Northern Gas Networks

RIIO – GD1 Year 5 Report

July 2018

Northern Gas Networks

we are the network

Contents

1 Chief Executive Officer's Strategic Summary 6

2 Board Update 9

3 RIIO – Performance Overview 12

4 Totex Drivers 14

5 Performance Summary
5.1 Financial performance 15
5.2 Totex financial performance 16
5.3 Other Outputs highlights 25
5.4 Incentives – Rore impact 26
5.5 Allowed revenue and customer bills 29

6 Totex Performance Review
6.1 Totex compared to the allowance 32
6.2 Totex forecasts 33

7 Opex Performance Review
7.1 Types of Operating Expenditure 34
7.2 Controllable Opex compared to the allowance 34
7.3 Year on Year Controllable Opex Performance 35
7.4 Year on Year Direct Opex Performance 36
7.5 Year on Year Indirect Opex Performance 41
7.6 Year on Year Non Controllable Opex Performance 42
7.7 Opex cumulative position under RIIO 43
7.8 Opex forecasts 43

8 Capex Performance Review
8.1 Capex compared to the allowance 46
8.2 Asset Health 47
8.3 LTS, storage and entry 48
8.4 Connections 50
8.5 Mains Reinforcement 54
8.6 Governor replacement 55
8.7 Other Capex 55
8.8 Capex cumulative position under RIIO 58
8.9 Capex forecasts 59

9 Repex Performance Review
9.1 Overview and strategy 61
9.2 Mains replacement outputs 62
9.3 Mains replacement costs 69
9.4 Repex cumulative position under RIIO 71
9.5 Repex forecasts 72

10 Overall Output Review
10.1 Introduction 73
10.2 Safety outputs 74
10.3 Reliability outputs 76
10.4 Customer service outputs 79
10.5 Environmental outputs 83
10.6 Social obligation outputs 89
10.7 Connections outputs 92

11 Uncertainties 93

12 Performance improvement and efficiencies 97

Outputs

Safety outputs	Page / Link
Risk removed (based on MPRS)	62
Length of main taken off risk	63
Number of gas in buildings events	65
Number of fracture and corrosion failures	65
Number of services replaced	66
Uncontrolled gas escapes attendance	38
Controlled gas escapes attendance	38
Annual repair risk	38
% of repairs completed within 12 hours	39
COMAH and GSMR compliance	75
Sub-deduct networks ‘off risk’	67
Asset health	47
Reliability outputs	
Number and duration of planned interruptions	67
Number and duration of unplanned interruptions	39
Meeting 1 in 20 standard	77
Asset utilisation	49
Offtake meter errors	77
Telemetered faults	78
PSSR faults	78
Gasholder decommissioning	36
Customer service outputs	
Customer satisfaction – unplanned interruption	40
Customer satisfaction – planned interruption	68
Customer satisfaction – connections	52
Complaints metric	80
Stakeholder engagement	81
Environmental outputs	
Broad measure – new connections to the network	83
Narrow measure – shrinkage	85
Narrow measure – business carbon footprint	86
Narrow measure – other emissions and resources	87
Social obligation outputs	
Number of fuel poor connections and other social issues	51
Carbon monoxide detection and awareness	90
Connections outputs	
Connections standards of service	53

CEO and Board update

A

1 Chief Executive Officer's Report

Our objective as a business is simple and has remained unchanged across the RIIO-GD1 period. That is, to provide an exceptional customer experience through delivering the services our customers require, at the levels they expect and at a price that represents great value for money. This report provides an opportunity for us and our customers to assess how we are performing against this objective.

I am very pleased that our performance during 2017/18 and the five year period since 2013/14 is showing that we are performing well on behalf of our customers. It is important that we can meaningfully demonstrate to our customers and stakeholders how we are pushing the boundaries of performance in the industry. NGN are ranked as number one for customer satisfaction in Ofgem's league table over the period since 2013/14 and continue as the most efficient gas network over the period since 2005.

It is also important that we do not simply measure ourselves against our peers within the industry but also against leading companies in the wider economy. With this in mind we successfully achieved reaccreditation to the Institute of Customer Service (ICS) during 2017/18. And the results of the ICS benchmarking exercise provided us with a performance score in excess of industry leaders such as John Lewis and Amazon. A good indication that our approach is taking us in the right direction.

Mark Horsley, CEO, Northern Gas Networks

2017/18 also reminded us of some of the key operational challenges faced in delivering our core services to our customers. The 'Beast form the East' brought a short but harsh period of winter weather – the worst we have experienced since 2010 – a sustained period of extremely cold temperatures with periods of heavy snow cover. This fully tested the resilience of our networks and operations:

- Levels of demand for gas on particular days were in excess of the '1 in 20 Peak Demand' level we are obliged to deliver from our system. The work that we have completed over the last few years to increase our ability to flexibly manage our system via active pressure management and investment in adequate capacity ensured that we did not lose any supplies during this period; and
- We received record peak numbers of calls to our emergency call centre during this period increasing the pressure on our Emergency Services workforce significantly. This, together with heavy snowfall in many areas that restricted road transport, presented significant operating challenges. However the robust winter contingency plans we put in place following the winter of 2010 meant that we overall we still delivered close to a 100% response rate to our obligations to attend a reported gas escape within a 1 hour or 2 hour period.

During 2017/18 we delivered on our commitment and became the first GDN to double the value of the compensation payments for all customers for failures to guaranteed standards of service. A single compensation payment of £60 now represents around half of NGN's portion of a domestic customer's annual gas bill. This reflects our overall commitment to delivering the highest standards of service for our customers whilst also ensuring that we appropriately compensate our customers when we fail to meet their expectations. During 2018/19 we are responding to customer feedback and making a commitment to move to proactive payment of compensation for a number of standards where currently the customer has to make a claim, further improving the customer experience in these areas.

However it is important that we recognise where there are areas where improvement is required. Customer service performance is strong across the gas distribution sector with scores for some companies, including NGN, consistently above 9 out of 10. We believe there is more we can do to improve the experience we deliver for our customers. Likewise, we have received feedback that areas of our stakeholder engagement need to evolve in line

with increasing expectations. We are already identifying and implementing initiatives that we believe will take both NGN and the industry forward in these areas.

Many of the initiatives we have implemented over the last five years have involved challenging traditional and well established working practices and a significant amount of change to our business. It is very pleasing to see that these initiatives are providing real benefits to our customers today:

- **Direct Service Provider Model** – our new contracting model that uses small, locally run engineering firms to deliver our iron mains replacement programme is now fully embedded. This year has seen significantly increasing our overall output whilst delivering a further 5% reduction in unit costs compared to the previous year. All this whilst delivering on our commitments to tackle the complex, high risk projects and challenging diameter band mix of work;
- **Modernising Terms & Conditions & Workforce Refresh** – close to 70% of our people are now employed on new, modern terms and conditions alongside a refresh of a significant percentage of our workforce. This means we can now deliver key activities such as our Emergency Service more flexibly and at an overall lower cost £5m in Totex; and
- **New Contracting Models & Insourcing** – in our information services and technology activities we have further extended the use of small service providers and taken the decision to insource activities and develop our own capabilities. This has allowed us to deliver a more agile and timely capability better able to adapt to business requirements but also deliver these services at a sustainable lower cost. Operating costs have reduced by over £5m in the last two years through the refresh of our service contracts and review of our licence and system requirements.

