repex Transfers	External factors			(4.1)	(4.1)	0%
Steel workload	Price control assumption			7.5	7.5	0%
Other Mains Workload	Price control assumption			19.1	19.1	1%
Non Recurring		(3.5)			(3.5)	0%
Actuals		**718.1**	**449.0**	**800.5**	**1,967.5**	**87%**

Figure 4.1: Totex Drivers

5. Performance Summary

Gas distribution was the first sector in the energy industry to have a periodic review of its prices carried out under the new RIIO principles. This new price control applied for the eight year period from 1 April 2013 to 31 March 2021 and is referred to as RIIO-GD1. Northern Gas Networks (NGN) continues to be the most efficient gas distribution network overall, evidenced by the financial benchmarking of the eight GDNs since 2005/06. We have maintained this position whilst operating a safe and reliable network and delivering on our customer commitments.

5.1. Financial Performance

Ofgem use the Return on Regulatory Equity (RORE) to measure the potential financial returns or penalties on the portion of the value of the company that is financed by equity. RORE is calculated by using the cost of equity (6.7%) as the starting point as this amount is funded directly in revenue. The cash value of any outperformance from the incentive mechanisms is then divided by the 35% notional equity portion of the Regulatory Asset Value to calculate the additional return on equity earned. The table and graph below show our annual and cumulative 8 year RORE:

RORE	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	RIIO to date
Base cost of equity	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%
Totex	3.5%	2.8%	3.4%	3.5%	2.7%	2.1%	3.2%	3.9%	3.1%
IQI Income	0.4%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%
Customer Satisfaction	0.4%	0.3%	0.4%	0.4%	0.3%	0.3%	0.4%	0.3%	0.4%
Shrinkage	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%
Environmental Emissions	0.3%	0.4%	0.4%	0.6%	0.5%	0.5%	0.5%	0.4%	0.4%
Discretionary Reward	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
NTS Exit Capacity	0.0%	0.1%	0.4%	0.2%	0.2%	0.2%	0.1%	0.0%	0.1%
Network Innovation	(0.0%)	(0.1%)	(0.2%)	(0.1%)	(0.1%)	(0.1%)	(0.0%)	(0.0%)	(0.1%)
Penalties and Fines	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.1%)	(0.0%)	(0.0%)	(0.0%)
RoRE - Operational	11.4%	10.8%	11.6%	11.9%	10.9%	10.1%	11.3%	11.8%	11.2%
Debt Performance (notional gearing)	4.2%	1.9%	(0.1%)	1.8%	4.6%	2.9%	1.9%	(0.8%)	2.0%
Tax performance (notional gearing)	(1.3%)	(1.3%)	(0.6%)	1.5%	0.0%	0.6%	(0.4%)	0.3%	(0.1%)
RoRE – including Finance and Tax	14.3%	11.5%	10.8%	15.1%	15.5%	13.6%	12.8%	11.4%	13.1%

Figure 5.1: RORE breakdown

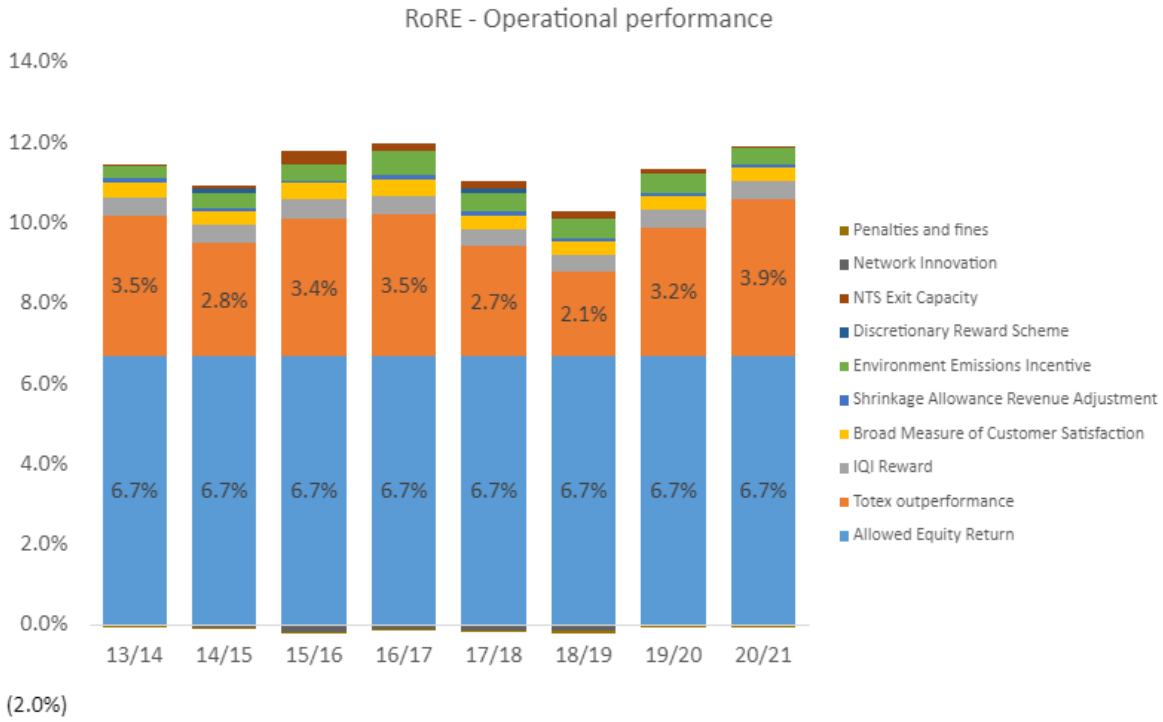


Figure 5.2: Operational RoRE Graph

5.2. Totex financial performance

The largest contribution to our RORE performance comes from our Totex outperformance. Under the Totex incentive mechanism any outperformance is shared with our customers who receive 36% of this outperformance through lower bills.

Totex forecasts 2020/21 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19 Actual	19/20 Actual	20/21 Actual	Total	Allowed	Variance
Opex	94.1	96.5	90.8	91.3	89.0	85.3	84.6	86.5	718.1	894.7	(176.7)
Capex	47.0	55.7	69.2	65.5	56.0	62.0	51.5	42.2	449.0	455.2	(6.2)
Repex	103.1	108.2	97.6	94.8	97.5	99.9	99.4	100.0	800.5	916.5	(116.0)
Totex	**244.3**	**260.3**	**257.5**	**251.5**	**242.5**	**247.2**	**235.6**	**228.7**	**1,967.5**	**2,266.4**	
Allowance	**284.4**	**292.6**	**296.9**	**292.9**	**275.1**	**272.5**	**274.8**	**277.3**	**2,266.4**		
Variance	(40.1)	(32.3)	(39.4)	(41.4)	(32.6)	(25.3)	(39.2)	(48.6)	(298.9)		
Cumulative Variance	(40.1)	(72.3)	(111.8)	(153.2)	(185.8)	(211.1)	(250.3)	(298.9)			

Figure 5.3: Totex Performance

5.2.1. Opex financial and output performance

The table below provides a summary of our controllable Opex performance against the allowance over the RIIO-GD1 period.

Opex forecasts 2020/21 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19 Actual	19/20 Actual	20/21 Actual	TOTAL
Work management	15.6	18.2	19.9	20.3	17.0	15.1	15.1	16.0	137.2
Emergency	11.5	11.7	11.7	11.4	11.7	11.0	10.2	10.9	90.0
Repair	19.1	17.2	15.3	14.9	15.7	16.7	16.5	18.8	134.2
Maintenance	9.8	10.7	11.1	11.2	11.6	12.4	12.9	11.7	91.5
SIUs	-	-	-	-	-	-			-
Other direct activities	7.8	7.8	7.3	7.3	6.3	5.9	5.2	6.0	53.7
Of which Xoserve	4.4	4.9	4.8	4.2	3.6	2.6	2.3	2.0	28.9
Total direct Opex	**63.8**	**65.6**	**65.3**	**65.1**	**62.4**	**61.2**	**59.8**	**63.5**	**506.6**
Business support	27.5	28.1	23.4	24.0	24.7	22.0	22.2	20.9	192.9
Training/apprentices	2.8	2.7	2.0	2.2	1.9	2.1	2.7	2.2	18.6
Total indirect Opex	**30.3**	**30.9**	**25.4**	**26.2**	**26.6**	**24.1**	**24.9**	**23.0**	**211.4**
Total controllable Opex	**94.1**	**96.5**	**90.8**	**91.3**	**89.0**	**85.3**	**84.6**	**86.5**	**718.1**
Allowance	113.1	114.4	115.1	115.2	111.1	109.9	108.7	107.1	894.7
Variance	**(19.0)**	**(17.9)**	**(24.3)**	**(23.9)**	**(22.1)**	**(24.6)**	**(24.1)**	**(20.6)**	**(176.7)**
Cumulative Variance	(19.0)	(36.9)	(61.2)	(85.2)	(107.3)	(131.9)	(156.0)	(176.7)	

Figure 5.4: Opex forecasts

Over RIIO-GD1 we outperformed the controllable Opex allowances by £176.7m (19.7%), generating an average RORE of 1.8% p.a. It is important to remember that the allowances are benchmarked against the other GDNs, and as the frontier company in some cases our allowances are higher than our base costs were at the time the allowances were set.

There are several key drivers for our strong performance against these benchmarked Opex allowances. The main driver is our historic operational efficiency and the further improvements we have delivered in RIIO-GD1. We estimate this will account for 72% of our outperformance over the period, c£128m out of c£177m, or £16.0m per annum.

A major driver for this efficiency is our modernised employee terms and conditions. These deliver a number of benefits which impact across the network, with the greatest impact in controllable Opex. We have:

- Refreshed our previously ageing workforce;
- Introduced more flexible working arrangements that match business and customer requirements;
- Incentivised employee performance – employee reward is now mainly linked to delivery of the Regulatory Contract;

- Revised terms and conditions that more closely reflect market rates; and
- Recruited, trained and developed a workforce ready to meet future challenges.

We have over 500 employees on new terms and conditions and over 600 on personal contracts out of an internal workforce of nearly 1,400. In terms of efficiency we estimate this is now delivering around £9m of benefits each year in Totex, with the majority (over £6m) being realised in our Emergency, Repair and Maintenance activities in Opex.

We have also invested significantly in technology and process improvements and will continue to do so in the remainder of RIIO-GD1. We have made significant efficiencies in our IT and Telecoms delivery model and have seen operating costs reduce by c£6m over recent years through the refresh of our service contracts, insourcing of many key activities, and review of our licence and system requirements. Details on our significant IT investment are provided in the Capex section below.

Further efficiencies have been delivered through business process improvements across our back and front office processes. We have further optimised all of our field based work patterns, reduced head count in many areas such as Street works and Dispatch through process improvements and the use of technology, and seen benefits from reduced overtime and average salaries across our supervisory workforce. We have introduced a Digital Operations room and Remote Hub which allows us to monitor work patterns and results more effectively.

As part of our Repex programme we have consistently targeted some of our poorest performing pipes. This is a key driver for improving our emergency and repair performance over RIIO-GD1, and over time we would expect both costs and workload to trend downwards. In addition, winters have been relatively mild in RIIO-GD1 compared to the last price control period, which has impacted overall workload, overtime payments and contractor costs. We estimate that over RIIO-GD1 these milder conditions will deliver net savings of c£20.4m when compared to the allowance.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
PREs	89,290	83,446	93,411	90,016	90,224	82,713	74,948	70,115
Reports	24,197	22,082	20,260	18,676	18,672	20,220	17,618	19,767
Repairs	25,526	22,377	19,933	17,801	17,484	19,169	17,317	17,794

Figure 5.5: Emergency and Repair Workload

However, in recent years we have experienced short periods of more extreme winter weather which has affected both costs and workload. We have seen severe flooding in 2015/16, which resulted in three major off-gas incidents, and in 2016/17 where one major incident resulted in 2,756 interruptions. During 2017/18 we saw increased workload across the winter months from December to March with the biggest increase in March during a sustained period of more extreme weather.

In 2018/19 we saw the number of Reports and Repairs increase, however this time the largest increase was during the summer months during a period of extreme warm weather. This most likely caused ground movement and increased leaks, leading to increased reports and repairs. In 2019/20 costs have remained broadly flat whilst workload has decreased. We are seeing repair complexity increase over time as iron pipes deteriorate faster than we can replace them, meaning each repair takes longer and is more costly. In 2020/21 both costs and workload have been impacted significantly by the Covid-19 pandemic. PREs fell during periods of lock down, whereas reports and repairs both increased.

All this shows that severe weather throughout the year is now becoming more prevalent and that we are not immune to shocks such as the Covid-19 pandemic. Recent workload increases and repair complexity suggests the underlying network performance is deteriorating faster than the repex programme delivers improvements. We have invested significantly in active pressure management and in adequate capacity at the local level to increase our ability to flexibly manage our system during these periods and to help manage these issues, ensuring that we minimise the risk of losing supplies.

Our Opex allowance in RIIO-GD1 included a one off allowance to manage the risks associated with potentially reinforcing large customers who were on interruptible contracts. Our successful management of this risk through network analysis, system balancing, and contingency plans is delivering a one off outperformance in this price control period of c£37.1m p.a.

Our maintenance workload has consistently been above the benchmarked workload allowed within the allowances, and prior to Covid-19 had increased in line with the strategy we outlined in our RIIO-GD2 Business Plan to increase maintenance work whilst reducing full asset replacement. We estimate this workload price control assumption is driving a £22.2m overspend against the allowance over RIIO-GD1.

There are two other factors that are impacting our overall outperformance against the allowance:

- We estimate Land Remediation costs to be £2.8m lower than the allowance over RIIO-GD1. Costs for this type of work are very difficult to estimate and are largely driven by what you discover when the work is underway; and
- Xoserve costs are expected to be £8.0m lower than the RIIO-GD1 allowance.

In terms of Opex related outputs, the majority are related to our Emergency and Repair activities. We have delivered a strong performance across all of these outputs in RIIO-GD1. Highlights of our performance include:

- We achieved a near 100% response rate for both the 1 and 2 hour emergency response standards over the price control, significantly outperforming the 97% target;
- Our Annual Repair Risk score averaged 21.5m and trended downwards, well below the target of 34.5m;
- We completed on average 65.1% of repairs within 12 hours, above the target in each year;
- We saw 99,903 unplanned interruptions in total, comfortably below the ceiling target of 103,677. The duration of the interruptions was 39.5 million minutes, again below the ceiling target of 47.0 million minutes. We have more control over duration, and on average customers were interrupted for a shorter period of time than the target;
- We delivered a very strong customer service performance, showing an upward trend and scoring 9.5 out of 10 on our customer satisfaction surveys for unplanned works in the final year. Even when customers had an unplanned interruption, we dealt with it well; and
- We decommissioned 24 gas holders over RIIO-GD1, one more than target. The remainder will be decommissioned in RIIO-GD2.

5.2.2. Capex financial and output performance

The table below provides a summary of our capex performance against the allowance over the RIIO-GD1 period.

RIIO Capex forecast 20/21 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19 Actual	19/20 Actual	20/21 Actual	Total	Allowed
LTS, storage and entry	10.4	17.2	22.6	16.6	12.2	16.3	7.4	10.7	113.3	138.0
Connections	7.6	7.8	11.2	9.8	10.7	10.7	9.8	5.6	73.1	63.0
Mains Reinforcemen	3.3	2.0	3.6	2.4	2.3	2.5	4.0	6.3	26.5	43.7
Governors replacement	2.4	1.6	2.0	1.8	1.6	2.7	2.0	0.2	14.3	14.8
Other Capex	23.3	27.1	29.7	34.9	29.3	29.7	28.4	19.4	221.7	195.6
Of which IT	6.2	5.6	6.8	17.8	15.1	24.3	17.0	11.8	104.7	49.7
Of which vehicles	4.6	5.1	3.1	2.8	3.5	0.4	1.3	0.4	21.1	32.6
Total	**47.0**	**55.7**	**69.2**	**65.5**	**56.0**	**62.0**	**51.5**	**42.2**	**449.0**	**455.2**
Allowance	60.1	64.8	69.1	64.3	48.9	49.3	49.0	49.7	455.2	
Variance	**(13.1)**	**(9.1)**	**0.1**	**1.2**	**7.2**	**12.7**	**2.5**	**(7.6)**	**(6.2)**	
Cumulative	(13.1)	(22.3)	(22.2)	(21.0)	(13.8)	(1.1)	1.4	(6.2)		

Figure 5.6: Capex forecasts compared to the allowance

Over RIIO-GD1 we have spent £449.0m, just under the overall allowance of £455.2m, and hence generated a RORE benefit of less than 0.1%. There are several key drivers for this overall performance.

Our investment covers both network and non-network areas. On the network side we have seen workload increases in response to unforeseen events, most notably we are investing in the security and erosion protection of our river overcrossings and major pipelines in response to the extreme flooding incidents we have seen over the three previous years. We estimate these factors have increased costs by c£14m over RIIO-GD1.

Our connections costs were £10.1m over the allowance in RIIO-GD1. We have seen a significant decrease in workload due to changes in the connection's marketplace and general demand levels for new gas connections. Volumes fell further in 2020/21 as a result of the Covid-19 pandemic. We estimate these external economic factors will decrease costs over RIIO by c£18.9m or £2.4m p.a. This will be partially offset by an increase in Fuel Poor connections. Our aspiration has always been to exceed our target of 14,500 fuel poor connections, and in the end we delivered 15,621. This increased costs by c£2.3m over the price control.

The overall reduced workload and the mix of work has also impacted our unit costs and recovery rate. Compared to the benchmarked unit costs we estimate we spent c£17.7m more than the allowance over RIIO-GD1, or £2.2m p.a. This is after adjusting the net allowance related to Fuel Poor. There was an assumption in the price control that the near 60% recovery rate associated with connections would also apply to fuel poor which is incorrect. This has a £10.9m impact over RIIO-GD1.

We have also seen a significant reduction in reinforcement workload over RIIO-GD1 – 68.8km of main compared to an allowance of 140km. There are two key reasons for this. Our pressure management function and a Cost – Benefit based filter process has allowed us to address capacity constraints on the network by managing system pressures rather than installing new pipework. The other driver is reduced demand on the gas network when compared to the assumed levels when the allowances were set. We are required to design and manage the gas network to meet 1 in 20 peak demand requirements, which is the level of demand that would be exceeded in 1 out of 20 winters. Although we are forecasting a slight increase in the Peak demand this year, overall Peak demands have fallen below those levels assumed when setting the allowance.

However, we have seen volumes increase in the final two years, and as outlined in our RIIO-GD2 plan expect volumes of work to increase further. We are seeing increased demand for new large load connections and expect to fund significant levels of specific reinforcement associated with these new connections to the network. We also have a £7m reinforcement project for a major pipe reinforcement in Penrith to increase network capacity.

On the non-network side, we invested c£105m in IT and c£16m in our depot and office infrastructure over RIIO-GD1. This is c£69.4m in excess of the eight year allowance and delivers a world class smart IT and workplace environment, driving improvements in ways of working, decision making, and control. This will enable us to improve both the customer experience and deliver efficiencies and value for money into the future.

In terms of outputs, we have delivered the asset health improvements we committed to in our business plan by the end of RIIO-GD1. In addition:

- We delivered the 15,621 new fuel poor connections against a target of 14,500, an excellent result;
- Our Connections GSOS performance was also very strong, with all measures well above the 90% minimum standard in every year; and
- Our Connections Customer Survey results increased over the period, ending on a very high 9.05 out of 10 in 2020/21.

We were on track to deliver both the 'Asset Utilisation and Capacity' output target and our Physical Security Upgrade Programme (PSUP) at Pannal prior to the Covid-19 pandemic, with firm plans and projects in place to complete work at all of the relevant sites.

However, the Covid-19 pandemic lead to a near 3 month stand down in activity for both NGN and its contractors. When work did restart new Covid-19 secure ways of working severely impacted productivity. The combination of these factors meant much of the work couldn't be completed prior to winter, when we are constrained on how much and the type of work we can carry out on these critical assets. Some work on civils and general infrastructure has continued due to its less critical nature. Work is now expected to be completed at all sites by the end of September 2021. Further details are provided in Section 8 below.

5.2.3. Repex Financial and output performance

Repex actuals 20/21 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
HSE driven mains and services	75.3	82.1	73.4	74.8	71.0	72.9	70.4	69.7	589.4
Non-HSE driven mains and services	27.8	26.1	24.2	19.9	26.4	27.1	29.1	30.2	210.7
Risers	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.4
Repex totals	103.1	108.2	97.6	94.8	97.5	99.9	99.4	100.0	800.5
Allowance	111.1	113.4	112.8	113.4	115.1	113.3	117.0	120.4	916.5
Variance	(7.9)	(5.2)	(15.2)	(18.6)	(17.6)	(13.4)	(17.6)	(20.4)	(116.0)
Cumulative	(7.9)	(13.1)	(28.3)	(47.0)	(64.6)	(78.0)	(95.6)	(116.0)	

Figure 5.7: Repex Actuals

The table above summarises our RIIO-GD1 Repex expenditure. We outperformed the £916.5m Repex allowance by £116.0m (12.7%), generating an average RORE of 1.2% p.a. We achieved this whilst materially outperforming the primary Repex output, the amount of risk removed from the network. Customers now have a network which is significantly safer than at the start of RIIO-GD1.

