Northern Gas Networks

RIIO – GD1 Year 7 Report

July 2020

Northern Gas Networks

we are the network

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A. CEO and Board update

1. Chief Executive Officer's Report

This report sets out the details of our performance in 2019/20 and represents 'Year 7' of the eight-year RIIO-GD1 Regulatory Period that comes to an end in 2020/21. 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. It is through our continued focus on doing the right thing for our customers, our colleagues and the communities that we serve that we can again report that we are firmly on-track to deliver against this objective.

It is important to us that we can clearly illustrate our performance and in particular, how we measure up against our peers both within the gas industry but also in the wider economy. And I am delighted to be able to report that again for a range of key measures we are at the forefront of performance.

Mark Horsley, CEO, Northern Gas Networks

- As measured by Ofgem, ***we remain the most efficient GDN in the country***. This means that we deliver our services at the lowest overall cost so that our customers can be sure that they are receiving the best value for money. We continue to strive for ways in which we can continue to cut the costs of providing our services and seek out new and innovative ways of running our business in both the short and longer term. We have maintained this frontier position since 2013.

- In 2019/20 we outperformed the Totex allowance by 38.81m and £247.3m over the seven years of RIIO-GD1. This will result in £89m being returned directly to customers in the form of lower network charges relating to this seven-year period.

- We have again ***delivered and in many cases exceeded all of the output targets*** set by the Regulator for the eight-year period since 2013. We are one of a small number of companies to deliver on these commitments. We have always strived wherever possible to go above and beyond these targets where this is supported by customers. We have introduced additional and enhanced voluntary targets throughout the period that further extend the value we are delivering.

- It is vitally important to us that we understand how customers rate their experiences of the services we provide and their interactions with us. Independent assessment and measurement show that we are ***achieving customer satisfaction scores in excess of 9 out of 10***. This level of performance places NGN ahead of leading companies such as Amazon, eBay, John Lewis and Marks & Spencer.

- Engaging effectively with our wider stakeholders and acting directly on this feedback has proven key to driving levels of performance across the business whilst also focussing on those areas that are of the greatest importance. The effectiveness of our stakeholder engagement activities is assessed annually by a panel of independent experts, chaired by Ofgem. This year's assessment placed ***NGN as the highest ranking GDN*** and second overall in the energy sector.

- Decarbonising the UK economy and reaching our shared goal of achieving Net-Zero carbon emissions by 2050 remains a significant challenge for the UK. We at NGN are playing our part in identifying and delivering the lowest cost pathway to that target. We are increasing the amount of low carbon Biomethane Gas injected into our network each year and are ***continuing with our ground-breaking research and trialling of projects that look at replacing natural gas with hydrogen***. I am very pleased with the significant progress being made across the industry, working collaboratively with Ofgem and the government on this objective.

- We continue to consider very seriously the impact of our own operations on the environment and I am delighted to see continued significant progress in our efforts to reduce our impact on the wider environment.

Looking Ahead

The challenges for NGN and the wider energy sector are significant. Achieving the objective of further reductions to customer bills, delivering higher levels of service alongside the significant investment required to deliver Net Zero by 2050 presents a very challenging conundrum.

However, I believe that NGN are well placed to meet these challenges head-on. We submitted our proposed Business Plan to Ofgem in December 2019 that set out how these often-conflicting objectives can be achieved. Our proposals represented the lowest cost pathway that would deliver on these objectives. And a fair balance between all stakeholders in both the short and longer term.

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.

I am pleased that NGN has again met all the output targets agreed as part of the RIIO-GD1 price control. During 2019/20 we continued to demonstrate strong customer, safety, reliability and environmental performance.

Andrew Hunter, Chairman, Northern Gas Networks.

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.

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.

Northern Gas Networks
Outputs

Northern Gas Networks
Financials

Regulatory Asset Value
Opening value - £2212m
Closing value - £2283m

Total Annual Revenue
£437m

Customer Bill Impact

Average of £136

Innovation
Funding awarded in 2019/20
NIA - £2.9m
NIC - £3.2m

RoRE

19/20	RIIO
11.3%	11.0%

TOTEX Incentive	£m 19/20	RIIO
Actual	233	1960
Adjusted allowances	274	2241
Outperformance	38.8	247.3
Outperformance %	15.1%	12.5%
Return to customers	13.9	89

Other Incentives	£m 19/20	RIIO
Customer Service	2.2	17.8
Shrinkage	0.5	5.9
Leakage	4.7	33.7
Exit Capacity	1.0	10.9
Total	**8.4**	**68.3**

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		**894.3**	**451.8**	**904.3**	**2184.6**	
Efficiency	Efficiency	(72.2)	(146.1)	(326.8)	-15%	(15%)
Land Remediation	External factors			(2.2)	0%	0%
Weather impact	External factors			(15.7)	-1%	(1%)
Maintenance workload	Price control assumption			26.6	1%	1%
Interruptions	Efficiency			(35.7)	-2%	(2%)
Xoserve	External factors			(6.7)	0%	0%
Connections workload	External factors	(17.3)		(17.2)	-1%	(1%)
Connections efficiency	Efficiency	18.5		18.2	1%	1%
Fuel Poor workload	External factors	2.7		2.7	0%	0%
Fuel poor allowance	Price control assumption	10.8		10.5	0%	0%
Reinforcement workload	Efficiency, External factors	(20.6)		(15.8)	-1%	(1%)
Governors workload	Price control assumption	3.9		5.2	0%	0%
IT and Building investment	Price control assumption	70.0		67.3	3%	3%
Unforeseen Capex	External Factors	10		10	0%	0%
Risers and Subdeducts	Price control assumption		(11.5)	(11.2)	-1%	(1)%
Repex Transfers	External factors		(3.3)	(4.0)	0%	0%
Steel workload	Price control assumption		10.7	10	0%	0%
Other Mains Workload	Price control assumption		34.2	34.3	2%	2%
Non Recurring		(3.5)			-3.4	0%
Actuals		**714.4**	**457.6**	**788.4**	**1930.7**	**88%**

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 applies for the eight year period from 1 April 2013 to 31 March 2021 and is referred to as RIIO-GD1. We have now successfully completed the sixth year of operations under RIIO and are well on the way to delivering the key outputs and deliverables we committed to in our business plan and when accepting the outcome of the price control. 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 are looking to maintain 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, cumulative and forecast 8 year RORE:

RORE	13/14	14/15	15/16	16/17	17/18	18/19	19/20	RIIO to date		RIIO 8 year forecast
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%	3.0%		3.0%
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%	0.4%		0.4%
Shrinkage	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%		0.1%
Environmental Emissions	0.3%	0.4%	0.4%	0.6%	0.5%	0.5%	0.5%	0.4%		0.5%
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%	0.2%		0.1%
Network Innovation	0.0%	-0.1%	-0.2%	-0.1%	-0.1%	-0.1%	0.0%	-0.1%		-0.1%
Penalties and Fines	0.0%	0.0%	-0.02%	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%**	**11.1%**		**11.0%**
Debt Performance (notional gearing)	4.2%	1.9%	-0.1%	1.8%	4.6%	2.9%	1.9%	2.5%		2.1%
Tax performance (notional gearing)	-1.3%	-1.3%	-0.6%	1.5%	0.0%	0.6%	0.8%	0.0%		0.1%
RoRE – including Finance and Tax	**14.3%**	**11.5%**	**10.8%**	**15.1%**	**15.5%**	**13.6%**	**14.0%**	**13.6%**		**13.2%**

Figure 5.1: RORE breakdown

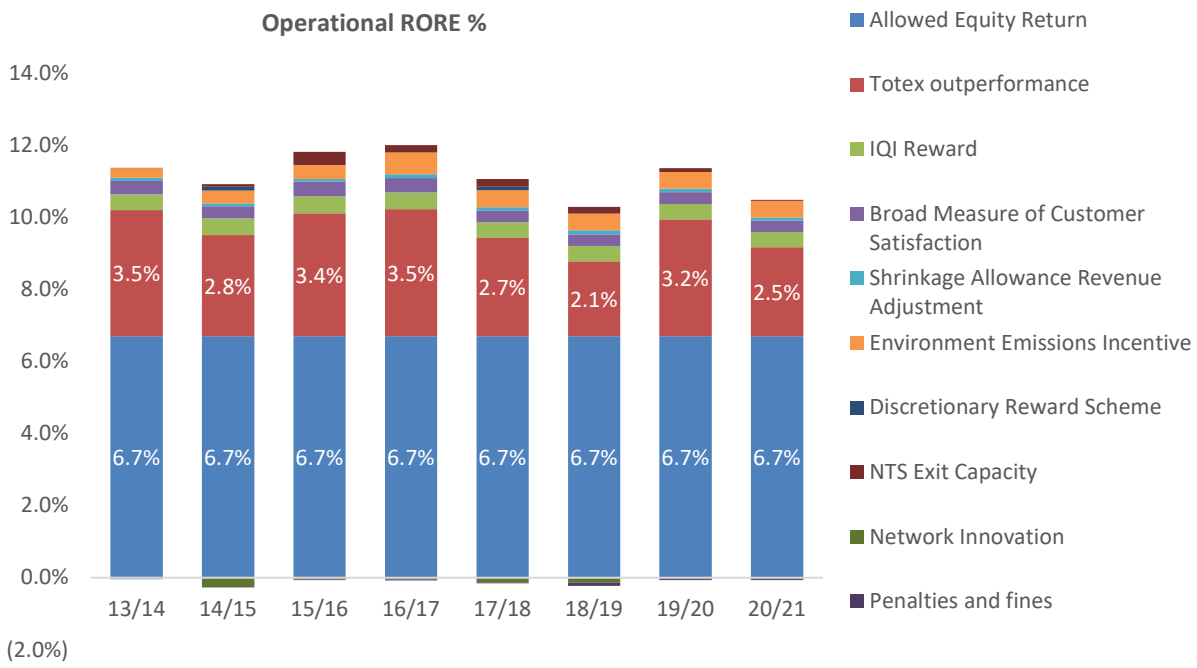


Figure 5.2: Operational RoRE Graph

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 any outperformance through lower bills.

Totex forecasts 2019/20 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	Total	Allowed	Variance
Opex	93.0	95.3	89.7	90.2	87.9	84.3	83.6	90.4	714.4	**884.0**	**(169.6)**
Capex	46.4	55.0	68.3	64.7	55.4	61.2	50.9	57.1	459.1	**449.7**	**9.3**
Repex	101.9	106.9	96.4	93.6	96.3	98.7	98.2	94.5	786.6	**904.3**	**(117.7)**
Totex	**241.4**	**257.2**	**254.4**	**248.5**	**239.6**	**244.2**	**232.7**	**242.1**	**1,960.1**	**2,241.1**	
Allowance	**280.9**	**289.1**	**293.4**	**289.4**	**271.8**	**269.2**	**271.5**	**272.8**	**2,238.1**		
Variance	**(39.6)**	**(31.9)**	**(39.0)**	**(40.9)**	**(32.2)**	**(25.0)**	**(38.7)**	**(30.7)**	**(277.9)**		
Cumulative Variance	**(39.6)**	**(71.5)**	**(110.4)**	**(151.3)**	**(183.5)**	**(208.5)**	**(247.3)**	**(277.9)**			

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 whole RIIO-GD1 period.

Opex forecasts 2019/20 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	TOTAL
Work management	15.4	17.9	19.6	20.1	16.8	14.9	14.9	15.0	134.7
Emergency	11.3	11.6	11.5	11.3	11.5	10.8	10.0	11.2	89.4
Repair	18.9	17.0	15.1	14.7	15.6	16.5	16.3	16.5	130.5
Maintenance	9.6	10.6	11.0	11.1	11.5	12.3	12.7	14.9	93.7
SIUs	-	-	-	-	-	-		0.0	-
Other direct activities	7.8	7.7	7.2	7.2	6.2	5.9	5.1	5.4	52.5
Of which Xoserve	4.4	4.8	4.8	4.2	3.5	2.6	2.3	2.5	29.
Total direct Opex	**63.0**	**64.8**	**64.6**	**64.3**	**61.6**	**60.4**	**59.1**	**63.0**	**500.8**
Business support	27.2	27.8	23.1	23.7	24.4	21.8	21.9	23.7	193.7
Training/apprentices	2.8	2.7	2.0	2.1	1.8	2.1	2.6	3.8	20.0
Total indirect Opex	**30.0**	**30.5**	**25.1**	**25.9**	**26.3**	**23.8**	**24.6**	**27.5**	**213.6**
Total controllable Opex	**93.0**	**95.3**	**89.7**	**90.2**	**87.9**	**84.3**	**83.6**	**90.4**	**714.4**
Allowance	**111.8**	**113.0**	**113.7**	**113.9**	**109.8**	**108.6**	**107.4**	**105.8**	**884.0**
Variance	**-18.8**	**-17.7**	**-24.0**	**-23.7**	**-21.9**	**-24.3**	**-23.8**	**-15.4**	**-169.6**
Cumulative Variance	-18.5	-36.5	-60.5	-84.2	-106.1	-130.4	-154.2	-169.6	

Figure 5.4: Opex forecasts

To date we are outperforming the controllable Opex allowances by £154.2m (19.8%), generating an average RORE of 2% p.a. We expect to continue outperforming the reducing Opex allowance, delivering a total outperformance over RIIO-GD1 of c£179.9m or c20%, and a RORE of 2%.

There are several key drivers for our strong performance against the 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£129.7m out of c£179.9m, or £16.1m 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.

So far, we have c600 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 £6.5m of benefits each year in Totex, with the majority (over £4.5m) being realised in our Emergency, Repair and Maintenance activities in Opex. This will continue to increase over time, and we will continue to invest in new ways of working to deliver further benefits across all activities.

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 nearly £6m over the last three years through the refresh of our service contracts 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 replacing 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£18.9m when compared to allowance.

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

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 actually 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. This increase in workload had a knock on impact on repair costs which increased by nearly £1m. 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.

All this shows that severe weather throughout the year is now becoming more prevalent. 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. This ensure that we minimise the risk of losing supplies during these difficult periods.

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£36.5m p.a.
Our maintenance workload has consistently been above the benchmarked workload allowed within the allowances but has been broadly consistent with the workload we forecast to deliver in RIIO-GD1.
We estimate this price control assumption is driving an £19.2m overspend against the allowance over the 8 year period.
In addition, we expect to increase our maintenance activities from now and into RIIO-GD2. This is a strategic change as we have invested significantly in Capex to replace and upgrade our riskier and more problematic assets. We plan to intervene on more of our assets in future through increased maintenance rather than undertaking full asset replacement. This is reflected in our forecast.

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

- We estimate Land Remediation costs to be £2.2m 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 £7.4m 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 to date and expect to continue to do so over the remainder of RIIO-GD1. Highlights of our performance this year include:

- We achieved a near 100% response rate for both the 1 and 2 hour emergency response standards for the sixth year in a row, significantly outperforming the 97% target. There was a very small increase in both compared to previous years;
- Our Annual Repair Risk score was 21.6m, well below the target of 34.5m;
- We completed 64.3% of repairs within 12 hours against a target of 61.5%. This is a strong result, though we have seen a small decrease since last year, reflecting the increased complexity of some of the work;
- We saw 12,110 unplanned interruptions this year, below the annualised target of 12,960. The duration was also below target at 5.1 million minutes. Cumulatively we are ahead of the targets for both the number and duration of unplanned interruptions. It is important to remember that whereas we would expect the number of planned 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;
- We delivered a very strong customer service performance, scoring 9.5 out of 10 on our customer satisfaction surveys for unplanned works, so even when customers had an unplanned interruption, we dealt with it well; and
- We are also targeted with decommissioning 23 gas holders over RIIO-GD1. We on track to deliver this target, having fully demolished 20 and partially demolished another 2. These will be completed in 2020/21 with the one remaining holder.