Performance during 2017/18

The results for the 2017/18 reporting year shows continued strong performance against the RIIO-GD1 Regulatory Contract both in terms of value (cost to deliver) and service delivery (Outputs):

- **Value (Total Expenditure)** – in 2017/18 we outperformed the Totex allowance by £30.2 and £173m over the first five years of RIIO-GD1. This will result in £62m being returned directly to customers in the form of lower network charges relating to this five year period.

  The majority of this outperformance is driven directly by genuine and enduring efficiency improvements as a result of the initiatives outlined above that have changed the way in which we deliver our key services in our operating and replacement expenditure.

  We are forecasting to spend all of our capital expenditure allowances on delivering the improvements in asset health and risk we committed to in RIIO-GD1. But in addition to this we are investing in the future of our business through a new information technology infrastructure that will make a fundamental change in how the business will capture and utilise data and also enable increased process automation; and
- **Service Delivery (Outputs)** – our strategy is to treat all primary and secondary outputs within the Regulatory Contract as firm commitments over the period and where appropriate go above and beyond those minimum requirements and deliver the best possible service for our customers.

  Our performance in 2017/18 illustrates we are firmly on track to deliver all of our commitments across the 6 output categories over the period and in many areas significantly exceed those targets.

We will continue to deliver the results seen in 2017/18 and the first five years of the RIIO-GD1 period. We are forecasting to deliver or exceed all the output targets set for the period and continue driving genuine efficiency throughout our business.

In a rapidly changing environment we continue to see new risks and opportunities develop that were not present when agreeing the RIIO-GD1 Regulatory Contract. These include:

- **Network Resilience** – climate change is leading to more frequent and severe instances of heavy rainfall across the region. This has led to localised flooding and damage to the physical environment and local infrastructure that surround our network assets. The impact upon those assets has included large scale water ingress, loss of roads, bridges and river banks and storm damage to above ground assets. Increasingly we have also experienced a growing issue of third party damage to our assets that has resulted in interruptions to supply for our customers;
- **Cyber Security** – as we continue to adopt greater levels of new technology that connects our assets and their performance with systems and remote control capability so the requirement for measures to manage the security risk is leading to this becoming an increasing priority for our business; and

- **New Network Users** – the evolution of the marketplace is seeing new uses and users of our network. We currently have 10 Biomethane producers connected to our network and another 8 planned for this year. We have been experiencing a significant increase in enquiries regarding large load connections from generators over the recent years with potentially material levels of associated specific reinforcement and this trend is continuing. There have been two large load connections to date with a cost of c£0.5m to NGN, with the potential for at least eight new connections in 2018-20 with associated reinforcement costs to NGN of £2.7m. We are looking at possible alternatives to pipe reinforcements in order to reduce costs.

At present we have not identified any risks that, with appropriate management, would impact upon the delivery of our commitments over the period.

Looking Forward - RIIO-GD1 and RIIO2

Our aim is to enter the RIIO-GD2 period from 2021 onwards as clearly the leading GDN in the sector and that this performance is sustainable for the longer term.

We anticipate that the operating and financial environment in RIIO-GD2 will be increasingly challenging. Many of the initiatives we have delivered over the first half of RIIO-GD1 mean we are well placed to deliver against this objective. However, the challenge to improve our business never ends and we have a number of additional initiatives that are currently being delivered that will build on those achieved to date. These are focused on one of the remaining challenges for our sector and that is increasing the core productivity of our business. These include:

- **Full Totex Operating Model** – the Full Totex Model across each of our 9 regions is now fully operational. Each region has a single senior manager and dedicated resources responsible for delivering our Emergency, Repair, Replacement and Connections workload in that area. Each area has been targeted to increase the productivity of the workforce it has at its disposal. In 2018 they have been challenged to significantly increase the productivity of their Repair teams on a jobs per week basis. This requires challenging established working practices and bringing forward new innovative ways of both planning, scheduling and delivery of jobs. This is aimed at delivering not only cost benefit in the repair activity but across all other operational activities. Whilst at the same time delivering a greater capacity to manage the performance of our assets and hence the services we supply for our customers; and
- **Future Ways of Working** – we are progressing very well with our project to deploy the new SAP S4/HANA enterprise resource management product across the business and to be the first company in the UK to fully implement this solution. As previously signalled this involves a complete reorganisation of our business processes and organisational structure to match the best practice already built into the SAP4/HANA core product. Our own people are at the heart of designing and delivering this solution and will create an organisation with increased efficiency, higher productivity and improved access to accurate and timely information and data. Importantly this is allowing us to design and implement processes that will significantly improve the customer experience of the core services we deliver.

With the UK tasked with reaching an 80% carbon reduction target by 2050 there is an urgent need to develop affordable, renewable energy solutions. We have a number of flagship projects which complement one another, by developing green forms of gas, breaking down barriers between different energy systems and exploring sustainable transport solutions:

- H21, our flagship project to establish hydrogen as a future fuel, secured a further £10.3 million of funding in 2017 to take the project to the next stage. Later this year we will also be releasing our H21 North of England project with Equinor and Cadent;
- InTEGReL, our new future energy research facility in Gateshead, officially opened for business, welcoming its first projects; and
- Our work continued to influence national, and international thinking. The UK Government launched its own £25 million hydrogen study (Hy4Heat) in 2017. And the Government's 2017 'Clean Growth Plan' also recommends converting the existing gas network to a hydrogen network as one potential option for decarbonisation.

NGN continue to push the boundaries of performance in the energy industry and keep giving our customers a world class service.

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 the 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 2017/18 and continues to demonstrate strong customer and safety performance. Incentive arrangements for the senior management team are directly linked to safety, customer and efficiency targets. These targets are updated annually.

The focus of the Board has been to support NGN through significant investments and innovations aimed at improving the performance of the business. Notably we have deployed significant capital to renew the information technology infrastructure of the business by moving to a cloud-based platform, acquiring the new SAP4hana product and developing our own expertise to implement the improvements this investment can deliver.

Andrew Hunter, Chairman, Northern Gas Networks

This investment will make a fundamental change in how the business will capture and utilise data and also enable increased process automation. Network investment levels generally are forecast to exceed the capital allowed during the GD1 price control demonstrating the Board's commitment to ensuring the right levels of investment in the network are maintained. Efficiencies in the delivery of the iron mains replacement programme and our operating costs reflect the improvements in the organisation and deployment of our directly employed workforce and use of the direct service provider model. The Board is clear that overall outperformance of the regulatory allowances is being driven by these factors rather than any lack of investment, failure to complete the work necessary on the network or degradation in customer service.