Repex workload and cost impact

We delivered 4,483km of mains abandonment overall, c2.7% more workload than is funded within the allowance. The table below provides further details:

Type (km)	Inferred Annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total	Total Allowed
Tier 1 – funded	448	445.4	487.8	439.8	452.9	479.4	491.6	455.5	349.4	3601.8	3584.0
Tier 1 – customer funded	15.4	1.8	2.1	2.9	1.9	2.0	2.2	1.6	2.2	16.7	122.9
Tier 2a	7.7	8.8	7.6	5.3	4.1	7.9	3.8	9.5	17.1	64.1	64.1
Tier 2b	20.4	22.1	18.3	12.2	12.4	24.7	26.8	23.0	24.7	164.2	163.5
Tier 3	5	7.4	5.7	3.9	4.3	2.4	4.5	8.1	3.3	39.6	40.0
Iron mains	**496.5**	**485.4**	**521.5**	**464.2**	**475.5**	**516.4**	**529.0**	**497.6**	**396.7**	**3886.3**	**3974.5**
Iron > 30m	-	8.7	9.3	11.4	10.8	2.7	7.3	5.5	14.2	70.0	-
Steel	48.7	57.6	75.6	45.9	59.5	59.6	58.6	58.1	36.8	451.7	389.8
Other	-	10.4	10.7	8.6	8.6	13.3	8.1	7.0	8.3	75.0	-
Total	**545.2**	**562.1**	**617.1**	**530.1**	**554.4**	**592.0**	**603.0**	**568.2**	**456.0**	**4483.0**	**4364.3**

Figure 5.8: Mains abandoned

We delivered 3,886.3km of iron mains abandonment, 88.2km lower than the target of 3,974.5km. Breaking this down:

- Funded Tier 1 mains – we delivered 17.8km more than the target of 3,584km;
- Customer funded Tier 1 mains – we delivered 106.2km less than the target of 122.9km;
- Tier 2a – the target flexes to what we deliver – a total of 64.1km;
- Tier 2b / 3 – we delivered 0.3km more than the combined target of 203.5km

It's clear that the driver of the shortfall is in customer funded Tier 1 iron mains, which comes from customer driven rechargeable diversions. We are expected to fund this shortfall and were on track to deliver this at the end of 2019/20.

However, the Covid-19 pandemic had a significant effect on the workload we were able to deliver in 2020/21. We undertook an enforced 3 month stand down, and then saw reduced productivity from adopting new covid secure working practices. We also delivered a more expensive work basket, targeting projects with limited customer interactions, and in city centres which had previously been difficult to access. It is this that has driven the overall shortfall in iron mains abandonment.

Despite this we are delivering more work than is funded in other areas, driving the overall 2.7% increase compared to the overall target:

- We abandoned 70km of iron mains >30m from a domestic property in RIIO-GD1. We abandon this type of main where it represents the most cost effective long term option to deliver an all plastic network and to protect the network from encroachment or 'dynamic' growth. There is no allowed target or cost allowance for this;
- We abandoned 451.7km of steel, 61.9km ahead of target. The increase has mainly been in <=2" steel which we abandon when found, and volumes are higher than those we assumed when the Business Plan was set; and
- Other – we have abandoned 75.0km of other materials mains. There is no allowed target for this type of work.

This material increase in workload drove up costs over the 8 year price control. We estimate the combined increase to be c£26.6m, £7.5m related to steel, £19.1m related to iron over 30m and other mains.

Repex efficiencies

Despite the increase in workload we outperformed the overall Repex allowance. The main driver is our historic operational efficiency and the further improvements we have delivered in RIIO-GD1. We estimate this will account for a c£127m efficiency outperformance against the £916.5m allowance, more than offsetting the increase in workload detailed above. This equates to c£15.9m p.a.

The main driver for our outperformance has been our new operational approach to the delivery of the iron mains replacement programme, which we began in 2011. Over the next four years we removed the major contracting partners we had previously used, directly contracting with their smaller sub-contractors. This has had 3 main impacts;

- We removed a layer of man marking cost between ourselves and major contractor as well as their profit margin and corporate costs. We estimate this has reduced costs by between c£6m to £8m p.a;
- We rebuilt our own in house workload and programme management structure in order to gain control of the end to end Repex investment process, estimated to have delivered between £3m and £4m savings p.a. We achieved this through a much more rigorous design process with operational reviews, site visits, better enabling works all allowing projects to start on time more often with vastly reduced contractor variations and down time; and

- Our materials and logistics costs have decreased by c£3m p.a. We have reworked and centralised our end to end procurement and logistics processes in order to gain greater control of costs and waste.

Together these changes have delivered significant improvements in workload delivery and efficiency and are the major driver for our outperformance.

However Covid-19 had a significant impact in 2020/21. In the short term much of our cost base is fixed, this together with the reduced productivity, more expensive work basket and stand down meant we spent c£4m more than we forecast to in 2020/21, whilst delivering lower workload. This is reflected in the all in average unit cost, which increased from £178 per meter in 2019/20 to £228 per meter in 2020/21.

Other Repex outputs

We performed strongly against the other outputs associated with the Repex programme:

- Risk removed is the main driver for the Repex programme and the primary output. Total risk removed was 219,404 over the price control, which meant we were 97% ahead of the eight year RIIO target of 111,191. This is an excellent result as we now have a significantly safer network;
- We were c11% behind target for the number of services replaced. Prior to the impact of Covid-19 on workload we were c5% behind target. This was partly down to mix and location of work, but we are also seeing fewer services replaced as a result of an emergency call out, reflecting the success of the replacement programme and the relatively mild winters we saw in RIIO-GD1;
- We delivered a very strong customer service performance, scoring 8.9 out of 10 on our customer satisfaction surveys in the final year;
- Gas in buildings events and fractures were both significantly below target supporting our approach to targeting the riskiest pipes; and
- We outperformed the revised targets for the number and duration of planned interruptions which both vary in line with the length of mains abandoned.

5.3. The impact of the Covid-19 pandemic

The Covid-19 pandemic has had a significant effect on our operations and costs in 2020/21 and will continue to do so into RIIO-GD2. Many of our activities are customer facing, and we are acutely aware of the impact Covid-19 has had on both our customers and our employees, many of whom are designated as key workers. As a key emergency service it was extremely important we responded appropriately to the challenges we faced in unprecedented times. This was a complex situation with many time critical decisions to be made with material impacts on services and outcomes for NGN, its employees and our customers.

Wherever possible, we have attempted to mitigate the impact of Covid-19 on our operations and our customers. The safety of our staff and our customers has been right at the forefront of every decision we have made and remains our top priority. We took the difficult decision early on to suspend all of our non-essential works across Opex, Repex, Capex and Connections in order to support social distancing measures and in response to issues seen within our supply chain. The majority of our office-based staff have worked from home since the pandemic began, with most continuing to do so. We have now begun to reopen offices to some staff, but numbers are limited and subject to strict hygiene and social distancing protocols.

It is clear from our performance in 2020/21 we did indeed rise to the challenge Covid-19 presented – we achieved a near 100% response rate for both the 1 and 2 hour emergency response standards, our customer satisfaction scores remained very high and indeed improved in some cases, we performed very well against all of the guaranteed standards, whilst still delivering the majority of our outputs. The only areas we stepped back from included major asset works which for largely operational reasons it was not appropriate to complete, and non-emergency replacement work which has significant customer interactions.

Importantly prior to the pandemic we were ahead of schedule in most cases and on track to deliver all of the work that was delayed. However the pandemic lead to a 3 month stand down in activity for both NGN and its contractors. When work did restart new covid-19 secure ways of working severely impacted productivity and increased costs. The combination of these factors meant work could not be completed prior to winter, when we are constrained on how much and the type of work we can carry out on many of our critical assets. This inevitably led to some work not being completed, or other work being substituted in which it was possible to complete.

Controllable Opex

In controllable Opex we saw a reduction in the number of Publicly Reported Escapes (PREs), likely partly driven by social distancing and reductions in population mobility, but an increase in the number of Repairs. We also saw a reduction in our Maintenance expenditure as some work was delayed during the stand down and when work restarted productivity was lower due to the changed working conditions. This work will be caught up in RIIO-GD2.

We have seen significant cost pressures as a result of the pandemic, summarised in the table below. In addition materials costs have increased across Totex as a result of raw materials increases;

Area	Cost impact
Stranded direct labour resource	£3.1m
Purchase of Personal Protective Equipment (PPE)	£1.2m
Increased contractor costs	£0.8m
Training costs	£0.1m
Communications, barriers and signage	£0.1m
Total	**£5.1m**

Figure 5.9: Covid-19 Controllable Opex costs

Stranded direct labour resource – during the stand down all non-priority planned works were stopped in order to minimise interaction with members of the public and protect both customers and employees. We also saw reduced customer driven connections and service alteration work throughout the year. This resulted in a significant amount of resource in the network being at work but with no specific work to complete. This

resulted in a stranded cost of £3.1m (£1.5m Emergency - £1.6m Repair - £0.1m Maintenance) for time that would, in a typical year, have been completing work which in many cases will need to be completed at a future date.

Purchase of Personal Protective Equipment (PPE) – we spent £1.2m extra on PPE to protect our front-line workers dealing with gas escapes, replacement work and other associated activity on the Network. Approximately 726,000 items of PPE were purchased and 27,000 consumable items (sanitiser and anti-bacterial wipes).

Increased contractor costs – in order to ensure we could deliver the 1 and 2 hour emergency standards we engaged additional contractor engineers at a cost of £0.8m to provide extra resilience within our emergency workforce. We were seeing significant Covid-19 related absences, during the first wave we had a peak of 77 operational colleagues isolating, then during the second wave a peak of 59 operational colleagues isolating.

Training costs – we employed a third-party at a cost of £0.1m to provide specific Covid-19 training regarding health and safety. This provided a level of confidence to our direct labour workforce in how to deal with an incident regarding Covid-19 on the network. There were also general refreshers as part of this regarding CPR and other key health and safety activities.

Communications, barriers and signage – we spent £0.1m on improved communication to customers and stakeholders and employees. We purchased new signage for our sites as well as internal animations to improve knowledge of Covid-19 and the safety measures to take to ensure compliance with Government guidelines.

Repex

In 2020/21 we spent c£4m more than we forecast whilst delivering lower workload. This is reflected in the all in average unit cost for all Repex, which increased from £178 per meter in 2019/20 to £228 per meter in 2020/21. The workload reduction and the unit cost increase were entirely driven by the Covid-19 pandemic and the cost pressures we experienced.

Repex Price Volume Analysis 20/21 prices (£m)	2019/20			2020/21			Variance		
	Cost	Volume	Unit Cost	Cost	Volume	Unit Cost	Volume	Price	Total
	(£m)	Km/no	(£)	(£m)	Km/no	(£)	(£m)	(£m)	(£m)
Tier 1 and <=2" Steel									
Mains	54.7	493	111	53.1	361	147	(14.7)	13.1	(1.6)
Services	11.6	36,573	318	5.6	18,181	310	-5.9	-0.2	(6.0)
Tier 2a									
Mains	3.9	11	370	10.8	19	559	3.2	3.6	6.9
Services	0.1	240	344	0.1	442	276	0.1	0.0	0.0
Other Mains									
Mains	16.2	45	363	21.9	49	449	1.5	4.2	5.7
Services	0.4	1,181	319	0.2	679	302	(0.2)	0.0	(0.2)
Total	**86.9**			**91.8**			**(15.9)**	**20.8**	**4.9**

Figure 5.10: Repex year on year comparison

Looking in more detail at mains and services workload and costs within Repex, the table above compares our 2019/20 and 2020/21 outturns using price – volume analysis. This shows that the reduced workload we delivered during the pandemic lead to a £15.9m reduction in costs, but this was more than offset by the increased unit rates we saw which drove a £20.8m increase in costs – an overall £4.9m increase.

It is not possible to individually analyse these cost pressures as many interact, but we have categorised them into three main groups:

Suspension of work during the 3 months stand down:

- When any project is suspended, we incur extra direct costs to de-mobilise/re-mobilise the site;
- Our Direct Service Providers (DSPs) are often locally owned and in some cases family run. In order to safeguard efficient remobilisation we provided cash support in lieu of future work; and
- Project durations have increased following additional controls and measures put in place to adhere with Covid-19 government guidance and to safeguard the wellbeing of our colleagues and customers.

Type of Projects undertaken – we undertook a full risk assessment for every project in the programme to ensure we delivered maximum risk reduction and abandonment outputs in the year whilst managing the Covid-19 risk to customers and employees. We are still constrained as we need to deliver the targeted seed pipes within the work asset portfolio. This led to significant changes within the work programme:

- The average project length in 2020/21 was 422m compared to 789m and 678m in 2018/19 and 2019/20 respectively – 47% and 38% lower;
- The reduced project length also led to reduced productivity as lay per week reduced to 8.7km from 11.7km (2018/19) and 11.1km (2019/20);
- The percentage of Open Cut projects has increased from 10% and 12% in 2018/19 and 2019/20 to 18% in 2020/21, increasing reinstatement costs and reducing productivity; and
- The work mix changed to more expensive larger diameter schemes which have lower customer impacts and are often in city centres. Local Authority's looked to approve projects with low customer impact and to take advantage of low traffic levels.

Access Impact – we experienced significant access issues to domestic properties for completion of services associated with mains replacement e.g. meter box installation/internal copper pipework re-runs. Re-visiting properties to complete this work has resulted in significant cost increases.

Capex

Where possible NGN enacted the force majeure clauses within its project contracts during the latter weeks of March into April 2020. The immediate effect on the capex program was small as many of the projects were pre-mobilization, and simply were paused with minimum consequences.

Three projects were in-flight and had mobilized which has led to significant cost pressures:

Penrith – this project saw delays from supply chain problems leading to materials shortages, with material orders now expected in 2021/22. Contractor resource has also had to self-isolate. The total impact is movement of cost of £2m between 2020/21 and 2021/22.

Pannal Security – this project was in flight and had mobilized and then had to de-mobilize and suspend work due to the enactment of the force majeure. Costs were further increased during the summer when mandatory social distancing rules as well as increased hygiene and welfare arrangements reduced productivity. This created additional costs of £0.3m in 2020/21. The project will now complete in 2021/22.

Lamesley – this project suffered reduced productivity from social distancing working arrangements as well as a higher level of hygiene provision. These delays in the program and the initial suspension of works in the early part of the pandemic have resulted in £0.4m of extra cost.

5.4. Incentives – RORE impact

The table below details the actual incentive income earned over RIIO-GD1. We earned an average incentive income per year of £9.9m.

20/21 Prices (£m)	Actuals (Earned)								RIIO Total	Avg. Yr
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
Customer Satisfaction:										
Customer Service	2.1	2.4	2.4	2.3	2.2	2.2	2.2	2.2	18.0	2.3
Stakeholder Engagement	1.3	0.7	1.3	1.5	0.9	0.8	1.3	1.4	9.2	1.2
Complaints Penalty	-	-	-	-	-	-	-	-	-	-
Shrinkage & Environmental Emissions	3.7	4.0	4.1	6.6	5.3	5.4	5.3	4.8	39.1	4.9
NTS Exit Capacity	0.0	0.7	3.4	1.9	2.0	1.8	1.0	0.2	11.0	1.4
RIIO – DRS	-	0.9	-	-	1.0	-	-	-	1.9	0.2
Total RIIO-GD1	**7.1**	**8.7**	**11.3**	**12.2**	**11.3**	**10.3**	**9.8**	**8.6**	**79.3**	**9.9**

Figure 5.11 : Incentives

Customer Satisfaction

The aim of the customer satisfaction incentives is to improve levels of customer satisfaction and minimise complaints from the activities carried out by the gas networks. The incentives also seek to encourage us to undertake effective engagement with our stakeholders and reflect their views in the day to day operation of our business.

Our results have been consistently very strong. Overall this delivered an average incentive of £2.3m and a RORE impact of 0.4% over the price control.

Customer Service

We delivered a very strong performance in our customer service outputs. We achieved an average score of 9.17 across the three customer satisfaction survey areas in the final year, a strong performance and an improvement from last year's average score of 9.15. Our scores generally trended upwards over the eight years of the price control.

Complaints Handling

Complaints handling performance is measured via the complaints metric which is a composite score calculated as the weighted average of our performance against four elements – the percentage of complaints unresolved after 1 day, 31 days, the percentage of repeat complaints, and the number of Energy Ombudsman decisions that go against us

In 2020/21 we achieved a weighted complaint score of 2.4 which does not generate any penalties. Penalties would only be imposed if our score was 11.57 or more. This is a very strong performance and reflects our strong performance over RIIO-GD2, during which we were where consistently well below the 11.57 target.

Stakeholder Engagement

We received a £1.4m award under the Stakeholder Engagement Incentive scheme in 2020/21, our highest award in RIIO-GD1, which meant we averaged a £1.1m reward over the price control. We now focus on how feedback from our stakeholders is shaping our business and leading to measurable improvements and benefits.

Environmental Emissions and Shrinkage

We are responsible for purchasing gas to replace the gas lost through shrinkage and are incentivised to reduce these losses over time. Shrinkage comprises leakage from pipelines (c95%), theft from the gas network (c3%), and own use gas (c2%). The table below summarises our actual performance against the Environmental Emissions and Shrinkage incentives.

20/21 Prices	Actuals								RIIO Total	Avg. Yr.
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
Shrinkage GWh:										
Allowed volumes	459.0	445.0	433.0	423.0	412.0	401.0	390.0	379.0	3,342	418
Actual	416.9	397.0	381.6	354.0	352.0	340.5	328.3	319.0	2,889	361
Variance	42.1	48.0	51.4	69.0	60.0	60.5	61.7	60.0	453	57
Variance %	9.2%	10.8%	11.9%	16.3%	14.6%	15.1%	15.8%	15.8%	13.7%	13.7%
Incentive Earned in year (£m)	**0.9**	**0.7**	**0.6**	**1.0**	**0.9**	**1.0**	**0.5**	**0.5**	**6.1**	**0.8**
Environmental Emissions GWh:										
Allowed volumes	434.0	420.0	408.0	398.0	386.0	376.0	364.0	354.0	3,140	393
Actual	395.2	374.9	360.1	332.0	328.7	319.1	306.0	296.9	2,713	339
Variance	38.8	45.1	47.9	66.0	57.3	57.0	58.0	57.1	427	53
Variance %	8.9%	10.7%	11.7%	16.6%	14.9%	15.1%	15.9%	16.1%	13.8%	13.8%
Incentive Earned in year (£m)	**2.8**	**3.2**	**3.5**	**5.6**	**4.4**	**4.4**	**4.8**	**4.3**	**33.0**	**4.1**

Figure 5.12 : Shrinkage and Leakage

We successfully outperformed both our shrinkage and leakage targets over RIIO-GD1, reducing overall shrinkage by 80 GWh (17.4%), an excellent result, improving air quality and reducing carbon emissions. We have achieved this through a combination of:

- Reducing our metallic mains population through the replacement programme.
- Reducing system pressures through strong governance and close working practices between our pressure management, network validation and network maintenance teams. .
- Managing our levels and use of MEG (Monoethylene Glycol), a gas conditioning agent used to saturate and swell lead yarn joints to reduce their propensity to leak gas.

Our results here have been consistently very strong, delivering an incentive of £39.1m in total, £4.9m per year, a RORE impact of 0.4%.

NTS Exit Capacity

The Exit Capacity incentive drives the gas networks to reduce gas exit capacity bookings, which are rights to flow volumes of gas from the national transmission system into our network. Reducing this cost will ultimately reduce overall costs in the gas transmission system and benefit end consumers.

On average we outperformed the target bookings by 12.3%, delivering an overall incentive of £11.0m, an average of £1.4m, and a RORE impact of 0.15%.

Gwh 20/21 Prices	Actuals								RIIO Total	Avg.Yr
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
Allowed volumes	612	618	624	624	624	624	624	624	4,975	622
Actual	611	596	546	541	527	514	514	514	4,361	545
Variance	1	22	78	83	97	110	111	110	613	77
Variance %	0.1%	3.6%	12.6%	13.3%	15.6%	17.7%	17.7%	17.7%	12.3%	12.3%
Incentive Earned in year (£m)	**0.0**	**0.7**	**3.4**	**1.9**	**2.0**	**1.8**	**1.0**	**0.2**	**11.0**	**1.4**

Figure 5.13 : Exit Capacity

Discretionary Reward Scheme

Our 2015-18 submission was ranked Number 1 among the gas networks. We were recognised for our commitment to local communities and the work we've undertaken over the last three years to help address a range of social, carbon monoxide safety and environmental issues. We are still awaiting the 2020/21 DRS score.

5.5. Allowed revenue and customer bills

Customer Bills

The graph below shows our allowed revenues for the 8 years of RIIO-GD1, as well as the average customer bill.

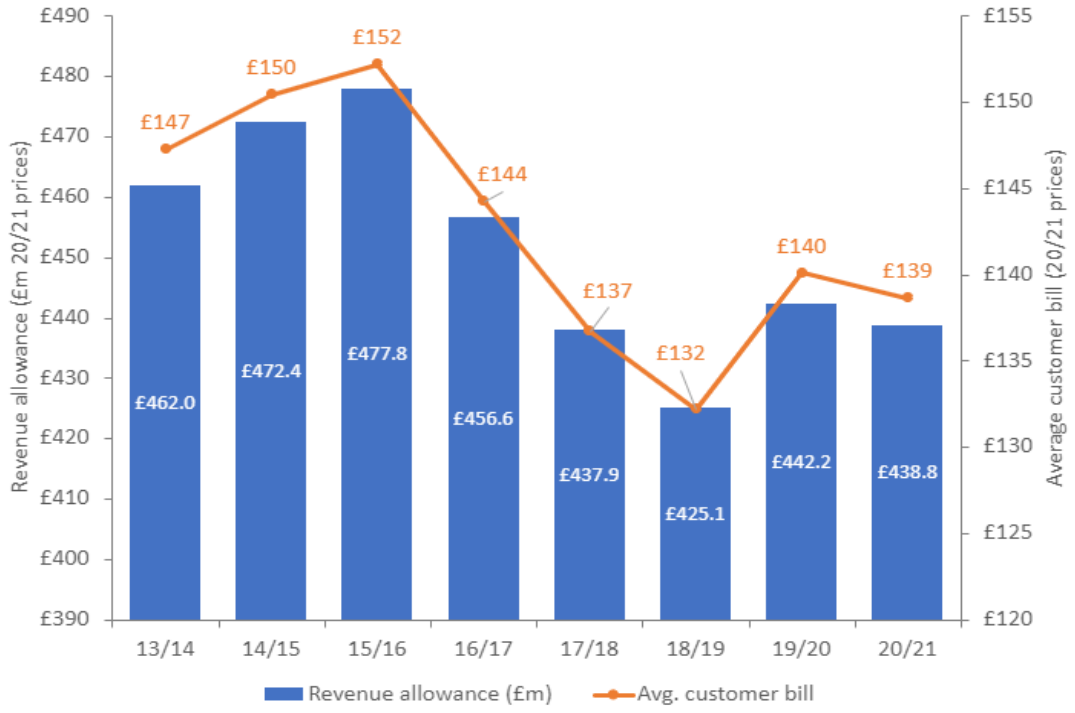


Figure 5.14: Allowed Revenue and Customer Bills

Allowed Revenue

(20/21 Prices)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	RIIO Total	Avg. Year
BASE REVENUE	**463**	**468**	**485**	**466**	**450**	**455**	**462**	**471**	**3,719**	**465**
Adjustments to Base Revenue Allowances:										
Cost of debt	0.0	(2.7)	(5.2)	(7.6)	(10.1)	(13.1)	(21.9)	(28.3)	(88.9)	(11.1)
Non-Controllable Costs	1.5	2.4	(4.5)	(5.4)	(5.1)	(5.5)	0.5	(4.3)	(20.4)	(2.6)
Totex Incentive	0.0	0.0	(2.8)	(2.0)	(3.8)	(3.8)	(2.3)	(0.6)	(15.3)	(1.9)
RPI true up	0.0	0.0	1.6	(6.6)	(10.1)	(1.8)	1.1	(0.3)	(16.0)	(2.0)
Pension Deficit	0.0	0.0	0.4	0.4	0.4	(3.8)	(4.2)	(4.3)	(11.0)	(1.4)
Other	(0.0)	(0.0)	(1.6)	(1.1)	(3.6)	(5.0)	(5.7)	(7.3)	(24.3)	(3.0)
Total	**1.5**	**(0.3)**	**(12.1)**	**(22.3)**	**(32.2)**	**(33.0)**	**(32.4)**	**(45.2)**	**(176.1)**	**(22.0)**
Incentive Income:										
Collected during RIIO-GD1 (with 2-year lag) *	0.0	0.0	6.8	7.6	11.1	11.6	10.1	10.2	57.3	7.2
Earned before RIIO-GD1	1.3	5.0	1.6	2.6	2.0	2.2	3.4	2.8	20.9	2.6
Total	**1.3**	**5.0**	**8.3**	**10.2**	**13.0**	**13.9**	**13.5**	**12.9**	**78.2**	**9.8**
(Over) / Under Collection	(3.6)	0.0	(3.6)	3.1	7.2	(10.9)	(1.2)	0.5	(8.5)	(1.1)
ALLOWED REVENUE	**462**	**472**	**478**	**457**	**438**	**425**	**442**	**439**	**3,613**	**452**

Figure 5.15: Allowed Revenue breakdown

Allowed revenue for 2020/21 was £439m, a decrease year on year of £3m (0.6%). The breakdown of allowed revenue is shown in table 5.15 above.