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 19/20 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	Total	Allowed
LTS, storage and entry	10.2	17.0	22.3	16.4	12.0	16.1	7.3	14.4	115.8	136.4
Connections	7.5	7.7	11.1	9.7	10.6	10.6	9.6	8.5	75.3	62.3
Mains Reinforcemen	3.3	2.0	3.6	2.4	2.3	2.4	4.0	9.0	29.0	43.2
Governors replacement	2.4	1.6	2.0	1.8	1.5	2.7	1.9	2.9	16.8	14.6
Other Capex	23.0	26.7	29.4	34.4	28.9	29.4	28.0	22.3	222.2	193.2
Of which IT	6.1	5.5	6.8	17.6	14.9	24.0	16.8	12.7	104.4	49.1
Of which vehicles	4.5	5.1	3.1	2.8	3.4	0.4	1.3	2.9	23.4	32.2
Total	**46.4**	**55.0**	**68.3**	**64.7**	**55.4**	**61.2**	**50.9**	**57.1**	**459.1**	449.7
Allowance	59.4	64.0	68.2	63.5	48.3	48.7	48.4	49.1	449.7	
Variance	**(13.0)**	**(9.0)**	**0.1**	**1.2**	**7.1**	**12.6**	**2.4**	**8.0**	**9.3**	
Cumulative	**(13.0)**	**(22.0)**	**(21.9)**	**(20.8)**	**(13.7)**	**(1.1)**	**1.3**	**9.3**		

Figure 5.6: Capex forecasts compared to the allowance

To date we are investing in line with the cumulative Capex allowance, and hence are generating no RORE benefit. We plan to continue investing significantly in the last year of RIIO-GD1 and expect to spend £5.8m over the cumulative allowance over the price control period. This will have a negative impact on RORE of c0.1%.

This continuing 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 may increase costs by c£10m over RIIO-GD1.

We expect our connections costs to be c£12.8m over the allowance over RIIO-GD1. We have seen a significant decrease in workload due to changes in the connections marketplace and general demand levels for new gas connections. We estimate these external economic factors will decrease costs over RIIO by c£17.3m or £2.2m p.a. This will be partially offset by an increase in Fuel Poor connections. Our aspiration has always been to exceed our target. We previously agreed a new target with Ofgem of 14,500 fuel poor connections. During 2019/20 we exceeded the RIIO 8 year target of 14,500, successfully completing 1,933 fuel poor connections to take us to 14,782 in total. We now forecast we will achieve in the region of 16,000 fuel poor connections over RIIO-GD1. This will increase costs by c£2.7m 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 net costs we estimate to spend £18.5m more than the allowance over RIIO, or £2.3m 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 £10.8m impact over RIIO.

We have also seen a significant reduction in reinforcement workload so far in RIIO – 56.9km of main compared to an allowance of 123.7km. 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 2019/20 and do 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. This is the main driver for our reinforcement forecast increasing in the final year of RIIO. However, we still expect workload over RIIO to be c73km against an allowed workload of c140km, with a cost impact of c£20.6m.

On the non-network side, we expect to invest c£104m in IT and c£16m in our depot and office infrastructure over RIIO. This is c£70m in excess of the eight year allowance and will deliver 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 and will continue to invest in all our assets and fully expect to deliver the asset health improvements we committed to in our business plan by the end of RIIO. In addition:

- We have continued to invest in our key above 7 bar assets in order to deliver against the asset utilisation and capacity output targets which is on target to be delivered by the end of RIIO-GD1;
- We have now delivered the 14,500 new fuel poor connections we committed to following Ofgem's review of the fuel poor extension scheme, having delivered over c14,700 connections so far. We are now targeting to achieve 16,000 connections over RIIO;
- Our Connections GSOS performance is excellent with all measures well above the 90% minimum standard; and
- Our Connections Customer Survey results increased slightly, achieving 9.05 out of 10 this year, a very strong position. In the second half of 2018/19 we looked to improve by setting stricter internal service level lead times for connections customers, stricter timescales for reinstatement work, and providing in depth customer training for all customer facing colleagues in the connections process. These have had an ongoing impact.

5.2.3. Repex Financial and output performance

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

Repex forecasts 19/20 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
HSE driven mains and services	74.4	81.1	72.5	73.9	70.1	72.0	69.5	68.0	581.5
Non-HSE driven mains and services	27.4	25.8	23.9	19.7	26.1	26.7	28.7	26.5	204.8
Risers	0.1	0.0	0.0	-	0.1	0.0	0.0	0.1	0.4
Repex totals	**101.9**	**106.9**	**96.4**	**93.6**	**96.3**	**98.7**	**98.2**	**94.5**	**786.6**
Allowance	109.8	112.0	111.4	112.0	113.7	112.0	115.6	117.8	904.3
Variance	**(7.9)**	**(5.1)**	**(15.0)**	**(18.4)**	**(17.4)**	**(13.2)**	**(17.4)**	**(23.3)**	**(117.7)**
Cumulative	**(7.9)**	**(13.0)**	**(28.0)**	**(46.4)**	**(63.8)**	**(77.0)**	**(94.4)**	**(117.7)**	

Figure 5.7: Repex forecasts

To date we are outperforming the Repex allowances by £94.4m (12.0%), generating an average RORE of 1% p.a. We expect to deliver further efficiency benefits, improving outperformance to 13.0% by the end of RIIO-GD1, and increasing RORE to 1.1%.

Repex workload and cost impact

We expect to deliver significantly more workload within this forecast 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	437.9	3,690.3	3,584.0
Tier 1 – customer funded	15.4	1.8	2.1	2.9	1.9	2.0	2.2	1.6	2.1	16.6	122.9
Tier 2a	7.7	8.8	7.6	5.3	4.1	7.9	3.8	9.5	15.0	62.0	62.0
Tier 2b	20.4	22.1	18.3	12.2	12.4	24.7	26.8	23.0	24.0	163.5	163.5
Tier 3	5	7.4	5.7	3.9	4.3	2.4	4.5	8.1	3.7	40.0	40.0
Iron mains	**496.5**	**485.4**	**521.5**	**464.2**	**475.5**	**516.4**	**529.0**	**497.6**	**482.8**	**3,972.4**	**3,972.4**
Iron > 30m	-	8.7	9.3	11.4	10.8	2.7	7.3	5.5	7.1	62.9	-
Steel	48.7	57.6	75.6	45.9	59.5	59.6	58.6	58.1	60.0	475.0	389.8
Other	-	10.4	10.7	8.6	8.6	13.3	8.1	7.0	7.2	73.9	-
Total	**545.2**	**562.1**	**617.1**	**530.1**	**554.4**	**592.0**	**603.0**	**568.2**	**557.2**	**4,584.2**	**4,362.2**

Figure 5.8: Mains abandoned

One of the major outputs associated with Repex is the length of iron mains abandoned over the eight year price control. To date we have abandoned 3,489.6km of iron main, 13.8km ahead of the inferred target. This target included an assumed 107.8km of Tier 1 iron mains work delivered from customer driven rechargeable diversions. Actual volumes have been much lower at c14.5km. We are expected to fund this shortfall.

We are delivering more work than is funded in other areas as well:

- We forecast we will abandon over 60km 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 have abandoned 415.0km of steel to date, 74.1km ahead of the inferred 7 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. We expect this to continue and to abandon 475km over RIIO-GD1, nearly 90km over the allowed volume; and
- Other – we have abandoned 66.7km of other materials mains to date and expect to abandon 73.9km over RIIO-GD1. There is no allowed target for this type of work.

We expect this material increase in workload to drive up costs over the 8 year price control. We estimate the combined increase to be c£45m, £10m related to steel, £35m related to iron over 30m and other mains.

Repex efficiencies

Despite this material increase in workload, we expect to continue our outperformance against the 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£146m efficiency outperformance against the £904m allowance (16.6%) more than offsetting the increase in workload detailed above. This equates to c£18.2m 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 reviewing 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.

Other Repex outputs

We continue to perform strongly against the other outputs associated with the Repex programme:

- Risk removed is the main driver for the Repex programme, and we continue to target pipes with the highest risk score. Total risk removed was 20,268 this year which gives a cumulative total of 206,130 which means we are now 85% ahead of the eight year RIIO target of 111,191. This is an excellent result as we now have a significantly safer network;
- We are c5% behind the cumulative target for the number of services replaced. This is 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 have seen so far in RIIO-GD1;
- We delivered a very strong customer service performance, scoring 8.9 out of 10 on our customer satisfaction surveys. Following stakeholder and customer feedback, we have introduced bespoke webpages for each of our replacement schemes, which are kept up to date with live information on useful customer information such as road closures, duration, and gas-on times. We are also continuing to use Roadworks.Org, and more recently have customised this tool to provide better information to road users visiting this website;
- 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. Other Outputs highlights

Not all of our outputs are directly related to costs or have a specific incentive attached. In particular we are expected to deliver further outputs in relation to social obligations and the environment. Highlights this year include:

- We have maintained compliance with the Control of Major Accident Hazards Regulations (COMAH) and the Gas Safety (Management) Regulations (GS(M)R);
- We continue to operate and develop the network to meet our 1 in 20 planning standard;
- We are outperforming all of our Network Reliability outputs related to offtake meter errors, telemetered faults, and Pressure Systems Safety Regulations (PSSR) faults;
- We have continued to promote and support new biomethane connections to our network and currently have 8 new sites connected to our network;
- In 2019/20 we comfortably achieved our annual business target for excavation spoil to landfill, sending less than 0.1% of our excavation spoil to landfill. Our tonnage of virgin aggregate used during 2019/20 was approximately 20% below our annual business target for this measure.
- We reduced our business carbon footprint (excluding shrinkage) by 37% between end 2013/14 and end 2019/20, and by 3.5% between Years 6 and 7, whilst continuing to improve data capture across our contractor base to more fully understand performance; and
- We have worked continuously to deliver many and varied social schemes as part of our 'community promises' scheme.

The following section provides further details of our performance against those outputs that are directly related to incentives – shrinkage and leakage, the complaints metric, overall customer service and stakeholder engagement, and NTS exit capacity bookings.

5.4. Incentives – RORE impact

The table below details the actual incentive income earned in the first seven years of RIIO-GD1 together with a forecast for the final year. To date we have earned average incentive income per year of £10.0m and expect to earn an average of £9.9m over the eight years of RIIO.

19/20 Prices (£m)	Actuals (Earned)							FC	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	2.1	2.2	2.2	2.2	17.8	2.2
Stakeholder Engagement	1.3	0.7	1.3	1.4	0.9	0.8	1.3	1.0	8.7	1.1
Complaints Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrinkage & Environmental Emissions	3.6	3.9	4.1	6.5	5.2	5.4	5.3	5.7	39.7	5.0
NTS Exit Capacity	0.0	0.7	3.3	1.8	2.0	1.8	1.0	0.2	10.9	1.4
RIIO – DRS	0.0	0.9	0.0	0.0	1.0	0.0	0.0	0.0	1.9	0.2
Total RIIO-GD1	**7.0**	**8.6**	**11.1**	**12.1**	**11.2**	**10.2**	**9.7**	**9.1**	**78.9**	**9.9**

Figure 5.9 : 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 here have been consistently very strong here, and overall have delivered an incentive of £2.2m and a RORE impact of 0.4%. We are targeting to sustain and improve on this strong performance and continue in our pursuit to deliver the best possible experience for our customers.

Customer Service

We have continued to deliver a very strong performance in our customer service outputs. We achieved an average score of 9.15 across the three customer satisfaction survey areas, a strong performance and an improvement from last year's average score of 9.09.

The main reason for the improved overall performance was an increase in our Connections score, which increased from 8.93 to 9.05. We are addressed the specific points that have caused this decrease by setting stricter internal service level lead times for connections customers, stricter timescales for reinstatement work, and providing in depth customer training for all customer facing colleagues in the connections process.

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

This year we have achieved a weighted complaint score of 2.5 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 is an improvement on last year's score of 2.9. 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. We have been working hard to make improvements in both these areas. We have continued to hold our daily complaints call but introduced an improvement to this by using one of the daily calls to focus on resolution for complaints over 1 day old. This has helped to improve our performance for D+31 complaints. We have also introduced a jeopardy report that focusses on open complaints approaching D+10 and D+20. Finally, our robust quality checks ensure that repeat complaints are kept to a minimum. We continue to have had no Ombudsman findings against NGN for RIIO-GD1.

Stakeholder Engagement

In 2019/20 we achieved a score of 6.96, achieving our strongest position within the scheme. We can first amongst the GDN's and worked extremely hard this year to continue to better demonstrate how input from our stakeholders is shaping our business and leading to measurable improvements and benefits and will continue to build on this performance.

Environmental Emissions and Shrinkage

We are responsible for purchasing gas to replace the gas lost through shrinkage and are incentivised reduce these losses over time. Shrinkage comprises leakage from pipelines (c.95%), theft from the gas network (c.3%), and own use gas (c.2%). The table below summarises our actual and forecast performance against the Environmental Emissions and Shrinkage incentives.

19/20 Prices	Actuals							Forecast	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	445	433	423	412	401	390	379	3,342	418
Actual / forecast	417	397	382	354	352	341	328	319	2,889	361
Variance	42	48	51	69	60	60	62	60	453	57
Variance %	9.2%	10.8%	11.9%	16.3%	14.6%	15.1%	15.8%	15.8%	13.5%	13.5%
Incentive Earned in year (£m)	**0.9**	**0.7**	**0.6**	**1.0**	**0.8**	**1.0**	**0.5**	**0.3**	**5.9**	**0.7**
Environmental Emissions GWh:										
Allowed volumes	434	420	408	398	386	376	364	354	3,140	393
Actual / forecast	395	375	360	332	329	319	306	295	2,711	339
Variance	39	45	48	66	57	57	58	59	429	54
Variance %	8.9%	10.7%	11.7%	16.6%	14.9%	15.1%	15.9%	16.8%	13.7%	13.7%
Incentive Earned in year (£m)	**2.7**	**3.2**	**3.5**	**5.6**	**4.3**	**4.3**	**4.7**	**5.5**	**33.7**	**4.2**

Figure 5.10 : Shrinkage and Leakage

Reducing system pressures through strong governance and close working practices between our pressure management, network validation and network maintenance teams. In 2019/20 we have seen a decrease in our average system pressure from 31.95 mbar to 31.63 mbar. This was predominantly due to a challenge we faced with a piece of monitoring equipment called an OKO. Rather than a costly full replacement of the product, we have worked with the manufacturer to produce a safe and simple battery replacement process which will keep the devices running well into GD2. This is at a fraction of the cost and effort of replacement.

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. For 2019/20 we improved on our 2018/19 progress and were confident that our network pressures were set appropriately.

Effectively managing our levels and use of MEG (Monoethylene Glycol), a 'wet' gas used to saturate and swell metallic joints which otherwise may leak gas. This year MEG saturation has decreased from 22.09% to 17.06%. 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 in the 2020/21 regulatory year

Our results here have been consistently very strong despite the net reduction this year, which still delivered an incentive of £4.7m overall and 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.

In 2019/20 we have outperformed the target bookings by 17.7%.This delivers an incentive of £1.0m this year and a RORE impact of 0.2%. We are targeting to sustain and improve on this strong performance.

Gwh 19/20 Prices	Actuals							Forecast	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 / forecast	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**	**3.3**	**1.8**	**2.0**	**1.8**	**1.0**	**0.2**	**10.9**	**1.4**

Figure 5.11 : Exit Capacity

Discretionary Reward Scheme

Our 2015-19 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.

5.5. Allowed revenue and customer bills

Customer Bills

The graph below shows our actual and latest forecast allowed revenues for the 8 years of RIIO-GD1.