The principal risks associated with the business and the associated mitigations are regularly reviewed by the Board. These include breach of legal and regulatory obligations, health and safety failure, network asset performance failure, employee retention and financial risks associated with interest rates, liquidity and credit. These remain largely unchanged over the course of the year though the Board has paid increased attention to the risks and has monitored the company activities associated with cyber security. The Board is satisfied with the arrangements the company has in place.

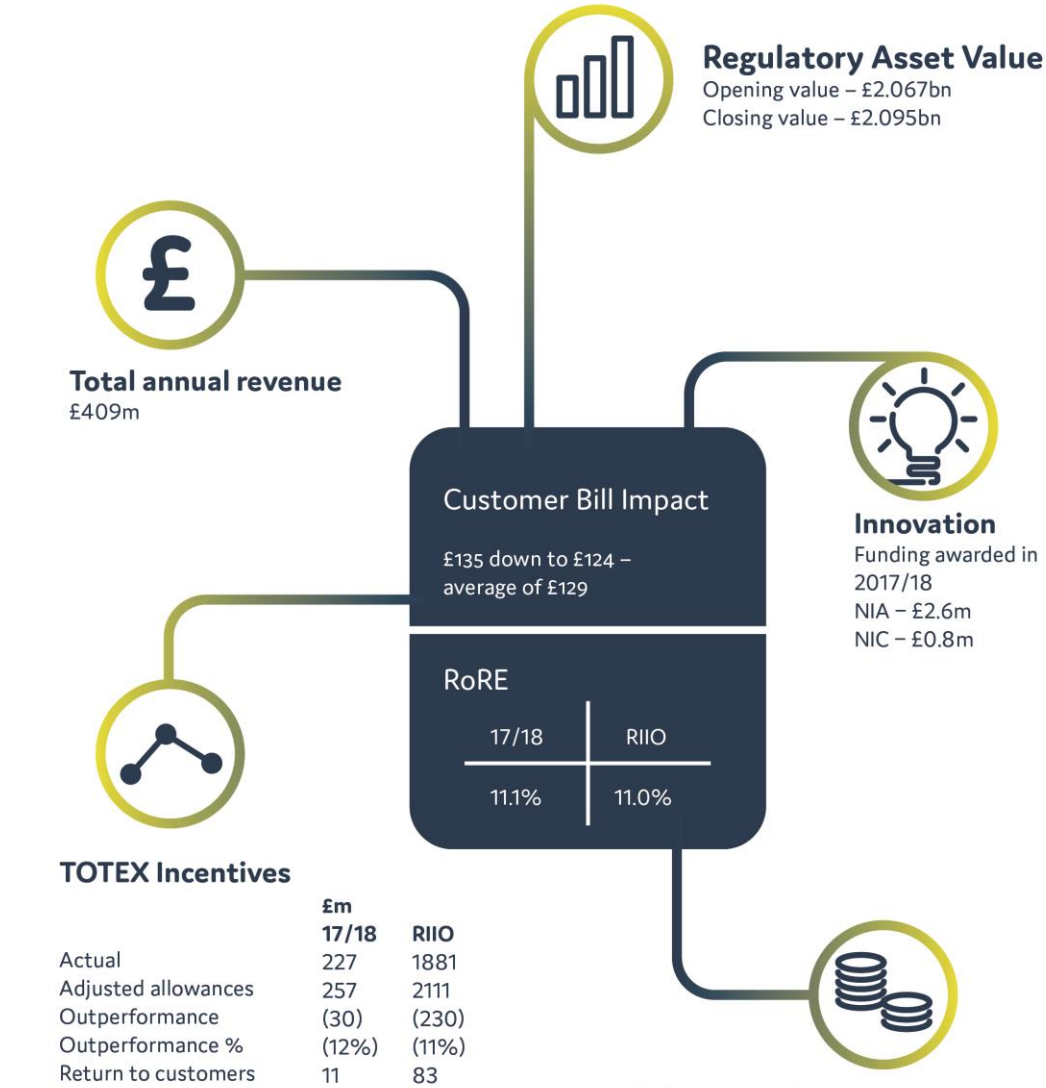
We are pleased that the government's green growth strategy has recognised the role that the existing gas network infrastructure can play in the decarbonisation of heat through conversion to hydrogen. Our ground breaking work on the H21 project is widely acknowledged as the leading piece of research in this field. The project has now progressed to the next stage following award of £9m of funding under the 2017 Network Innovation Competition.

Executive Summary

B

3 RIIO – Performance Overview

Northern Gas Networks
Financials



£m	17/18	RIIO
Actual	227	1881
Adjusted allowances	257	2111
Outperformance	(30)	(230)
Outperformance %	(12%)	(11%)
Return to customers	11	83

	£m 17/18	RIIO
Customer service	2.9	25
Shrinkage	0.8	6.1
Leakage	4.1	31.5
Exit capacity	1.9	10.4
Total	9.7	72.8

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		**836.1**	**425.4**	**849.8**	**2111.3**	
Efficiency	Efficiency	(113.5)	(27.1)	(138.5)	**(244.3)**	(13%)
Land Remediation	External factors	(1.9)			**(1.9)**	0%
Weather impact	External factors	(13.5)			**(13.5)**	(1%)
Maintenance workload	Price control assumption	18.2			**18.2**	1%
Interruptions	Efficiency	(34.5)			**(34.5)**	(2%)
Xoserve	External factors	(6.3)			**(6.3)**	0%
Connections workload	External factors		(19.6)		**(19.6)**	(1%)
Connections efficiency	Efficiency		24.2		**24.2**	1%
Fuel poor allowance	Price control assumption		10.2		**10.2**	0%
Reinforcement workload	Efficiency, External factors		(19.2)		**(19.2)**	(1%)
Governors workload	Price control assumption		1.8		**1.8**	0%
IT and Building investment	Price control assumption		51.0		**51.0**	2%
Unforeseen Capex	External Factors		10.0		**12.0**	0%
Risers and Subdeducts	Price control assumption			(8.7)	**(8.7)**	0%
Repex Transfers	External factors			(3.6)	**(3.6**	0%
Steel workload	Price control assumption			15.0	**15.0**	1%
Other Mains Workload	Price control assumption			29.4	**29.4**	1%
Non Recurring		(3.3)			**(3.3)**	0%
Actuals		**681.4**	**456.7**	**743.3**	**1881.4**	**89%**