Our domestic customer bill analysis shown above is calculated based on NGN average Annual Quantities (AQ) and peak daily capacity requirements, which gives an average domestic customer bill of £139.

Allowed Revenue movement year on year

(20/21 prices)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	RIIO Total
2020 FORECAST	462	472	478	457	438	425	442	440	3,614
Inflation impact:									
2019 RPI forecast	2.9%	2.0%	1.1%	2.1%	3.7%	3.1%	2.6%	1.7%	
2020 RPI forecast	2.9%	2.0%	1.1%	2.1%	3.7%	3.1%	2.6%	1.2%	
Variance %	0.0%	0.0%	0.0%	0.0%	(0.0%)	0.0%	0.0%	(0.5%)	
Cumulative Variance %	0.0%	0.0%	0.0%	0.0%	(0.0%)	(0.0%)	0.0%	(0.5%)	
Impact £m on base revenues	0.0	0.0	(0.0)	(0.0)	(0.0)	0.0	(0.0)	(0.0)	(0.0)
Other Changes:									
Shrinkage & Env. Incentive	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	0.1	0.1
Cost of debt Index	0.0	0.0	0.0	0.0	(0.1)	0.1	(0.0)	(0.0)	(0.0)
Under/(Over) Collection	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	0.0	0.0
Shrinkage & Env. Incentive	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	0.0	(1.3)	(1.3)
2021 ACTUALS	462	472	478	457	438	425	442	439	3,613
YOY Movement	0.0	0.0	0.0	0.0	(0.1)	0.1	(0.0)	(1.1)	(1.1)

Figure 5.16 : Allowed Revenue

Our total revenue over RIIO-GD1 has decreased very slightly from a forecast of £3.614bn last year to £3.613bn.

6. Totex Performance Review

Under the RIIO price control methodology we have been set cost allowances to enable us to deliver our primary outputs and associated secondary deliverables. These allowances are broken down into Opex, Capex, and Repex, and then by activity below this. We have also been set an efficiency incentive rate which determines the proportion of any under or overspend which is shared with customers.

The efficiency incentive rate is now the same for all expenditure areas, which are collectively known as Totex. This means that £1 spent or saved in Opex is treated in exactly the same way as £1 spent in Capex. In previous price controls different expenditure lines had different efficiency incentives, which could create an artificial bias towards one type of expenditure.

6.1. 2020/21 Totex compared to the allowance

Totex 20/21 prices (£m)	**Allowance**	**2020/21**	**Variance**
Controllable Opex	107.1	86.5	(20.6)
Capex	49.7	42.2	(7.6)
Repex	120.4	100.0	(20.4)
Totex	**277.3**	**228.7**	**(48.6)**

Figure 6.1 : Totex compared to the allowance

The table above summarises this year's performance against the Totex allowance. It is important to remember that the allowances were set by benchmarking all the gas networks. We have historically been assessed as the most efficient network, and so some of our allowances were set at a level higher than our costs were at the time.

Overall, we outperformed the Totex allowances by £48.6m this year, compared to an outperformance last year of £39.2m. The main drivers for this £9.4m increase in outperformance are:

- A decrease in capital investment driving a £10.0m swing in the variance to the allowance, primarily due to timing of projects and the impact of Covid-19;
- Repex costs increased by £0.6m but the allowance increased by £3.4m, driven by a 7.6km increase in Tier 2a abandonment. Outperformance therefore increased by £2.8m. The allowance for Tier 2a abandonment is subject to a volume driver; and
- Controllable Opex costs increased by £1.9m against a £1.6m lower allowance, reducing outperformance by £3.5m.

The £48.6m outperformance is shared with our customers under the Totex incentive mechanism detailed above. Full explanations of our performance are contained in the following sections.

6.2. RIIO-GD1 Totex compared to the allowance

Totex 2020/21 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total	Allowed	Variance
Opex	94.1	96.5	90.8	91.3	89.0	85.3	84.6	86.5	718.1	894.7	(176.7)
Capex	47.0	55.7	69.2	65.5	56.0	62.0	51.5	42.2	449.0	455.2	(6.2)
Repex	103.1	108.2	97.6	94.8	97.5	99.9	99.4	100.0	800.5	916.5	(116.0)
Totex	**244.3**	**260.3**	**257.5**	**251.5**	**242.5**	**247.2**	**235.6**	**228.7**	**1,967.5**	**2,266.4**	
Allowance	**284.4**	**292.6**	**296.9**	**292.9**	**275.1**	**272.5**	**274.8**	**277.3**	**2,266.4**		
Variance	(40.1)	(32.3)	(39.4)	(41.4)	(32.6)	(25.3)	(39.2)	(48.6)	(298.9)		
Cumulative Variance	(40.1)	(72.3)	(111.8)	(153.2)	(185.8)	(211.1)	(250.3)	(298.9)			

Figure 6.2: Totex Performance

The table above summarises our Totex performance over the RIIO-GD1 period.

We outperformed the £2,266.4m Totex allowance by £298.9m (13.2%) over the price control. Our strongest outperformance was in controllable Opex which saw a £176.7m (19.7%) outperformance. Repex saw a £116.0m (12.7%) outperformance, and Capex a £6.2m (1.3%) outperformance.

7. Opex Performance Review

This section covers our performance against the Opex cost allowance, as well as the output targets which are associated with the emergency, repair and gas holder demolitions which all sits within Opex. The emergency and repair outputs include:

- The uncontrolled and controlled gas escapes attendance rate – Emergency Response;
- The annual repair risk score;
- The percentage of repairs completed within 12 hours;
- The number and duration of unplanned interruptions; and
- The customer satisfaction survey results associated with unplanned interruptions

7.1. Types of Operating Expenditure

We categorise operating expenditure (Opex) depending on whether it is within our direct control or not. We then split controllable Opex into two categories:

- **Direct Opex** – covering work management, emergency, repair, maintenance and other direct costs; and
- **Indirect Opex** – covering training and apprentices, and business support activities such as HR and IT.

Non-controllable costs include items such as Ofgem's licence fee, network rates and the NTS pension deficit recharge.

7.2. Controllable Opex compared to the allowance

Controllable Opex 20/21 prices (£m)	Allowance	2020/21	Variance
Direct Opex			
Work Management	24.0	16.0	(7.9)
Emergency	17.3	10.9	(6.3)
Repair	16.4	18.8	2.4
Maintenance	10.3	11.7	1.4
Other direct activities	10.9	6.0	(4.9)
Direct Opex total	**78.8**	**63.5**	**(15.3)**
Business Support costs	23.6	20.9	(2.7)
Training and Apprentices	4.7	2.2	(2.5)
Indirect Opex total	**28.3**	**23.0**	**(5.3)**
Total controllable Opex	**107.1**	**86.5**	**(20.6)**

Figure 7.1 : Controllable Opex compared to the allowance

Our controllable Opex costs were £86.5m in 2020/21, outperforming the allowance of £107.1m by £20.6m. This outperformance will be shared with our customers under the Totex sharing mechanism.

7.3. Year on Year Controllable Opex Performance

Controllable Opex 20/21 prices (£m)	2019/20	2020/2021	Variance
Direct Opex			
Work Management	15.1	16.0	1.0
Emergency	10.2	10.9	0.8
Repair	16.5	18.8	2.3
Maintenance	12.9	11.7	(1.1)
Other direct activities	5.2	6.0	0.8
Direct Opex total	**59.8**	**63.5**	**3.7**
Business Support costs	22.2	20.9	(1.3)
Training and Apprentices	2.7	2.2	(0.5)
Indirect Opex total	**24.9**	**23.0**	**(1.8)**
Total controllable Opex	**84.6**	**86.5**	**1.9**

Figure 7.2 : Controllable Opex year on year variance

Our controllable Opex has increased by £1.9m from 2019/20 to 2020/21. Direct Opex increased by £3.7m, which was partially offset by a £1.8m decrease in Indirect Opex. The sections below provide a detailed analysis of this performance by activity type, and considers the outputs related to Emergency and Repair.

7.4. Year on Year Direct Opex Performance

The table below shows the year on year cost movements for Direct Opex.

Direct Opex 20/21 prices (£m)	2019/20	2020/21	Variance
Work Management			
Asset management	3.4	4.0	0.6
Operations management	8.7	9.8	1.1
Customer management	1.6	1.3	(0.3)
System control	1.3	0.9	(0.4)
Emergency	10.2	10.9	0.8
Repair	16.5	18.8	2.3
Maintenance	12.9	11.7	(1.1)
Other direct activities	5.2	6.0	0.8
Total Direct Opex	**59.8**	**63.5**	**3.7**

Figure 7.3 : Direct Opex year on year variance

7.4.1. Work Management

Work management has seen a £1.0m year on year increase in costs across the four activities included. This increase is driven by:

- An increase in asset management of £0.6m. We spent £0.3m more on land remediation costs – £0.1m on increased monitoring and maintenance, and £0.2m more on directly remediating non gas holder sites. We also carried out three preheating feasibility studies this year, which after further review will not proceed, at a cost of £0.2m;
- An increase of £1.1m in operations management. Incremental Pensions Deficit payments totalled £2.6m and are in line with the latest triennial valuation discussed with Ofgem as part of the RIIO-2 business plan submission. These were partially offset by a £1.2m reduction in staff costs. Our new totex operating model has increased flexibility and reduced costs in our supervisory workforce, we have seen fewer incidents that need investigation by our Health and Safety teams, and marginally more non-formula work, increasing the time spent outside of Totex work. We have also seen fewer claims and lower associated costs to support this work, saving a further £0.2m;
- A £0.3m decrease in customer management, driven by a one-off settlement payment from Cadent Gas in association with the Call Handling contract as part of a periodic contract review; and
- A £0.4m decrease in system control, again as part of our new totex operating model, which increases flexibility, drives savings and means staff are more closely aligned to the activity they undertake.

Output: Gasholder decommissioning

We have 46 low pressure gasholders at 31 sites spread across the network which are no longer required to operate the network. Our gasholder decommissioning programme reduces the risks associated with gas storage and the requirements set out in COMAH Regulations for managing gas storage assets. The programme also removes a number of other requirements to inspect and maintain the holders, in addition to the costs of maintaining such ageing assets. The programme will have an overall customer and stakeholder benefit. Our plans include the phased demolition of all of these gasholders over a 13 year period starting from April 2013.

Our output target for RIIO-GD1 is to decommission a minimum of 23 gasholders. This year we completed work at a further 4 holders, meaning over the RIIO-GD1 period we successfully completed 24 holders, one ahead of target, which simply means we have one less to do in RIIO-GD2.

	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Number of gasholders decommissioned	**23**	1	2	3	7	3	3	1	4	24

Figure 7.4 : Gasholder decommissioning

7.4.2. Emergency and Repair costs and associated outputs

Emergency and repair costs have seen a combined increase of £3.0m.

- We saw a £2.9m increase largely driven by Covid-19. We saw stranded resource costs in Emergency and Repair due to lower workload overall for our totex workforce, but made best use of this by focusing and clearing out many of our older repairs;
- We saw a £0.9m increase associated with Traffic management as councils mandated we increase the use of manned traffic lights;

- We saw a £0.6m increase in specialist contractors on deep excavation work at some of our larger and more complex repairs; and
- These cost pressures were offset by a £1.4m saving in plant hire. We have now purchased much of this equipment through Capex which has materially reduced our operating costs. We have also seen reduced fuel costs of £0.1m.

As part of our Repex programme we have consistently targeted replacing some of our poorest performing pipes, which is a key driver for improving our emergency and repair performance over RIIO-GD1. However since 2016/17 we have experienced short periods of more extreme weather which affected both costs and workload, in particular in 2017/18 and 2018/19. Covid 19 also appears to have had an effect towards the end of 2019/20 and through 2021.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
PREs	89,290	83,446	93,411	90,016	90,224	82,713	74,948	70,115
Reports	24,197	22,082	20,260	18,676	18,672	20,220	17,618	19,767
Repairs	25,526	22,377	19,933	17,801	17,484	19,169	17,317	17,794

Figure 7.5 : Emergency and Repair workload

PREs vary year on year, but dropped in the final two years of RIIO-GD1, which we associate at least in part with the Covid-19 pandemic. We saw consistent reductions in Reports and Repairs before 2017/18. The slowdown in workload reduction in 2017/18 was driven by increased workload across the winter months from December to March with the biggest increase in March during the period of more extreme weather. In 2018/19 we saw the number of Reports and Repairs increase. However, this time the largest increase was during the summer months during the extreme warm weather experienced at this time, which is likely to have caused ground movement and increased leaks. Volumes and costs have fell again in 2019/20, but then increased further in 2020/21. These increases and the variability suggests the underlying network performance is deteriorating faster than the repex programme delivers improvements.

Output: Emergency Response

Target – 97% of uncontrolled gas escapes attended within 1 hour
Target – 97% of controlled gas escapes attended within 2 hours

The primary outputs for emergency response are to attend 97% of uncontrolled gas escapes within one hour, and 97% of controlled gas escapes within two hours.

	RIIO Annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
97% of uncontrolled gas escapes attended within 1hr	97%	99.85%	99.85%	99.76%	99.76%	99.61%	99.75%	99.5%	99.8%
97% of controlled gas escapes attended within 2hrs	97%	99.97%	99.99%	99.96%	99.97%	99.72%	99.94%	99.8%	99.9%

Figure 7.6 : Emergency response 1hr & 2hr

In 2020/21 we have again performed significantly above the targets – achieving 99.76% and 99.93% respectively. This excellent performance was driven by the detailed day to day focus of our area managers and their teams and resourcing up our emergency response teams in the key winter period. We now resource more of this activity internally following the recruitment of Rapid Response Engineers to replace external contractors to support our winter resilience plans.

Output: Annual Repair Risk

Annual repair risk is the total risk score associated with all pipes which require a repair, recorded on a daily basis and totalled over a year. The risk score is based on a range of criteria and is used to prioritise repair work. Our target for RIIO-GD1 is to maintain annual repair risk at or below the level that was achieved in 2012/13. We have significantly outperformed this output in RIIO-GD1, an excellent performance. The main drivers for this improvement are;

- Focusing the Repex programme on pipes in the poorest condition;
- Ongoing daily monitoring of this output and sharing knowledge and experience across the Network;
- Ongoing training provided to all repair teams to ensure that we assess risk appropriately across the network and that all teams are fully aware of the importance and focus we have on this output;
- A further rebalancing of our workforce to those locations where most work occurs; and
- Expanded use of Core and Vac and Acoustic camera detection techniques, as well as the use of specifically trained sniffer dogs which have greatly reduced the time to locate difficult to find leaks.

However, our risk score has increased in 2017/18 and 2018/19, then remained broadly flat in 2019/20. This is largely as a result of the workload increases detailed above, and the mix and type of work we are seeing, which is getting more complex with multiple failures. In 2020/21 we saw a significant drop, as a result of the focus on clearing out older repairs during the Covid-19 pandemic.

Annual repair risk	**RIIO Annual target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
	<34.5m	34.4m	24.8m	18.6m	17.4m	19.3m	23.6m	23.0m	12.5m

Figure 7.7 : Annual repair risk

Output: Percentage of repairs completed within 12 hours

We also have a requirement to complete repairs within 12 hours. We committed to a gradual improvement in performance across RIIO-GD1, reflecting our commitment to repairing gas escapes on a first visit where possible.

% repairs completed within 12hrs	**RIIO year 7 target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
	62.5%	62.3%	62.9%	64.4%	62.3%	66.1%	68.4%	64.3%	65.1%

Figure 7.8 : % repairs completed within 12 hours

We achieved 65.1% in 2020/21 against a target of 62.5%, an excellent performance which was achieved through the same drivers as detailed above for Repair Risk. This performance is consistently high when compared across the industry.

Output: Number and duration of unplanned interruptions

Unplanned interruptions occur when there has been no prior notification given to the customer. Causes include problems with our assets (upstream of the ECV), damage to assets by third parties, and water ingress. The output targets are to keep the number and duration of planned and unplanned interruptions over the RIIO period below the levels set out in the table below. There is no formal year on year target.

Unplanned Interruptions	RIIO 8 year target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Number	103,677	11,464	13,034	12,859	12,427	13,714	14,030	12,110	10,265	99,903
Number related to major incidents	-	0	0	1,430	2,756	765	4,577	1,248	1,771	12,547
Total Number	-	11,464	13,034	14,289	15,183	14,479	18,607	13,358	12,036	112,450
Duration	47.0	4.8	4.2	4.4	4.8	5.6	6.3	5.1	4.2	39.5
Duration related to major incidents	-	0	0	7.4	4.7	2.0	16.8	1.7	2.4	35.0
Total Duration	-	4.8	4.2	11.8	9.5	7.6	23.1	6.8	6.6	74.4

Figure 7.9 : Number and duration of unplanned interruptions

We had 12,036 unplanned interruptions in 2020/21 with a duration of 6.6 million minutes (mm). This included five major incidents impacting more than 250 properties. These incidents saw 1,771 customers off gas for 2.4 mm. Adjusting for these incidents, our underlying performance was 10,265 interruptions with a duration of 4.2mm, both decreasing from 2019/20. It is this underlying performance which drove the RIIO-GD1 targets.

The number of interruptions over RIIO-GD1 was 99,903, comfortably below the ceiling target of 103,677. The annual volume shows no clear trend, and whereas we would expect the number of unplanned interruptions to trend downwards over time as a result of our investment in the Repex programme, the unpredictable nature of the incidents will lead to short term workload swings.

The duration of the interruptions over RIIO-GD1 was 39.5 mm, below the ceiling target of 47.0 mm. We have more control over duration. On average customers were interrupted for a shorter time than the target.

We achieved this strong performance by embedding a customer focused management approach to unplanned interruptions. We operate a daily conference call to review, in detail, the outstanding position on all 'open' interruptions, which is attended by a cross section of operational managers and field operatives. These meetings have identified areas for improvement, such as training and equipment use and embedding ownership of the customer, which has increased focus on the management of interruptions.

7.4.3. Customer Satisfaction Survey results for unplanned interruptions

In 2020/21 we have delivered a score of 9.55, an improvement from 9.48 last year.

Through 20/21, we worked hard to deliver an exception level of customer service, through extremely difficult circumstances caused by the COVID-19 pandemic. We worked with our Citizen's Jury, and directly with our customers, to design enhanced safety processes that went above and beyond government guidance. We created a Covid-secure promise, that detailed all the practical actions that we would take to keep our customers and colleagues safe. This was particular relevant for emergency and repair customers where we need to obtain immediate access to their property. Customer feedback was positive. This is reflected in the increased score over the last 12 months.

In addition to this we have continued to increase our customer support during large interruption to supply incidents. Additional services include a temporary hot-water facility. We have also launched a new NGN incident app to help up track and monitor the support that we need to provide to Priority Service Registered customers.

7.4.4. Maintenance and Other Direct Activities

Maintenance costs have decreased by £1.1m this year. We saw a £0.1m decrease in fuel costs with the balance due to workload fluctuations, exacerbated this year by the impact of Covid-19 which lead to some workload deferrals and reprioritisation. Governor and PRS costs reduced by c£1.4m in total, but this was partially offset by a £0.4m increase in work on Offtakes.

Other direct activities increased by £0.8m. We saw £2.2m of Covid-19 costs mainly from the purchase of personal protective equipment (PPE), contractor stand down costs, and contractor training costs to ensure we had the necessary resource to manage our contingency plans. This was partially offset as we successfully recovered £1.2m of costs from an incident at Silsden, and £0.3m of income received from Xoserve's sale of their operational arm – Correla.