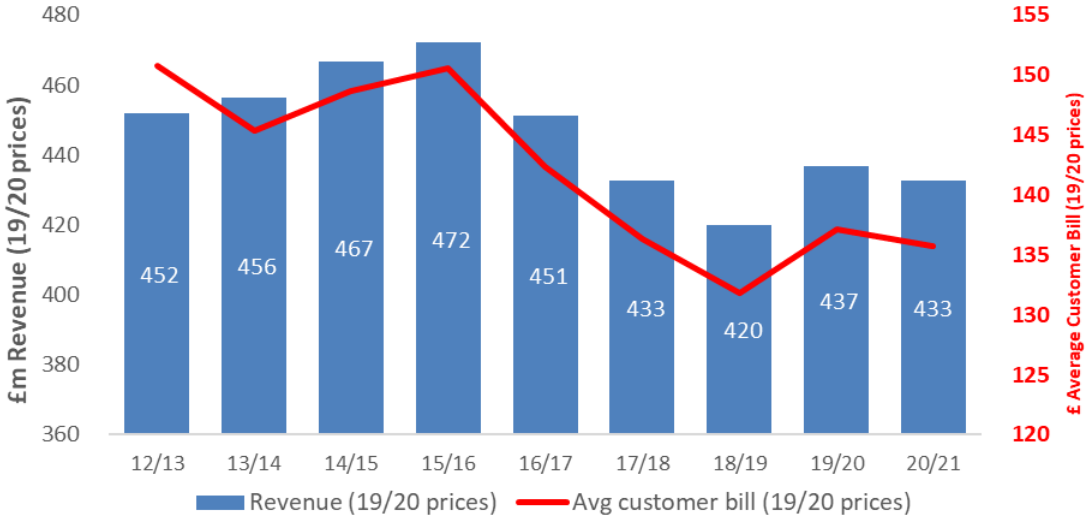


Figure 5.12: Allowed Revenue and Customer Bills

Allowed Revenue

Allowed revenue for 19/20 was £436.9m, an increase year on year of +£17m / +4%. The breakdown of allowed revenue is shown in table 5.13 below:

(19/20 Prices)	Actual							FC	RIIO Total	Avg. Yr
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
BASE REVENUE	**457**	**462**	**479**	**460**	**444**	**450**	**457**	**463**	**3,672**	**459**
Adjustments to Base Revenue Allowances:										
Cost of debt	0.0	(2.7)	(5.2)	(7.5)	(9.9)	(12.9)	(21.6)	(27.8)	(87.7)	(11.0)
Non-Controllable Costs	1.5	2.4	(4.5)	(5.3)	(5.1)	(5.4)	0.5	(3.0)	(18.9)	(2.4)
Totex Incentive	0.0	0.0	(2.8)	(2.0)	(3.7)	(3.8)	(2.2)	(0.6)	(15.2)	(1.9)
RPI true up	0.0	0.0	1.6	(6.5)	(9.9)	(1.8)	1.1	(0.3)	(15.8)	(2.0)
Pension Deficit	0.0	0.0	0.4	0.4	0.4	(3.8)	(4.2)	(4.2)	(10.9)	(1.4)
Other	(0.0)	(0.0)	(1.6)	(1.1)	(3.6)	(4.9)	(5.6)	(7.2)	(24.0)	(3.0)
Total	**1.5**	**(0.3)**	**(12.0)**	**(22.0)**	**(31.8)**	**(32.6)**	**(32.0)**	**(43.2)**	**(172.5)**	**(21.6)**
Incentive Income:										
Collected during RIIO-GD1 (with 2-year lag) *	0.0	0.0	6.7	8.4	10.9	11.5	10.9	9.9	58.2	7.3
Earned before RIIO-GD1	1.3	5.0	1.5	1.7	2.0	2.2	2.5	2.7	18.8	2.4
Total	**1.3**	**5.0**	**8.2**	**10.1**	**12.9**	**13.7**	**13.3**	**12.6**	**77.1**	**9.6**
(Over) / Under Collection	(3.5)	0.0	(3.6)	3.0	7.1	(10.7)	(1.2)	0.5	(8.4)	(1.0)
ALLOWED REVENUE	**456**	**467**	**472**	**451**	**433**	**420**	**437**	**433**	**3,568**	**446**

Figure 5.13 : Allowed Revenue breakdown

Our domestic customer bill analysis shown above is calculated based on NGN average Annual Quantities (AQ) and peak daily capacity requirements. NGN's average AQ in 19/20 was 13,999 Kwh which when applied with load factors and our unit rates gave an average domestic customer bill impact of £136.

The remaining years of RIIO-GD1 have RPI forecast in line with the last HM Treasury publication in May 2020 – this has RPI growth for calendar year 2020 @ 1.6% and 2021 @ 2.0%.

Allowed Revenue movement year on year

(19/20 prices)	Actual							FC	RIIO Total
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	
2019 FORECAST	**456**	**467**	**472**	**451**	**432**	**420**	**437**	**434**	**3,569**
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%	1.7%	
Variance %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumulative Variance %		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Impact £m on base revenues	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1.7)	(1.7)
Other Changes:									
Shrinkage & Env. Incentive	0.0	0.0	0.3	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.1
Cost of debt Index	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.2)	(0.2)
Under/(Over) Collection	0.0	0.0	0.0	0.0	0.2	(0.0)	0.2	(0.1)	0.3
Other	0.0	0.0	(0.1)	(0.0)	(0.0)	0.0	(0.0)	0.9	0.8
Shrinkage & Env. Incentive	0.0	0.0	0.3	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.1
2020 FORECAST	**456**	**467**	**472**	**451**	**433**	**420**	**437**	**433**	**3,568**
YOY Movement	**0.0**	**0.0**	**0.2**	**(0.0)**	**0.2**	**(0.1)**	**0.1**	**(1.1)**	**(0.7)**

Figure 5.14 : Allowed Revenue

Our forecast for total revenue over RIIO-GD1 has decreased very slightly from £3.569bn last year to £3.568bn. The primary drivers for this are increased forecasts for the Retail Prices Index (RPI), which is used as part of the annual process to reset our unit prices.

6. Totex Performance Review

Under the RIIO price control methodology we have been set cost allowances to enable us to deliver our 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. Totex compared to the allowance

Totex 19/20 prices (£m)	**Allowance**	**2019/20**	**Variance**
Controllable Opex	107.4	83.6	(23.8)
Capex	48.4	50.9	2.4
Repex	115.6	98.2	(17.4)
Totex	**271.5**	**232.7**	(38.8)

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 have been set at a level higher than our base costs.

Overall, we outperformed the Totex allowances by £38.8m this year, compared to an outperformance last year of £25.0m. The main drivers for this £16.8m increase in outperformance are:

- A decrease of £11.0m in capital investment variance to the allowance due to timing of projects, the allowance was broadly flat, but our investment decreased this year, closing the gap;
- Repex mains workload decreased by 35km this year, which is the main driver why outperformance increased by £3.0m; and
- The balance of the increase in outperformance was in Opex (£2.8m). Actual costs fell by £0.7m year on year, with the balance of the outperformance due to phasing of the allowance.

The £38.8m outperformance is shared with our customers under the Totex incentive mechanism detailed above. Full explanations of our performance are contained in the following section.

6.2. Totex forecasts

Totex forecasts 2019/20 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	TOTAL
Controllable Opex	93.0	95.3	89.7	90.2	87.9	84.3	83.6	90.4	714.4
Capex	46.4	55.0	68.3	64.7	55.4	61.2	50.9	57.1	459.1
Repex	101.9	106.9	96.4	93.6	96.3	98.7	98.2	94.5	786.6
Totex	241.4	257.2	254.4	248.5	239.6	244.2	**232.7**	242.1	1,960.1

Figure 6.2 : Totex forecasts

The table above summarises our forecast for Totex over the RIIO-GD1 period. The main drivers for the various costs movements from now are:

- Opex increasing by c6m. The forecasts include an assumption that the relatively mild winters we have recently experienced will not continue, impacting our emergency and repair costs, and an increase in maintenance costs as we maintain rather than replace a higher number of our assets. Our IT expenditure will increase as we expand our cyber resilience capabilities. In addition, the credits received this year will not be repeated, and we expect claims to be more in line with our long term average;
- Capex will stay broadly in line with the £57m average seen in the first 7 years of RIIO-GD1. We expect to see increased Reinforcement costs, driven mainly by one major project in Penrith. We will also complete our significant investment in IT and several large Offtake and PRS schemes; and
- Repex will decrease marginally in 2020/21 as we are currently ahead of our overall phased workload target to deliver on our workload commitments. We are also targeting to deliver further efficiencies.

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 19/20 prices (£m)	Allowance	2019/20	Variance
Direct Opex			
Work Management	23.8	14.9	(8.9)
Emergency	17.2	10.0	(7.1)
Repair	16.8	16.3	(0.6)
Maintenance	9.8	12.7	2.9
Other direct activities	11.3	5.1	(6.2)
Direct Opex total	**78.9**	**59.1**	**(19.8)**
Business Support costs	23.2	21.9	(1.3)
Training and Apprentices	5.0	2.6	(2.4)
Indirect Opex total	**28.3**	**24.6**	**(3.7)**
Total controllable Opex	**107.4**	**83.6**	**(23.8)**

Figure 7.1 : Controllable Opex compared to the allowance

Overall, our 2019/20 controllable Opex costs were £83.6m, outperforming the allowance of £107.4m by £23.8m. This is detailed by activity in the table above. This outperformance will be shared with our customers under the Totex sharing mechanism.

7.3. Year on Year Controllable Opex Performance

Controllable Opex 18/19 prices (£m)	2018/19	2019/2020	Variance
Direct Opex			
Work Management	14.9	14.9	0.0
Emergency	10.8	10.0	(0.8)
Repair	16.5	16.3	(0.2)
Maintenance	12.3	12.7	0.4
Other direct activities	5.9	5.1	(0.7)
Direct Opex total	**60.4**	**59.0**	**(1.4)**
Business Support costs	21.8	21.9	0.1
Training and Apprentices	2.1	2.6	0.6
Indirect Opex total	**23.8**	**24.6**	**0.7**
Total controllable Opex	**84.3**	**83.6**	**(0.6)**

Figure 7.2 : Controllable Opex year on year variance

Overall controllable Opex has reduced by £0.6m from 2018/19 to 2019/20. Direct Opex decreased by £1.4m, which was partially offset by a £0.7m increase 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 summarises our year on year Direct Opex performance:

Direct Opex 19/20 prices (£m)	2018/19	2019/20	Variance
Work Management			
Asset management	4.0	3.4	(0.6)
Operations management	7.9	8.6	1.7
Customer management	1.7	1.6	(0.1)
System control	1.3	1.2	(0.1)
Emergency	10.8	10.0	(0.8)
Repair	16.5	16.3	(0.2)
Maintenance	12.3	12.7	0.4
Other direct activities	5.9	5.1	0.8
Total Direct Opex	**60.4**	**59.1**	**(1.4)**

Figure 7.3 : Direct Opex year on year variance

7.4.1. Work Management

Work management overall has seen a less than £0.1m year on year decrease in costs across the four activities included here. This overall decrease is driven by:

- A decrease in asset management of £0.6m. We spent £1.1m less on holder demolition and land remediation this year, both costs are project specific and can vary materially year on year. This has been offset by an increase in net staff costs and professional and consultancy costs, where we saw increased headcount across some of our planning functions within Opex;
- An increase of £0.7m in operations management primarily in net staff costs. We have insourced our maintenance activity which included TUPE transferring the supervisory resource in house, driving this increase. Previously this resource would have been charged through the contract rates and shown in Maintenance; and
- Minor decreases in both customer management and system control.

Output: Gasholder decommissioning

We have 44 low pressure gasholders at 31 sites spread across the network which are no longer required to operate the network. Our gasholder decommissioning programme will reduce 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 16 year period starting from April 2013.

Our output target for RIIO-GD1 is to decommission a minimum of 23 gasholders. We successfully accelerated the programme in 2016/17 and completed the decommissioning of seven holders, and then decommissioned a further six over the following two years. This year we have completed the demolition of one further holder and are part way through demolishing two further holders at our Cannon Park site. These will be completed in 2020/21 together with one further holder to deliver on the output commitment.

	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	3	23

Figure 7.4 : Gasholder decommissioning

7.4.2. Emergency and Repair costs and associated outputs

Emergency and repair costs have seen a combined decrease of £1.0m, whilst achieving a very strong performance in our emergency and repair outputs. £0.4m of this is a one off reduction as a result of a stock review as we implemented new system and processes in our new SAP 4 Hana upgrade. We saw further cost savings in plant hire as we have invested in and purchased some equipment we use on a frequent basis, and the lower volumes of PRE, Reports and Repairs allowed us to use less specialist and contractor resource.

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, in the last three years 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.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20
PREs	89,290	83,446	93,411	90,016	90,224	82,713	74948
Reports	24,197	22,082	20,260	18,676	18,672	20,220	17618
Repairs	25,526	22,377	19,933	17,801	17,484	19,169	17317

Figure 7.5 : Emergency and Repair workload

PREs vary year on year as seen in the table above, whereas we had been seeing 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 have seen 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 fallen in 2019/20. Covid 19 appears to have had an effect on workload towards the end of 2019/20 as volumes dropped, which may be as a result of customers reluctance to put pressure on emergency services. Another driver for lower volumes is the record mild weather experienced at that time. Innovation is also helping keep our emergency and repair costs down. This year we estimate we have delivered c£0.9m in Opex from the use of;

- Back Blade Protectors (£0.3m) on digging equipment which reduces road scarring and expensive reinstatement;
- Core'n'vac techniques (£0.3m) which reduce time in the highways, the amount of spoil going to landfill and its associated transport costs, as well as the need to dig expensive larger holes;
- Mains and Service Water extraction (£0.1m), reducing the time and cost when extracting water from our pipes; and
- Our Dog Survey team (£0.1m), which finds escapes quicker and reduces the number of holes drilled.

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%	97.5%
97% of controlled gas escapes attended within 2hrs	97%	99.97%	99.99%	99.96%	99.97%	99.72%	99.94%	99.8%	97.5%

Figure 7.6 : Emergency response 1hr & 2hr

In 2019/20 we have again performed significantly above the targets – achieving 99.49% and 99.83% 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. Our forecast for the rest of RIIO-GD1 takes into account the relatively mild weather experienced in the last seven years compared to the previous price control, and therefore reduces for 2020/21 with the assumption of a more typical winter.

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 2019/20, 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. Our forecast takes this into account. Ignoring any future extreme weather, we expect to make year on year improvements, whilst outperforming the target every year during RIIO-GD1.

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	21.3m

Figure 7.7 : Annual repair risk forecast

Output: Percentage of repairs completed within 12 hours

We also have a requirement to complete repairs within 12 hours. We have committed to a gradual improvement in performance across RIIO-GD1, reflecting our commitment to repairing gas escapes on a first visit where possible. The table below details this target and includes our forecast against this, which similarly assumes a more typical winter moving forward. We expect to outperform our targets in every year.

% repairs completed within 12hrs	**RIIO year 7 target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
	62.0%	62.3%	62.9%	64.4%	62.3%	66.1%	68.4%	64.3%	>62.5%

Figure 7.8 : % repairs completed within 12 hours forecast

We achieved 64.3% in 2019/20 against a target of 62.0%, 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 targets.

Unplanned Interruptions	RIIO year 7 target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Number	12,960	11,464	13,034	12,859	12,427	13,714	14,030	12110	13,500	103,138
Number related to major incidents	-	0	0	1,430	2,756	765	4,577	1248	-	10,776
Total Number	-	11,464	13,034	14,289	15,183	14,479	18,607	13,358	13,500	113914
Duration	5.9	4.8	4.2	4.4	4.8	5.6	6.3	5.1	5.6	40.9
Duration related to major incidents	-	0	0	7.4	4.7	2.0	16.8	1.7	-	32.6
Total Duration	-	4.8	4.2	11.8	9.5	7.6	23.1	6.8	5.6	73.5

Figure 7.9 : Number and duration of unplanned interruptions

We had 13,358 unplanned interruptions in 2019/20 with a duration of 6.7 million minutes (mm). This included one major incident impacting more than 250 properties at Barlby. This incident saw 1,248 customers off gas for 1.6 mm. Adjusting for these incidents, our underlying performance was 12,110 unplanned interruptions with a duration of 5.1mm, both decreasing from 2018/19.

The number of interruptions is below the average yearly RIIO target of 12,960, and cumulatively we are ahead of the 8 year target phased target, having had 89,368 interruptions compared to a pro rata target of 90,720. It is important to remember that 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 this year was ahead of target at 5.1 mm compared to a target of 5.9mm. We have more control over this, and on average customers were interrupted for a shorter period of time than the target. Cumulatively customers have been interrupted for 35.1 mm duration compared to the target of 41.3 mm.

Our forecasts for the remainder of RIIO-GD1 take into account the unpredictable nature of interruptions. We expect to deliver improvements by further 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.

The forecasts do not take into account the likely impact of the smart metering installation program, which we believe will materially impact the number of unplanned interruptions as a result of issues with the meter installations, in particular around the emergency control valve. The timing and scope of the programme is still unclear.

7.4.3. Customer Satisfaction Survey results for unplanned interruptions

In 2019/20 we have delivered a score of 9.48.

We have built on the success of the Customer Interface Centre (CIC) and recently improved this app to allow for both customer referrals to the Priority Services Register (PSR) and also referrals to additional help beyond utilities, such as fire service checks and debt management. In terms of training, last July we introduced a new approach to delivering customer service training. We are engaging with the whole business to vote on what they need the most, and then tailoring 6 monthly training sessions around these topic areas. We have continued to enhance our approach to looking after customers during major incidents. We now work early to identify local social media routes that we can partner with, and we also provide bespoke food and heating support to vulnerably customers.