Figure 4.1: Totex Drivers

5 Performance Summary

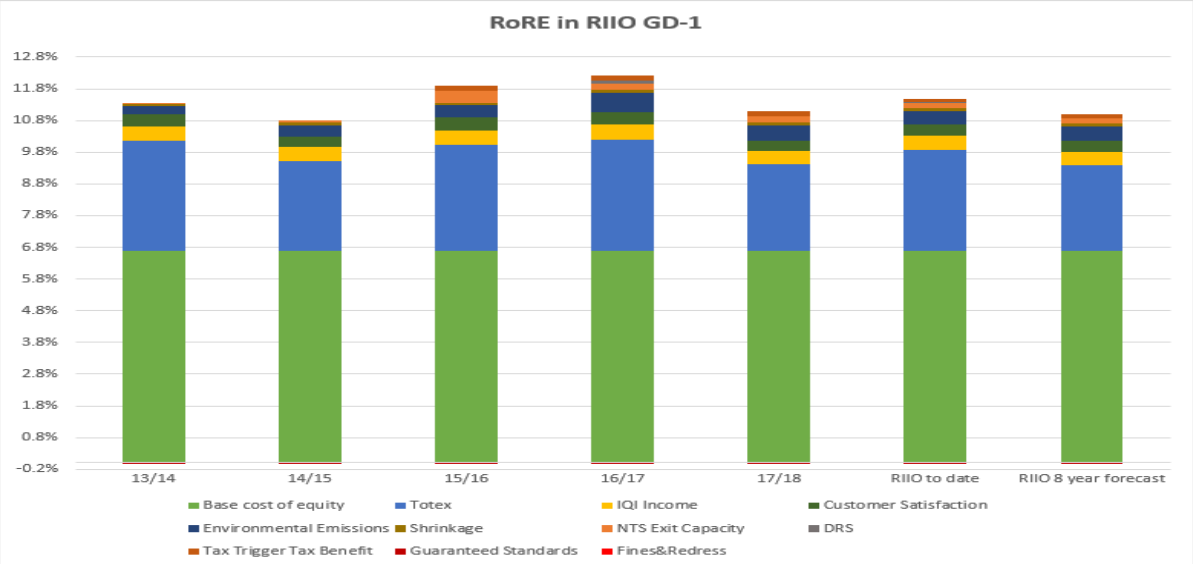
Gas distribution was the first sector in the energy industry to have a periodic review of its prices carried out under the new RIIO principles. This new price control applies for the eight year period from 1 April 2013 to 31 March 2021 and is referred to as RIIO-GD1. We have now successfully completed the fifth 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 shows our annual, cumulative and forecast 8 year RORE:

RORE	13/14	14/15	15/16	16/17	17/18	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%**
Totex	3.5%	2.8%	3.3%	3.5%	2.7%	**3.2%**		2.6%
IQI Income	0.4%	0.5%	0.5%	0.5%	0.4%	**0.5%**		0.4%
Customer Satisfaction	0.4%	0.3%	0.4%	0.4%	0.3%	**0.4%**		0.4%
Environmental Emissions	0.3%	0.4%	0.4%	0.6%	0.5%	**0.4%**		0.4%
Shrinkage	0.1%	0.1%	0.1%	0.1%	0.1%	**0.1%**		0.1%
NTS Exit Capacity	0.0%	0.1%	0.4%	0.2%	0.2%	**0.2%**		0.1%
DRS	0.0%	0.0%	0.0%	0.1%	0.0%	**0.0%**		0.0%
Tax Trigger Tax Benefit	0.0%	0.0%	0.2%	0.2%	0.2%	**0.1%**		0.1%
Guaranteed Standards	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**		0.0%
Fines and Redress	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**		0.0%
RoRE Total	**11.3%**	**10.8%**	**11.9%**	**12.2%**	**11.1%**	**11.5%**		**10.9%**

Figure 5.1: RORE breakdown



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 2016/17 prices (£m)	**13/14** Actual	**14/15** Actual	**15/16** Actual	**16/17** Actual	**17/18** Actual	**18/19**	**19/20**	**20/21**	**Total**	**Allowed**	**Variance**
Opex	88.1	90.2	85.0	85.5	83.3	84.6	83.4	81.5	681.4	836.1	(154.7)
Capex	44	52	64.6	61.2	52.4	62.7	61.8	57.9	456.7	425.4	31.3
Repex	96.4	101.1	91.2	88.6	91.2	96.4	88.5	89.9	743.3	849.8	(106.5)
Totex	228.5	243.4	240.8	235.2	226.9	243.6	233.7	229.3	1881.4	2111.3	(229.9)
Allowance	265.7	273.5	277.3	273.7	257.1	254.9	255	254.1	2,111.3		
Variance	(37.2)	(30.1)	(36.5)	(38.5)	(30.2)	(11.3)	(21.3)	(24.8)	(229.9)		
Cumulative Variance	(37.2)	(67.4)	(103.8)	(142.3)	(172.5)	(183.8)	(205.0)	(229.9)			

Figure 5.2: Totex Performance

In 2017/18 we have outperformed the Totex allowance by £30.2m (11.7%) which generates a RORE of 2.7%, just below the average of 3.2% we have achieved in the first five years of RIIO-GD1. Over RIIO-GD1 we expect our Totex outperformance to be £229.9m, an average of £28.7m, which generates a RIIO period RORE of 2.6%.

Overall this is a strong performance. It is important to remember that the allowances were 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. Further details on our performance are set out below.

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 2017/18 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19	19/20	20/21	TOTAL
Work management	14.6	17.0	18.6	19.0	15.9	15.8	15.8	14.8	131.3
Emergency	10.7	10.9	10.9	10.7	10.9	11.2	11.0	10.8	87.2
Repair	17.9	16.0	14.3	13.9	14.7	16.2	16.1	16.0	125.1
Maintenance	9.1	10.0	10.4	10.5	10.9	10.5	10.4	10.3	82.1
SIUs	-	-	-	-	-	-	-	-	-
Other direct activities	7.4	7.3	7.0	7.0	6.0	5.5	5.2	5.1	50.6
Of which Xoserve	4.2	4.6	4.5	4.0	3.3	2.8	2.5	2.4	28.2
Total direct opex	**59.7**	**61.3**	**61.2**	**61.0**	**58.4**	**59.2**	**58.5**	**56.9**	**476.3**
Business support	25.7	26.3	21.9	22.4	23.1	22.8	22.4	22.0	186.7
Training/apprentices	2.6	2.6	1.9	2.0	1.7	2.5	2.5	2.5	18.4
Total indirect opex	**28.4**	**28.9**	**23.8**	**24.5**	**24.8**	**25.3**	**24.9**	**24.5**	**205.1**
Total controllable opex	**88.1**	**90.2**	**85.0**	**85.5**	**83.3**	**84.6**	**83.4**	**81.5**	**681.4**
Allowance	**105.7**	**106.9**	**107.5**	**107.7**	**103.8**	**102.7**	**101.6**	**100.1**	**836.1**
Variance	(17.6)	(16.7)	(22.5)	(22.2)	(20.5)	(18.1)	(18.2)	(18.6)	(154.7)
Cumulative Variance	(17.6)	(34.3)	(56.9)	(79.1)	(99.5)	(117.8)	(136.0)	(154.7)	

Figure 5.3: Opex forecasts

To date we are outperforming the controllable Opex allowances by £99.5m (18.7%), generating an average RORE of 1.9% p.a. We expect to make further efficiencies over the remainder of RIIO against a reducing allowance, outperforming the 8 year allowance by c£154.7m. This maintains our outperformance at c18.5% over the period, and delivers an equivalent RORE performance.