7.5. Year on Year Indirect Opex Performance

Indirect Opex 20/21 prices (£m)	**2019/2020**	**2020/2021**	**Variance**
Business Support			
IT and telecoms	6.7	6.1	(0.5)
Property management	2.8	2.1	(0.7)
Human resources	0.8	1.1	0.3
Audit, finance and regulation	4.3	4.0	(0.4)
Insurance	2.9	2.5	(0.4)
Procurement	0.3	0.2	(0.1)
CEO and group management	4.4	4.8	0.4
Training and apprentices	2.7	2.2	(0.5)
Indirect Opex total	**24.9**	**23.0**	**(1.8)**

Figure 7.10 : Indirect Opex year on year variance

Indirect Opex has seen a £1.8m year on year decrease in costs across business support and training and apprentices. This decrease is driven by:

- A £0.5m decrease in IT costs as a result of further savings in external contractor and supplier costs as we completed the transition to our new SAP 4 Hana systems, and reduced staff costs as we upskilled and developed our internal teams to lead and work on specific projects;
- A £0.7m decrease in property costs as we reduced our rent at rates at several sites including Temple Point, Hendon, and Heckmondwike. We also saw a one-off rebate for our Thorpe Park head office.
- A £0.3m increase in HR costs, largely driven by the insourcing of Occupational Health which led to four new internal roles. These costs were previously charged direct to individual activities when incurred;
- A £0.4m decrease in Audit, Finance and Regulation costs, primarily driven by decreased Professional and Consultancy costs which can vary materially from year to year. We saw a reduction this year as we had completed the RIIO-GD2 business plan;
- A £0.4m decrease in insurance, driven equally by reduced premiums and claims from third parties; and
- A £0.4m increase in CEO largely driven by consultancy support for strategic net zero projects.

We also saw a decrease in Training and Apprentice costs as a result of a new but smaller intake of apprentices.

7.6. Year Non Controllable Opex Performance

Non Controllable Opex 20/21 prices (£m)	2019/20	2020/21	Variance
Shrinkage	5.7	4.5	(1.2)
Ofgem Licence	2.1	2.0	(0.1)
Network Rates	45.5	45.6	0.2
Established pension deficit recovery plan payment	4.4	3.5	(0.9)
PPF levy costs	0.0	0.0	0.0
Pension scheme administration costs	0.6	0.8	0.2
NTS Pension Recharge	7.5	7.6	0.0
Bad debt	0.1	0.0	(0.1)
NTS exit costs	5.1	23.4	18.4
Network Innovation (ex IRM)	3.0	1.7	(1.2)
Supplier of Last Resort	0.8	0.9	0.1
Non Controllable Opex total	74.9	90.2	15.3

Figure 7.11 : Non Controllable Opex year on year variance

Overall non-controllable Opex costs have increased by £15.3m in real terms. The key variances are:

- A £1.2m decrease in Shrinkage driven by gas prices and a year on year reduction in shrinkage gas volumes;
- A £0.9m decrease in the Established Pension Deficit recovery plan payment, based on the latest triennial valuation discussed with Ofgem as part of the RIIO-2 business plan submission;
- An £18.4m increase in NTS Exit Costs driven by changes in the NTS Exit Unit Rates applied by National Grid; and
- A £1.2m reduction in Network Innovation, driven by the Covid-19 pandemic. A significant number of projects have seen postponed field trials as a result of social distancing restrictions and supply chain issues. These projects have been transitioned into the Carry over Network Innovation Allowance (CNIA) and will be delivered in year 1 of RIIO-2.

The innovation costs detailed above cover the Network Innovation Allowance. We have increased our focus this year on maximising the overall value delivered from our innovation portfolio. We track and report on the benefits realised from innovation funded through the allowance. All innovation projects start with a problem statement which follows our 6-step innovation process, 'idea to implementation' and are assessed for qualitative and quantitative benefits. We undertake rigorous Cost Benefits Analysis, with defined assumptions and targets from the outset, which are then fully tested during the development of the solution.

We have put in place a new process to track, monitor and report on the take up and use of innovation across our various regions. This involves our implementation managers attending regional performance meetings, highlighting where specific tooling, equipment and processes could be used. This demonstrates to each region the significant benefits that other areas are achieving from the new products.

Covid-19 has materially impacted the work we have undertaken this year and hence the opportunity to use the innovative techniques and products we have developed. As a result, the estimated savings have materially reduced. We saw £0.1m savings from Stub End abandonment, down from c£0.8m last year. We saw very low estimated savings across the rest of the portfolio, with the overall total of tracked savings at less than £0.3m for the year.

For further details on our innovation projects and strategy please visit
http://corporate.northerngasnetworks.co.uk/innovation/

7.7. Opex Cumulative position under RIIO

Opex 2020/21 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	TOTAL
Work management	15.6	18.2	19.9	20.3	17.0	15.1	15.0	16.0	137.2
Emergency	11.5	11.7	11.7	11.4	11.7	11.0	10.2	10.9	90.0
Repair	19.1	17.2	15.3	14.9	15.7	16.7	16.5	18.8	134.1
Maintenance	9.8	10.7	11.1	11.2	11.6	12.4	12.9	11.7	91.1
SIUs	-	-	-	-	-	-			-
Other direct activities	7.8	7.8	7.3	7.3	6.3	5.9	5.2	6.0	53.7
Of which Xoserve	4.4	4.9	4.8	4.2	3.6	2.6	2.3	2.0	28.9
Total direct Opex	**63.8**	**65.6**	**65.3**	**65.1**	**62.4**	**61.2**	**59.8**	**63.5**	**506.6**
Business support	27.5	28.1	23.4	24.0	24.7	22.0	22.2	20.9	192.9
Training/apprentices	2.8	2.1	2.0	2.2	1.9	2.1	2.7	2.2	18.6
Total indirect Opex	**30.3**	**30.9**	**25.4**	**26.2**	**26.6**	**24.1**	**24.9**	**23.0**	**211.4**
Total controllable Opex	**94.1**	**96.5**	**90.9**	**91.3**	**89.0**	**85.3**	**84.6**	**86.5**	**718.1**
Licence/network/other	53.8	55.3	57.4	77.5	62.9	55.5	55.7	53.7	474.3
NTS exit costs	7.8	9.9	8.5	8.2	8.2	4.0	5.1	23.4	75.1
Shrinkage	10.1	7.2	5.7	5.2	5.4	5.8	5.7	4.5	49.6
NTS pensions contribution	5.6	5.7	7.9	7.8	7.7	7.5	7.5	7.6	57.2
Total non-controllable	**77.2**	**78.1**	**79.6**	**98.7**	**84.2**	**72.7**	**74.1**	**89.3**	**656.2**

Figure 7.14 : Opex Cumulative

The table above summarises our RIIO-GD1 Opex expenditure. We spent £718.1m on controllable Opex, outperforming the £894.7m controllable Opex allowance by £176.6m (19.7%), whilst delivering all of our output commitments to a very high standard. In particular we averaged 99.7% and 99.9% for the 1 and 2 hour emergency response standards, well above the 97% minimum target.

There are several key drivers for our strong performance against these benchmarked Opex allowances. The main driver is our historic operational efficiency and the further improvements we have delivered in RIIO-GD1. A major driver for this efficiency is our modernised employee terms and conditions. These deliver a number of benefits which impact across the network, with the greatest impact in controllable Opex.

We have also invested significantly in technology and process improvements and will continue to do so in the remainder of RIIO-GD1. We have made significant efficiencies in our IT and Telecoms delivery model and have seen operating costs reduce by c£6m over recent years through the refresh of our service contracts, insourcing of many key activities, and review of our licence and system requirements. Details on our significant IT investment are provided in the Capex section below.

Further efficiencies have been delivered through business process improvements across all of our back office and front office processes. We have further optimised all of our field based work patterns, reduced head count in many areas such as Street works and Dispatch through process improvements and the use of technology and seen benefits from reduced overtime and average salaries across our supervisory workforce. We have introduced a Digital Operations room and Remote Hub which allows us to monitor work patterns and results more effectively.

As part of our Repex programme we have consistently targeted some of our poorest performing pipes. This is a key driver for improving our emergency and repair performance over RIIO-GD1, and over time we would expect both costs and workload to trend downwards. In addition, winters have been relatively mild in RIIO-GD1 compared to the last price control period, which has impacted overall workload, overtime payments and contractor costs.

However, in recent years we have seen more severe weather throughout the year, and that we are not immune to shocks such as the Covid-19 pandemic. Recent workload increases and repair complexity suggests the underlying network performance is deteriorating faster than the repex programme delivers improvements.

Our Opex allowance in RIIO-GD1 included a one off allowance to manage the risks associated with potentially reinforcing large customers who were currently on interruptible contracts. Our successful management of this risk through network analysis, system balancing, and contingency plans is delivering a one off outperformance in this price control period of c£37.1m p.a.

Our maintenance workload has consistently been above the benchmarked workload allowed within the allowances, and prior to Covid-19 had increased in line with the strategy we outlined in our RIIO-GD2 Business Plan to increase maintenance work whilst reducing full asset replacement.

There are two other primarily externally driven factors that are impacting our overall outperformance against the allowance:

- We estimate Land Remediation costs to be £2.8m lower than the allowance over RIIO-GD1. Costs for this type of work are very difficult to estimate and are largely driven by what you discover when the work is underway; and
- Xoserve costs are expected to be £8.0m lower than the RIIO-GD1 allowance.

In terms of non-controllable expenditure, the main variance comes from our NTS exit costs, which vary primarily due to price fluctuations offset by our reduced bookings. We expect to see material price increases from October 2020 due to National Grid's current work to rebalance these charges nationally.

8. Capex Performance review

Capital expenditure (Capex) covers a wide range of investments in both network and non-network assets. This investment is key in delivering many of our outputs, in particular those associated with asset health, asset utilisation, fuel poor and connections.

Throughout 2020/21 we have continued to improve the investment decision making process behind our capital programme, as well as the way we work together in order to deliver it. Each asset class has an Investment Lead, and where appropriate this is a full time rather than a part time responsibility within another role. Investment Leads are entirely accountable for the investment plan associated with a particular asset class/classes. They lead a multi skilled investment team of colleagues containing the following:

- Asset Integrity – provide expertise regarding asset risk, performance and compliance with legislation and technical standards. They also sign off designs and commission assets;
- Major Projects & Maintenance – provide expertise including design management, project management, procurement, commercial and risk management throughout the project delivery cycle; and
- Finance, property and system operations – who all play a key role in enabling the delivery of the capital programme.

To improve ways of working together further, Major Projects, Asset Integrity and Investment Planning hold a weekly 'surgery' to troubleshoot live projects. Alongside this there is a monthly Capex forum to discuss investment decisions, long term resource plans, delivery risk and financial performance

8.1. Capex compared to the allowance

Capital expenditure 20/21 prices (£m)	Allowance	2020/21	Variance
LTS, storage and entry	14.5	10.7	(3.8)
Connections	8.3	5.6	(2.8)
Mains Reinforcement	5.1	6.3	1.2
Governors (Replacement)	1.8	0.2	(1.6)
Other Capex	20.0	19.4	(0.6)
Including : IS and telecoms	5.2	11.8	6.7
Including : Vehicles	3.7	0.4	(3.4)
Capex total	**49.7**	**42.2**	**(7.6)**

Figure 8.1 : Capex variance to the allowance

The table above summarises our actual capital expenditure in 2020/21 against the allowances. We invested £42.2m, £7.6m less than the allowance of £49.7m. Further detail on the capital investment in each asset class can be found in the sections below.

8.2. Asset Health

The Network Output Measures Methodology (NOMs) was developed to consider the assessment of asset health and criticality, using the principles of monetised risk. NGN has used this methodology to develop a standardised set of regulatory reports which show the monetised risk value for each key asset group both before and after investment. The first report using the new methodology was submitted in July 2016.

The monetised risk values within the July 2021 return are derived from the Network Output Measures Health & Risk Reporting Methodology & Framework (Version 3.2 – July 2017), and have been reported through models developed and implemented within NGN's asset management decision support tool. In June 2017, we submitted to Ofgem a rebased set of risk targets using the new methodology and in June 2019, Ofgem approved our rebased risk targets.

In 2021 we have completed a refresh of the data supporting our NOMs models. This was undertaken to ensure that our modelling was informed by the most up to date information for our annual reporting and assessment of our final GD1 NOMs position. We note that our RIIO-1 targets have not been rebased, as the formal targets had not been approved. We have undertaken the necessary analysis to understand where any risk improvement or detriment is a result of data changes, as opposed to interventions on the network. Where data deficiencies have been identified, we have outlined future data improvement initiatives. These initiatives are outlined in Part 2 of our Implementation report, which was submitted to Ofgem as part of RRP2020 consistent with Special Condition 4G a(ii) of the Gas Transporters licence. This document was not required to be submitted as part of RRP2021.

Our 2021 RRP submission provides NOMs outputs for our rebased 2013 GD1 start position and our final GD1 position based on intervention activities undertaken to 31 March 2021. A forecast With Intervention and Without Intervention position are not provided as they match the final 2021 position.

NGN's GD1 starting monetised risk position was £158m. The final total network risk at 31 March 2021 is £94.7m. This compares to a total network risk of £102.4m and a forecast With Intervention final position of £99.7m that was reported for 2020. Our analysis indicates that the final £5m more risk reduction compared to last years' RRP is due to:

- Mains replacement volumes have been significantly higher in year 8 than previously forecast therefore driving a larger risk reduction. This reduction is primarily attributable to work on Below 8" Steel mains and the complete removal of all remaining Tier 2A Low Pressure mains; both of which carry high risk.
- Data improvements across Offtakes and PRS have led to a relatively large decrease in total risk. These data improvements are mainly attributable to Property Density allocations.
- Risk has increased in other asset classes compared to the forecast position from 2020, for example Services where this mainly is due to corrections to Non-domestic customer numbers; LTS Non-Piggable Pipelines where more assets are classed as being in urban environments which significantly increases their associated Health & Safety risk; and District Governors where the total population has increased and more assets are now carrying a capacity flag, therefore increasing their Reliability risk.

Due to the large reduction in risk caused by the asset data refresh in 2019 and further movements with the 2021 data refresh, NGN will submit a rebased NOMS target to reflect the asset data adjustments in line with GD1 Close Out requirements.

As with 2021, the Iron Mains population holds NGN's highest total risk at a 2021 monetised risk value of approximately £26.2m.

8.3. LTS, storage and entry

8.3.1. Costs and Workload

LTS, storage and entry 20/21 prices (£m)	Allowance	2020/21	Variance
LTS pipelines		0.1	
LTS diversions		(0.1)	
NTS offtakes		9.9	
Gas entry points		0.0	
PRSs		0.8	
Storage		0.0	
Total	**14.5**	**10.7**	**(3.8)**

Figure 8.2 : LTS, storage and entry variance to the allowance

The table above summarises our actual capital expenditure for LTS, storage and entry against the 2020/21 allowance. Overall, we invested £10.7m against an allowance of £14.5m, an under spend of £3.8m.

LTS pipelines and diversions

We have carried out minor Ball Valve and Cathodic Protection upgrades on our LTS pipelines this year, which has been offset by £0.1m of prepaid contribution for an LTS connection.

NTS Offtakes and Pressure Reduction Stations

NTS Offtakes and Pressure Reduction Stations are both critical above ground assets within the gas network. When making investment decisions on these assets we need to ensure that they both have the required capacity to ensure we can meet our 1 in 20 supply obligations and are in a suitable operational condition to deliver that capacity.

The asset condition is determined using existing asset health data, including site condition information, fault history, and operating costs. This information is combined with recent known operational conditions and a site investment appraisal visit to capture actual condition and to prioritise the site for investment against other NGN installations. In terms of capacity, where a site is expected to exceed 100% Capacity Utilisation, it is progressed as a project for further investigation and potential upgrade through the capital investment programme. There is a specific output attached to this.

In 2020/21 the majority of our investment was in the following sites, either in terms of design, procurement or construction:

Offtakes - Total of £9.8m including:

- Pickering (£1.1m) – An Offtake upgrade that will rectify issues with two individual pressure reduction systems on site. It also includes a filter upgrade and metering upgrade to install twin stream ultrasonic meters;
- Bishop Auckland (£2.1m) – Upgrade of the volumetric regulators on site. Alongside this the pressure reduction systems and associated preheating system that supplies the local area of Chilton will be fully replaced;

- Rawcliffe (£0.9m) – Split into two phases this work entails the upsizing of the inlet pipework and filters in phase 1 and the installation of a new ultrasonic metering system, 70-7 bar pressure reduction and upsizing of the site outlet header in Phase 2;
- Penrith (£3.6m) – this work is to rectify a capacity issue by reinforcing Penrith town with a new 7km IP supply and an IP-MP District governor to provide a secondary feed into the Penrith MP network; and
- Burley Bank (£1.2m) – Primarily a fiscal meter upgrade to incorporate twin stream ultrasonic meters, this also includes a full E&I upgrade.

PRS's - Net total of £0.3m:

- Lamesley PRS Diversion (gross £4.0m with an income of £4.6m) – a rechargeable PRS project resulting in the complete rebuild of Lamesley PRS, as a result of the diversion of the A1(m) at Coalhouse. In total the project is expected to cost £7.8m with an income of £6.9m, after legally binding discounts.

8.3.2. Reliability output – Asset utilisation and capacity

Offtakes enable gas to be taken from the National Grid system into NGN's high pressure pipe network. Pressure Reduction Installations (PRIs) then enable onward transportation through the network to customers. To meet our supply obligations, both of these asset types need to be technically compliant and capable of meeting the required throughput volumes. If not, we invest to upgrade or replace the asset.

Our output targets for improving the utilisation of our assets are outlined below, based on capacity utilisation analysis for the 20/21 Table 6.5 submission.

Capacity utilisation	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Utilisation < / =50%	**51**	51	59	64	75	80	80	83	83
Utilisation 50% < l <=70%	**52**	58	56	59	57	60	53	57	57
Utilisation 70% < l <=80%	**45**	25	27	22	27	26	25	27	25
Utilisation 80% < l <=100%	**44**	49	44	41	30	25	30	22	24
Utilisation > 100%	**0**	10	9	8	5	3	4	3	3
Total	**192**	193	195	194	194	194	192	192	192

Figure 8.3 : Asset utilisation and capacity

On an annual basis, NGN undertake a full and detailed network analysis of all PRIs and Offtakes using our PRISM and Graphical Falcon modelling tools. Aligning this work with our expected maximum flow data allows us to identify where specific site investment is required to maintain each unit within an acceptable utilisation band. This ensures we make the investment at the latest opportunity allowing us to avoid 'gold plating' of the system.

The methodology for measuring PRI capacity uses maximum flow figures derived from the Graphical Falcon 1:20 model as opposed to flows derived from the PK6 modelling. Expected and design minimum pressures are modelled in PRISM, along with the maximum flows, to determine the capacity of each site. All PRI's are analysed by applying the methodology stated in IGEM TD/13 where velocities are measured with a maximum of 20m/s before filtration and 40m/s at the outlet header.

There has been a change in utilisation bands in most instances, due to the year to year variations in forecast flows and inlet pressures resulting from re-validation of models and changing demand forecasts.

Over Capacity Sites

The output target was to have no sites over capacity by the end of RIIO-GD1. We were on track to deliver this with firm plans and projects in place to complete work at the three remaining sites identified last year.

During 20/21 we successfully completed work at Meadow Lane, but the Covid-19 pandemic prevented us completing work at Penrith and Rawcliffe. One further site at Asselby became over capacity during the year, given its complexity it was not possible to complete any work in 2020/21.

Penrith is over capacity due to increasing domestic demands and high commercial consumption in the area. The work involves installing a new pipeline connecting the Penrith network to Melkinthorpe offtake (reported under Reinforcement), transferring 40% of the load from the Penrith pressure reduction installation to Melkinthorpe, which reduce flows through Penrith, eliminating the capacity constraint. Melkinthorpe will also see upgraded offtake heating, metering and regulators to manage the increased flow.

This is a large scale project which improves the connectivity between a heavily constrained area of the network (Penrith) and an isolated network (Melkinthorpe). It removes the capacity issue at Penrith whilst increasing robustness in the overall distribution network.

Prior to the Covid-19 pandemic all works were due to complete in September 2020 at the latest. However the pandemic lead to a near 3 month stand down in activity for both NGN and its contractors. When work did restart new covid-19 secure ways of working severely impacted productivity. The combination of these factors meant work couldn't be completed prior to winter, when we are constrained on how much and the type of work we can carry out on these critical assets. Some work on civils and general infrastructure has continued due to its less critical nature. Work is now expected to be completed by the end of September 2021.

By the end of 2020/21 we had spent £5.3m on the project, and expect to spend a further £2.1m completing the work in RIIO-GD2.

Rawcliffe is over capacity due to a breach in velocities through the pipework on the inlet of the site. The work involves upsizing the inlet pipework from 80mm to 150mm, and upgrading the meter capacity and regulators to accommodate the forecast future flows.

Again, prior to the Covid-19 pandemic all works were due to complete in September 2020 at the latest. However the pandemic lead to a near 3 month stand down in activity for both NGN and its contractors. When work did restart new covid-19 secure ways of working severely impacted productivity. The combination of these factors meant work couldn't be completed prior to winter, when we are constrained on how much and the type of work we can carry out on these critical assets. Some work on civils and general infrastructure has continued due to its less critical nature. Again work is now expected to be completed by the end of September 2021.

By the end of 2020/21 we had spent £1.0m on the project, and expect to spend a further £1.3m completing the work in RIIO-GD2.

Asselby has been flagged as over capacity during 2020/21 for the first time. It is marked as over capacity as the expected maximum peak flow breaches the sites metered limit. As mentioned above we do not look to make any 'early' investments to gold place assets. Indeed capacity utilisation does vary over time based on the latest demand data.

The work is likely to involve upsizing the meter. However the situation is more complex and will need a greater review to fully scope the project. Asselby Offtake is a single feed system in the North East LDZ which supplies two downstream systems. Due to the isolation of this system and the small diameter of the local transmission pipeline, the system is heavily constrained. There has been a number of commercial enquiries in the area, which to date have not progressed. Consideration needs to be given to support future demand growth, as well as the constraints of the local transmission pipeline.

This is also the location of our one current 'interruptible' customer, meaning their individual supplies can be turned down or isolated if necessary. This has allowed NGN to avoid undertaking a physical reinforcement scheme. Had this 'interruption' contract not been in place the asset capacity would have been breached earlier.

Clearly this is a complex scenario with several interested parties. We are currently undertaking further analysis and discussions with the relevant third parties prior to determining the best option. Any final work needed will be completed in RIIO-GD2.

8.4. Connections

8.4.1. Costs and Workload

Connections	2019/20	2020/21	Variance
Workload			
Mains (km)	41.5	27.7	(14.0)
Services (number)	7,551	5,099	(2,452)
Governors (number)	2	0	(2)
Risers (number)	0	0	0
Costs (19/20 prices £m)			
Mains	4.9	2.0	(2.9)
Services	11.0	8.5	(2.5)
Governors	0.0	0.0	0.0
Risers	0.0	0.0	0.0
Gross Cost	**15.9**	**10.5**	**(5.4)**
Contribution	(6.1)	(4.9)	1.2
Net Cost	**9.8**	**5.6**	**(4.2)**
Net Allowance	**8.2**	**8.3**	**0.1**

Figure 8.4 : Connections workload and costs variance

The table above summarises our connections performance against the 2020/21 allowance and against our 2019/20 outturn. Overall, this year we have spent a net £5.6m, £2.7m less than the allowance of £8.3m.