7.4.4. Maintenance and Other Direct Activities

Maintenance costs have marginally increased by £0.4m this year but would have increased by a further £0.6m without the increase we saw in operations management detailed in 7.4.1 above. We have insourced our maintenance activity and TUPE transferred the associated supervisory resource in house which shows in operations management. This resource would previously have been charged through the contract rates and shown in maintenance. We have seen a £0.5m increase in expenditure on district governors associated with minor refurbishments to maximise their life. We have also seen expenditure increase marginally on valves and our pressure control systems.

Other direct activities have decreased by £0.7m. We saw a £0.4m reduction in Xoserve operating cost recharges following changes to the funding and governance arrangements for Xoserve. The balance is driven by one off savings as a result of a stock review as we implemented news system and processes in our new SAP 4 Hana upgrade, affecting odorant and other stock items. This saving will not reoccur in future years.

7.5. Year on Year Indirect Opex Performance

Indirect Opex 19/20 prices (£m)	**2018/2019**	**2019/2020**	**Variance**
Business Support			
IT and telecoms	6.0	6.6	0.6
Property management	2.9	2.8	(0.1)
Human resources	1.1	0.8	(0.3)
Audit, finance and regulation	3.9	4.3	0.4
Insurance	2.9	2.8	(0.1)
Procurement	0.3	0.3	0.0
CEO and group management	4.4	4.3	0.0
Training and apprentices	2.1	2.6	0.6
Indirect Opex total	23.8	24.6	0.7

Figure 7.10 : Indirect Opex year on year variance

Overall Indirect Opex has seen a £0.7m year on year increase in costs across business support and training and apprentices. This increase is driven by:

- A £0.6m increase in IT costs as a result of increased external contractor costs and licence costs. We are currently transitioning fully to our new SAP 4 Hana systems, and for a period in 2018/19 during the migration process our Opex costs were artificially reduced due to the contract structure in place. Costs in 2017/18 were over £7.0m prior to this. All new contracts are now in place leading to the increase. We have also seen increased costs associated with Cyber Security;
- A £0.3m decrease in HR costs driven by lower than expected professional and consultancy costs, as well as role rationalisation and headcount reductions, partly enabled by our IT investments;
- A £0.4m increase in Audit, Finance and Regulation costs, primarily driven by increased Professional and Consultancy costs which can vary materially from year to year; and

A £0.6m increase in Training and Apprentice costs as a result of a new intake of apprentices, as well as increased compliance training costs. These are driven by new training requirements in deep excavation work, confined spaces work, and plant and equipment use.

7.6. Year Non Controllable Opex Performance

Non Controllable Opex 19/20 prices (£m)	2018/19	2019/20	Variance
Shrinkage	5.7	5.7	0.0
Ofgem Licence	1.9	2.1	0.1
Network Rates	45.1	44.9	(0.2)
Established pension deficit recovery plan payment	4.3	4.3	0.0
PPF levy costs	0.0	0.0	0.0
Pension scheme administration costs	0.5	0.6	0.1
NTS Pension Recharge	7.4	7.4	0.0
Bad debt	0.1	0.1	0.0
NTS exit costs	3.9	5.0	1.1
Network Innovation (ex IRM)	2.9	2.9	0.0
Supplier of Last Resort	0.7	0.8	0.1
Non Controllable Opex total	72.6	74.0	1.4

Figure 7.11 : Non Controllable Opex year on year variance

Overall non-controllable Opex costs have increased by £1.4m in real terms. The key variances are:

- A £1.1m increase in NTS Exit Costs driven by changes in the NTS Exit Unit Rates applied by National Grid; and
- Minor increases have been seen in the Ofgem Licence, our pension scheme administration costs, and costs associated with the Supplier of Last Resort process. These have been partially offset by a decrease in our Network Rates payments.

The innovation costs detailed above cover the Network Innovation Allowance. We have increased our focus this year on maximising the benefits we can realise from innovation funded through the allowance. All innovation projects start with a problem statement which is assessed for qualitative and quantitative benefits. Any assumptions and targets are then fully tested during the development of the solution.

We have fully reviewed and updated our approach to implementation and have put in place a new process to track, monitor and report on the take up and use of the innovation across our various regions. This involves our implementation managers attending regional performance meetings, highlighting where specific tooling and equipment is or isn't being used. This demonstrates to each region the significant benefits that other areas are achieving from the new products. This process has increased the use of new products across the network, allowing for savings to be passed onto our customers faster than ever before. This year we estimate we have delivered c£2.0m of efficiencies in Totex, c£0.8m in Repex through our Stub End abandonment projects, and £0.9m in Opex in the main from the Core'n'vac, Dog survey team, and Back Blade Protector projects. The balance is in Capex, through the use of a new 'window cutter' tool.

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 forecasts 19/20 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Cumulative Total	Cumulative Allowance	Variance
Work management	15.4	17.9	19.6	20.1	16.8	14.9	14.9	119.7	167.7	(48.0)
Emergency	11.3	11.6	11.5	11.3	11.5	10.8	10.0	78.1	122.5	(44.4)
Repair	18.9	17.0	15.1	14.7	15.6	16.5	16.3	114.0	128.5	(14.5)
Maintenance	9.6	10.6	11.0	11.1	11.5	12.3	12.7	78.8	69.0	9.8
Other direct activities	7.8	7.7	7.2	7.2	6.2	5.9	5.1	47.1	93.6	(46.4.)
Total direct Opex	63.0	64.8	64.6	64.3	61.6	60.4	59.1	437.8	581.3	(143.5)
Business support	27.2	27.8	23.1	23.7	24.4	21.8	21.9	170.0	161.1	8.8
Training/apprentices	2.8	2.7	2.0	2.1	1.8	2.1	2.6	16.2	33.6	(17.4)
Total indirect Opex	30.0	30.5	25.1	25.9	26.3	23.8	24.6	186.2	194.8	(8.6)
Total controllable Opex	93.0	95.3	89.7	90.2	87.9	84.3	83.6	624.0	778.3	(154.2)

Figure 7.12 : Opex cumulative position

Cumulatively we have outperformed the controllable Opex allowance of £778.3m by £154.2m (19.8%). The majority of the outperformance is in Direct Opex.

7.8. Opex forecasts

Opex forecasts 19/20 prices (£m)	19/20 forecast	19/20 actuals	Variance
Work management	16.2	14.9	(1.4)
Emergency	11.8	10.0	(1.7)
Repair	16.9	16.3	(0.6)
Maintenance	13.8	12.7	(1.1)
Other direct activities	5.5	5.1	(0.4)
Total direct Opex	64.2	59.1	(5.2)
Business support	24.5	21.9	(2.6)
Training/apprentices	2.3	2.6	0.3
Total indirect Opex	26.9	24.6	(2.3)
Total controllable Opex	91.1	83.6	(7.5)

Figure 7.13 : Opex forecast comparison

In our 2018/19 submission we forecast that our 2019/20 controllable Opex would be £91.1m. Our outturn costs have been £6.9m lower at £83.6m. The table above provides details of the variances by activity. The main drivers for this variance are:

- A £1.4m variance decrease in work management costs. The main driver was the decrease in our holder demolition costs as we fully demolished one holder against a target of three, with the remainder to be completed in early 2020/21. We spent less on environmental remediation. Together these accounted for £1.1m of the variance;
- A combined variance in Emergency and Repair costs of £1.7m. In our forecasts we assumed winter conditions would be more severe and typical of the longer term than the relatively mild conditions seen recently. In addition, we saw a one off £0.4m saving as a result of a stock review as we implemented news system and processes in our new SAP 4 Hana upgrade, and further cost savings in plant hire through our investment in this area.
- A variance in Maintenance costs of £1.1m. We have increased expenditure on district governors associated with minor refurbishments, and on valves and our pressure control systems as we expected but not as quickly as we planned. This accounts for £0.5m of the variance. Costs also reduced by £0.6m as a result of the insourcing of our maintenance activity, as the supervisory employees we TUPE transferred in are now recorded under Operations Management; and
- A net £2.3m variance in Business Support. We saw reduced employee liability claims compared to the average we have seen so far in RIIO-GD1, and we did not use as much professional and consultancy support to deliver our RIIO-2 Business Plan as expected. This was partially offset by increased Training and Apprentices costs, mainly as a result of the apprentice intake and increased expenditure on compliance training.

7.9. RIIO-GD1 forecast

The table below summarises our forecasts for controllable and non-controllable Opex for the RIIO-GD1 period.

Opex forecasts 2019/20 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	TOTAL
Work management	15.4	17.9	19.6	20.1	16.8	14.9	14.9	15.0	134.7
Emergency	11.3	11.6	11.5	11.3	11.5	10.8	10.0	11.2	89.4
Repair	18.9	17.0	15.1	14.7	15.6	16.5	16.3	16.5	130.5
Maintenance	9.6	10.6	11.0	11.1	11.5	12.3	12.7	14.9	93.7
SIUs	-	-	-	-	-	-	-	-	-
Other direct activities	7.8	7.7	7.2	7.2	6.2	5.9	5.1	5.4	52.5
Of which Xoserve	4.4	4.8	4.8	4.2	3.5	2.6	2.3	2.5	29.0
Total direct Opex	63.0	64.8	64.6	64.3	61.6	60.4	59.0	63.0	500.8
Business support	27.2	27.8	23.1	23.7	24.4	21.8	21.9	23.7	193.7
Training/apprentices	2.8	2.7	2.0	2.1	1.8	2.1	2.6	3.8	20.0
Total indirect Opex	30.0	30.5	25.1	25.9	26.3	23.8	24.6	27.5	213.6
Total controllable Opex	93.0	95.3	89.7	90.2	87.9	84.3	83.6	90.4	714.4
Licence/network/other	53.1	54.6	56.8	76.6	62.1	54.8	55.0	54.8	467.9
NTS exit costs	7.7	9.8	8.4	8.1	8.1	3.9	5.0	22.0	73.1
Shrinkage	9.9	7.1	5.6	5.1	5.4	5.7	5.7	5.7	50.3
NTS pensions contribution	5.5	5.6	7.8	7.7	7.6	7.4	7.4	7.6	56.7
Total non-controllable	76.3	77.1	78.6	97.5	83.2	71.8	73.2	90.2	647.9

Figure 7.14 : Opex forecasts

Work management includes our profile for holder demolition, we will fully demolish one holder in 2020/21 and complete the demolition of two partially demolished holders. The holder programme is the main driver for the overall cost movements in this activity.

Our emergency and repair forecasts are based on a more prudent 'normal' winter workload than has been experienced in the last seven years. We would expect to outturn lower than this when the winter weather is mild. However, over the last three years costs have been higher due to some winter workload spikes, and the extreme temperatures seen in the summer of 2018, which lead to ground heave and increased repairs.

Within business support we are forecasting an increase in IT costs as we increase our cyber resilience capabilities, as well as a more typical level of claims based on historic run rates. We also expect to see increased levels of professional and consultancy costs associated with developing our RIIO-2 plan and managing our stakeholder engagement programme, and some increases in our property costs due to changes in our portfolio. Training and apprentice's expenditure follow our expected recruitment plans and demonstrates our commitment to reinvigorating our workforce and investing for the future.

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 2019/20 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 19/20 prices (£m)	**Allowance**	**2019/20**	**Variance**
LTS, storage and entry	13.8	7.3	(6.5)
Connections	8.1	9.6	1.5
Mains Reinforcement	5.2	4.0	(1.2)
Governors (Replacement)	1.8	1.9	0.2
Other Capex	19.5	28.0	8.5
Including : IS and telecoms	6.2	16.8	10.6
Including : Vehicles	4.3	1.3	(3.0)
Capex total	48.4	50.9	**2.4**

Figure 8.1 : Capex variance to the allowance

The table above summarises our actual capital expenditure in 2019/20 against the allowances by activity type. Overall, we invested £50.9m, £2.4m more than the allowance of £48.4m. 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 2020 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 2019 we 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 informed our planning for RIIO2 which utilised the NOMs models to inform the Network Asset Risk Metric (NARMs) for RIIO2 investment planning. We note that our RIIO1 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 and do not intend to claim any risk benefit for data changes. 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 by 1 April 2019 consistent with Special Condition 4G a(ii) of the Gas Transporters licence. This document also been updated and will be submitted as part of RRP2020.

Our 2020 RRP submission provides NOMs outputs for our rebased 2013 GD1 start position, our current performance based on intervention activities undertaken to 31 March 2020 and our forecast 2021 position without further intervention and based on planned interventions for the remainder of RIIO GD1.

NGN's GD1 starting monetised risk position was £158m. The current total network risk at 31 March 2020 is £102.4m. This compares to a total network risk of £103.1m that was reported for 2019. Without further intervention, this risk will increase to £104.9m at 2021. The delivery of NGN's current planned work for Year8 of RIIO-GD1 to 2021, will reduce the risk to £99.7m at 2021, this compares to £96.7m at 2021 that was reported at 2019. Our analysis indicates that the forecast £3m less risk reduction compared to last years' RRP is due to:

In previous reporting years interventions have been applied to assets that were selected through optimisation using NGNs asset decision support tool. This was undertaken here workloads had been forecast but specific assets were yet to be identified. More detailed investment plans are now available for the remainder of the regulatory period as there is only one year remaining; this has led to a lower risk reduction than previously forecast.

Fewer interventions have been delivered when compared to previous forecasts and in some cases the type of intervention also differed. For example, fewer Governor Replacements were delivered but a higher volume of Governor Refurbishments and Civils interventions have been undertaken; which deliver less of a risk reduction.

An adjustment was made to the number of Preheating systems as duplications were found during the GD2 Business Plan submission process.

Due to the large reduction in risk caused by the asset data refresh in 2019, NGN expect to rebase the agreed NOMS target to reflect the asset data adjustments. Further data improvement initiatives will be carried out as we continue through our RIIO2 determinations over the course of 2020. As such we intend to undertake any rebasing once the data update is complete.

As with 2019, the Iron Mains population holds NGN's highest total risk at a 2020 monetised risk value of approximately £31.5m. The length of iron mains replaced so far in RIIO-GD1 is in-line with business plan targets.

8.3. LTS, storage and entry

8.3.1. Costs and Workload

LTS, storage and entry 19/20 prices (£m)	Allowance	2019/20	Variance
LTS pipelines		0.5	
LTS diversions		0.0	
NTS offtakes		6.6	
Gas entry points		0.0	
PRSs		0.1	
Storage		0.0	
Total	**13.8**	7.3	**(6.5)**

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 2019/20 allowance. Overall, we have invested £7.3m against an allowance of £13.8m, an under spend of £6.5m. Importantly

LTS pipelines

Our £0.5m expenditure on LTS pipelines has primarily been on Pipeline Re-life and Cathodic Protection upgrades These are upgrade to our pipelines including re-coating of pipes and the installation of shells, as well as replacing transformer rectifier units with more reliable units.

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 2019/20 NGN invested in the following sites, either in terms of design, procurement or construction:

Offtakes - Total of £6.6m including:

- Pickering (£2.2m) – An Offtake upgrade that will rectify issues with two individual pressure reduction systems on site by replacement with new. It also includes a metering upgrade to install twin stream ultrasonic meters;

- Bishop Auckland (£1.8m) – 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;
- Melkinthorpe (£0.7m) – This is a two phase project. The first is a 7bar pipeline reinforcement from Melkinthorpe to Penrith town. The second is a capacity based upgrade that includes replacement of the pressure reduction system, replacement of the fiscal metering equipment to incorporate twin stream ultrasonic meters, and refurbishment of the boiler system on site;
- Cowpen Bewley (£0.3m) – Primarily a fiscal meter upgrade to incorporate twin stream ultrasonic meters, this also includes a partial E&I upgrade; and
- Burley Bank (£0.3m) – Primarily a fiscal meter upgrade to incorporate twin stream ultrasonic meters, this also includes a full E&I upgrade.

PRS's - Net total of £0.1m:

- Lamesley PRS Diversion (gross £1.9m with an income of £3.9m) – a PRS diversion resulting in the complete rebuild of Lamesley PRS which is rechargeable, 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; and
- Saltend (£0.8m) – Construction for a preheating upgrade and filter replacement alongside some site rationalisation.