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 73% of our outperformance over the period, c£113m out of c£155m, or £14m 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 c500 employees on new terms and conditions and over 600 on personal contracts out of an internal workforce of nearly 1,500. In terms of efficiency we estimate this is now delivering over c£5m of benefits each year in Totex, with the majority (over £3.5m) 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 over £5m in the last two 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.

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. To date we estimate that this overall reduced workload has driven savings of c£15m compared to the equivalent allowance.

However this has been somewhat offset by periods of severe flooding, in particular in 2015/16, which resulted in three major off-gas incidents, and in 2016/17 where one major incident resulted in 2,756 interruptions. 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.

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. However this year we experienced short periods of more extreme winter weather which affected both costs and workload. The rest of the winter weather was comparatively mild.

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

Figure 5.4: Gasholder decommissioning forecast

PREs vary year on year as seen in the table above, whereas we had been seeing consistent reductions in Reports and Repairs before this year. This validates our approach to the Repex programme. However workload was broadly flat year on year in all areas. This apparent slowdown in workload reduction was driven by increased workload across the winter months from December to March with the biggest increase in March during a sustained period of more extreme weather. This increase in winter workload had a knock on impact on costs and is the driver behind the £1.0m increase in costs retained within our Emergency and Repair activities this year.

For the remainder of RIIO our forecast assumes more typical winters which could increase our costs by more than c£2m p.a across emergency, repair and associated supervisory activities. This increase in costs would drive us over the annual allowances meaning we estimate that over RIIO weather would deliver net savings of c£13.5m compared to the equivalent allowance.

Our opex allowance in RIIO 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£34.5m 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 £18.2m overspend against the allowance over the 8 year period. In RIIO we have delivered a new outsourced operating model which is delivering savings mainly in the supervisory area of the activity. We expect to deliver further efficiencies over the remaining 3 years of the price control.

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

- We estimate Land Remediation costs to be £1.9m lower than the allowance over RIIO. 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 £6.3m lower than the RIIO period opex allowances.

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. However the short period of more extreme winter weather we experienced in March this year has impacted some of the outputs, demonstrating that more severe weather going forward would impact our overall performance. This is factored into our forecasts which are detailed in the relevant sections later in this document. 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 fifth year in a row, significantly outperforming the 97% target. There was a very small decrease in both compared to previous years;
- Our Annual Repair Risk score increased by 11% to 19.3m as a result of a spike in scores during the extreme weather seen in March. This is still well below the target of 34.5m;
- We completed 66.1% of repairs within 12 hours against a target of 61.0%. This is an excellent result and the highest we have achieved in RIIO to date;
- We saw 13,714 unplanned interruptions this year which is above the annualised target of 12,960. Importantly the duration is below target, 5.6 million minutes compared to 5.9 million minutes, which means on average customers were interrupted for a shorter period of time. Cumulatively we are ahead of both targets, having had 63,498 interruptions compared to a pro rata target of 64,798, and 23.8 million minutes duration compared to 29.5 million minutes. 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 9.4 out of 10 on our customer satisfaction surveys for unplanned works, so even when customers had an unplanned interruption we generally dealt with it well; and
- We are also targeted with decommissioning 23 gas holders over RIIO-GD1. We are ahead of target having removed 3 holders this year, bringing our cumulative total to 16.

5.2.2 Capex financial and output performance

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

RIIO Capex forecast 17/18 prices	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19	19/20	20/21	Total	Allowed
LTS, storage and entry	9.7	16.1	21.1	15.5	11.4	13.8	16.8	20.9	**125.2**	129.0
Connections	7.1	7.3	10.5	9.2	10.0	10.8	8.5	8.4	**71.9**	58.9
Mains Reinforcement	3.1	1.9	3.4	2.2	2.2	4.1	3.7	3.9	**24.6**	40.9
Governors replacement	2.2	1.5	1.9	1.7	1.5	1.8	1.2	1.3	**13.0**	13.8
Other Capex	21.8	25.3	27.8	32.6	27.3	32.2	31.6	23.5	**222.1**	182.8
Of which IT	5.8	5.2	6.4	16.6	14.1	16.0	7.9	8.8	**80.9**	46.5
Of which vehicles	4.3	4.8	2.9	2.6	3.2	0.9	3.1	1.3	**23.2**	30.4
Total	44.0	52	64.6	61.2	52.4	62.7	61.8	57.9	456.7	425.4
Allowance	56.2	60.6	64.6	60.1	45.7	46.0	45.8	46.5	425.4	
Variance	(12.2)	(8.6)	0.0	1.1	6.7	16.7	16.0	11.4	31.3	
Cumulative	(12.2)	(20.8)	(20.8)	(19.7)	(13.0)	3.7	19.7	31.3		

Figure 5.5: Capex forecasts compared to the allowance

To date we are outperforming the cumulative Capex allowances by £13.0m (4.5%), generating an average RORE of 0.2% p.a. However we plan to continue investing significantly over the remaining five years against a reducing allowance, and expect to spend £31.3m over the eight year allowance by 20/21. This will have a negative impact on RORE by an equivalent 0.3%.

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£13m over the allowance over RIIO. We have seen a significant decrease in workload due to changes in the connections market place and general demand levels for new gas connections. We estimate these external economic factors will decrease costs over RIIO by c£19.6m or £2.4m p.a. This 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 £24.2m more than the allowance over RIIO, or £3.0m 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 £10.2m impact over RIIO.

We have also seen a significant reduction in reinforcement workload so far in RIIO – 37.2km of main compared to an allowance of 90.1km. There are two key reasons for this. A combination of our new pressure management function and a Cost – Benefit 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 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 do expect volumes of work to increase over the next three years. 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 over the second half of RIIO. However we still expect workload over RIIO to be c75km against an allowed workload of c140km, with a cost impact of c£19.2m.

On the non-network side we expect to invest c£80.9m in IT and c£17m in our depot and office infrastructure over RIIO. This is c£51m in excess of the eight year allowance and will deliver a world class smart IT and work place 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.

After taking all of the above into account we estimate that we will deliver an underlying efficiency of £27.1m over RIIO, or 6% of the allowance. Capex projects are varied by their nature, and it is important to remember that costs will vary dependent on many factors that are difficult to predict – including type, length, location and complexity of the projects undertaken.