Our net costs have reduced by £4.2m since last year, driven by a £5.4m reduction in gross costs and a £1.2m reduction in contributions from customers. The decrease was driven predominantly by the Covid-19 pandemic and the ensuing lockdowns. This led to;

- A fall in the number of new connections overall, with services workload decreasing by 2,452 (33%). Fuel poor connections fell by 1,074 (56%), partially as a result of the pandemic, and partly as fewer properties now qualify for a fuel poor connections under the new eligibility criteria. Domestic and Non Domestic connections fell by 1,020 (34%);
- Mains laid fell by 14km to 27.7km (33%). Costs fell relatively more, due to the mix of work and location of the projects delivered.

Proportionally contribution did not fall in line with costs, driven by the workload mix and is partially a timing difference. We report on a cash basis for connections, and so there is often a timing difference between incurring the costs and receiving payment. Note fuel poor connections receive very little contributions from the customer.

Output: Number of fuel poor network connections

Our RIIO output target was originally to supply 12,000 gas connections to customers in fuel poverty over RIIO-GD1. However, our aspiration has always been to exceed our target. We have previously agreed a new target with Ofgem of 14,500 fuel poor connections. In order to achieve this, we put in place a number of initiatives and activities against a backdrop of revisions to fuel poverty definitions associated with the Fuel Poor Network Extension scheme. During 2019/20 we achieved the 14,500 target, and despite the Covid-19 pandemic completed a further 859 connections in 2020/21. In total we delivered 15,621 fuel poor connections over RIIO-GD1, 8% more than target.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Number of fuel poor network connections	1,164	1,707	2,458	2,638	2,099	2,763	1,933	859	15,621
Phased Target	1,500	1,500	1,917	1,917	1,917	1,917	1,917	1,917	14,500

Figure 8.5 : Fuel poor workload

8.4.2. Customer Satisfaction Survey results for connections

In 2020/21 we have delivered a score of 9.05, a small increase from 9.04 last year and a very strong performance.

We have continued to focus on delivering a 'value-for money' connections service, with improvements being made across every touchpoint on the connections journey. We worked hard to minimise the impact of the pandemic on delivering new connections that had already been paid for, and also working through the backlogs caused by each of the lockdowns. This meant we had to communicate effectively with customers, to make sure we could replan their work at a time that was convenient to them, at the same time as managing longer lead times.

Output: Connections Standard of Service

We have had another strong year in Connections; all seven outputs are significantly above the existing OFGEM guaranteed standards of service. Indeed this has been the case for the whole of the RIIO-GD1 period, an excellent result. Performance fluctuated slightly, mainly when we migrated on to our new SAP 4 HANA platform, even then we were well above standard. We were then able to maintain an excellent standard of service during the Covid-19 pandemic.

	RIIO Annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
% of standard connection quotes issued in 6 working days	**99.6%**	99.5%	99.7%	99.98%	99.92%	99.66%	99.59%	97.90%	98.88%
% of non-standard connection quotes below 275kwh issued in 11 working days	**99.6%**	99.5%	99.6%	99.98%	99.85%	99.52%	99.50%	97.67%	98.55%
% of non-standard connection quotes above 275kwh issued in 21 working days	**99.6%**	97.5%	98.7%	100.0%	100.0%	99.68%	99.65	96.54%	98.78%
% of land enquiries where response sent within 5 working days	**99.6%**	99.5%	99.6%	100.0%	99.43%	98.26%	100%	97.21%	98.55%
% of commencement and completion dates for connections below 275 kwh provided within 20 working days	**99.6%**	99.5%	99.8%	100.0%	99.97%	99.94%	99.74%	98.75%	98.66%
% of commencement and completion dates for connections above 275 kwh provided within 20 working days	**100%**	100%	98.5%	97.6%	100.0%	100%	80.00%	91.38%	100.00%
% of connection jobs substantially completed on date agreed with customer	**95%**	97.2%	98.6%	98.4%	98.50%	97.69%	97.21%	97.17%	97.10%

Figure 8.6 : Connections outputs

8.5. Mains Reinforcement

Mains reinforcement	Allowance	2020/21	Variance
Workload			
Mains < 180mm (km)		7.8	
Mains > 180mm (km)		4.1	
Total	**16.1**	**11.9**	**(4.2)**
Governors (number)	6	0	(6)
Costs (19/20 prices £m)			
Mains < 180mm		2.9	
Mains > 180mm		3.3	
Governors		0.1	
Total	**5.1**	**6.3**	**1.2**

The table above summarises our actual mains reinforcement expenditure against the 2020/21 allowance. We invested £6.3m, delivering 11.9km of reinforcement mains. This equates to a unit cost of c£520 per metre, the highest in RIIO-GD1 to date. It is important to remember that unit costs will vary dependent on the type, length, location and complexity of the projects undertaken. This year two projects in particular drove the increased unit cost:

- A large scale reinforcement project associated with the Penrith to Melkinthorpe LTS Project detailed in section 8.3.2 above, which involved the purchase of long lead items up front; and
- A £0.8m project in Pocklington which has seen preparatory work this year, but where the pipe work will mostly be commissioned in 2021/22.

This was the first time in RIIO-GD1 we spent more than the allowance – £6.3m against an allowance of £5.1m. Prior to this our average expenditure had been £2.9m p.a. though it increased to £4m in 2019/20. This is in line with expectations and our RIIO-GD2 business plan, where we highlighted an increased workload overall, and in particular we were seeing more work associated with electricity peaking plant.

The earlier significant outperformance against the allowance was driven by reduced mains laid workload, which was c30% below that contained in the allowance. A combination of our new pressure management function and a CBA based filter process has allowed us to address capacity constraints on the network whilst successfully mitigating the volume of new pipework we install where there is a more cost-effective Totex solution.

The other driver for reduced reinforcement workload is reduced demand on the gas network when compared to the assumed levels when the allowances were set. We are required to design and manage the gas network to meet 1 in 20 peak demand requirements, which is the level of demand that would be exceeded in 1 out of 20 winters. Overall peak demands have fallen below those levels forecast in submission of the RIIO-GD1 business plan, and subsequent setting of the allowances. This has been driven by a slower than expected economic recovery in the North of England and increases in energy prices.

This affects both general and specific reinforcement:

- General reinforcement usually occurs as a result of our network validation process, where we model forward-looking demand against each network to ensure we can meet our 1 in 20 peak demand requirements. The lower peak demand requirements have meant much of our forecast work in the business plan has not been required to date.
- Specific reinforcement usually occurs as a result of customer requests for new connections, requiring specific investment to supply a new load or increased load to an existing supply. The depressed economic environment has directly impacted new connections-driven work, in particular for new housing developments. Many Local Authority economic development plans have also been reduced.

8.6. Governor replacement

Governor replacement	Allowance	2020/21	Variance
Workload			
District Governors		23	
Service Governors		2	
Total	30	25	(5)
Costs (20/21 prices £m)			
District Governors		0.2	
Service Governors		0.0	
Total	1.8	0.2	(1.6)

Figure 8.8 : Governor replacement workload and costs variance

When designing our governor programme, we prioritise sites based on maintenance frequencies, capacity, physical condition of the unit and the locality using local knowledge and hands on experience of field staff.

We invested £0.2m in our overall governor replacement programme during 2020/21. The number of district governor replacements reduced from earlier years, partly due to programme variances and partly to the Covid-19 pandemic. The unit cost has reduced, reflecting the different mix of governor size installed, the work carried out, and the timing of the purchase of the equipment. District governor unit costs can vary materially depending on the size and type of the governor and the exact nature of the work we need to complete. In particular we continue to invest in civils upgrades as we are seeing an increasing deterioration of these assets, resulting in worsening condition and increased risk.

8.7. Other Capex

Other Capex 20/21 prices (£m)	Allowance	2020/21	Variance
System Operations	-	0.0	-
Infrastructure and Systems	5.2	11.8	6.7
Xoserve	-	0.1	-
Plant, tools and equipment	-	3.0	-
Land, buildings, furniture fittings	-	0.1	-
Vehicles	3.7	0.4	(3.4)
Security (Exc PSUP)	-	0.1	-
PSUP	-	2.3	-
Other	-	1.5	-
Capex total	20.0	19.4	(0.6)

Figure 8.9 : Other Capex variance to the allowance

The table above summarises our Other Capex expenditure against the 2020/21 allowances. We have invested £19.4m against an allowance of £20.0m.

The main area of expenditure has been the continued investment in the delivery of our Digitalisation Strategy and work to improve our IT and cyber resilience.

During the year, significant investment in our IT Infrastructure and Systems through an IT enabled business transformation programme called Future WoW (Ways of Working) has continued as planned. This investment commenced in 2017 and is a key part of our Digitalisation Strategy. The aim of this investment is to turn NGN into a 'Smart' organisation. Improving our systems and how we interact with them will enable fundamentally new ways of collaborative working between multi-disciplinary, flexible teams. This will lead to improved decision making, ever developing customer and colleague experiences and a far more flexible organisation that can respond quickly to the future demands of the energy market.

During the year, this work has included:

- Commencing a major upgrade of our GIS systems, which will include the first deployment of the Utility Network Model for GIS in the UK. This project will futureproof NGN's GIS systems and provide a more modern and integrated platform for data visualisation and analytics;
- The upgrade of our S4 HANA and SAP FIORI systems to ensure systems remain supported well into RIIO-GD2 and to release more enhanced features to live;
- The further development of NGN's in houde work Management Apps, to deliver enhanced features and to support changes in standards and reporting required for RIIO-GD2; and
- The development of a new online customer portal and gas connections application process.

Alongside the delivery of this work, NGN have continued to progress the delivery of our Digitalisation Strategy through our membership of the following groups:

- NGN chairs the Common Information Model subgroup as part of the Data and Digitalisation Steering Group (DDSG) at the ENA;
- NGN is a member organisation in the National Energy Systems Map and Data Triage groups;

- NGN sits on the Advisory Group for the Open Energy data platform; and
- NGN is a beta participant in the Energy Data Visualisation Project.

NGN have also worked to improve the security and resilience of our IT systems and technology through the investment in:

- New mobile phones and tablet devices;
- A Windows Desktop upgrade to Windows 10 to support greater security and ensuring systems remain in manufactures support;
- Deploying new laptops to colleagues, inline with our device refresh strategy; and
- The continued development and enhancements of our AWS public cloud infrastructure to support the delivery of projects, enhance the resilience of the landscape and to invest in technology to reduce the operational costs of our cloud infrastructure.

NGN have also invested in people, process and technology to improve our cyber resilience, through the appointment of new roles, delivery of new technology (MDM, MFA and monitoring technology) and new processes around cyber security to increase our cyber resilience and meet the NIS Basic Profile

£0.9m of the £3.0m spent on Plant, Tools and Equipment expenditure was used to purchase Mini Diggers to save on hire costs. The benefits are seen primarily in Opex. We then spent c£0.3m on each of the following items, mainly due to obsolescence, age, and low stock levels;

- Breathing Apparatus Kits;
- Cable Avoidance Tools (CAT);
- Mains Cameras; and
- Gleave Tools & Equipment.

The remaining investments were made in smaller purchases for tools and equipment across the network such as depot vehicle weigh terminals, network maintenance testing equipment, upgrade to Core & Vac tools and camera's which provide operational and cost efficiencies.

During this year we spent £0.4m on Operational Vehicles, significantly lower than the allowance. We use a risk based model to determine which vehicles are in greatest need of replacement based on actual data rather than any set mileage/age criteria. This can generate material year on year swings in our vehicle investment programme and has changed the profile compared to the allowance.

Within the Other category (£1.5m), the majority of expenditure related to electrical upgrades (£0.5m), including condition based expenditure and site rationalisation in conjunction with other works, and overcrossings (£0.5m), including repairs to the pipework, supports and upgrades to security.

Physical Security Upgrade Programme – Pannal

The Physical Security Upgrade Programme (PSUP) requires us to enhance security at sites in our network that are designated to be Critical National Infrastructure (CNI) sites. We have spent a net £2.3m in 2020/21 on our security upgrades at our Pannal Offtake site which is our only CNI site.

We were on track to deliver complete this project before the end of 2021. However we have seen significant delays due to the Covid-19 Pandemic, which affected both onsite construction and provision of third-party services – a Distribution Network Operator Power Supply, and a 10mb Datalink. We have now extended the programme until September 2021. The delays included a 3 month total site stand down during the Spring of 2020, and an additional 2 months added to the Civils programme due to Covid safe working practices reducing productivity. In total we expect a further £1m to be spent on the project in RIIO-GD2.

8.8. Capex position over RIIO-GD1

RIIO Capex 20/21 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total	Allowed
LTS, storage and entry	10.4	17.2	22.6	16.6	12.2	16.3	7.4	10.7	113.3	138.0
Connections	7.6	7.8	11.2	9.8	10.7	10.7	9.8	5.6	73.1	63.0
Mains Reinforcement	3.3	2.0	3.6	2.4	2.3	2.5	4.0	6.3	26.5	43.7
Governors replacement	2.4	1.6	2.0	1.8	1.6	2.7	2.0	0.2	14.3	14.8
Other Capex	23.3	27.1	29.7	34.9	29.3	29.7	28.4	19.4	221.7	195.6
Of which IT	6.2	5.6	6.8	17.8	15.1	24.3	17.0	11.8	104.7	49.7
Of which vehicles	4.6	5.1	3.1	2.8	3.5	0.4	1.3	0.4	21.1	32.6
Total	**47.0**	**55.7**	**69.2**	**65.5**	**56.0**	**62.0**	**51.5**	**42.2**	**449.0**	**455.2**
Allowance	60.1	64.8	69.1	64.3	48.9	49.3	49.0	49.7	455.2	
Variance	**(13.1)**	**(9.1)**	**0.1**	**1.2**	**7.2**	**12.7**	**2.5**	**(7.6)**	**(6.2)**	

Figure 8.12 : Capex compared to the allowance

Over RIIO-GD1 we have invested £449.0m in our assets, just under the overall allowance of £455.2m. However, there are variances across the asset classes which offset each other. These include:

- Reduced mains reinforcement work (£17.2m) through proactive management of network pressures as an alternative to reinforcement, and lower than expected customer demand for reinforcement as economic conditions have not recovered as expected when the allowances were set;
- Reduced investment on LTS, storage and entry (£24.7m) due to timing and efficiencies in delivering both our above and below 7 bar capital investment projects. We have also seen some projects delayed in the final year of RIIO-GD1 due to the Covid-19 pandemic;
- Increased Infrastructure and Systems investment (£55.0m) due to our business transformation programme (Future WoW) and the implementation of the SAP 4 HANA platform, with a range of cloud based modules; and
- Increase investment on Connections (£10.1m) which can be explained through the low unit costs set in the allowances and increased Fuel Poor work.

We have continued to develop our commercial and delivery models to produce efficiencies, greater competition and cost savings. Examples of these are:

- Engaging closely with our supply chain to improve their planning and programming capabilities;
- Integrated new contractors into to our supply chain to increase competition;
- Improved our planning capabilities and held expression of interest events to ensure we are early to market with tenders therefore securing best price;
- Optioneering best cost solutions to drive cost savings; and

Widened our involvement in Considerate Constructors Scheme by registering more sites and achieving better results as we believe a well organised site is a safer one.

9. Repex Performance

Replacement (Repex) activities are generally associated with the replacement of old metallic pipes which potentially cause a safety risk if the pipe fractures and allows gas to escape. Pipes are generally classed as a main, serving a number of customers, or a service, which typically connects the main to a customer's meter.

This section covers our performance against the Repex cost allowance, as well as the output targets we are expected to deliver under the Repex programme. These outputs include;

- The level of risk removed;
- The length of mains taken 'off-risk';
- The number of services replaced;
- The number of gas in building events;
- The number of fracture and corrosion failures;
- The number of sub deduct networks 'off-risk;
- The number and duration of planned interruptions; and
- The customer satisfaction survey results associated with planned interruptions.

We also consider whether the workload mix delivered is in line with our expectations when the RIIO performance targets were set.

9.1. Overview and strategy

HSE required NGN and the other GDNs to replace all iron mains within 30 metres of buildings within 30 years ('30/30' programme). The new policy is referred to as the 'Three-Tier Approach' and enables us to consider factors other than the safety risk in determining which pipes to prioritise for replacement.

The rules for each tier are:

- **Tier 1 Mains** (pipes with a diameter of 8 inches or less): under the new policy NGN must still achieve full decommissioning by 31st March 2032 and replace an agreed length of mains each year as under the old policy. In addition, we can now prioritise replacement based on a wide range of benefits, including reductions in gas losses, operating costs, and improvements in safety risk;
- **Tier 2 Mains** (pipes of greater than 8 inches and less than 18 inches in diameter): all mains exceeding a defined risk action threshold must, by 31st March 2021, be abandoned, remediated or assessed for continued safe use (Tier 2a Mains). Pipes in tier 2 scoring below the risk-action threshold may be decommissioned where this is justified in cost benefit terms (Tier 2b Mains); and
- **Tier 3 Mains** (pipes with a diameter of 18 inches or above): in general, the new policy only requires GDNs to replace mains if the replacement is justified in cost benefit terms.

The eighth year of RIIO-GD1 has been materially affected by the Covid-19 pandemic. This led to a 3 month stand down where little other than emergency work was completed. When work did restart the work basket we had to target was more expensive, focussed on projects with little or no customer interaction where possible, and in city centres which had previously been difficult to access. Working practices changed to protect both our employees and customers, using personal protective equipment (PPE) and new welfare processes. All of this materially impacted the volume and type of work we were able to deliver and the unit cost of delivery.

Despite this, our overall strategy, based upon utilising the flexibility within the 'Three-Tier Approach' to maximise the benefits for customers from mains replacement, had already delivered improvements in asset condition and safety performance beyond that forecast in our Business Plan. This approach has delivered significant additional value for customers and enabled us to exceed a number of the key RIIO-GD1 outputs including Risk Removed, the number of Gas in Buildings events, and Fracture and Corrosion failures.

9.2. Mains replacement outputs

The table below sets out our replacement performance for the mains replacement outputs over RIIO-GD1.

	Inferred / actual annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Risk removed (incidents/year x10^{-6})	13,898	43,119	41,213	29,893	26,727	23,439	20,268	19,240	15,505
Length of Mains taken off risk	495.2	485.4	521.5	464.2	475.5	516.4	529.0	497.6	396.7
Number of services replaced	30,932	29,305	29,609	27,579	29,275	29,908	30,984	27,667	15,699
Number of GIB events	144	56	77	58	52	64	53	49	49
Number of fracture and corrosion failures	2,742	815	883	685	683	689	678	569	814
Sub deduct networks 'off risk'	100%	7%	58%	83%	90%	90%	91%	100%	100%
Number of Planned Interruptions	64,646	43,276	57,434	58,925	59,677	62,669	63,774	50,413	21,464
Duration of Planned Interruptions (mm)	21.3	22.4	30.3	13.7	15.1	16.4	17.6	13.7	6.6

Figure 9.1 : Mains replacement

9.2.1. Risk removed (based on MRPS)

The primary output for mains replacement is the level of risk removed from the network as a direct result of replacing the main. Every iron pipe within our network has a risk score calculated by MRPS (Mains Replacement Prioritisation System) measured as incidents/year x 10^{-6}. This output is based on reducing the amount of risk over RIIO-GD1 and does not have formal year on year targets.

Forecast iron mains risk at beginning of RIIO-GD1 (incidents/year x 10^{-6})	276,341
Risk reduction target over RIIO-GD1	111,191
% risk reduction over RIIO-GD1	40%
2013/14 risk reduction achieved	43,119 (15.6%)
2014/15 risk reduction achieved	41,213 (14.9%)
2015/16 risk reduction achieved	29,893 (10.8%)
2016/17 risk reduction achieved	26,727 (9.7%)
2017/18 risk reduction achieved	23,439 (8.5%)
2018/19 risk reduction achieved	20,268 (7.3%)
2019/20 risk reduction achieved	19,240 (7.0%)
2020/21 risk reduction achieved	15,505 (5.6%)

Figure 9.2 : Iron mains risk reduction RIIO target

As the main driver for the replacement programme and primary output in this category, risk removal is one of the key criteria used in determining the selection of mains for replacement.

Our approach has been to target the pipes with the highest risk score early in RIIO-GD1 in order to maximise customer benefit. This has resulted in a significant risk reduction over the eight year price control. In 2020/21 the total risk removed was 15,505 which gives a cumulative total of 219,404. The total RIIO-GD1 output target was to reduce risk by 111,191 over the eight year period. We achieved this during 2015/16, and now are 97% ahead of the full period target. This is an excellent result for customers and vindicates our approach to delivering the replacement programme as we now have a significantly safer network.

9.2.2. Length of main taken 'off-risk'

This output measures the amount of iron main taken off-risk (abandoned) during RIIO-GD1. The RIIO-GD1 target for the length of iron main taken off risk was 3,991.9km over the full eight years, an average target of 499km per annum over the period. Of the 3,991.9km of main, 81.6km relates to Tier 2a mains. For these mains our allowance is adjusted annually to match the actual workload. We abandoned 64.1km of Tier 2a main which reduced the overall allowed workload to 3,974.5km, an average target of 496.8km.

The table below illustrates the breakdown of these output targets over the RIIO-GD1 period. In terms of Total Mains we abandon 4,483km of main, 2.7% more than the funded target of 4364.3.