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 19/20 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	84
Utilisation 50% < I <=70%	**52**	58	56	59	57	60	53	57	54
Utilisation 70% < I <=80%	**45**	25	27	22	27	26	25	27	29
Utilisation 80% < I <=100%	**44**	49	44	41	30	25	30	22	25
Utilisation > 100%	**0**	10	9	8	5	3	4	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 were analysed applying 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

Of the three sites reported >100% in 2018/19 table, Lillyhall 19 to 2 bar PRI upgrade works were completed in 2019.

Three sites now remain above 100% for 2019/20 reporting;

Meadow Lane - upgrade works were completed 06.05.20 therefore they were still reported as being over capacity in the 2019/20 period.

Penrith – Pipeline infrastructure between Penrith & Melkinthorpe will help reduce flows through Penrith PRI thus eliminating the capacity constraint.

Rawcliffe – Multiple upgrades are required to the offtake including inlet pipework, regulator and meter upsize.

Going forward, there will be a continued aim to improve capacity utilisation analysis and reduce the capacity utilisation levels wherever possible. There will also be continued review and re-analysis in order to optimise the outcome for each site prior to the compilation of data for the 2020/21 submission and ensure NGN meets the RIIO-GD1 target of 0 sites >100% by 2021.

8.4. Connections

8.4.1. Costs and Workload

Connections	2018/19	2019/20	Variance
Workload			
Mains (km)	41.3	41.5	0.2
Services (number)	8,390	7,551	(839)
Governors (number)	2	2	0
Risers (number)	3	0	(3)
Costs (19/20 prices £m)			
Mains	3.5	4.9	1.4
Services	13.0	10.8	(2.2)
Governors	(0.1)	0.0	0.1
Risers	0.0	0.0	0.0
Gross Cost	**16.4**	**15.7**	**(0.7)**
Contribution	(5.8)	(6.0)	(0.3)
Net Cost	**10.6**	**9.6**	**(1.0)**
Net Allowance	**8.0**	**8.1**	**0.1**

Figure 8.4 : Connections workload and costs variance

The table above summarises our connections performance against the 2019/20 allowance, and against our 2018/19 outturn. Overall, this year we have spent a net £9.6m, £1.5m over the allowance of £8.1m.

Our net costs have reduced by £1.0m since last year, driven by a £0.7m reduction in gross costs and a £0.3m increase in contributions from customers. This was mainly due to:

- A fall in the number of new connections overall, with services workload decreasing by 839 (10%). This is almost entirely driven by a reduction in fuel poor connections, and saw gross costs decrease by £2.2m. It is important to recognise we have already delivered our targeted output in this area;
- Mains laid stayed broadly flat year on year, though costs increased by £1.4m due to the mix of work and location of the projects delivered; and.
- A decrease in Governor costs of £0.1m driven by the type and size of governors installed.

The increase in contribution is partially 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, successfully completing 1,933 fuel poor connections, which cumulatively means we have delivered 14,672. As a result of this and working with new partner organisations we now forecast we will achieve in the region of 16,000 fuel poor connections over RIIO-GD1.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Number of fuel poor network connections	1164	1707	2458	2638	2099	2,763	1933	1238	16,000
Phased Target	1500	1500	1917	1917	1917	1917	1917	1917	14500

Figure 8.5 : Fuel poor workload forecast

8.4.2. Customer Satisfaction Survey results for connections

In 2019/20 we have delivered a score of 9.04, an increase from 8.93 last year.

We addressed the specific points that have caused this decrease last year by setting stricter internal service level lead times for connections customers, stricter timescales for reinstatement work, and providing in depth customer training for all customer facing colleagues in the connections process. This has been reflected positively on our score this year.

Output: Connections Standard of Service

We have had another strong year in Connections; all seven outputs are significantly above existing OFGEM guaranteed standards of service.

The table below compares our RIIO-GD1 NGN output targets with our actual performance to date and forecast performance for the remainder of the RIIO-GD1 price control period. We saw a drop in six of our seven connections outputs. The migration to our new SAP 4 HANA platform led to a drop in our performance across our % of quotes targets and our % of commencement and completion dates for connections above and below 27wkwh.

We have now recovered our position as SAP 4 HANA platform has been established and training has been delivered across the area. However, the drop is performance is reflected in this year's submission.

	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%	99.6%
% 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%	99.6%
% 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%	99.6%
% 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%	99.6%
% 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%	99.6%
% 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%
% 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%	95%

Figure 8.6 : Connections forecast outputs

8.5. Mains Reinforcement

Mains reinforcement	Allowance	2019/20	Variance
Workload			
Mains < 180mm (km)		7.3	
Mains > 180mm (km)		4.2	
Total	16.8	11.6	(5.3)
Governors (number)	7	1	(6)
Costs (19/20 prices £m)			
Mains < 180mm		2.1	
Mains > 180mm		1.5	
Governors		0.6	
Total	**5.2**	4.2	**(1.0)**

Figure 8.7 : Mains reinforcement workload and costs variance

The table above summarises our actual mains reinforcement expenditure against the 2019/20 allowance. We invested £4.2m on mains reinforcement and associated governors, delivering 11.6km of reinforcement mains and one governor. This equates to a unit cost of c£276 per metre which is the lowest achieved 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 is a significant outperformance against the £5.2m allowance to deliver 16.8km of reinforcement main. The key driver is the reduced mains laid workload, which is 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	2019/20	Variance
Workload			
District Governors		51	
Service Governors		1	
Total	**30**	**52**	**22**
Costs (19/20 prices £m)			
District Governors		2.0	
Service Governors		0.0	
Total	**1.8**	**1.9**	**0.2**

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. District governor unit costs in particular vary materially depending on the size and type of the governor and the exact nature of the work we need to complete.

We have invested £1.9m in our overall governor replacement programme in 2019/20. The number of district governor replacements is in line with last year, however the unit cost has slightly reduced, reflecting the different mix of governor size installed and the work carried out. 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 19/20 prices (£m)	Allowance	2018/19	Variance
System Operations	-	0.0	-
Infrastructure and Systems	6.2	16.8	10.6
Xoserve	-	0.0	-
Plant, tools and equipment	-	1.8	-
Land, buildings, furniture fittings	-	3.3	-
Vehicles	4.3	1.3	(3.0)
Security (Exc PSUP)	-	0.1	-
PSUP	-	3.0	-
Other	-	1.7	-
Capex total	**20.2**	**28.0**	**7.9**

Figure 8.9 : Other Capex variance to the allowance

The table above summarises our actual Other Capex expenditure against the 2019/20 allowances. We have invested £28.0m in the areas detailed in the table against an allowance of £20.2m.
The main driver for spending more than the allowance has been a significant investment in our IT Infrastructure and Systems through an IT enabled business transformation programme called Future WoW (Ways of Working). This investment commenced in 2017 and will continue through to 2020/21. 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.

NGN's legacy systems architecture was complex, which makes it difficult to access data and information, and create relationships between data sets. The legacy SAP platform was reaching the end of its life, and will be out of support in 2021, which would then be a risk to our operations. As a result, we decided to implement the SAP 4 HANA platform, with a range of cloud based modules. This has included a full data migration into a newly created data model, which went live in October 2019 and included:

- Smart Information Management – this programme is focused on optimising and improving our Information Life Cycle Management to leverage the best results from our data. It will deliver new capabilities, revised processes, systems and working practices. This is being enabled through SAP's S4 HANA technology and includes investment in:
    - S4 HANA and BPC (Business Planning and Consolidation);
    - SAP Governance Risk and Compliance;
    - Success Factors to enable manager and employee self-service for HR activities such as attendance management and training; and
    - Concur for expense management.

- Smart Work Management – this programme is focused on optimising the processes and systems that are used to support our operational and back office support functions, delivering efficiency and improved customer management performance. This covers areas such as scheduling, dispatch, mapping, work execution, and data capture and includes investment in:
    - New mapping technology through the GeoCortex platform;
    - New field data capture applications using SAP's cloud platform application technology

- Asset Decision Support Tool – This programme is focussed on embedding the Asset Management capability within NGN to ensure that we are conscious in our decision making and continue to deliver value to our customers and stakeholders. Specifically, the implementation of our decision Support tool will provide the capability to:
    - Improve our ability to efficiently forecast the long-term risk profile for network assets consistently with the Network Output Methodology using monetised risk;
    - Embed a consistent and transparent approach to Cost Benefit Analysis that can be applied across and within asset classes; and
    - Enable the optimisation of cost, risk and service outputs in the development of our GD2 business plan so that we can demonstrate that our plan will continue to deliver value for customers at least cost without compromising our service objectives.

Following these changes, further work is planned to further enhance our technology and support the delivery of our Digitalisation Strategy, which includes:

- New scheduling and dispatch technology through SAP's MRS (multi resource scheduler).
- Expanding the use of our Work Apps to Connections, Replacement and Maintenance Work
- Further developing Success Factors to support Performance Management and Onboarding
- Enhancing our Digital Operations Room with further Realtime reporting capabilities

- Enhancing and developing our data through our Data and Information Centre of Excellence, which will enhance the maturity of our data and support our work towards greater data interoperability

Most of the Plant, Tools and Equipment expenditure (£1.8m) was associated with the following work:

- Telehandlers (£0.3m) – NGN previously hired in Telehandlers which are used within our stores/yards. We have purchased 6 telehandlers to save on hire costs; and
- Welfare Pods (£0.5m) – NGN previously hired in staff welfare facilities such as cabins and vehicles, and in some cases no facilities were provided. We have since invested in colleague welfare and purchased our own welfare cabins which includes toilet, break out and food preparation areas.

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.
Expenditure on Land, Buildings, Furniture and Fittings consists of continuing the roll out of our office and depot upgrades to provide a common 'look and feel' template for all of our properties, the aim being to provide the best possible working environment for our colleagues and to provide them with the workspace that best enables them to work in the most efficient manner possible. During 2019/20 we completed the refurbishment of the ground floor and communal areas at Thorpe Park. We also completed the first new build depot project at Burradon. A similar new building is to be constructed at Cannon Park, Middlesbrough during 2021.
During this year we spent £1.3m on Operational Vehicles, significantly lower than the allowance, but an increase on last year. 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.
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 £3.0m in 2019/20 on our security upgrades at our Pannal Offtake site which is our only CNI site. Work will be completed in 2020/21.

Within the Other category over 50% of the expenditure relates to major upgrade works on overcrossings, including repairs to the pipework, supports and upgrades to the security. 28% of the expenditure relates to PSSR Validations and remedial works which is compliance driven work to prevent serious injury from the hazard of stored energy because of a failure in the pressure system. The rest of the expenditure is on various small value projects, typically on below 7 bar assets.

8.8. Capex cumulative position under RIIO

Cumulative Capex 19/20 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Cumulative Total	Cumulative Allowance	Variance
LTS, storage and entry	10.2	17.0	22.3	16.4	12.0	16.1	7.3	101.4	122.0	(20.7)
Connections	7.5	7.7	11.1	9.7	10.6	10.6	9.6	66.8	54.0	12.7
Mains Reinforcement	3.3	2.0	3.6	2.4	2.3	2.4	4.0	20.0	38.2	(18.2)
Governors replacement	2.4	1.6	2.0	1.8	1.5	2.7	1.9	13.9	12.8	1.1
Other Capex	23.0	26.7	29.4	34.4	28.9	29.4	28.0	199.9	173.5	26.4
Including : IT	6.1	5.5	6.8	17.6	14.9	24.0	16.8	91.7	44.0	47.7
Including : Vehicles	4.5	5.1	3.1	2.8	3.4	0.4	1.3	20.5	28.5	(8.0)
Total	**46.4**	**55.0**	**68.3**	**64.7**	**55.4**	**61.2**	**50.9**	**401.9**	**400.6**	**1.3**

Figure 8.10 : Cumulative Capex position compared to the allowance

The table above summarises our cumulative Capex expenditure over the first seven years of RIIO-GD1 against the equivalent allowances. Overall, we have spent in line with allowance. However, there are variances across the asset classes which offset each other. These include:

- Reduced mains reinforcement work (£18.1m) 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 to date on LTS, storage and entry (£20.7m) due to timing and efficiencies in delivering both our above and below 7 bar capital investment projects. We also have seen on rechargeable project which has delivered £3.9m contribution so far, so the net difference is £16.8m;
- Increased Infrastructure and Systems investment (£47.7m) 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 (£12.7m) 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 the drive improvements in 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 such as modular buildings and refurbishment programmes; 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.

8.9. Capex forecasts

2019/20 actuals against forecast

2018/19 Capex forecast 19/20 prices (£m)	19/20 forecast	19/20 actuals	Variance
LTS, storage and entry	13.6	7.3	(6.4)
Connections	9.4	9.6	0.3
Mains Reinforcement	4.9	4.0	(0.9)
Governors replacement	3.5	1.9	(1.5)
Other Capex	29.3	28.0	(1.2)
Including : IT	14.3	16.8	2.5
Including : Vehicles	2.1	1.3	(0.8)
Total	**60.6**	**50.9**	**(9.8)**

Figure 8.11 : 2019/20 actual Capex position compared to the prior year forecast

RIIO-GD1 forecast

The table below summarises our RIIO Capex expenditure forecast, based on the first seven years' actual performance and a forecast for the remaining year. We fully expect to achieve all of our output targets through our Capex investment programme, in particular our asset health and capacity targets.

We are forecasting to spend £5.8m over our allowances, which is largely driven by non-network overspend on Infrastructure and Systems, where we expect to spend £55.0m over the equivalent allowance.

LTS, storage and entry expenditure vary year on year given the major project driven nature of the work. We expect to spend £21m below the allowance whilst achieving all of our outputs. This is a change from last year's forecast, mainly driven by the contribution referenced above.

Connections expenditure includes both normal customer driven connections work and fuel poor connections. We expect customer driven connections work to remain broadly flat, with increases in connections to new properties being offset by reductions in connections to existing properties. Fuel poor connections expenditure follows the profile detailed in the outputs section 8.4.2 above, with plans to increase the total number of connections to 16,000 from 14,500.

Our forecast for mains reinforcement workload and costs are impacted by expected economic growth, and our proactive management of network pressures as a more cost effective alternative to reinforcement. We are forecasting higher workload for the remaining three years of the regulatory period which is largely driven by expectations that the network will fund significant levels of specific reinforcement associated with new large load connections. We have seen a material increase in enquiries from generators in the past year and this trend is continuing. In addition, we have a major pipe reinforcement project in Penrith to increase network capacity, which is the main driver of the c£5m increase in expenditure in 2020/21.

We are forecasting an increase in our governor investment in the final year of RIIO-1. We now have detailed workload plans down to individual projects and expect to increase our civil upgrade programme to replace and refurbish buildings to ensure the ongoing protection of our governor assets.

Other Capex, similar to LTS, storage and entry, varies year on year given the project driven nature of this work. We are forecasting to continue to invest in our Infrastructure and Systems as detailed in section 8.7 above and our offices and depots to ensure we provide the best possible working environment that will drive collaboration and efficient working. Both of these investments will drive efficiencies in our ways of working, improve our decision making, and enable us to improve our management and control of activities across the network, supporting our colleague and customer experiences.

RIIO Capex forecast 19/20 prices	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19 Actual	19/20 Actual	20/21	Total	Allowed
LTS, storage and entry	10.2	17.0	22.3	16.4	12.0	16.1	7.3	14.4	115.8	136.4
Connections	7.5	7.7	11.1	9.7	10.6	10.6	9.6	8.5	75.3	62.3
Mains Reinforcement	3.3	2.0	3.6	2.4	2.3	2.4	4.0	9.0	29.0	43.2
Governors replacement	2.4	1.6	2.0	1.8	1.5	2.7	1.9	2.9	16.8	14.6
Other Capex	23.0	26.7	29.4	34.4	28.9	29.4	28.0	22.3	222.2	193.2
Of which IT	6.1	5.5	6.8	17.6	14.9	24.0	16.8	12.7	104.4	49.1
Of which vehicles	4.5	5.1	3.1	2.8	3.4	0.4	1.3	2.9	23.4	32.2
Total	**46.4**	**55.0**	**68.3**	**64.7**	**55.4**	**61.2**	**50.9**	**57.1**	**459.1**	**449.7**
Allowance	59.4	64.0	68.2	63.5	48.3	48.7	48.4	49.1	449.7	
Variance	(13.0)	(9.0)	0.1	1.2	**7.1**	12.6	**2.4**	**8.0**	**9.3**	

Figure 8.12 : Capex forecasts compared to the allowance

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.