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 are ahead of schedule in delivering the 14,500 new fuel poor connections we committed to following Ofgem's review of the fuel poor extension scheme, having delivered nearly just over 10,000 connections so far;
- Our Connections GSOS performance is excellent as all measures register as well above the 90% minimum standard; and
- Similarly our Connections Customer Survey results are strong, achieving 8.8 out of 10 this year. Over the last twelve months we have restructured our connections teams, bringing quotation and design under one roof, and putting planning alongside delivery within each of the nine operational patches. The benefits of this are two-fold. The first stage of the customer process is now delivered by one team, who can take responsibility for owning the customer journey. In addition to this, our delivery teams will have total control of how they physically do the work, ensuring that local knowledge can be taken into account when managing customer expectations;

5.2.3 Repex financial and output performance

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

Repex forecasts 17/18 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
HSE driven mains and services	70.4	76.7	68.6	69.9	66.4	66.4	62.0	62.0	542.4
Non-HSE driven mains and services	26.0	24.4	22.6	18.7	24.7	29.8	26.4	27.8	200.3
Risers	0.1	0.0	0.0	-	0.1	0.1	0.1	0.1	0.7
Repex totals	96.4	101.1	91.2	88.6	91.2	96.4	88.5	89.9	743.3
Allowance	103.8	106.0	105.2	106.0	107.6	106.2	107.6	107.5	849.8
Variance	(7.4)	(4.9)	(14.0)	(17.4)	(16.4)	(9.8)	(19.1)	(17.6)	(106.5)
Cumulative	(7.4)	(12.3)	(26.3)	(43.7)	(60.0)	(69.9)	(89.0)	(106.5)	

Figure 5.6: Repex forecasts

To date we are outperforming the Repex allowances by £60.0m (11.4%), generating an average RORE of 1% p.a. We expect to deliver further efficiency benefits against a broadly flat allowance, improving outperformance to 12.5% 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	448.0	445.4	487.8	439.8	452.9	479.4	484.6	450.0	450.1	3690.0	3584.0
Tier 1 – customer funded	15.4	1.8	2.1	2.9	1.9	2.0	2.1	2.1	2.1	16.9	122.9
Tier 2a	5.9	8.8	7.6	5.3	4.1	7.9	4.4	4.4	4.4	47.0	47.0
Tier 2b	20.4	22.1	18.3	12.2	12.4	24.7	32.5	20.7	20.7	163.5	163.5
Tier 3	5.0	7.4	5.7	3.9	4.3	2.4	6.3	5.0	5.0	40.0	40.0
Iron mains	**494.7**	485.4	521.5	464.2	475.5	516.4	529.9	482.2	482.3	3957.4	3957.4
Iron > 30m	-	8.7	9.3	11.4	10.8	2.7	6.9	6.9	6.9	63.7	-
Steel	48.7	57.6	75.6	45.9	59.5	59.6	65.0	72.0	80.0	515.3	389.8
Other	-	10.4	10.7	8.6	8.6	13.3	9.5	9.5	9.5	80.1	-
Total	**543.4**	562.1	617.1	530.1	554.4	592.0	611.3	570.6	578.7	4616.4	4351.5

Figure 5.7: Length of iron main taken off-risk performance

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 2,463km of iron main, 10km (0.4%) behind the inferred target. This target included an assumed 77km of iron mains work delivered from customer driven rechargeable diversions. Actual volumes have been much lower at c15km and this c62km shortfall has been a major driver for the deficit to date. We are expected to fund this shortfall and are targeting to fully recover the position in 2018/19.

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 c298km of steel to date, c55km ahead of the inferred 5 year target and allowance. This 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 c515.3km over RIIO-GD1, nearly 125km over the allowed volume; and
- We have abandoned c52km of other materials mains to date and expect to abandon 80km over RIIO-GD1. There is no workload 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 £44.4m, £15m related to steel and £29.4m related to iron mains over 30m and mains of other material types.

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£138m efficiency outperformance against the £850m allowance (16.2%) more than offsetting the increase in workload detailed above. This equates to c£17m 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 23,439 this year which gives a cumulative total of 164,391 which means we are now 48% 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 c6% 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, a minor decrease of 0.1. 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 the 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 Output 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 10 sites connected to our network;
- We have delivered an 18% reduction in our use of virgin aggregate and a 95% reduction in the amount of spoil to landfill, an excellent performance against two of our key environmental targets;
- We have reduced our business carbon footprint in 2 out of the 3 of the measures we target, 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 five years of RIIO-GD1 together with a forecast for the final three years. To date we have earned average incentive income per year of £9.4m, and expect to earn an average of £9.3m over the eight years of RIIO.

17/18 Prices (£m)	Actuals (Earned)					Forecast (Earned)			RIIO Total	Avg. Yr
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
Customer Satisfaction:										
Customer Service	2.0	2.2	2.3	2.1	2.0	2.0	2.0	2.0	16.8	2.1
Stakeholder Engagement	1.2	0.7	1.3	1.4	0.9	1.0	1.0	0.9	8.2	1.0
Complaints Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Environmental Emissions	2.2	3.0	3.3	5.2	4.1	4.5	4.0	5.1	31.5	3.9
Shrinkage	0.7	0.7	0.6	0.9	0.8	0.8	0.8	0.8	6.1	0.8
NTS Exit Capacity	0.0	0.6	3.1	1.7	1.9	1.7	1.0	0.2	10.4	1.3
RIIO - DRS	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.0	1.8	0.2
Total RIIO-GD1	**6.2**	**8.1**	**10.5**	**11.4**	**10.6**	**10.0**	**8.8**	**9.1**	**74.6**	**9.3**

Figure 5.8 : Incentives

Customer Satisfaction

The aim of the customer satisfaction incentives are 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 £2.9m and a RORE impact of 0.3%. 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 9.14 across the three customer satisfaction survey areas, an excellent performance and in line with last year, ranking us a close second across the GDNs.

We have continued to work with companies outside our sector in order to further develop our learning and experience on managing the customer journey. In March 2018 we achieved the Institute for Customer Service Service Mark Accreditation. This accreditation allows us to benchmark our performance outside sector. For the customer survey we achieved a score of 9.2 – this score placed us amongst the highest performers in the customer service – John Lewis at 8.8 and Amazon at 8.0.

Complaints Handling

Complaints handling performance is measured via the complaints metric which is a composite score calculated as the weigheted 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 3.4 which does not generate any penalties. Penalties would only be imposed if our score was 11.57 or more. This is a very strong performance but over the last twelve months our D+1 and D+31 performance has dropped slightly. We have been working hard to make

improvements in both these areas, and some key actions have been to move the chairing of the daily customer call to our operational managers. This ensures that ownership and accountability is embedded within the business. We are pleased that we have maintained our strong repeat complaint performance, and that we have continued to have zero ombudsman findings against NGN. For RIIO to date, we have had no ombudsman findings against NGN.

Stakeholder Engagement

In 2017/18 we achieved a score of 6.15 for Stakeholder Engagement, the second highest of all the gas networks. We have 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.