Type (km)	Inferred Annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total	Total Allowed
Tier 1 – funded	448	445.4	487.8	439.8	452.9	479.4	491.6	455.5	349.4	3601.8	3584.0
Tier 1 – customer funded	15.4	1.8	2.1	2.9	1.9	2.0	2.2	1.6	2.2	16.7	122.9
Tier 2a	8.0	8.8	7.6	5.3	4.1	7.9	3.8	9.5	17.1	64.1	64.1
Tier 2b	20.4	22.1	18.3	12.2	12.4	24.7	26.8	23.0	24.7	164.2	163.5
Tier 3	5	7.4	5.7	3.9	4.3	2.4	4.5	8.1	3.3	39.6	40.0
Iron mains	**496.8**	**485.4**	**521.5**	**464.2**	**475.5**	**516.4**	**529.0**	**497.6**	**396.7**	**3886.3**	**3974.5**
Iron > 30m	-	8.7	9.3	11.4	10.8	2.7	7.3	5.5	14.2	70.0	-
Steel	48.7	57.6	75.6	45.9	59.5	59.6	58.6	58.1	36.8	451.7	389.8
Other	-	10.4	10.7	8.6	8.6	13.3	8.1	7.0	8.3	75.0	-
Total	**545.5**	**562.1**	**617.1**	**530.1**	**554.4**	**592.0**	**603.0**	**568.2**	**456.0**	**4483.0**	**4364.3**

Figure 9.3 : Length of iron main taken off-risk performance

In terms of Total Irons Mains we have abandoned 3,886.3km of main over RIIO-GD1 at an average of 485.8km. This is 88.2km short of the overall target of 3,974.5km. This shortfall is entirely down to the Covid-19 pandemic impact. Importantly we were 13.8km ahead of the inferred 7 year target before the pandemic struck, giving us every confidence we would deliver the 8 year target as a minimum. The three month shut down and impact on productivity of Covid-19 working practices meant we completed 396.7km of work in 2020/21, a more than 100km reduction compared to 2019/20.

The **Tier 1 Mains** target includes an annual allowed workload of 15.4km for customer driven Tier 1 rechargeable mains diversions, and 448km of totex funded Tier 1 iron mains, totalling 463.4km per annum. Over RIIO-GD1 we have abandoned 16.7km of Tier 1 mains from customer driven rechargeable diversions. This put us 106.2km behind the target of 122.9km – we are expected to make up this shortfall.

We did abandon 3,601.8km of totex funded Tier 1 mains, 17.8km more than the target of 3584.0km, which did partially offset the rechargeable diversions shortfall. Importantly we were 23.1km ahead of the combined target at the end of 2019/20, and consequently fully expected to deliver the overall target. However, working

on Tier 1 mains has the most customer impact and was the area most impacted by Covid-19, which meant we were not able to fully deliver our 2020/21 work programme. We did deliver more than the target of 3,520km of Tier 1 mains abandonment set by the Health and Safety Executive.

Tier 2a Mains – Tier 2a relates to pipes of greater than 8 inches and less than 18 inches in diameter whose risk score exceeds a defined risk action threshold. The risk posed by each iron main is modelled via MRPS. For the RIIO-GD1 period, the defined threshold for NGN is an MRPS score of 142.9.

There is uncertainty as to the exact workload that may be generated by mains passing beyond the risk action threshold as a result of the dynamic nature of the iron pipe network and risk model enhancements. This was recognised in setting the RIIO-GD1 targets and a revenue driver was included to address this issue. Therefore, if a GDN abandons more or less iron main than assumed then the cost allowance will be adjusted accordingly. Tier 2a workload allowances were set at 81.6km across the whole period. This was set on the basis of the anticipated population of pipe that would be above the risk threshold during RIIO-GD1 after allowing for dynamic growth over the period. Based on the current risk scores of Tier 2 pipes, at the start of RIIO we had 37.5km of pipe exceeding the threshold, less than half that assumed in the allowances. This increased through dynamic growth, and in total we delivered 64.1km of Tier 2a main over RIIO-GD1.

Tier 2b and 3 Mains – Tier 2b relates to pipes of greater than 8 inches and less than 18 inches in diameter that fall below the risk threshold. Tier 3 relates to pipes with a diameter of 18 inches or above. Iron mains in this category are non-mandatory and the new replacement policy only requires NGN to replace mains if the replacement is justified in cost benefit terms.

We have continued to employ the cost benefit analysis methodology set out in our RIIO-GD1 business plan to identify and design the mains replacement projects in this category. Whilst abandonment / replacement of these pipes will reduce the risk of an incident this is not necessarily the principal driver, as replacement will allow us to deliver a range of benefits that are significant in their own right. These include:

- Reduction in risk;
- Reduction in leakage (emissions);
- Reduction in reported escapes;
- Reduction in associated repairs; and
- Positive customer and stakeholder impact.

The workload volumes delivered in both of these categories totalled 203.8km, marginally ahead of the 203.5km RIIO-GD1 target. The final workload mix was impacted by Covid-19 which meant we were 0.4km behind on Tier 3 mains, but this was more than offset as we were 0.7km ahead on Tier 2a mains.

In terms of the other workload;

- **Iron mains >30m** – we continue to abandon this type of main where it represents the most cost effective long term option to deliver an all plastic network and to protect the network from encroachment or 'dynamic' growth i.e. where there is reasonable certainty the main will become risk scoring in the future. There is no target for this. We abandoned 70km of this type of main in RIIO-GD1. The rate increased materially in the final year as we brought work forward to make the best use of resource during the Covid-19 pandemic, given the low customer impact of this type of work;
- **Steel** – we have abandoned 451.7km of steel, 61.9km ahead of the 8 year target. The increase has mainly been in <=2" steel which we abandon when found, and volumes are higher than those we assumed when the Business Plan was set. The rate decreased in the final year as a result of the Covid-19 pandemic; and
- **Other** – we have abandoned 75.0km of other materials mains over RIIO-GD1. There is no allowed target for this type of work.

9.2.3. Number of Gas in Building Events (GIBs)

Gas in Buildings (GIBs) is a measure of the number of gas escapes on a network pipe upstream of the Emergency Control Valve (ECV) which results in gas entering a building. Gas can enter the building in a number of ways – entering along the line of a service, having an open escape near property or an escape within the property. The output target is based on minimising the number of such events over RIIO-GD1 and does not have formal year on year targets.

GIB events (any concentration level)	**Max. number of events (RIIO-GD1)**	**Inferred Annual target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
	1,153	144	56	77	58	52	64	53	49	49

Figure 9.4 : GIB events performance

The number of GIB events during RIIO-GD1 is well below the annualised target of 144, and in part, is a reflection of our targeted replacement programme. However, across all of these measures it must be recognised that there are a range of factors that can influence the overall number of events in any year that are outside of our control. These factors include weather and ground conditions. There is therefore much uncertainty around forecasting future performance.

9.2.4. Number of fracture and corrosion failures

Fracture and corrosion failures on metallic gas mains are a key driver of gas escapes. The resultant release of gas can potentially lead to an incident. In a similar way to GIBs, fracture and corrosion failures can be influenced by other factors such as material deterioration, change in temperature and ground conditions.

Number of fractures / failures over RIIO-GD1	**Max. number of events (RIIO-GD1)**	**Inferred Annual target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
	21,936	2,742	815	883	685	683	689	678	569	814

Figure 9.5 : Fractures and corrosion failures performance

The number of fracture and corrosion failure events during RIIO-GD1 is well below the annualised target of 2,742. This improvement can again be traced back to the improved asset health and performance of our distribution pipeline network. However, the incidence of fracture and corrosion failures in any year can be influenced by a number of factors that are outside of our control. There is therefore again much uncertainty around forecasting future performance.

9.2.5. Number of domestic services replaced

This output relates to the number of domestic services replaced during RIIO-GD1. These volumes include all services replaced as part of our activities:

- Services associated with the Iron Mains Replacement Programme;
- Stand-alone bulk-service renewal programmes;
- Relays after escapes; and

- Other services replacement categories.

The output target is based on achieving the total replacement volumes over RIIO-GD1 and does not have formal year on year targets.

Number of domestic services replaced	**RIIO-GD1 8 year target**	**Inferred Annual target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
	247,458	30,932	29,305	29,609	27,579	29,275	29,908	30,984	27,667	15,699

Figure 9.6 : Number of services replaced

The total number of domestic services replaced during RIIO-GD1 has averaged 27,503, below the average annual target of 30,932. We saw a decrease of c12,000 services replaced in 2020/21 when compared to last year, driven by the reduced Tier 1 mains workload and focus on minimising customer interactions as a result of the Covid-19 pandemic.

At the end of 2019/20 we were already seeing lower number of service replacements than forecast, averaging 29,190 per annum over the first seven years of RIIO-GD1. There were a number of factors behind this lower level of services replacement:

- Mains replacement activities in lower 'service density areas' – the historic average underlying the RIIO output target is one service every 12.6m of iron main. During the first seven years of RIIO-GD1 this average has increased to one service every 14m of iron main;
- Lower than forecast reactive relay after escape workload – this is due to our strategy of employing 'targeted service performance led mains replacement' and the milder than average winters we have experienced. In the first seven years of RIIO-GD1 Relays after escapes have averaged over 3,000 jobs lower than forecast when setting the output targets.

Cost benefit analysis shows that it would not have been cost effective and in the interests of our customers to carry out a bulk service renewal programme to make up the shortfall. We confirmed this in writing to Ofgem at the time. The shortfall has now increased however as a result of the Covid-19 pandemic.

9.2.6. Sub-deduct networks 'off-risk' by the end of RIIO GD1

A sub deduct network is a network configuration which consists of a primary meter, pipes and one or more secondary meters. The owner and operator of these networks is not always clear, presenting a potential safety risk. This risk can be removed by re-engineering the pipes and meters, or by establishing that a third party formally accepts responsibility for them. Our target is to remove the risk from these networks by the end of RIIO-GD1.

Sub-deduct networks 'off-risk' by the end of RIIO	**RIIO target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**Total**
	136	9	69	34	9	0	2	12	1	**136**

Figure 9.7 : Sub deduct networks off risk

At the start of RIIO-GD1 there were an estimated 134 sub-deducts connected to our network. One additional site was identified by Xoserve in 2015 with one further site in 2020, bringing the total number of sites to 136. All sub-deduct networks are now 'off-risk'.

9.2.7. Number and duration of planned interruptions

Our output target covers all planned interruptions, which have three main drivers:

- The replacement programme – GDN initiated – which accounts for c96% of the total number;
- Service alterations at the request of a customer – which accounts for c4% of the total number; and
- Diversions at the request of a customer – which accounts for the balance.

	Annual Target	Total	GDN Initiated	Customer initiated diversion	Customer initiated service alteration
Number of planned interruptions	**64,257**	**21,464**	19,773	266	1,425
Duration of planned interruptions	**17.35 mm**	**6.6 mm**	6.4 mm	0.1 mm	0.1 mm

Figure 9.8 : Number and duration of planned interruptions

The table above details our performance during 2020/21. We had 21,464 planned interruptions with a duration of 6.6 million of minutes (mm). This was less than 40% of the average number of planned interruptions seen over the first seven years of RIIO-GD1, with the decrease driven by the reduced Tier 1 mains replacement workload as we focussed on minimising customer interactions as a result of the Covid-19 epidemic. Customer initiated service alteration work also fell from an average of over 2,000 to 1,425.

The average time on site increased to 307 minutes from 272 minutes in 2019/20, driven by the working practices we adopted to protect both our employees and customers from Covid-19. This was still below the average of c334 minutes over the first seven years of RIIO-GD1.

Over RIIO-GD1 we undertook c418,000 planned interruptions with a total duration of 135.7 million minutes. This outperforms the targets by c100,000 interruptions and 34 million minutes respectively.

9.2.8. Customer Satisfaction Survey results for planned interruptions

In 2020/21 we have delivered a score of 8.92, the same as is in 2019/20.

Of all three work streams, planned work has been the most challenging to deliver through the pandemic. We have worked really hard to understand from customers how we can reassure them that we are delivering the work safely. Listening to feedback, we adapted our processes to give longer notification of interruptions, and also to take account of customers who were shielding and/or had specific vulnerability needs. Given these challenges, we were pleased that our score remained the same as the previous year.

Overall, for all three workstream, we have seen performance that has improved over GD1, and that improvements we have made have sustained through really challenging times. At NGN we have a very customer-centric culture, and the last 12 months have shown that this is embedded across all our operational activities, and across all departments involved in the end to end customer journeys for Unplanned, Planned and Connections customers.

9.3. Mains replacement costs

9.3.1. Repex compared to the allowance

Replacement expenditure	Net Costs 20/21 prices (£m)	Workload
Tier 1 – Mains laid	53.1	360.6
Tier 1 – Associated services	5.6	18181
Tier 2a – Mains laid	10.8	19.3
Tier 2a – Associated services	0.1	442
Other – Mains laid	21.9	48.8
Other – Associated services	0.2	679
Diversions – Mains laid	0.8	9.8
Diversions – Associated services	0.1	263
Other services	7.2	5549
Risers	0.1	106
Sub deducts	0.0	1
Total	**100.0**	
Allowance	**120.4**	
Variance	**(20.4)**	

Figure 9.9 : Repex costs and workload

The table above sets out our 2020/21 Repex costs and workload, along with the cost allowance. Overall, we spent £100.0m against an allowance of £120.4m (after adjusting for allowed Tier 2A workload). This £20.4m saving will be shared with our customers under the Totex sharing mechanism.

It is important to remember that the allowances are benchmarked against the other GDNs, and as the frontier performer, the allowances we have been set are in some cases higher than our base costs were when the allowances were set. We have also made considerable changes to our delivery model and commercial strategy for Repex which have contributed materially to our outperformance. These changes have focused on:

- Using direct contracts with end service providers to deliver the work in the field, rather than contracting through larger intermediary contractors. This removes the profit of the intermediary and gives us greater control of the field activities, improving efficiency and customer service; and
- Reviewing and rebuilding our preconstruction processes – project selection, project build and various preconstruction enabling works – to remove duplication, improve decision making, and streamline all activities

We have also implemented new innovative techniques developed under the RIIO Innovation framework which have delivered efficiencies in Repex, estimated at £0.1m for 2020/21. The main technique that has delivered efficiencies this year has been Stub end abandonment – a technique that allows us to cap off a smaller pipe connected to a larger pipe without leaving a short 'stub'. However Covid-19 meant this technique was used less frequently than last year, when the savings were c£0.8m.

9.3.2. Mains and Services year on year performance

Mains and Services (20/21 prices)	2019/20			2020/21		
	Net Costs £m	Workload	Unit Costs £	Net Costs £m	Workload	Unit Costs £
Tier 1 + steel – Mains laid	54.7	493.5	111	53.1	360.6	147
Tier 1 – Services	11.6	36573	318	5.6	18181	310
Tier 2a – Mains laid	3.9	10.6	370	10.8	19.3	559
Tier 2a – Services	0.1	240	344	0.1	442	276
Other – Mains laid	16.2	44.6	363	21.9	48.8	449
Other – Services	0.4	1181	319	0.2	679	302
Diversions – Mains laid	3.3	11.2	294	0.8	9.8	82
Diversions – Services	0.1	364	359	0.1	263	353
Other services	9.1	5989	1513	7.2	5549	1300
Total mains laid	**78.1**	**559.9**	**140**	**86.6**	**438.5**	**198**
Total services	**21.3**	**44,347**	**480**	**13.3**	**25,114**	**528**
All in mains cost	**99.4**		**178**	**99.9**		**228**

Figure 9.10 : Repex year on year variance

In terms of year on year performance, the all in mains laid unit rate averaged £228 per metre this year, an increase of £50 per meter when compared to 2019/20. This was predominantly driven by an increase in Tier 1 mains unit rates as a result of the Covid-19 pandemic. We experienced a 3 month stand down in early 2020/21 when in the short term much of our cost base is fixed, and when we returned to work productivity decreased due to new working conditions to protect customers and our employees. The work basket changed as well to more expensive work, with shorter projects and less customer interaction, and more work completed in city centres which had previously been difficult to access. This impacted all areas of work, however the unit rates are much more variable in the higher diameter work. Workload across these tiers is in general more complex and so unit costs can vary significantly depending on the length, diameter band and location of the projects.

9.3.3. Iron mains laid workload mix

Section 9.2.2 above details where we are against the abandonment workload targets. This section considers what mains laid workload mix we have achieved when delivering this abandonment, compared to the mix we forecast in the Business Plan. There are no targets for this, however it is relevant as it is mains laid which is the primary determinant of cost. We do not target this specifically when designing projects, but achieving a similar mains laid workload mix to that planned whilst also hitting the abandonment targets shows we are delivering the work as we expected and not targeting easier and cheaper projects.

With regards to Tier 1, which represents c88% of our overall workload, most mains laid is in the bottom 2 diameter band Tiers. However, when compared to the Business Plan there has been a significant shift towards the second tier from the first, which is marginally more expensive work. Things are less clear cut when looking at Tiers 2 and 3 which make up c6% of our overall workload. There are small % movements across all bands,

with the majority of the work in the middle four bands. Here there has been a swing towards lower diameter band work.

Mains laid workload mix	Tier 1			Tiers 2 and 3		
	Business Plan	Actual	Variance	Business Plan	Actual	Variance
<=75mm	39%	26%	(13%)	1%	3%	2%
>75mm to 125mm	45%	62%	17%	6%	5%	(1%)
>125mm to 180mm	14%	12%	(2%)	9%	11%	2%
>180mm to 250mm	2%	1%	(1%)	25%	28%	3%
>250mm to 355mm	0%	0%	0%	40%	37%	(4%)
>355mm to 500mm	0%	0%	0%	14%	15%	1%
>500mm to 630mm	0%	0%	0%	4%	2%	(3%)
>630mm	0%	0%	0%	0%	0%	0%

Figure 9.11 : Mains laid workload mix compared to the Business Plan

9.3.4. Risers and Sub-deduct performance

NGN have an obligation to manage the risks identified with mains and services associated with medium and high rise buildings. We manage this through an ongoing programme of surveys and then carry out remedial work on both a reactive and planned basis as required. In 2015/16 we started an annual sampling survey program for buildings below 5 storeys and therefore we expected costs, workload and complexity to increase in future years. As a result of the 2015/16 surveys, a total of 12 risers have been replaced this year, with a further 94 isolated.

Sub-deduct networks present a potential safety risk as the owner and operator of these networks is not always clear. We completed the programme of work last year, however one further sub-deduct was identified by Xoserve in year which has been successfully managed off risk.

9.4. Repex summary position over RIIO-GD1

Repex actuals 20/21 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
HSE driven mains and services	75.3	82.1	73.4	74.8	71.0	72.9	70.4	69.7	589.4
Non-HSE driven mains and services	27.8	26.1	24.2	19.9	26.4	27.1	29.1	30.2	210.7
Risers	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.4
Repex totals	**103.1**	**108.2**	**97.6**	**94.8**	**97.5**	**99.9**	**99.4**	**100.0**	**800.5**
Allowance	111.1	113.4	112.8	113.4	115.1	113.3	117.0	120.4	916.5
Variance	**(7.9)**	**(5.2)**	**(15.2)**	**(18.6)**	**(17.5)**	**(13.4)**	**(17.6)**	**(20.4)**	**(116.0)**
Cumulative	(7.9)	(13.1)	(28.3)	(46.9)	(64.4)	(77.8)	(95.4)	(116.0)	

Figure 5.7: Repex forecasts

The table above summarises our RIIO-GD1 Repex expenditure. Cumulatively we have outperformed the £916.5m Repex allowance by £116.0m (12.7%) whilst materially outperforming the primary Repex output, the amount of risk removed from the network. Customers now have a network which is significantly safer than at the start of RIIO-GD1.

Over the price control we delivered 3,886.3km of iron mains abandonment against a target of 3974.5km. At the end of 2019/20 we were on track to fully deliver this target. However in 2020/21 Covid-19 had a significant effect on the workload we were able to deliver, as a result of the enforced 3 month stand down and then reduced productivity from adopting new covid secure working practices. We also delivered a more expensive work basket, targeting projects with limited customer interactions, and in city centres which were previously difficult to access. In the short term much of our cost base is fixed, this together with the reduced productivity meant we spent c£4m more than we forecast in 2020/21. This is reflected in the average all in unit cost, which increased from £178 per meter in 2019/20 to £228 per meter in 2020/21.

Overall, we have actually delivered more work than is funded. Steel volumes are more than 60km ahead of the target, mainly in below 2" steel which is replaced when found. We have also abandoned 70km of iron >30m from a domestic property and 75km of other mains. This means in total we abandoned 4,483km or mains against a target of 4,364.3km.

10. Overall Output Review

10.1. Introduction

The adoption of an outputs-based framework is a key element of the RIIO framework. By defining the outputs companies need to deliver (e.g. risk removed), instead of prescribing a set of inputs (e.g. length of mains abandoned), the framework provides incentives for companies to innovate and deliver the services that customers require at least cost. An output-based framework also provides greater transparency for customers in relation to the services companies need to deliver.

This section provides a summary of the outputs NGN is required to deliver during RIIO-GD1, our progress against these targets for 2020/2021 and our position at the end of the 8-year period. This section also provides detailed commentaries on those outputs which are not directly related to costs – detailed commentaries on those outputs are provided in the relevant expenditure sections.

The outputs cover six areas:

Safety – Minimising the risks associated with operating the gas distribution network for our stakeholders and society:

Reliability – Improving the reliability of our network with the optimum level of expenditure.

Customer Service – Improving the service we offer customers by engaging with them fully, so their views direct the way we operate our business.

Environment – Reducing the environmental impacts of gas distribution.

Social Obligations – Helping to alleviate fuel poverty and actively addressing the concerns and risks of carbon monoxide poisoning; and

Connections – Providing a high-quality connections service for both entry and exit customers.
Outputs are classified as primary (or principal) outputs and secondary deliverables. In theory the secondary deliverables were designed to measure performance against the primary outputs. However, this distinction is blurred and does not hold true in all cases. It is far simpler therefore to consider both the primary outputs and the secondary deliverables as a single set of outputs that we must deliver for our customers. There are 52 in total.

10.2. Safety outputs

The aim of the safety output measures is to ensure the provision of a safe network in compliance with HSE safety standards and improve asset knowledge to ensure GDNs develop well justified investment plans.

The table below shows the safety outputs which have a one-year output target, and our performance against target during 2020/21. We continued to outperform the 1hr and 2hr target and have exceeded our 12hr repair percentage target set by Ofgem. Annual repair risk is comfortably within the annual target of <34.5m. Sub deducts target for RIIO GD1 has been delivered. This is consistent with our very strong performance against these outputs across RIIO-GD1.

One Year Outputs	RIIO-GD1 Year 8 target	20/21	RAG	
Emergency response				
97% of uncontrolled gas escapes attended within 1 hr	97%	99.8%	G	Link
97% of controlled gas escapes attended within 2 hrs	97%	99.9%	G	
Repair				
Annual repair risk (m)	<34.5	12.5	G	Link
Percentage of repairs completed within 12 hrs	62.5%	65.1%	G	Link
Major accident hazard prevention (MAHP)				
Compliance with the Control of Major Accident Hazards regulations (number of breaches)	0	0	G	Link
Compliance with the Gas Safety (Management) Regulations (GS(M)R) (number of breaches)	0	0	G	Link
Sub-deduct networks 'off-risk' by the end of RIIO	0	0	G	Link

Figure 10.1: 'One Year' safety outputs performance

The table below shows the safety outputs which have an eight-year output target.