In the seventh year of RIIO-GD1 we have continued the mains replacement strategy set out in detail in our Business Plan. Our strategy is based upon utilising the flexibility within the 'Three-Tier Approach' to maximise the benefits for customers from mains replacement. We do this by considering other factors, not just safety risk, when choosing which pipes to prioritise for replacement. By continuing this strategy, we have built upon our already strong performance and delivered improvements in asset condition and safety performance beyond that forecast previously. 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 to date for the other outputs, along with forecasts for the RIIO-GD1 period. We expect to deliver all of these mains replacement safety outputs by the end of 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	21,471	20,268	20,238
Length of Mains taken off risk	495.2	485.4	521.5	464.2	475.5	516.4	529.0	497.6	470.6
Number of services replaced	30,932	29,305	29,609	27,579	29,275	29,908	30,984	27,667	29,260
Number of GIB events	144	56	42	58	52	60	53	49	50
Number of fracture and corrosion failures	2,742	815	883	685	683	689	678	569	650
Sub deduct networks 'off risk'	100%	7%	58%	83%	90%	90%	91%	100%	100%
Number of Planned Interruptions	64,257	43,276	57,434	58,925	59,677	62,669	63,774	50,413	57,354
Duration of Planned Interruptions (mm)	17.3	22.4	30.3	13.7	15.1	16.4	17.6	13.7	15.6

Figure 9.1 : Mains replacement forecasts

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	21,471 (7.8%)
2019/20 risk reduction achieved	20,268 (7.3%)

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 first seven years. In 2019/20 the total risk removed was 20,268 which gives a cumulative total of 206,130. 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 85% 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. We expect the amount of risk removed in the remaining year of RIIO-GD1 to reduce slightly due to the risk profile of those assets not yet replaced.

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 will be adjusted annually to match the actual workload. Our forecast for Tier 2a is to abandon 62.0km of main, which reduces the overall allowed workload to 3972.4km, an average target of 496.5km.

The table below illustrates the breakdown of these output targets, our performance to date, and forecasts for the remainder of RIIO-GD1. In terms of Total Mains, we expect to abandon 4,584.2km of main against a funded target of 4362.2, a 5% outperformance. The breakdown of this outperformance is discussed below:

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	437.9	3,690.3	3,584.0
Tier 1 – customer funded	15.4	1.8	2.1	2.9	1.9	2.0	2.2	1.6	2.1	16.6	122.9
Tier 2a	7.7	8.8	7.6	5.3	4.1	7.9	3.8	9.5	15.0	62.0	62.0
Tier 2b	20.4	22.1	18.3	12.2	12.4	24.7	26.8	23.0	24.0	163.5	163.5
Tier 3	5	7.4	5.7	3.9	4.3	2.4	4.5	8.1	3.7	40.0	40.0
Iron mains	**496.5**	**485.4**	**521.5**	**464.2**	**475.5**	**516.4**	**529.0**	**497.6**	**482.8**	**3,972.4**	**3,972.4**
Iron > 30m	-	8.7	9.3	11.4	10.8	2.7	7.3	5.5	7.1	62.9	-
Steel	48.7	57.6	75.6	45.9	59.5	59.6	58.6	58.1	60.0	475.0	389.8
Other	-	10.4	10.7	8.6	8.6	13.3	8.1	7.0	7.2	73.9	-
Total	**545.2**	**562.1**	**617.1**	**530.1**	**554.4**	**592.0**	**603.0**	**568.2**	**557.2**	**4,584.2**	**4,362.2**

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

In terms of Total Irons Mains, we have abandoned 3,489.6km of main to date at an average of 498.5km. This is 2.0km ahead of the inferred annual target, and cumulatively 13.8km ahead of the inferred year 7 target.

The total iron mains target includes an annual allowed workload of 15.4km for customer driven Tier 1 rechargeable mains diversions. To date we have abandoned 14.5km of iron mains associated with this type of work. This puts us 93.3km behind the seven year target of 107.8km and was the main driver why previously we had been behind the inferred iron main target.
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 forecast to abandon over 62.9km of this type of main in RIIO-GD1;
- **Steel** – we have abandoned 415.0km of steel to date, 74.1km ahead of the inferred 7 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. We expect this to continue and to abandon 475km over RIIO-GD1, nearly 90km over the allowed volume; and
- **Other** – we have abandoned 66.7km of other materials mains to date and expect to abandon 73.9km over RIIO-GD1. There is no allowed target for this type of work.

Focusing back on iron mains and starting with – **Tier 1 Mains** – the annualised abandonment target for both funded and customer funded mains is 463.4km per annum. We abandoned 457.1km of Tier 1 mains this year, 6.2km below this target. Cumulatively we have abandoned 3,266.9km, which puts us 23.1km ahead of target. Importantly we are also well ahead of the annualised target of 440km 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. We now expect this to increase to around 62.0km through dynamic growth. Cumulatively we have abandoned 47.0km of main which puts us behind schedule to deliver this overall workload. However, we have plans in place to recover this and expect to achieve the full revised target by the end of 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 was just ahead of the annualised target of 25.4km. We have focused on delivering the projects with the highest benefit as early as possible within the overall programme. Cumulatively we have completed 175.8km against a target of 177.8km. We expect to recover this position in 2020/21.

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
	1,153	144	56	42	58	52	64	53	49

Figure 9.4 : GIB events performance

The number of GIB events during the first seven years of RIIO-GD1 is well below the annualised target of 144, and in part, is a reflection of the 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.

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

Figure 9.5 : Fractures and corrosion failures performance

The number of fracture and corrosion failure events during the first seven years of 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.

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

Figure 9.6 : Number of services replaced

The total number of domestic services replaced during the first seven years of RIIO-GD1 has averaged 29,190, below the average annual target of 30,932. We saw a decrease of c3,300 services replaced compared to last year, largely as a result of the decrease in Tier 1 mains replacement work carried out.

There are 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.

Our project design methodology now has increased focus on both service asset performance and service density, and so we expect the service incidence rate to increase. However, we do not expect that this increase will offset the below target volumes seen so far in RIIO-1 and do not expect to hit the 8 year target. Cost benefit analysis shows that it would not be cost effective and in the interests of our customers to carry out a bulk service renewal programme to make up this shortfall. We have confirmed this in writing to Ofgem.

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**
	135	9	69	34	9	0	2	12	0	135

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 bringing the total number of sites to 135. During 2019/20 we negotiated the transfer of the operatorship and ownership of the remaining sites to the site owners. This involves ensuring that the site owners understand the safety and maintenance obligations they are responsible for managing.

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.

Ofgem are currently reviewing the targets for planned interruptions as part of the RIIO-GD1 Mid-Point Review. The targets detailed below are those currently proposed.

	Annual Target	Total	GDN Initiated	Customer initiated diversion	Customer initiated service alteration
Number of planned interruptions	**64,257**	**50,413**	47,956	215	2,242
Duration of planned interruptions	**17.35 mm**	**13.7 mm**	13.5 mm	0.05 mm	0.15 mm

Figure 9.8 : Number and duration of planned interruptions

The table above details our 2019/20 performance. We had 50,413 planned interruptions with a duration of 13.7 million of minutes (mm). As expected, this was mainly driven by the replacement programme, which accounted for 47,956 interruptions with a duration of 13.5 mm. This was a 20% decrease in volume from last year, driven by the decrease in total mains abandonment. We also saw a 1.5% decrease in the average minutes lost per interruption from 276 minutes to 272 minutes, which is driven largely by the type and location of the mains and services we have replaced as well as individual customer requirements.

The length of mains abandoned is the main driver of the number of planned interruptions and accounts for the majority of variances in our year by year forecasts for planned interruptions. It is not the only driver, however. Volumes will also be affected by the proportion of mains replaced via open cut – more open cut increases the number of interruptions required – and the length of mains we have been able to replace via live service insertion, which does not require an interruption.

Overall, we expect to outperform both the number of planned interruptions and minutes lost eight year RIIO-GD1 output targets. We expect to improve all aspects of the management and control of our replacement programme to minimise any project churn and hence impact on the customer. This will support delivery of this output.

9.2.8. Customer Satisfaction Survey results for planned interruptions

In 2019/20 we have delivered a score of 8.92, a minor increase from 8.83 in 2018/19.

Over the last twelve months we have made significant improvements to how we communicate with our customers during planned work. Following stakeholder and customer feedback, we have introduced bespoke webpages for each of our replacement schemes, which are kept up to date with live information on useful customer information such as road closures, duration, and gas-on times. We are also continuing to use Roadworks.Org, and more recently have customised this tool to provide better information to road users visiting this website.

9.3. Mains replacement costs

9.3.1. Repex compared to the allowance

Replacement expenditure	Net Costs 19/20 prices (£m)	Workload
Tier 1 – Mains laid	54.6	512.5
Tier 1 – Associated services	11.6	39,017
Tier 2a – Mains laid	3.9	7.7
Tier 2a – Associated services	0.1	216
Other – Mains laid	16.2	48.6
Other – Associated services	0.4	1,474
Diversions – Mains laid	3.3	9.2
Diversions – Associated services	0.1	170
Other services	9.0	5,940
Risers	0.0	16
Sub deducts	0.0	12
Total	**99.3**	
Allowance	**115.6**	
Variance	**(16.3)**	

Figure 9.9 : 2019/20 Repex costs and workload

The table above sets out our 2019/20 Repex costs and workload, along with the cost allowance. Overall, we spent £99.3m against an allowance of £115.6m (after adjusting for lower than allowed Tier 2A workload). This £16.3m 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 £0.8m for 2019/20. The main technique that has delivered efficiencies this year has been Stub end abandonment – a new techniques that allows us to cap off a smaller pipe connected to a larger pipe without leaving a short ‘stub’.

9.3.2. Mains and Services year on year performance

Mains and Services (19/20 prices)	2018/19			2019/20		
	Net Costs £m	Workload	Unit Costs £	Net Costs £m	Workload	Unit Costs £
Tier 1 + steel – Mains laid	58.6	512.5	114	54.6	493.5	111
Tier 1 – Services	11.8	39,017	302	11.6	36,573	318
Tier 2a – Mains laid	1.5	7.7	197	3.9	10.6	370
Tier 2a – Services	0.1	216	280	0.1	240	343
Other – Mains laid	17.8	48.6	366	16.2	44.6	363
Other – Services	0.5	1,474	352	0.4	1,181	319
Diversions – Mains laid	1.1	9.2	122	3.3	11.2	299
Diversions – Services	0.1	170	428	0.1	364	358
Other services	6.9	5,940	1170	9.0	5,989	1511
Total mains laid	**79.0**	**578.0**	**137**	**78.1**	**559.9**	**139**
Total services	**19.4**	**46,817**	**414**	**21.3**	**44,347**	**479**
All in mains cost	**98.4**		**170**	**99.3**		**177**

Figure 9.10 : Repex year on year variance

In terms of year on year performance, the all in mains laid unit rate averaged £177 per metre this year, an increase of £7 per meter when compared to 2018/19. Our Tier 1 mains and services net unit rate actually showed a small decrease; however, this was more than offset by increases in particular in Tier 2a and Diversions. 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 8.2.2 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%	27%	(13%)	1%	3%	2%
>75mm to 125mm	45%	62%	17%	6%	4%	(2%)
>125mm to 180mm	14%	11%	(3%)	9%	16%	7%
>180mm to 250mm	2%	1%	(1%)	25%	32%	6%
>250mm to 355mm	0%	0%	0%	40%	33%	(7%)
>355mm to 500mm	0%	0%	0%	14%	11%	(3%)
>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 year on year 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 16 risers have been replaced this year.

Sub-deduct networks present a potential safety risk as the owner and operator of these networks is not always clear. We use a risk based approach to manage and target our sub-deduct work programme. During 2019/20 we negotiated the transfer of the operatorship and ownership of the remaining sites to the site owners. This involves ensuring that the site owners understand the safety and maintenance obligations they are responsible for managing.

9.4. Repex cumulative position under RIIO

Cumulative Repex 19/20 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Cum Total	Cum Allow.	Var.
Repex	101.9	106.9	96.4	93.6	96.3	98.7	98.2	692.1	786.5	(94.4)
Total	**101.9**	**106.9**	**96.4**	**93.6**	**96.3**	**98.7**	**98.2**	**692.1**	**786.5**	**(94.4)**

Figure 9.12 : Cumulative Repex position compared to the allowance

Cumulatively we have outperformed the £786.5m Repex allowance by £94.4m (12.0%).
It is important to remember that the majority of the allowances are fixed and do not vary by workload, with the exception of Tier 2a which represents less than 1% of the total expected mains abandonment. To date we have abandoned 3,489.6km of iron main against an inferred 7 year target of 3,475.8km, which puts us 0.4% ahead of target.

9.5. Repex forecasts

2019/20 actuals against forecast

2019/20 Repex forecast 19/20 prices (£m)	19/20 forecast	19/20 actuals	Variance
HSE driven mains and services	73.7	69.5	(4.2)
Non HSE driven mains and services	27.0	28.7	1.7
Risers	0.1	0.0	(0.1)
Total	**100.8**	**98.2**	**(2.6)**

Figure 9.13 : 2019/20 actual Repex position compared to the prior year forecast

The table above summarises our actual Repex expenditure in 2019/20 against the forecast for 2019/20 we submitted last year. Overall, we spent £98.2m, a £2.6m decrease from the forecast (2.6%). In terms of volume we completed 568.7km of mains abandoned against a forecast of 584.4km (2.6%). Our overall unit cost increased slightly as a result of workload mix, accounting for the 1.2% variance.

RIIO-GD1 forecast

Repex forecasts 19/20 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
HSE driven mains and services	74.4	81.1	72.5	74.0	70.2	72.0	69.5	68.0	581.5
Non-HSE driven mains and services	27.4	25.8	23.8	19.5	26.1	26.5	28.7	26.5	204.8
Risers	0.1	0.1	0.1	0.3	0.1	0.3	0.0	0.1	0.4
Repex totals	**101.9**	**107.0**	**96.4**	**93.7**	**96.4**	**98.7**	**98.2**	94.5	**786.6**

Figure 9.14 : Repex forecasts

The table above summarises our RIIO-GD1 Repex expenditure forecast, based on the first seven years' actual performance and a forecast for the remaining year. We expect to achieve all of our output targets through our replacement programme whilst outperforming the allowances.

We will achieve this by re-engineering our replacement programme in line with our Total Network Management (TNM) approach. In particular we continue to fully utilise the added flexibility introduced in the new 3 tier approach to replacement, as well as maximising the return on this investment through a detailed cost benefit analysis approach.

In terms of the forecast cost profile above, we are introducing further efficiencies into our delivery model by expanding our commercial and operational strategy, which has already delivered benefits. We expect to achieve year on year unit cost savings as a result.

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 2019/20 and our forecasts for the next year. 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 2019/20. We continue 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.

One Year Outputs	RIIO-GD1 Year 7 target	19/20	RAG	
Emergency response				
97% of uncontrolled gas escapes attended within 1 hr	97%	99.83%	G	Link
97% of controlled gas escapes attended within 2 hrs	97%	99.49%	G	
Repair				
Annual repair risk (m)	<34.5	23.0	G	Link
Percentage of repairs completed within 12 hrs	62.0%	64.25%	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	12	12	G	Link

Figure 10.1: 'One Year' safety outputs performance

The table below shows the safety outputs which have an eight year output target. In most cases we have inferred an annual target based on the eight year output target in order to track progress, but we assess the performance against our cumulative and forecast performance.

8 Year Output	RIIO-GD1 Year 7 inferred target	19/20	RAG	
Mains replacement				
Risk removed (incidents/year x10^{-6}) as measured by MRPS	13,899	20,268	G	Link
Number of Gas in Buildings (GIB) events	144	49	G	Link
Number of fractures and corrosion failures	2,742	569	G	Link
Length of main taken 'off-risk'(km)	497.2	497.6	G	Link
Number of services replaced	30,932	27,667	G	Link
Asset health and risk metrics	Phased plan	On Target	G	Link

Figure 10.2: 'Eight Year' safety outputs performance

We are making good progress delivering our safety outputs. We are cumulatively 9.2km ahead of the inferred year 7 target for length of mains taken 'off risk'. The number of services replaced is below target this year. We are currently 5% behind target here mainly as we have seen fewer services replaced when completing emergency response work, driven by the relatively mild winters we have experienced in previous years. 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 are not forecasting any breach of legislation.

	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 forecast

Output: Compliance with the 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 is to maintain full compliance with GS(M)R throughout RIIO-GD1. We have achieved this in 2019/20 and expect to for the remainder of RIIO-GD1.