17/18 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	421	397	382	354	352	341	330	319	2,895	362
Variance	38	48	51	69	60	60	60	60	447	56
Variance %	8.4%	10.8%	11.9%	16.3%	14.6%	15.0%	15.4%	15.8%	13.4%	13.4%
Incentive Earned in year (£m)	**0.7**	**0.7**	**0.6**	**0.9**	**0.8**	**0.8**	**0.8**	**0.8**	**6.1**	**0.8**
Environmental Emissions GWh:										
Allowed volumes	434	420	408	398	386	376	364	354	3,140	393
Actual / forecast	399	375	360	332	329	317	307	295	2,713	339
Variance	35	45	48	66	57	59	57	59	427	53
Variance %	8.1%	10.7%	11.7%	16.6%	14.9%	15.8%	15.7%	16.8%	13.6%	13.6%
Incentive Earned in year (£m)	**2.2**	**3.0**	**3.3**	**5.2**	**4.1**	**4.5**	**4.0**	**5.1**	**31.5**	**3.9**

Figure 5.9 : Shrinkage and Leakage

Our actual Shrinkage and Leakage volumes have reduced year on year but the targets have reduced more, meaning that our outperformance reduced by 9 GWh in both categories. The main driver for this was a significant increase in network demand during a particularly cold period during the first quarter of 2018, which saw average system pressure rise from 30.62 mbar to 31.31 mbar. However average system pressures would have been even higher if we had not introduced remote pressure monitoring and control equipment at targeted governor stations – this allows us to prepare for some of the high demand days experienced in winter 2017/18 at very short notice while still maintaining overall leakage reduction.

We also saw MEG saturation decrease from 29.75% to 22.84%, a decrease of 6.9%. MEG (Monoethylene Glycol) is a 'wet' gas used to saturate and swell metallic joints which otherwise may leak gas. Since last year we have implemented 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.

Our results here have been consistently very strong despite the net reduction this year, which still delivered an incentive of £4.9m overall and a RORE impact of 0.6%.

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 2017/18 we have outperformed the target bookings by 15.6%. This delivers an incentive of £1.9m this year and a RORE impact of 0.2%. We are targeting to sustain and improve on this strong performance.

Gwh / 17/18 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	512	512	512	4,358	545
Variance	1	22	78	83	97	112	112	112	617	77
Variance %	0.1%	3.6%	12.6%	13.3%	15.6%	17.9%	17.9%	17.9%	12.4%	12.4%
Incentive Earned in year (£m)	**0.0**	**0.6**	**3.1**	**1.7**	**1.9**	**1.7**	**1.0**	**0.2**	**10.4**	**1.3**

Figure 5.10 : Exit Capacity

Discretionary Reward Scheme

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

5.5 Allowed revenue and customer bills

Customer Bills

Figure 3.3 below shows our actual and latest forecast allowed revenues for the 8 years of RIIO-GD1.

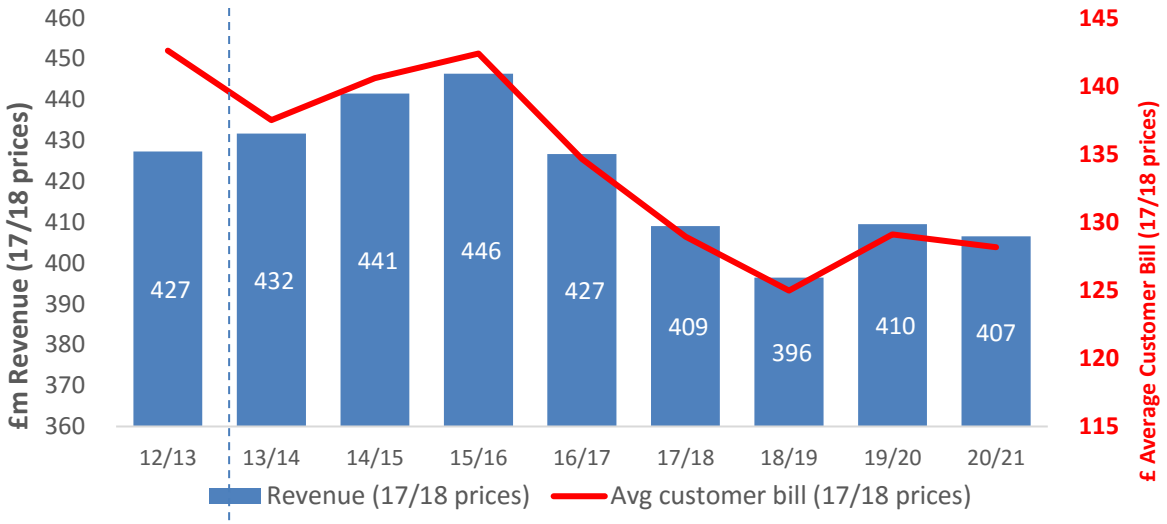


Figure 5.11 : Allowed Revenue and Customer Bills

Our domestic customer bill analysis shown above is calculated based on NGN average Annual Quantities (AQ) and peak daily capacity requirements. This shows an average Domestic customer bill of £129 for 2017/18.

Allowed Revenue

(17/18 Prices)	Actual				Forecast				RIIO Total	Avg. Year
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
BASE REVENUE	432	437	453	435	420	424	428	434	3,466	433
Adjustments to Base Revenue Allowances:										
Cost of debt	0.0	(2.6)	(4.9)	(7.1)	(9.4)	(12.2)	(20.3)	(25.2)	(81.7)	(10.2)
Non Controllable Costs	1.4	2.3	(4.1)	(5.0)	(4.8)	(5.1)	(0.2)	(4.9)	(20.5)	(2.6)
Totex Incentive	0.0	0.0	(2.7)	(1.9)	(3.5)	(3.6)	(2.1)	0.5	(13.2)	(1.7)
RPI true up	0.0	0.0	1.5	(6.1)	(9.3)	(1.8)	1.1	0.7	(13.9)	(1.7)
Pension Deficit	0.0	0.0	0.4	0.4	0.4	(3.6)	(3.9)	(4.0)	(10.2)	(1.3)
Other	0.0	0.0	(1.5)	(1.0)	(3.5)	(4.5)	(4.7)	(8.3)	(23.6)	(2.9)
Total	1.4	(0.3)	(11.2)	(20.8)	(30.1)	(30.7)	(30.1)	(41.3)	(163.1)	(20.4)
Incentive Income:										
Earned during RIIO-GD1 (with 2 year lag)	0.0	0.0	6.0	7.9	10.4	10.9	10.3	9.7	55.2	6.9
Earned before RIIO-GD1	1.2	4.7	1.5	1.6	1.8	2.1	2.3	2.5	17.8	2.2
Total	1.2	4.7	7.5	9.6	12.2	13.0	12.6	12.2	72.9	9.1
(Over) / Under Collection	(3.4)	0.0	(3.4)	2.9	6.5	(10.1)	(1.3)	1.1	(7.6)	(0.9)
ALLOWED REVENUE	432	441	446	427	409	396	410	407	3,368	421

Figure 5.12 : Allowed Revenue breakdown

Allowed revenue for 2017/18 was £409m, a decrease year on year of -£18m / -4.2%. The main drivers for the variance are the movement in Base Revenue which was set out in the licence as determined by the price control settlement (£15m), and the reduction in the allowed cost of debt (£2.3m).