8 Year Output	RIIO-GD1 Year 8-year target	20/21	RIIO GD1	8 Year Performance	RAG	
Mains replacement						
Risk removed (incidents/year $x10^{-6}$) as measured by MRPS	13,899	15,505	111,192	219,404	G	Link
Number of Gas in Buildings (GIB) events	144	49	1,153	458	G	Link
Number of fractures and corrosion failures	2,742	814	21,936	5,816	G	Link
Length of main taken 'off-risk'(km)	497.2	396.7	3,974	3,886	A	Link
Number of services replaced	30,932	15,669	247,458	220,026	A	Link
Asset health and risk metrics	Phased plan	On Target	Phased plan	On Target	G	Link

Figure 10.2: 'Eight Year' safety outputs performance

We have seen a significant risk reduction over RIIO-GD1, ending 97% ahead of the eight-year target, an excellent result for customers. We delivered on our asset health commitments, and saw reductions in both gas in building events and fraction and corrosion failures. Covid-19 significantly impacted our replacement work – we ended up cumulatively 88.3km behind the target for length of iron mains taken 'off risk'. The

number of services replaced was 11% behind target. We saw fewer services replaced when completing emergency response work, driven by the relatively mild winters, and in the final year volumes were significantly down due to the COVID pandemic. More detail and explanation on each individual measure can be found below and by following the links in the table above.

10.2.1. Major Accident Hazard Prevention

NGN's existing safety requirements in relation to Major Accident Hazard Prevention are set out in legislation and monitored by the HSE. There are three outputs in this area. Two are related to compliance with legislation and the other relates to risk removal from sub-deduct networks.

As outlined in the table below, we saw no breaches of legislation in RIIO-GD1.

	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Compliance with the Control of Major Accident Hazards regulations (number of breaches)	0	0	0	0	0	0	0	0	0	0
Compliance with the Gas Safety (Management) Regulations (GS(M)R) (number of breaches)	0	0	0	0	0	0	0	0	0	0

Figure 10.3 : Major accident hazards prevention

Output: Compliance with Control of Major Accident Hazards Regulations (COMAH) (2015)

This output requires us to demonstrate that we have fully complied with COMAH and set out the details of any non-compliance within the relevant year. It requires us to have a major accident prevention policy backed by a robust safety management system. We have detailed policies and procedures in place to manage compliance.

NGN have removed all high-pressure storage sites and have decommissioned and denotifed all low pressure COMAH sites. This eliminates the legislative requirement associated with gas storage set out in COMAH regulations.

Output: Compliance with the Gas Safety (Management) Regulations (GS(M)R)

This output requires NGN to demonstrate that it has fully complied with GS(M)R and operated in accordance with the safety case required by this legislation. A culture of compliance with the safety case is embedded throughout NGN.

Our output target was to maintain full compliance with GS(M)R throughout RIIO-GD1. We have achieved this for this price control GD1 and expect to continue into GD2.

10.3. Reliability outputs

The aim of the reliability output measures is to promote a network capable of providing long term reliability, whilst adapting to climate change, as well as minimising the number and duration of interruptions.

Eight Year Outputs	**RIIO-GD1 Year 8 inferred target**		**20/21**		**RAG**	
Loss of supply						
Target	**Annual**	**8 Year**	**Annual**	**8 Year**		
Number of planned interruptions	64,646	517,170	21,464	417,632	G	Link
Number of unplanned interruptions	12,960	103,677	10,265	99,903	G	Link
Duration of planned interruptions (mins-millions of)	21.3	170	7	136	G	Link
Duration of unplanned interruptions (mins-millions of)	5.9	47	4	39	G	Link
One Year Outputs	**RIIO-GD1 Year 8 target**					
Network capacity						
Meeting NGN's 1 in 20 planning standard (MWhpa)	505,357		487,000		G	Link
PRI utilisation and capacity	Phased plan		Behind		A	Link
Network reliability – maintaining operational performance						
Percentage by volume of offtake meter errors	<0.1% pa		0.1%		G	Link
Number and duration of telemetered faults	120 pa		89		G	Link
Pressure System Safety Regulation (PSSR) Faults (A1 and A2 faults per number of AGIs)	0.49		0.41		G	Link
Gasholder decommissioning	3		4		G	Link

Figure 10.4 : Reliability outputs 2020/2021 performance

The table above shows the reliability outputs, which all have an eight-year output target. In most cases we have inferred an annual target based on the eight-year target to track progress. The number and duration of planned and unplanned interruptions were all below the ceiling targets, an excellent result. We met all of our Network reliability – operational performance targets, and the 1 in 20 planning standard.

Covid-19 meant we were not able to deliver the PRI utilisation and capacity output. We had firm plans in place to deliver the required projects in 2020/21, but the three month stand down and reduced productivity when we returned meant the work could not be completed before the end of the year. These projects will all be delivered in 2021/22.

10.3.1. Network Capacity

Output: Meeting NGN's 1 in 20 planning standard

This output requires our network to have sufficient capacity to ensure that customers' gas supply is not interrupted during periods of highest demand.

Forecasts of peak demand are reviewed annually and are a primary influence on our modelling and capacity planning processes. The demand forecasting process employs specific modelling techniques which identify the peak (1:20) demand over a period of ten years. This is used alongside our storage simulation model which identifies the peak storage requirements using historic demand and weather patterns over a 61-year period.

Estimates of peak customer demand in 1 in 20 weather conditions have been falling since 2005 as a result of high energy prices, the economic downturn and increased energy efficiency. From 2019 we have been estimating relatively steady and consistent profiles of peak day demand and our 2021/22 forecasts were in line with recent years.

In 2020/21 we fulfilled our requirement to meet our 1 in 20 standard yet again as we have procured sufficient capacity to meet our expected system demand. We are involved in the Capacity Access Review (UNC Modification 0705R) with National Grid which aims to improve the accessibility of capacity to meet our licence obligation, which is still ongoing. An Exit Regime which is flexible and enables us to reduce the costs we pass through to our customers is ultimately where we hope the Capacity Access Review takes us.

The table below details our latest peak demand.

	RIIO Annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Meeting NGN's 1 in 20 planning standard (MWh pa)	501,052	500,315	502,916	492,560	476,850	478,846	473,411	485,014	485,452

Figure 10.5 : Meeting NGN's 1 in 20 planning standard

10.3.2. Network Reliability

Output: Percentage by volume of offtake meter errors

NGN is responsible for measuring and reporting meter accuracy for the delivery of gas from the NTS into our network. This is measured through a process administered by the Joint Office of Gas Transporters, which requires the identification and reporting of potential meter errors as part of a measurement error notification process.

There is a common industry output target for RIIO-GD1 in relation to meter errors of no greater than 0.1% of total throughput (measured in GWh).

	RIIO Annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Offtake meter errors	<0.1%	0%	0%	0%	0.0%	<0.1%	<0.1%	0%	<0.1%

Figure 10.6 : Offtake meter errors

All our offtake metering systems have been assessed for accuracy and repeatability through the full flow range with results assessed to identify sites where the accuracy and reliability could be improved by introducing new technology.

A program of metering upgrades has been developed to replace the old metering systems with the latest ultrasonic meters, which are more efficient as they have a higher accuracy through the full flow range and require less maintenance.

Meter errors can take a significant period of time to progress through the process detailed above. This year we have seen one report for our Cowpen site, 5.33 (GWh) equating to 0.007%. This is under detailed investigation and review. Over RIIO-GD1 we have been below the target in every year.

Output: Number and duration of telemetered faults

RIIO-GD1 includes output targets covering our response to telemetered faults on Above Ground Installations (AGI). This is measured as the average duration of 'now' faults per AGI. We have an output target to reduce the number and duration of telemetered faults over RIIO-GD1 as detailed in the table below.

	RIIO Yr. 8 Target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Number of 'now' faults duration in hrs / number of telemetered AGIs	120	105	63	135	63	95	116	94	89

Figure 10.7 : Telemetered faults

Continuous scrutiny is still being applied to fault logs. The COVID-19 pandemic has not affected the fault number adversely.

In 2020/21 we had the number of 'now' faults duration in hrs / number of telemetered AGIs as 89 against a target of 120 continuing our outperformance for this output. The level of fault has decreased from last year, as our system control and network maintenance functions have continued to focus on this output. Fault data is reviewed through weekly reports, which drives the reduction and close out of faults quickly and efficiently.

NGN has been under the annual target in every year of RIIO-GD1.

Output: Pressure Systems Safety Regulations (PSSR) faults

Statutory inspections are carried out on our above two bar network under the Pressure Systems Safety Regulations. Addressing PSSR faults allows us to limit the deterioration of network assets. Faults are reported by reliability categories, with A1 (imminent danger) being the most serious.

This output measure was not consistently defined across the GDNs, and so it has been agreed that all GDNs will move to a revised consistent approach when this has been reviewed further.

	RIIO 20/21 target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Number of PSSR A1 and A2 faults per inspection	0.47	0.43	0.26	0.31	0.35	0.37	0.29	0.19	0.41

Figure 10.8 : PSSR faults

The RIIO-GD1 target for the proposed new measure is <0.47 faults per inspection. We have achieved 0.41 faults per inspection in 2020/21. We have been below the target in every year of RIIO-GD1.

Approximately 63% of the reported PSSR A2 faults last year were due to the higher number of primary protective devices recorded over Year 8 of RIIO-GD1. There are no significant changes in the PSSR A2 fault numbers for other components.

10.4. Customer service outputs

The aim of the customer service output measures is to improve levels of customer satisfaction from the activities carried out by NGN. The outputs also seek to encourage us to undertake effective engagement with our stakeholders and reflect their views in the day to day operation of our business.

There are no specific RIIO targets, only a sliding scale penalty or reward based on our performance.

One Year Outputs	RIIO-GD1 year 8 target	20/21	RAG	
Customer satisfaction survey				
Unplanned interruption (Overall satisfaction score from 0-10)	9.0	9.55	G	Link
Planned interruption (Overall satisfaction score from 0-10)	8.5	8.92	G	Link
Connections (Overall satisfaction score from 0-10)	8.4	9.05	G	Link
Complaints				
Complaints metric	11.6	2.40	G	Link
Stakeholder engagement				
Maximise rewards under the stakeholder incentive target (score from assessment panel)	>5.0	7.20	G	Link

Figure 10.9 : Customer service outputs 2020/21 performance

We have achieved an excellent outcome in our customer service outputs over RIIO-GD1. We have also maintained a strong performance for complaint handling and performed well in the stakeholder engagement assessments.

In 20/21 we have seen a slight increase in performance overall. For our Connections and Replacement scores, we have maintained performance from 19/20. However, we have seen an increase in our Unplanned Interruptions performance, which has impacted our overall performance positively.

No specific targets have been set for the customer satisfaction outputs. However, there are baseline targets for the associated financial incentive scheme. We have improved over RIIO-GD1 and now maintain a very high standard of service.

Output: Complaints Metric

Under RIIO-GD1, complaints performance is incentivised through penalties for poor performance. Our aim has been to avoid any penalties for all the eight years of RIIO-GD1. Performance is measured via the complaint's metric, which is a composite score calculated as the sum of each GDN's performance against four elements. The table below summarises the four elements and our performance in 2020/21.

	Complaint Scores
Percentage of complaints unresolved after one working day	18.42%
Percentage of complaints unresolved after 31 working days	1.73%
Percentage of repeat complaints	0.07%
The number of Energy Ombudsman (EO) decisions that go against NGN as a percentage of total complaints received	0

Figure 10.10 : Complaint metric breakdown

The above scores generate a weighted complaint score of 2.4 which does not generate any penalties. Penalties would only be imposed if our score was 11.57 or more. This is a very strong performance, and reflects the levels seen throughout RIIO-GD1. We have consistently been well below the penalty threshold.

	RIIO Maximum target	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
Complaints Metric	11.57	5.0	2.7	3.1	2.7	3.4	2.8	2.5	2.4

Figure 10.11: Complaints metric

In 20/21 we have seen our best performance in our overall complaints metric score. Over the last 12 months we have worked hard to resolve more complaints within D+1 and D+31, and this has had a positive impact on the overall score.

This performance had been delivered strong processes, such as our daily call, and by having the right ownership and accountability at every level in the organisation. Over the last 12 months, we have not made any significant changes to our complaints handling processes. However, at the outset of the pandemic, we introduced a further root cause category – COVID 19 – against which a complaint could be recorded if it was clear that the customer was dissatisfied with the safety measure/approach that we had taken during their work. This meant we could immediately see if there were any issues with approach we were taking, and if we needed to take any action internally i.e. order more PPE; carry out more colleague briefings etc..

For GD1, we are proud of our complaints performance, and ended the GD1 price control with no Ombudsman findings against NGN.

10.4.1. Stakeholder Engagement

At NGN we firmly believe that stakeholder engagement and our response to feedback can lead to stronger outcomes for our stakeholders, our customers, our colleagues, and our business.

We recognise that all our stakeholders are different and may have specific areas of interest. By ensuring our engagement programme allows these diverse views to be heard, we are confident that we are building the required evidence base and legitimacy for our current and future plans.

Our strategy

Our comprehensive stakeholder strategy has been established since 2014/15. It is reviewed and updated every year with increased checks to ensure it is robust. Our framework allows colleagues at all levels to engage stakeholders effectively; it provides the flexibility to tailor engagement methods to the interests and capacity of our stakeholders, whilst ensuring our approach aligns to the AA1000 Stakeholder Engagement Standards (SES) best practice principles.

In our last regulatory year for RIIO-1, we've worked harder than ever to further embed our proven engagement strategy. Driven by external factors such as Covid-19 and the transition to RIIO-2 we've evolved our approach by building on areas of strength and adapted in areas where we identified gaps and opportunities for improvement. We have continued to focus on strengthening accountability in engagement planning and building on our business wide engagement planning process. This has included establishing a transition year work programme for our Customer Engagement Group focused on readiness for RIIO-2, underpinned by directorate engagement plans led by our Senior Leadership Team. This year we've included for the first time traditionally internally focused teams such as HR, Finance, and IT, further embedding a holistic business approach to engagement.

In order to improve capability to deliver high quality online engagement we've invested in new systems, software and training courses for our colleagues and launched a refreshed Stakeholder Toolkit, codesigned with our colleagues, offering an online suite of best-practice resources, including 'how to guides' and templates available to all colleagues that are more accessible and relevant for colleagues.

We've continued to deliver sector leading engagement mechanisms and our Citizen's Jury has continued to flourish this year as an enduring central mechanism with a temporary transition to online engagement. We've retained 78% of original members since the group was formed in 2019, who now act as mentors to our new members, providing a balance of experience and fresh experiences. Alongside this, we've also addressed a key gap in our engagement with the younger demographic, establishing our Young Innovators Council modelled on our highly effective adult domestic customer panel. The group of 35 14-19-year olds from across our network will enable us to hear the voices of our future customers, employees and partners and give them a say in the decisions we are making that will affect them in future years.

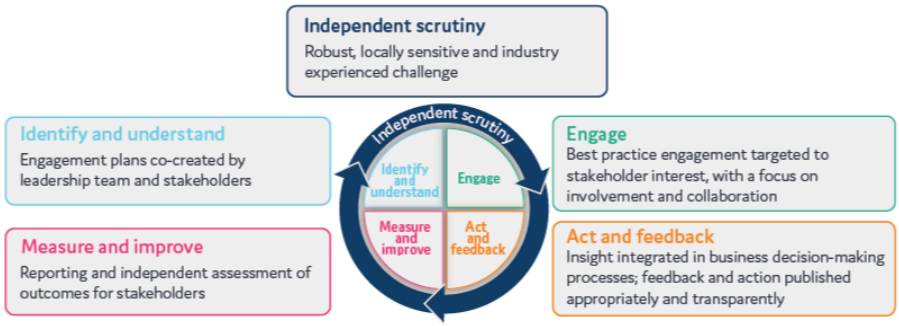
At the same time, we've brought stakeholders into our strategic decision-making groups developing a Social Strategic Partners Board and recruiting an external stakeholder to chair our internal innovation working group Think Tank, to challenge and approval innovation project proposals. Both these mechanisms put stakeholder insight at the centre of our decision-making process.

This has led to positive feedback from our external assurance programmes, including the BS 18477 Inclusive Service Provision, our independent external audit, and our Customer Engagement Group.

"NGN demonstrated leading practice in many areas of its engagement strategy and delivery. NGN's strengths remain in its leadership commitment to engagement, the mandate it gives those at all levels of the company to engage, and a culture of engagement which recognises the benefits of engagement for strategy and governance. The structures and resources put in place for RIIO-2 are embedded in the approach to engagement across the business."
SGS, Internal Management Report for Northern Gas Networks 2021.

Meaningful engagement

We have embedded stakeholder engagement into our core decision making processes and regularly take temperature checks to ensure our overarching strategic priorities continue to be relevant to our stakeholders. And in delivery of those objectives, we work directly with impacted groups to co-design changes to our services and approach.



Strengthening our engagement

To deliver great outcomes for our stakeholders we need to be great at engaging with our stakeholders. Throughout this year our engagement has continued to be followed closely by our Customer Engagement Group (CEG), an independent board established to assess how well we have understood our stakeholders' needs and reflected these against our readiness for RIIO-2 and the commitments we've made in our Business Plan. In April 2021, the Group published its independent review the year, concluding that engagement has produced "significant benefits to customers and improved both the transparency and quality of NGN's plans."

Independent benchmarking allows us to assess the quality of our engagement inside and outside of our sector. We are pleased to have retained the AA1000SES standard for the eight year in a row and our approach to auditing throughout the year is helping us to continually measure and improve how we engage.

In 2020/21 we have:

- Heard over 250,000 voices;
- Engaged with over 14,900 stakeholders from the doorstep through to the board room and online workshops;
- 22% of voices heard through strategic engagement were vulnerable customers;
- Had 8,402 interactions with stakeholders through our Together online engagement hub;
- Held 51 strategic engagement events, and launched our Young Innovators Council;
- Received an average rating of 8.7/10 for our stakeholder workshops; and
- 9/10 overall satisfaction with NGN from our Communities of Interest

Delivering benefits

Stakeholder input continues to help us to focus our resources on delivering the right outcomes and improvements, and in developing our longer term plans – from developing a new strategy to improve customer access to the Priority Services Register and our customers cocreating a new portal to deliver a quicker connection process through to launching the sector's first retail Green Transition Bond allowing our customers to invest in their local communities and a net zero future and brokering new relationships with our hydrogen supply chain.

Stakeholder Incentive Scheme

In 2020/21 we achieved a score of 7.20, maintaining our strong position within the scheme. We have worked extremely hard this year to continue to better demonstrate how input from our stakeholders is shaping our business and helping us go beyond our regulated surveys to get a holistic, and deep, understanding of how we must adapt to meet changing needs. This in turn is leading to measurable improvements and benefits and we move into RIIO-2 confident that we have in place the right culture, processes and relationships with our stakeholders ensure their insights are the heart of our business decisions.

10.5. Environmental outputs

The aim of the environmental output measures is to reduce the environmental impacts of gas distribution. This is delivered through the measures detailed below. The outputs in this area are split into a broad measure and a narrow measure.

The outputs under the broad environmental measure are aimed at ensuring that we play a role in delivering a low carbon energy sector. The most prominent role involves facilitating the connection of new renewable gas plant. As we don't have control over the delivery of such connections, the output measures are more around assisting and promoting such development rather than specific targets for the amount connected. The outputs and our achievements are set out below.

The outputs under the narrow measure are aimed at minimising the environmental impact of our own activities.

10.5.1 Broad Measure

Eight Year Output	Inferred annual target	19/20	RAG
Total capacity of biomethane connected (SCMH)	No target	0	G
Total capacity of biomethane enquiries/applications in progress (SCMH)	No target	7446	G
Information provision and arrangements for customers wanting to inject gas on the distribution network	No target	Met	G
Voluntary standards of service: 15-day response to initial enquiry under 7 bar	100%	100%	G
Voluntary standards of service: 30-day response to capacity study under 7 bar	100%	100%	G

Figure 10.12 : Environmental broad measure performance

In 2020/21 no new biomethane connections were made, a contributing factor being the end of the Renewable Heat Incentive (RHI) earlier this year. Later this year we expect that the launch of the Green Gas Support Scheme will see the number of studies, reservations and connections pick up again through GD2, applicants have until Autumn 2025 to submit their applications for a tariff that will last for 15 years.

	RIIO Annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Total capacity of biomethane connected (SCMH)	No target	0	1,200	7,800	500	550	0	6290	0
Total capacity of biomethane enquiries/applications in progress (SCMH)	No target	11,800	29,600	27,390	38,440	18,740	9,190	9170	7446
Information provision and connection charging for distributed gas	No target	Met	Met	Met	Met	Met	Met	Met	Met
Voluntary standards of service: 15-day response to initial enquiry under 7bar	100%	100%	98%	89%	100%	100%	100%	100%	100%
Voluntary standards of service: 30-day response to capacity study under 7bar	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figure 10.13: Environmental broad measure performance

10.5.2. Narrow Measure

The table below shows the narrow environmental measure outputs, which all have an eight-year output target. In most cases we have inferred an annual target based on the eight-year target to track progress.

Eight Year Outputs	Inferred Annual Target	20/21	RAG
Shrinkage gas			
Shrinkage baselines (GWh)	379	319	G
Leakage baselines (Gwh)	354	297	G
Business Carbon Footprint			
BCF excluding shrinkage	None	20,687	G
Other emissions and natural resource use			
Number of sites where statutory remediation has been carried out	None	2	G
Use of virgin aggregate	<17,000	14,740	G
Amount of spoil to landfill sites	<13,000	202	G
ISO14001 major non-conformities	None	0	G

Figure 10.14: Environmental narrow measure 2020/21 performance

Output: Shrinkage & Leakage

We are responsible for purchasing gas to replace the gas lost through shrinkage. Shrinkage comprises leakage from pipelines (c.95%), theft from the gas network (c.3%), and own use gas (c.2%). We have set output targets to reduce the amount of shrinkage and leakage from our network over RIIO-GD1. The table below sets out the target shrinkage and leakage volumes set out in our Licence against our actual performance. The baselines have been reset to the reflect the 1.4 version of the Shrinkage and Leakage model.