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 7 inferred target	19/20	RAG	
Loss of supply				
Number of planned interruptions	64,646	50,413	G	Link
Number of unplanned interruptions	12,960	12,110	G	Link
Duration of planned interruptions (mins-millions of)	21.3	13.6	G	Link
Duration of unplanned interruptions (mins-millions of)	5.9	5.6	G	Link
Network capacity				
Meeting NGN's 1 in 20 planning standard (MWhpa)	505,357	485,014	G	Link
PRI utilisation and capacity	Phased plan	On Target	G	Link
Network reliability – maintaining operational performance				
Percentage by volume of offtake meter errors	<0.1% pa	0%	G	Link
Number and duration of telemetered faults	136 pa	94	G	Link
Pressure System Safety Regulation (PSSR) Faults (A1 and A2 faults per number of AGIs)	0.49	0.19	G	Link
Gasholder decommissioning	3	1	G	Link

Figure 10.4 : Reliability outputs 2019/2020 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 in order to track progress. Number of unplanned interruptions & Duration of unplanned interruptions (mins-millions of) are within the RIIO GD1 7 Year cumulative inferred target.

Our year seven performance on reliability outputs has been good. We expect to deliver all our reliability outputs. More detail and explanation on each individual measure can be found below and by following the links in the table above.

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 52 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. However, in our 2019 modelling process we forecast an increase in peak demand for the year 2019/20, then in 2020 we have forecast a further increase for the 2020/21 year. After experiencing a series of mild winters since 2010/11 our peak demand had previously looked like it was in steady decline, but we believe this is no longer the case. Our peak demand profile appears steady and flat from 2021/22 onwards.

In 2019/20 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. 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 forecasts.

Meeting NGN's 1 in 20 planning standard (MWh pa)	**RIIO Annual target**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**
	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).

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

Figure 10.6 : Offtake meter errors forecast

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 has been an improvement from previous years with Zero meter errors recorded this reporting 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.

	Year 7 inferred 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	136	105	63	135	63	95	116	94	120

Figure 10.7 : Telemetered faults forecast

Continuous scrutiny is still being applied to fault logs, there were no surprises this year forecast is under the RIIO target. At present, it is unclear how much of an impact the COVID-19 outbreak will have on the figures next year. The impact has not been reflected in the figures and the emergency situation has happened right on the regulatory year boundary. It is possible availability (or lack of) of personnel to attend in the 2 hour fault window would be the biggest impact on the score.

In 2019/20 we had the number of 'now' faults duration in hrs / number of telemetered AGIs as 94 against a target of 128 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.

Output: Pressure Systems Safety Regulations (PSSR) faults

Statutory inspections are carried out on our above two bar network under the Pressure Systems Safety Regulations which can find faults. 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 19/20 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	0.48	0.43	0.26	0.31	0.35	0.37	0.29	0.19	0.47

Figure 10.8 : PSSR faults forecast

The RIIO-GD1 target for the proposed new measure is <0.48 faults per inspection. We have achieved 0.19 faults per inspection in 2029/20, significantly lower than last year and below the target. The target reduces year on year throughout RIIO-GD1, and we expect to outperform this target every year.

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 7 target	19/20	RAG	
Customer satisfaction survey				
Unplanned interruption (Overall satisfaction score from 0-10)	9.0	9.48	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	2.46	G	Link
Stakeholder engagement				
Maximise rewards under the stakeholder incentive target (score from assessment panel)	>5.0	6.96	G	Link

Figure 10.9 : Customer service outputs 2019/20 performance

We have achieved a good outcome in our customer service outputs. We have maintained a strong performance for complaint handling and performed well in the stakeholder engagement assessment.

In 19/20 we have seen a slight increase in performance overall. For our Emergency and Replacement scores, we have maintained performance from 18/19 to 19/20. However, we have seen an increase in our planned and connections 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 are aiming to achieve the maximum reward under the scheme, and so the scores necessary to achieve this are our minimum targets. We are forecasting to outperform these targets throughout RIIO-GD1.

10.4.1. Complaints Metric

Under RIIO-GD1, complaints performance is incentivised through penalties for poor performance. Our aim is to avoid any penalties for all of 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 2019/20.

	Complaint Scores
Percentage of complaints unresolved after one working day	20.19%
Percentage of complaints unresolved after 31 working days	1.13%
Percentage of repeat complaints	0.21%
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 2.46 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, but we will look to improve this year on year.

	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	2.5

Figure 10.11: Complaints metric forecast

In 19/20 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.

We have continued to hold our daily complaints call but introduced an improvement to this by using one of the daily calls to focus on resolution for complaints over 1 day old. This has helped to improve our performance for D+31 complaints. We have also introduced a jeopardy report that focusses on open complaints approaching D+10 and D+20. Finally, our robust quality checks ensure that repeat complaints are kept to a minimum. We continue to have had no Ombudsman findings against NGN for RIIO-GD1.

10.4.2. 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.

This year we have continued to embed our proven engagement strategy, building on areas of strength and adapting our approach in areas where there is room for improvement.

We have focused on strengthening accountability in engagement planning and building on our business wide engagement planning process. This has seen our senior leadership team develop their own directorate engagement plans - reaching further across the business than ever before.

In order to improve our understanding of our stakeholders and enable us to target stakeholders effectively we've invested in two new systems - Mapolitial and a new stakeholder database system - that give us better, smarter data on our stakeholders and help us to better target our engagement.

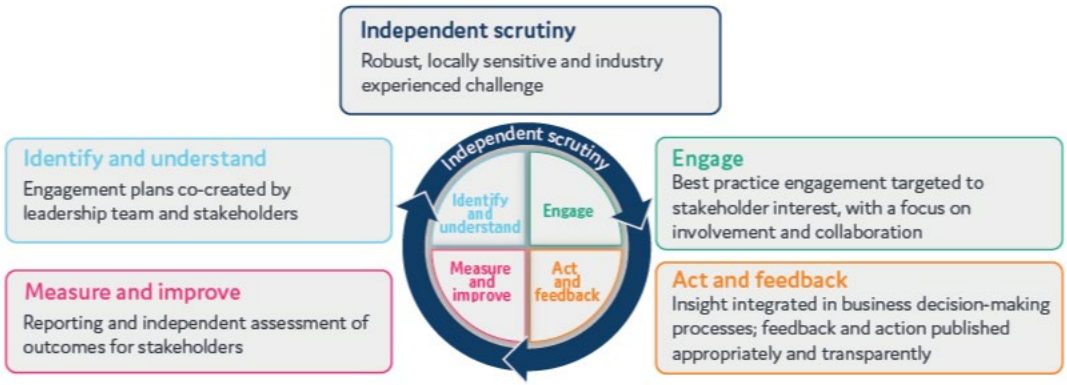
We've continued to deliver sector leading engagement mechanisms, including establishing our Citizen's Jury as an enduring mechanism- the first of its kind in the utilities sector - and harnessed the engagement power of our operational teams through new operational engagement targets embedded across each of our patches.

This has led to positive feedback from our independent observers, including the BITC's nationally recognised Responsible Business Tracker scheme, our independent external audit and our Customer Engagement Group.

"NGN has consolidated its learning from previous years, and now demonstrates 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. However, this year those strengths have been accompanied by significant improvements in engagement planning, identifying and mapping stakeholders beyond the usual suspects, learning from engagement, capacity building and exploring new methods for engaging."
SGS, Internal Management Report for Northern Gas Networks 2020.

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

In order to deliver great outcomes for our stakeholders we need to be great at engaging with our stakeholders. Throughout this year our engagement has been 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 with our RIIO-2 Business Plan. In December 2019, the Group submitted its independent review of that engagement, concluding that "It is our opinion that NGN designed and delivered an exceptional engagement programme."

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 seventh year in a row and our approach to auditing throughout the year is helping us to continually measure and improve how we engage.

This year, we also took part in BITC's nationally recognised Responsible Business Tracker scheme, which allowed us to understand how our broader engagement programme compares, inside and outside of sector.

Northern Gas Networks (NGN) should be commended for how it has identified and mapped its stakeholders and its ability to demonstrate a robust methodology for identifying their key issues and priorities. This has created the credibility and confidence that you are focusing and addressing the most material issues.
Business in The Community Responsible business tracker, March 2020,

In 2019/20 we have:

- Heard over 190,000 voices
- Engaged with over 24,000 stakeholders from the doorstep through to the board room and online
- Listened to over 6,000 vulnerable customers
- Had 10,000 interactions with stakeholders through our Together online engagement hub
- Become the first GDN to establish an enduring Citizens' Jury
- Engaged with 79% of customers for the first time
- Received an average rating of 9.1/10 for our stakeholder workshops

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 establishing a hardship fund for customers who need additional support through to working collaboratively with local authorities to support local place-making efforts and developing sustainable and net zero futures for the communities we work in and with.

Stakeholder Incentive Scheme

In 2019/20 we achieved a score of 6.96, 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 will continue to build on this performance

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	6290	G
Total capacity of biomethane enquiries/applications in progress (SCMH)	No target	9,170	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

Throughout 2019/20 we have connected seven new biomethane plants to the network. One of these connections subsequently increased its maximum flow rate, bringing the total capacity connected throughout the regulatory year to 6290scm/h. This brings the total number of connected sites to 17 and a maximum capacity of 16,340scm/h. This is a 62% increase in capacity from 2018/19.

There are no new connections forecast for 2020/21, however the extension of the Non-Domestic Renewable Heat Incentive and the development of the Green Gas Support Scheme are likely to renew interest in connections.

The table below provides a forecast of enquiries and connections for the RIIO-GD1 period, together with performance against the voluntary standards of service. The voluntary standards of service currently cover pre-quotation data and we have met all our voluntary targets this year.

	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	-
Information provision and connection charging for distributed gas	No target	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 forecast

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 in order to track progress.

Eight Year Outputs	Inferred Annual Target	19/20	RAG
Shrinkage gas			
Shrinkage baselines (GWh)	390	329	G
Leakage baselines (Gwh)	364	306	G
Business Carbon Footprint			
BCF excluding shrinkage	None	22,294	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	13,505	G
Amount of spoil to landfill sites	<13,000	120	G
ISO14001 major non-conformities	None	0	G

Figure 10.14: Environmental narrow measure 2019/20 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 and forecast 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	Forecast 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**	295

Figure 10.15: Shrinkage & Leakage performance

We have continued to successfully outperform both our shrinkage and leakage targets in 2019/20, reducing overall shrinkage by a further 12 GWh from last year. We plan to further outperform the annual targets throughout RIIO-GD1. We will achieve 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. In 2019/20 we have seen a decrease in our average system pressure from 31.95 mbar to 31.63 mbar. This was predominantly due to a challenge we faced with a piece of monitoring equipment called an OKO. Rather than a costly full replacement of the product, we have worked with the manufacturer to produce a safe and simple battery replacement process which will keep the devices running well into GD2. This is at a fraction of the cost and effort of replacement.
- 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. For 2019/20 we improved on our 2018/19 progress and were confident that our network pressures were set appropriately.
- Effectively managing our levels and use of MEG (Monoethylene Glycol), a 'wet' gas used to saturate and swell metallic joints which otherwise may leak gas. This year MEG saturation has decreased from 22.09% to 17.06%. 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 in the 2020/21 regulatory year.

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 will be compared with other GDNs and published on an annual basis. The table below shows our performance to date and forecast for the remainder of 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	6,470
NGN non-shrinkage BCF (Scope 3) - tCO2e	12,821	16,298	15,287	13,135	14,409	15,095	15,793	13,562
NGN non-shrinkage Total BCF - tCO2e	21,739	25,542	23,763	21,135	21,827	21,832	22,294	20,032

Figure 10.16: Business Carbon Footprint forecast

*Forecasts based on NGN's Scope 1 and 2 Science Based Targets for a well below 2 degree warming scenario in 2050 as developed in conjunction with the Carbon Trust. Our 2019/20 Scope 1 and 2 emissions have already achieved our target for 2020/21 so we have forecast additional 2% annual reductions beyond our 2019/20 performance to ensure we deliver continuous improvement.

Our Scope 1 and 2 BCF (excluding shrinkage) has reduced by 37% between end 2013/14 and end 2019/20, and by 3.5% between Years 6 and 7.

Notable achievements in 2019/20 include:

We used 4% less electricity in our buildings and above ground sites, which resulted in an almost 13% drop in emissions. This is due in part to an ever-changing conversion factor- which reflects the increase of renewables in the UK energy mix. But it's also the result of extensive refurbishment and upgrading of lights and equipment in our offices over the GD1 period. It's also indicative of positive behaviour change in our colleagues. Corresponding reductions in Scope 3 emissions attributed to electricity transmission and distribution losses have also been achieved.

Continued reduction in emissions from fleet is indicative of our fleet replacement strategy and continuing improvement in overall efficiency of our vehicles.

We saw a 15% reduction in emissions from gas use which is partly due to improved efficiency of heating equipment at our sites and allowing colleagues zonal control of their temperature. However, early 2020 was particularly mild, and so the need for heating was reduced in the months which usually see highest gas consumption.

Notably, during 2019/20 we experienced a 4.45% increase in emissions from Business Mileage as compared to 2018/19. This is the result of us driving an additional 250,000 miles across the year. We have seen fluctuations in business mileage in since the start of GD1, and overall business mileage emissions are 10.66% lower than in Yr1 of GD1.

Output: Statutory remediation of contaminated land

No specific targets have been set for statutory land remediation. During 2019/20 we continued our programme of reviewing our portfolio of sites with potential for land contamination, and land remediation monitoring and maintenance works were completed across 72 sites. This included intrusive land contamination surveys at two sites and environmental sampling at a further nine sites to provide an updated assessment of the environmental risk and potential liability associated with each site. In addition, site inspections were completed at 61 former gasworks sites to ensure their conditions remain stable and their existing environmental risk assessments remain valid.

Remediation projects were completed at two former gasworks sites during 2019/20 to reduce environmental risks to receptors at each site as detailed below:

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. This is an on-going, long term remediation project which had recovered over 700 litres of coal tar by the end of March 2020, using only renewable energy. This project is continuing to operate into 2020/21 and potentially beyond.

Kirkburton Governor Site: Securing an area of former gasworks land to ensure site conditions pose no unacceptable risks to site users or neighbours.

During 2017/18 we commenced a land remediation project at Knottingley AGI 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 2019/20 over 1,300 litres of toxic coal tar were recovered for safe disposal. The treatment system continues to operate and has been shortlisted for the 'Sustainability Award' at the 2020 Ground Engineering Awards.

During 2019/20 we completed our remediation works at Redheugh Gas Holder Station. In total our innovative solar powered in-situ remediation system recovered over 6,100 litres of toxic coal tar for safe disposal, using only renewable energy whilst having minimal impact on stakeholders.

The town gas era has left a legacy of contamination across the UK and worldwide associated with the by-products of the gas manufacturing process. One such contamination source characteristic of former gasworks is 'blue billy', a cyanide enriched waste from historical town gas purification which is toxic to humans, flora and fauna and which readily contaminates groundwater. There are currently few remediation options available to deal with this contamination other than disposal to landfill. During 2019/20 we funded a research project to examine the potential to bioremediate this waste as a more sustainable alternative to landfill disposal. The research has proven positive and has been prepared as a technical paper for publication and the intention is to proceed to laboratory-based trials during 2020/21.

We expect to carry out further monitoring/maintenance works and remediations during 2020/21 as detailed below. The impacts of COVID-19 may affect the delivery of this forecast workload, in particular if lockdown extends beyond summer 2020, however we will work with our supply chain to attempt to minimise any such impacts.

	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	**45**

Figure 10.17: Statutory remediation of contaminated land

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

In 2019/20 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 in 2019/20 and meant that we achieved our target for the fourth consecutive year. Between 2013/14 and 2019/20 the tonnage of spoil we have sent to landfill has reduced by approximately 99% for a similar workload.

Our tonnage of virgin aggregate used during 2019/20 was approximately 20% below our annual business target for this measure. This is the third consecutive year that we have achieved this target during RIIO GD-1. Between 2013/14 and 2019/20 our usage of virgin aggregate has reduced by approximately 64% for a similar workload.

Unfortunately, our use of virgin aggregate increased in 2019/20 compared to 2018/19, by approximately 40% equating to an increase of 5,300 tonnes. This relative increase in the use of virgin aggregate was predominantly experienced in the second half of the regulatory year and is interpreted to be associated with difficulties in obtaining quality recycled aggregate during the unseasonably wet second half of the regulatory year.

In 2019/20 we experienced some difficulty in auditing the robustness of our spoil and aggregate data from Delivery Service Partners (DSP). This was due to the unprecedented steps taken by the government around the global pandemic, Covid-19. Movement of people and therefore business as usual was halted on the 23rd March when the government introduced lockdown measures and has continued to present. This alongside the subsequent furloughing of many staff at presented challenges to face-to-face auditing. We digitally audited around 50% of our DSPs and found minimal errors, but trends were identified and will be communicated and rectified in the coming months, as soon as is possible.

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 in order 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 2020) 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. Additionally, some of the YHAUC registered recycling centres do not produce approved recycled aggregate, or operate at reduced production rates, between October and March. This is due to the sensitivity of the recycled material and production process to the wet winter weather and as referenced above this hinders our ability to procure approved recycled aggregate during these times of the year in parts of our network area.

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 this year in 2020/21 we will be automating the submission of data from DSPs through utilising Control Hub.

As a result of our performance to date, trends shown throughout 2016/17 to present and extra measures we'll implement, we anticipate that our spoil disposal to landfill will remain low and we will continue to achieve reductions in usage of virgin aggregate throughout the remainder of RIIO-GD1. This will enable us to consistently achieve our annual business targets for these measures.

	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%)	7,500
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%)	100

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

Output: ISO 14001 major non-conformities

During October 2019 our Environmental Management System was subject to an external annual surveillance audit against the ISO14001:2015 standard. No observed weaknesses or major non-conformities were identified.
We anticipate continued high-level performance with no major non-conformities during RIIO-GD1.

	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. In most cases we have inferred an annual target based on the eight-year target in order to track progress.

	Inferred Annual Target	19/20	RAG
Number of fuel poor network connections	1,917	1933	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	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 in 2019/20. Cumulatively we are ahead of schedule on the number of fuel poor connections completed, meeting our full GD1 target of 14500 Fuel Poor Connections. We are now working to exceed the target.

Output: Fuel Poverty

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 insulation and central heating. This continues to be successful, and during 2019/20 we have developed further relationships with more Social and private Landlords to extend our reach and delivery, particularly successful has been raising the profile and impact of changes to FPNES, whereby geographic based schemes remain less likely to be feasible following the removal of the LSOA criteria. 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, and work with community-based organisations to access those that could be considered hard to reach.

Having progressed research based on the health impacts for those living in cold homes. 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 clod homes, and we look forward to providing the results of this research in July 2020, the purpose of the research being to establish evidence to support the benefits of living in a warmer environment, particularly for those with cold related ill health.

Off-gas communities – rural

We have continue to support our 'Warm Hubs' scheme in remote rural areas with Community Action Northumberland, after 3 years support from NGN the scheme now continues and is self-sustainable, and whilst our support for Warm Hubs from NGN is now "light touch" we have progressed a spin off project, a series of Pop up warm hubs, different to warm hubs as they will take the learning from Warm Hubs and make it mobile rather that location this will be tested for two years.

Energy Challenges

Recognising that Fuel Poverty and Energy Efficiency go hand in hand, we have undertaken work to test several activities;

Green Doctors, a previously jointly funded initiative with NPG has been extended for another two years, now into its second year, in addition to previous switching/Energy efficiency we have funded the establishment of further services to cover more remote/rural areas. Additionally, in 2019/20 we jointly developed an accredited (BPED) energy efficiency course, early trials brought very positive results which are now a feature of our planning for GD2.

Yorkshire Energy Doctor agreed in September 2019 this is a two-year contract to promote Energy Efficiency to training community champions to work within their communities.

Support for Durham, we have supported and funded a role with DCC to work with people in the Durham area to promote WHD, Fuel Switching and provision of energy advice.

Making Every Contact Count- an NIA funded project whereby we recognise the challenges if vulnerable customers are disconnected, ensuring that where vulnerability is sensed suitable follow up support is undertaken. The results from this work were very positive and as a result, we now plan for GD2 to embed this across all of our network to bring assistance resulting in support to vulnerable customers avoiding where possible them being disadvantaged through circumstance.

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 and in 2019/20 we have trained a diverse and difficult to reach customer group through delivery of sessions at a range of organisations such as Fire and Rescue Services and a range of local community groups.
- 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
- In Collaboration with other GDNS, we have also undertaken the following promotions;
    - Billboard advertising- a national campaign across all GDNs promoting CO alarms on main routes into cities across the UK
    - Bounty Pack promotion- raising the profile of CO with expectant mothers through info provided during pregnancy
    - Support for the All-Party Parliamentary Party (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
- 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 is scheduled for July 2020, but we remain committed to meeting and where possible exceeding the standard.

Community Promises Fund

We continue to work in partnership with ‘trusted intermediaries’, and in have continued our Community Promises Fund, jointly with Northern PowerGrid, this has doubled the fund to £100k, and provides two application rounds per year 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
- Carbon Monoxide awareness
- STEM (Science technology engineering and maths).

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 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 target	19/20	RAG
% of standard connection quotes issued in 6 working days	99.6%	97.9%	A
% of non-standard connection quotes below 275kwh issued in 11 working days	99.6%	97.67%	A
% of non-standard connection quotes above 275kwh issued in 21 working days	99.6%	96.54%	A
% of land enquiries where response sent within 5 working days	99.6%	97.21%	A
% of commencement and completion dates for connections below 275 kwh provided within 20 working days	99.6%	97.67%	A
% of commencement and completion dates for connections above 275 kwh provided within 20 working days	100%	91.38%	A
% of connection jobs substantially completed on date agreed with customer	95%	97.17%	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, six out of our seven targets were missed. We saw this drop in performance as we transitioned to our new SAP 4 HANA platform . We have now recovered our position; however, it has affected this year's performance.

- NGN set a target of 99.6% on the % connections quotes issued and we have seen this service level drop to c.97.5%
- We also saw a drop in % of commencement and completion dates for connection above and below 275kwh.
- % of connection jobs substantially completed on date agreed with customer exceeded the NGN target of 95% by 2.17%.

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)

Under RIIO-GD1, allowed revenues are indexed by the Retail Price Index (RPI). However, it is expected that the price of several inputs will not change in line with RPI inflation, most notably labour. To account for this differential our allowances are based on forecast differences between economy-wide inflation, as measured by RPI, and input price inflation, which is known as the Real Price Effect (RPE). In other words, RPEs represent the actual change in input prices over and above the level of inflation in the economy.

Specifically, RPE is calculated by the following formula:

RPE = Input Price Inflation minus **Retail Price Inflation**

The approach used to set RPEs over RIIO-GD1 was to draw on outturn data and short term wage growth forecasts using the latest forecasts published by HM Treasury, and use the real average historical rate for relevant input price indices for all other years.

Labour RPEs

For labour costs, which comprise around 60% of our costs, forecast RPEs are 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.

For 2014/15, allowances were based on a positive labour RPE of 1.3% following two years of negative real wage growth as shown in the table below.

Labour RPEs	Assumption RPE	Retail Price Index	Assumed Labour wage change	Actual labour wage change	Actual RPE
2012/13	(0.8%)	3.1%	2.3%	2.7%	(0.4%)
2013/14	(0.2%)	2.9%	2.7%	2.9%	0.0%
2014/15	1.3%	2.0%	3.3%	2.7%	0.7%
2015/16	1.3%	1.1%	2.4%	2.7%	1.6%
2016/17	1.3%	2.1%	3.4%	2.7%	0.6%
2017/18	1.3%	3.7%	5.0%	3.4%	(0.3%)
2018/19	1.3%	3.1%	4.4%	3.2%	0.1%
2019/20	**1.3%**	**3.1%**	**4.9%**	**Still under review**	**Still under review**

Figure 11.1 : Labour RPEs

During the years 2014/15 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. For those whom are collectively bargained negotiations are currently on going, having been delayed as a result of COVID 19. As in previous years these rates have been part of an overall package of measures which have included;

- As at 31/3/2020, the number of operational (industrial) colleagues on new terms and conditions was 484, with 162 remaining on legacy terms. This represents a shift from 7.5 % on new terms and conditions at the beginning of GD1, to 75% at 31/3/2020

- In line with our ambition to be the best at all that we do, we continue to strive for increased productivity and output levels and a customer-focused culture of 'right first time'. 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 2019, The Totex Site Manager Incentive scheme paid out a bonus for the first time, which was based on the outcomes of Operational Score card. This scheme was introduced in 2018 as part of the new Totex Site Manager role.

- 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.

- For those colleagues, the number on personal contracts has increased to 566 at 31/3/2020 which represents 40%. At the beginning of GD1, this figure was 5%.

Non-labour RPEs

For RIIO-GD1, 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.

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.

12. Covid-19

Covid-19 is continuing to have a significant impact across our Network. We first felt the impact in late 2019/20 and the effects quickly escalated at the beginning of the 2020/21 regulatory year. The exact scale of the impact is difficult to estimate and predict, due to the environment we are operating in and our customer's expectations are constantly changing. As a result, and after discussions with Ofgem, the forecast information within this document and the RRP table submissions have been prepared on a pre Covid-19 basis – assuming the pandemic had not taken place.

Wherever possible, we have attempted to mitigate the impact of Covid-19 on our operations and our customers, whilst recognising we are a key emergency service and that many of our front-line employees are designated as key workers. 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.

The workload suspension has reduced planned workload across many of our activities. The scale of the reduction makes it clear that not all of this shortfall can be recovered in RIIO-1, even if the pandemic was to end now. We have also seen reductions in our reactive emergency and repair work, we believe as a result of social distancing and the reduction of population mobility. Customers may also have been keen to avoid putting pressure on key services, reducing the number of calls to the 0800 emergency number.

This reduced workload across the network, together with new ways of working both during the pandemic and after, will most likely lead to increased unit costs. These costs pressures will also be felt during any remobilisation period, with many of these pressures likely to continue as new requirements.

Lower workload but higher unit costs will have knock on impacts across many of the outputs and incentives we need to deliver under the RIIO-1 framework. These include:

- The Totex Incentive Mechanism (TIM) performance is likely to show improvement due to lower workload delivery, but this will be offset by higher unit costs;
- Shrinkage and Leakage will increase due to reduced Repex workload, impacting our environmental performance and the incentive significantly;
- Customer Service survey volumes requirements are unlikely to be met for the incentive;
- Interruptions durations may increase due to access issues / social distancing, which may impact Customer Scores and Complaints
- Workload driven outputs will be impacted – holder demolition, Repex abandonment – which will all impact NARMs.

The tables below provide more granular detail of the expected impacts across Opex, Capex and Repex, covering workload, costs, outputs and incentives. Reduced field work will have several other consequences;

- A slowdown in our Innovation investments for any projects requiring field trails;
- An artificial reduction in our Business Carbon Footprint. We are likely to see changes to this going forward as a result of Covid-19 but 2020/21 is not an appropriate baseline;
- Spoil to landfill and the use of virgin aggregate will also reduce.

Opex				
Workload		**Costs**	**Outputs**	**Incentive**
Emergency & Repair	PREs, Reports, Repairs have all reduced during lockdown period Exact reasons unclear – 70% PREs are non-network calls, more people at home so could have increased. Potential build-up of work. This has also impacted Repex Other Services Re-laid after escape. However reduced Repex abandonment completed means risk that volumes in the future will be more than expected as a higher proportion of poor performing pipes will still be in the ground	Reduced use of specialist contractors and overtime due to lower workload. This is likely to be more than offset by reduced charge out – less chance to use the resources on other activities as fill in work which have also paused – maintenance, Repex, connections. Also operating costs during remobilisation – property access, social distancing, PPE, two vehicles, site safety, barrier checks. Some likely to become the norm certainly in the medium term.	**97% 1 & 2 Hour Standards: % Repairs completed in 12 hours** Annual Repair Risk Reduced volumes of work & increased resource availability enable strong performance – no issue **Customer Satisfaction** RIGs survey volumes won't be met due to lower workload Not statistically robust **No. and Duration of unplanned interruptions** Lower number and duration due lower workload	**Customer Satisfaction** Incentive could be 'biased' either way due to reduced sample size Results could be impacted by changed customer expectations especially during access **Totex Incentive Mechanism** Reduced use of specialist contractors and overtime during lockdown will be more than offset by increased costs during remobilisation and in the medium term, reducing outperformance Reduced charge out – impact at the Totex level may be minimal in the short term, as costs here will be offset by reduced costs elsewhere. However, this is stranded cost not delivering output, some of which will need to be delivered at some point – connections, maintenance, Repex etc
Maintenance	Many areas of work on hold, focused on any that require social distancing. Expectation that majority of workload can be recovered, though that will depend on availability and competition for specialist contractors for some activities	Workload recovery likely to increase unit cost – competition for specialist contractors. Remobilisation costs will increase – social distancing, PPE, two vehicles, site safety, welfare May become the norm.		
Operations / Customer Mang.	Impacted mainly by Emergency and Repair workload as above, and to a lesser extent by Maintenance, which has also been on hold	Likely to see an increase by reduced charge out – similar to Emergency and Repair above		
System Control / Asset Mang. & Business Support	Lock down – Adapting to new ways of working.	Limited impact.		
Training & Apprentices	Largely on hold due to social distancing etc	Most costs are 'stranded', some aspects of training or may need 'rebooking'		
Holder Demolition / Land Remediation	All works on hold. Mainly specialist contractors – difficult to increase workload to catch up programme – high probability all planned works won't be completed in RIIO-1 Land Remediation monitoring and maintenance can be suspended and restart when possible – ongoing programme.	Physical projects may not all be completed, leading to reduced costs. Future costs of delivery will increase during remobilisation and on an ongoing basis - social distancing, PPE, two vehicles, site safety, welfare. Competition for specialist contractors could increase costs in the short / medium term	**Risk** May not complete all 23 holder demolitions **Risk** May not complete all planned remediation projects	

Figure 12.1 : Covid-19/ Opex impacts

Repex			
Workload	**Costs**	**Outputs**	**Incentive**
Reduction in mains and services abandoned Whilst work is suspended – including MOBs and special crossings Other Services re-laid after escape also reduced due to lower PREs, Reports and Repairs in Emergency and Repair – may increase if there has been a reluctance to call out. High level of general and specialist contractors – limited supply – potential to lose to other sectors / networks. Difficult to increase activity to catch up programme – high probability all planned works won't be completed in RIIO-1 **Impact on Emergency and Repair** Likely to be more reactive work as fewer iron mains will have been abandoned	**Workload volume & mix** Costs may decrease at the programme level if we are not able to catch up and deliver all workload targets – mix of work may move towards Tiers 2/3 as fewer services / customer interactions. Customer reaction to work starting unknown. **Unit Costs and loss of productivity** Remobilisation loss of productivity Avoid property access (shorter projects, complete mains then services at a later date), social distancing, PPE, two vehicles, safety, barrier checks, welfare Ongoing loss of productivity Some remobilisation costs will become the norm – PPE, restricted access, safety. Councils and Streetworks changes may lead to increased planning costs and constraints on location – walkway size Competition for resource to complete workload over shortened periods Fixed programme costs – direct and indirect overheads still incurred during lower activity – IT, Finance, Commercial, Property, Design, Scheduling etc	**Shrinkage and Environmental Emissions** Targets likely to be met but driven by earlier outperformance which feeds forward, due to cumulative nature of work. **Customer Satisfaction** RIGs survey volumes won't be met due to lower workload. Not statistically robust **Risk Removed** Target already met **Mains / Services abandoned** Probable all targets won't be met **No. and duration of planned interruptions** Lower number and lower overall duration as workload lower **Gas in Buildings, Factures** Many drivers but potentially higher due to lower workload **Sub deducts** No issue	**Shrinkage and Environmental Emissions** Incentive targets reflect the allowed workload targets. So lower pipe replacement volumes delivered means that the incentive targets don't reflect work completed. This and 'Roller' nature of the incentive means that we are likely to be in penalty in year 8 – and we will receive full 8 year penalty in one year. ASP no impact, some MEG work delayed – minor impact. **Customer Satisfaction** Incentive could be 'biased' either way due to reduced sample size. Results could be impacted by changed customer expectations especially during access. **Totex Incentive Mechanism** Only Tier 2a allowances are adjusted for workload volumes So potentially reduced workloads across the other work areas could lead to artificially high outperformance against a 'fixed' target This will be offset by the higher unit costs we will have to incur

Figure 12.2 : Covid-19 / Repex impacts

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