GWh	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Shrinkage baselines	455	445	433	423	412	401	390	379
Shrinkage actuals	417	397	382	354	352	341	329	319
Leakage baselines	430	420	408	398	386	376	364	354
Leakage actuals	395	375	360	332	329	319	306	297

Figure 10.15: Shrinkage & Leakage performance

We have successfully outperformed both our shrinkage and leakage targets in 2020/21, reducing overall shrinkage by a further 11 GWh from last year. We outperformed in every year of RIIO-GD1, through a combination of:

- Reducing our metallic mains population through the replacement programme.
- Reducing system pressures through strong governance and close working practices between our pressure management, network validation and network maintenance teams. .
- Managing our levels and use of MEG (Monoethylene Glycol), a gas conditioning agent used to saturate and swell lead yarn joints to reduce their propensity to leak gas.

Performance

MEG saturation has decreased from 17.68% to 14.83%. Following the first Covid-19 restrictions in March 2020, MEG filling and sampling was impacted in the following month when non-essential operations were stalled. As with last year, we are continuing to run an annual cost benefit analysis on all foggers on our network and by targeting investment in the most beneficial units and turning off those that are uneconomic, we are ensuring we operate a more efficient and cost-effective gas conditioning strategy. We have recently implemented a new route schedule to new sample points which we hope will improve our position going forward.

In 2020/21 we saw a small decrease in our average system pressure from 31.63 mbar to 31.61 mbar. Once again, having the ability to remotely control pressures in some of our biggest networks, we were able to prepare for some of the high demand days at short notice while still maintaining a leakage reduction. During the pandemic we've seen an increase in domestic demand but a reduction in industrial and commercial demand, but overall demand has remained largely in line with forecasted demand. The impact that Covid-19 would have on network pressures was largely unknown, but performance has shown a negligible impact. We have, however, seen some difficulties with lead times of replacement parts so this has impacted our ability to drive down pressures further.

Preparations are in place for our RIIO-GD2 strategy, which will be primarily focused on the continued renewal of aging control and monitoring equipment.

Output: Business Carbon Footprint (BCF) (excluding Shrinkage)

All GDNs are expected to reduce their BCF over time. No specific targets have been set for RIIO-GD1. However, our performance is compared with the other GDNs and published on an annual basis. The table below shows our performance over RIIO-GD1.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
NGN non-shrinkage BCF (Scope 1 and 2) - tCO2e	8,918	9,244	8,476	7,999	7,418	6,737	6,501	5,537
NGN non-shrinkage BCF (Scope 3) - tCO2e	12,821	16,298	15,287	13,135	14,409	15,095	15,793	15,150
NGN non-shrinkage Total BCF - tCO2e	21,739	25,542	23,763	21,135	21,827	21,832	22,294	20,687

Figure 10.16: Business Carbon Footprint

Our Scope 1 and 2 BCF (excluding shrinkage) has reduced by 37.9% between end 2013/14 and 2020/21, and by 14.8% between Years 7 and 8, a very strong performance.

During 2020/21 we saw a reduction in all areas of the BCF. This is partially as a result of business investments, as well as the COVID-19 pandemic. This led to temporary cessation of non-emergency work during spring/summer 2020 and employee home working throughout 2020/21. Notable changes to our BCF between 2019/20 and 2020/21 included:

- 34% reduction in business mileage emissions from cars as a result of driving almost 1.3 million fewer miles, interpreted to be predominantly associated with home working and effective use of videoconferencing technology.
- 19% reduction in emissions from gas use and 16% reduction from electricity use in our offices, depots, and infrastructure sites. Our offices and depots remained open throughout 2020/21, however homeworking for non-operational colleagues was adopted wherever possible. This resulted in reduced energy use at our premises, in addition to the savings from the building efficiency improvements we have made across our property portfolio throughout GD-1. It is of note that these savings will be offset to some degree by increased energy consumption at our colleague's homes during this period of homeworking.
- 1% reduction in emissions from PE pipe purchased, despite work non-emergency work being temporarily paused during 2020/21. Once works resumed they frequently focused on replacement of larger diameter pipes which have an inherently larger carbon footprint which, in addition to material stockpiling pre-Brexit later in 2020, offset some of the savings from the temporary pause in work activities.

Output: Statutory remediation of contaminated land

No specific targets have been set for statutory land remediation. During 2020/21 we continued our programme, with monitoring and maintenance works completed across 51 sites. This included desk top assessments at three sites, intrusive land contamination survey at one site, and environmental sampling at a further 11 sites to provide an updated assessment of the environmental risk and potential liability associated with each site. In addition, site inspections were completed at a further 36 former gasworks sites to ensure their conditions remain stable and their existing environmental risk assessments remain valid.

Despite the impacts of Covid-19, remediation projects were undertaken at two former gasworks sites during 2020/21 to reduce environmental risks to receptors at each site as detailed below:

- Ossett AGI, West Yorkshire: Removal of c.100 tonnes of contaminated soil (classified as hazardous waste) and c.3,000 litres of contaminated waters and coal tar from two discrete ground contamination

hotspots associated with the former tar tank and cyanide enriched spent oxide ('blue billy'). Excavations were reinstated with site clean materials and imported recycled aggregates to minimise natural resource use.

- Keswick AGI, Cumbria: Commencement of an 11-week remediation pilot trial to attempt recovery of viscous coal tar located with a below ground semi-circular former tar tank. The tank measures c.15m diameter and 2.3m deep, is infilled with rubble and contains water from 0.4m below ground level. The tank is located c.15m from a river in a wider urban area in this popular tourist town and had been identified to contain c.0.3m depth of coal tar in the tank base. The project was completed in May 2021 and successfully recovered c.10,000 litres of coal tar and contaminated waters, reducing the thickness of coal tar present in the tank to below measurable thicknesses. Further monitoring will be undertaken during 2021 to assess for any post-works rebound.

During 2020/21 we have continued two long term land remediation projects:

- Howdon Gas Holder Station: Deployment of our award winning innovative solar powered in-situ remediation system (as previously used by NGN at Redheugh Gas Holder Station) to recover toxic coal tar from the base of an infilled 9m deep, 38m diameter former gas holder tank. Between project commencement in February 2020 and March 2021, this project has recovered c.1250 litres of coal tar for safe disposal using only renewable energy. This project is continuing to operate into RIIO-GD2.
- Knottingley AGI: During 2017/18 we commenced a land remediation project involving installation of an in-situ remediation system to recover coal tar from the base of an infilled, approximately 4.5m deep, former gas holder tank located beneath live gas infrastructure. Between 2017/18 and 2020/21 c.1,550 litres of coal tar were recovered for safe disposal. The treatment system continues to operate in RIIO-GD2 and was shortlisted for the 'Sustainability Award' at the 2020 Ground Engineering Awards.

	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Number of sites where statutory remediation has been carried out	None	0	0	3	3	3	3	2	**2**
Number of sites monitored or maintained	None	0	40	54	79	46	39	72	**51**

Figure 10.17: Statutory remediation of contaminated land

Output: Use of virgin aggregate and amount of spoil to landfill

In 2020/21 we comfortably achieved our annual business target for excavation spoil to landfill, sending less than 0.1% of our excavation spoil to landfill. Our performance was 99% below our regulatory target and meant that we achieved our target for the fifth consecutive year. Between 2013/14 and 2020/21 the tonnage of spoil we have sent to landfill has reduced by approximately 99% - an excellent result.

Our tonnage of virgin aggregate used during 2020/21 was approximately 15% below our annual business target for this measure. This is the fourth consecutive year that we have achieved this target during RIIO GD-1. Between 2013/14 and 2020/21 our usage of virgin aggregate has reduced by approximately 61%.

Our use of virgin aggregate increased in 20/21 compared to 2019/20, by approximately 9% equating to an increase of 1,200 tonnes. This was predominantly due to a supply issues in Cumbria which meant low availability of approved recycled aggregate, additionally, our contractors are carrying out works which require the use of virgin aggregate from a stakeholder or engineering perspective (council requirement).

In comparison to other areas of the country, the Yorkshire Highway Authorities Utilities Committee (YHAUC) continues to impose comparatively stringent quality requirements which must be adhered to for recycled aggregate to be registered on their database and approved for use within the Yorkshire region for reinstatement. Consequently, only eight sites currently (as of June 2021) produce YHAUC approved recycled aggregate in the entire NGN network area. These sites are all located in the south and east of our Yorkshire network region. Collective lobbying by utilities, including NGN, has resulted in more producers becoming approved over time.

	NGN target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Use of virgin aggregate (t)	<17,000	37,862 (28.58%)	29,426 (23%)	33,553 (25.44%)	17,140 (12.56%)	14,321 (10.5%)	8,160 (6.1%)	13,505 (9.51%)	14,740 (11.16%)
Amount of spoil to landfill sites (t)	<13,000	61,555 (35.99%)	18,565 (10%)	17,311 (9.92%)	6,232 (3.23%)	308 (0.2%)	744 (0.4%)	120 (0.06%)	202 (0.00%)

Figure 10.18 : Use of virgin aggregate and amount of spoil to landfill sites

We have maintained contractor management procedures which were introduced in 2016/17, namely:

- Each contractor is individually challenged on their spoil and aggregate performance at the regular contract performance 1-2-1s held with NGN.
- Supporting our contractors to find local recycling centres to help them improve their own performance and assisting with their data reporting to ensure they are correctly classifying their spoil to landfill and virgin aggregate performance.
- Inclusion of spoil to landfill and virgin aggregate usage KPIs within contracts for mains replacement and reinstatement.

In addition to this, in recognition of the challenges faced in auditing the DSPs remotely across the past 2 years we will be automating the submission of data from DSPs in the coming months.

Output: ISO 14001 major non-conformities

During October 2020 our Environmental Management System was subject to an external annual surveillance audit against the ISO14001:2015 standard. No major non-conformities were identified.

	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
ISO14001 major non-conformities	None	0	0	0	0	0	0	0	0

Figure 10.19 : ISO 14001 major non-conformities

10.6. Social obligation outputs

The aims of the social obligation outputs are to help alleviate fuel poverty through extending the gas network, and to improve awareness of the risks from carbon monoxide. There is also a general output to play an active role in addressing wider social issues. These outputs all have an eight-year output target.

	Inferred Annual Target	20/21	GD1 Target	8 Year	RAG
Number of fuel poor network connections	1,917	859	14,500	15,621	G
Providing all emergency staff with upgraded detection equipment which will enable them to test for the presence of carbon monoxide and provide appropriate advice	-	Met	-	Met	G
Ongoing programme of activities to improve general customer awareness of the danger from carbon monoxide	See Below				-
Other social issues	See Below				-

Figure 10.20 : Social obligations outputs

We have achieved all outputs in this category over RIIO-GD1. We delivered 15,621 Fuel Poor connections over the price control, 1,121 more than target, an excellent result.

Off-gas communities – extensions and infills

We have continued to work with partner organisations, predominantly registered social landlords and local authorities, to support a workbook that provides 'whole house' solutions. This ensures that those who benefit from an assisted connection are also supported with effective in-house measures such as central heating and insulation. This continues to be successful, and we have now developed further relationships with more social and private landlords to extend our reach and delivery. We continue to advertise in collaboration with the other GDNs in the National Landlord Magazine, and sponsor the NEA publication, reaching out to energy champions nationwide. A key success is our ability to work with community-based organisations, to access those that could be considered hard to reach.

We have been able to install both central heating and gas supplies into 103 homes in Durham and Sunderland where the occupants have health conditions, worsened by living in cold homes. The results of this research project were very positive, and evidence was gathered around the benefits of living in a warmer environment, particularly for those with cold related ill health. This evidence was considered by Ofgem and health criteria is now part of the eligibility for GD2, in relation to FPNES.

Off-gas communities – rural

We have continued to support our 'Warm Hubs' scheme in remote rural areas with Community Action Northumberland (CAN). After 3 years support from NGN, the scheme now continues and is self-sustainable. Whilst our support for Warm Hubs is now "light touch" we have progressed a spin off project, a series of Pop Up Warm Hubs. This is an evolution of the Warm Hubs model and involves a 'mobile' session, (rather than a static, energy efficient building), which links into venues that already host events, such as employment hubs and food banks. Pop Up's are focussed around using slow cookers as a cheap method of using nutritional food to prepare a hearty meal. The messaging associated with this model is energy efficiency e.g. the cost of a slow cooker is c7p per hour. This model has been tested for two years with great success and we are currently awaiting a proposal from CAN which will support rolling this model out across all the GDN's.

Energy Challenges

Recognising that fuel poverty and energy efficiency go hand in hand, we have undertaken work to test several activities;

Green Doctors, a jointly funded initiative with NPG was extended for another two years, now into its third year and this service will continue into GD2. In addition to previous switching/energy efficiency initiatives, we have funded the establishment of further services to cover more remote/rural areas. In 2019/20 we jointly developed an accredited (BPEC) one day fuel poverty / energy efficiency course. This has been very successful and is targeted at front line workers/trusted intermediaries who go into the properties of customers living in vulnerable situations. This training is also being extended into GD2.

Yorkshire Energy Doctor in September 2019, a two-year contract was established to promote energy efficiency/switching/PSR/CO awareness. Community Energy Ambassadors were trained to work within their communities to promote the areas mentioned. As a result of the pandemic, this training was switched to being online, which has proven to be very successful. Delegates can now attend from across the whole of NGN's geographical footprint as the sessions are delivered on Zoom

Support for Durham County Council - we have supported and funded a role with DCC to work with people in the Durham area to promote CO awareness, WHD, fuel switching and provision of energy advice. This has proven to be very successful, despite the pandemic and DCC have now created a role which they will now be funding themselves.

Making Every Contact Count - a NIA funded project whereby we recognise the challenge when vulnerable customers are disconnected. The aim of this project was to provide further support when a disconnection occurred and refer on when possible. The results from this work were very positive and as a result we now plan for GD2 to embed this across all our network as a BAU process. This will enable additional support to be offered to vulnerable customers. Currently three out of our nine geographical patches have completed the training.

Output: Carbon monoxide detection and awareness

Under this output measure we are committed to improving awareness of the dangers from carbon monoxide (CO). We continue to provide CO alarms for vulnerable customers but prefer to promote through education wherever possible. Additionally, we have an ongoing programme of activities to improve general customer awareness of CO and its dangers. This includes:

- A CO Poster competition – following the running of a CO poster competition via charity CO-Gas Safe with the other GDNs, we have expanded the competition in our own network, and continue to support the competition;
- Training an Army – we have continued to offer further formal training related to CO (BPEC accredited) and in 2019/20 we trained Fire and Rescue Services, Durham CC and a range of local community groups. As these are trusted intermediaries, they can access properties and hard to reach customers that NGN can't and can therefore pass on the key CO safety messages; and
- Safety Seymour - developed within Cadent and shared as part of collaboration with other GDNs. We continue to deliver the schools training, targeting schools in areas of most need. During the pandemic, more resources were created to be accessed online and a bespoke Safety Seymour website was also created.

In collaboration with other GDNS, we have also undertaken the following promotions;

- Billboard advertising – a national campaign across all GDNs promoting CO awareness on main routes into cities across the UK;
- Bounty Pack promotion – raising the profile of CO with expectant mothers through info provided during pregnancy; and
- Support for the All-Party Parliamentary CO Group (APPCOG) in their profile raising and research into a range of CO related matters.

Addressing Related Social Challenges

A helping hand for our customers

Building on our previous high-level strategy and recognising that some of our customers need extra help, across the following areas;

- Those living with physical challenges;
- Those living with mental health challenges;
- Those that are temporarily vulnerable;
- Those with limited access to services from living in rural areas; and
- Those in financial hardship

We have further developed and now work to our "Customer in Vulnerable Situations Strategy". Building on our vulnerability themes, we have built targets around key activities to provide greater clarity and focus.

In Jan 2019 we invited BSI to assess our inclusive services provisions and were delighted to be accredited against BSI 18477 Inclusive services standard. Delayed by COVID 19, our reassessment against the standard took place in July 2020, which we retained and then again in January 2021, which again retained. However, we remain committed to meeting and where possible exceeding the standard.

Community Partnering Fund

We continue to work in partnership with 'trusted intermediaries', and have continued our Community Partnering Fund, jointly with Northern PowerGrid. This has doubled the fund to £100k, and previously provided two application rounds per year. This was changed to one round per year from Summer 2021. The fund continues to encourage community groups to bid for funding (between £1-£10k) for projects that support our key areas of;

- Fuel poverty/energy efficiency;
- Priority Services Register;
- Carbon Monoxide awareness; and
- STEM (Science, Technology, Engineering and Maths)

In light of the pandemic and in response to stakeholder feedback, a fifth theme was introduced in Autumn 2020 around 'CV-19 Response / Community Resilience'.

10.7. Connections outputs

The aim of the seven primary connections output measures is to ensure that NGN provides an efficient and effective service to customers wanting to connect to the gas network.

Our RIIO-GD1 output 2020internal targets for connections are significantly higher than the obligations required by our Licence, reflecting our aim to provide a best in class service. The table below provides details of our performance this year. Commentary about our performance can be found in Section 8.4.

One Year Outputs	RIIO annual NGN stretched targets	20/21	RAG
% of standard connection quotes issued in 6 working days	99.6%	98.88%	A
% of non-standard connection quotes below 275kwh issued in 11 working days	99.6%	98.55%	A
% of non-standard connection quotes above 275kwh issued in 21 working days	99.6%	98.78%	A
% of land enquiries where response sent within 5 working days	99.6%	98.55%	A
% of commencement and completion dates for connections below 275 kwh provided within 20 working days	99.6%	98.66%	A
% of commencement and completion dates for connections above 275 kwh provided within 20 working days	100%	100%	G
% of connection jobs substantially completed on date agreed with customer	95%	97.10%	G

Figure 10.21 : Connections outputs

We have had another strong year in Connections and are significantly above the Ofgem guaranteed standards of 90%. Our NGN stretched targets saw a drop in performance this year, likely as a result of Covid-19. Five out of our seven targets were missed, but only very marginally.

11. Performance improvement and efficiencies

This section details our approach to performance improvement, and how we have used this to both drive efficiencies and meet our output targets.

11.1. Real Price Effects (RPEs)

Forecast real price effects were built into our base allowances. For labour – around 60% of our costs – forecast RPEs were based on independent forecasts for wage growth over the short term. This indicated negative real wage growth in the first year of RIIO reverting to the long term trend of 1.3% per annum from 2014/15 onwards.

Labour RPEs	Assumption RPE	Retail Price Index	Actual labour wage change	Actual RPE
2012/13	(0.8%)	3.1%	2.7%	(0.4%)
2013/14	(0.2%)	2.9%	2.9%	0.0%
2014/15	1.3%	2.0%	2.7%	0.7%
2015/16	1.3%	1.1%	2.7%	1.6%
2016/17	1.3%	2.1%	2.7%	0.6%
2017/18	1.3%	3.7%	3.4%	(0.3%)
2018/19	1.3%	3.1%	3.2%	0.1%
2019/20	1.3%	3.1%	2.4%	(0.7%)
2020/21	**1.3%**	**1.5%**	**1.5%**	**0%**

Figure 11.1 : Labour RPEs

From 2013/14 to 2016/17 our average wage settlement was 2.7%, which then increased to 3.4% in 2017/18; the average in 2018/19 was 3.2%.

For 2020 we applied an average of 2.4% to our colleagues on personal contracts and 2.8% for those on collectively bargained arrangements. Our 2021 pay deal was agreed at 1.5% for all colleagues.

Outside of pay settlements we incentivise our staff and look to drive productivity improvements using other methods to get best value. Examples include:

- We continue to use a number of process specific incentive schemes. These are designed to incentivise colleagues to deliver excellent customer service, adopting a culture of safety first, ensuring that work is undertaken in the most efficient way possible and that all records are accurately maintained at the end of each piece of work;
- We have also introduced other recognition processes to drive positive behaviours, most recently a recognition package to reward 'safe days' across the network;
- In 2020, the Totex Site Manager Incentive scheme paid out a bonus for the recognising efficiency, performance and customer service; and
- Colleagues within corporate / central functions are generally all retained on personal contracts. This allows us to incentivise them, setting specific personal objectives and achievements recognised with an annual bonus. This methodology keeps base salary levels at a reasonable level and provides us with the flexibility

to reward performance on an annual basis, thereby not increasing the overall salary bill on an enduring basis.

Non-labour RPEs

For the RIIO-GD1 allowances, RPEs for Capex and Repex materials were assumed to have a positive change of 1.7% from 2013/14 onwards. This means that material costs were assumed to increase more than inflation year on year. Capex and Repex material costs comprise less than 10% of our total costs.

This assumption was based on an unweighted average of PAFI indices for steel works, plastic pipes and copper piping. Our PE pipes and fittings are currently dictated by a variety of indices such as PIEWEB, LEBA, ICIS and Oanda, which monitor fluctuations in Power, Polymer and Copper markets.

In 2016/17 we undertook a full tender event and new contracts commenced in January 2017. The tender lead to an overall cost decrease of 10%, which was linked to metal commodity prices which impacted on electrofusion fittings, which saw a c35% reduction. PE pipe costs remained constant. The price review mechanism has remained the same. Contracts were awarded for a period of 3 years with options to extend for a further 5 x 1-year extensions.

Year	Pipe	EF Fittings	Other Fittings
2018	2.05%	2.60%	2.09%
2018	3.92%	2.51%	2.47%
2019	2.84%	1.02%	1.76%
2019	-6.33%	-3.86%	-3.86%
2020	-2.66%	-1.97%	-1.76%
2020	-7.94%	-5.75%	-5.28%
2021	-0.91%	3.45%	1.66%
2021	22.40%	17.80%	15.49%
Overall movement	**13.38%**	**15.80%**	**12.56%**

Figure 11.2 Non – Labour RPEs

In 2018/19 we saw one contractual price review which saw an increase of 3.4% on PE Pipe and 0.74% on Electrofusion Fittings.

Following two years of falling polymer prices, 2021 has seen significant increases in polymer rates due to a number of factors affecting both supply (US plant closures due to extreme weather, European plant closures) and demand (plastics diverted to healthcare sector due to Covid 19, surge in product demand following re-opening of economies post-lockdown). The result of which has been a 15-22% increase on PE pipe and fittings following the latest price review.

Northern Gas Networks
1100 Century Way, Thorpe Park
@NGNgas
/northerngasnetworks

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