Allowed Revenue movement year on year

17/18 Prices	Actual					Forecast			RIIO Total
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	
2017 FORECAST	**432**	**441**	**446**	**427**	**409**	**395**	**412**	**406**	**3,369**
Inflation impact:									
2017 RPI forecast	2.9%	2.0%	1.1%	2.1%	3.5%	3.4%	3.2%	3.2%	
2018 RPI forecast	2.9%	2.0%	1.1%	2.1%	3.7%	3.3%	3.0%	3.1%	
Variance %	0.0%	0.0%	0.0%	0.0%	0.3%	(0.1%)	(0.2%)	(0.2%)	
Cumulative Variance %		0.0%	0.0%	0.0%	0.3%	0.2%	0.0%	(0.2%)	
Impact £m on base revenues	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**1.2**	**0.0**	**1.4**
Other Changes:									
Shrinkage & Env. Incentive	0.0	0.0	0.0	0.0	0.0	0.0	(1.2)	(0.9)	**(2.1)**
Cost of debt Index	0.0	0.0	0.0	0.0	0.0	1.4	(1.7)	0.2	**(0.2)**
Co-op Supplier of Last Resort	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	**0.8**
Under/(Over) Collection	0.0	0.0	0.0	0.0	0.0	(0.2)	(0.6)	1.1	**0.4**
Other	0.0	0.0	0.0	(0.2)	(0.1)	(0.3)	(0.2)	(0.1)	**(0.9)**
2018 FORECAST	**432**	**441**	**446**	**427**	**409**	**397**	**410**	**407**	**3,368**
YOY Movement	**0.0**	**0.0**	**0.0**	**(0.2)**	**(0.1)**	**1.9**	**(2.6)**	**0.3**	**(0.7)**

Figure 5.13 : Allowed Revenue

Our forecast for total revenue over RIIO-GD1 has decreased very slightly from £3.369bn last year to £3.368bn. 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, offset by forecast reductions in the Shrinkage and Environmental incentives detailed in the incentive section above.

Performance Review

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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 over spend 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 17/18 prices (£m)	Allowance	2017/18	Variance
Controllable Opex	103.8	83.3	(20.5)
Capex	45.7	52.4	6.7
Repex	107.6	91.2	(16.4)
Totex	257.1	226.9	(30.2)

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 £30.2m this year, compared to an outperformance last year of £38.4m. The main drivers for this variance in outperformance are:

- An decrease of £8.8m in capital investment due to timing of projects, however the allowance reduced by £14.0m, so under performance increased to £5.6m more than last year;
- A reduction in Repex mains laid unit costs against a higher workload in particular in the higher Tiers 2 and 3, which saw outperformance reduce by £1.1m; and
- Opex outperformance decreased by £1.6m, mainly as a result of reduced holder demolition and environmental costs, offset by increased Emergency and Repair costs as a result of a short period of extreme winter weather in March where demand exceeded our 1 in 20 forecast.

The £30.2m 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 2017/18 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19	19/20	20/21	TOTAL
Controllable Opex	88.1	90.2	85.0	85.5	83.3	84.6	83.4	81.5	**681.4**
Capex	44.0	52.0	64.6	61.2	52.4	62.7	61.8	57.9	**456.7**
Repex	96.4	101.1	91.2	88.6	91.2	96.4	88.5	89.9	**743.3**
Totex	**228.5**	**243.4**	**240.8**	**235.2**	**226.9**	**243.6**	**233.7**	**229.3**	**1,881.4**

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 reducing by c£1.8m. The forecasts include an assumption that the relatively mild winters we have recently experienced will not continue, impacting our emergency and repair costs, but this will be offset by the end of RIIO with c5% of efficiencies and reduced holder demolition costs;
- Capex increasing from c£55m p.a. average in the first 5 years of RIIO-GD1 to just over £60m in the final 3 years. This is primarily driven by our significant investment in IT and the completion of several large Offtake and PRS schemes; and
- Repex reducing from just under £94m p.a. average in the first 5 years of RIIO-GD1 to under £90m average over the final three years. The variances in the forecast above are workload driven, as we target to deliver significant volumes of higher diameter band work in 2018/19. We are targeting to deliver further efficiencies over the rest of RIIO-GD1.

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 activities; and
- **Indirect Opex** – covering training and apprentices, and business support activities such as finance 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 17/18 prices (£m)	Allowance	2017/18	Variance
Direct Opex			
Work Management	22.6	15.9	(6.7)
Emergency	16.4	10.9	(5.5)
Repair	16.9	14.7	(2.2)
Maintenance	9.3	10.9	1.6
Other direct activities	11.7	6.0	(5.7)
Direct Opex total	**76.9**	**58.4**	**(18.5)**
Indirect Opex			
Business Support costs	21.9	23.1	1.2
Training and Apprentices	4.8	1.7	(3.1)
Indirect Opex total	**26.6**	**24.8**	**(1.8)**
Total controllable Opex	**103.8**	**83.3**	**(20.5)**

Figure 7.1 : Controllable Opex compared to the allowance

Overall our 2017/18 controllable Opex costs were £83.3m, outperforming the allowance of £103.8m by £20.5m. 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 17/18 prices (£m)	2016/17	2017/18	Variance
Direct Opex			
Work Management	19.0	15.9	(3.0)
Emergency	10.7	10.9	0.2
Repair	13.9	14.7	0.8
Maintenance	10.5	10.9	0.4
Other direct activities	7.0	6.0	(0.9)
Direct Opex total	**61.0**	**58.4**	**(2.6)**
Indirect Opex			
Business Support costs	22.4	23.1	0.7
Training and Apprentices	2.0	1.7	(0.3)
Indirect Opex total	**24.5**	**24.8**	**0.4**
Total controllable Opex	**85.5**	**83.3**	**(2.2)**

Figure 7.2 : Controllable Opex year on year variance

Overall we have seen a real cost decrease of £2.2m in controllable Opex from 2016/17 to 2017/18. Direct Opex decreased by £2.6m, whereas Indirect Opex increased by £0.4m. 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 17/18 prices (£m)	2016/17	2017/18	Variance
Work Management			
Asset management	7.4	5.0	(2.4)
Operations management	7.9	7.6	(0.4)
Customer management	2.1	2.2	0.1
System control	1.5	1.2	(0.3)
Emergency	10.7	10.9	0.2
Repair	13.9	14.7	0.8
Maintenance	10.5	10.9	0.4
Other direct activities	7.0	6.0	(0.9)
Total Direct Opex	**61.0**	**58.4**	**(2.6)**

Figure 7.3 : Direct Opex year on year variance

7.4.1 Work Management

Work management overall has seen a £3.0m year on year decrease in costs across the four activities included here. This overall decrease is driven by:

- A decrease in asset management of £2.4m. We have demolished three gas holders this year compared to seven in 2016/17 and saw a minor decrease in land remediation costs which combined accounts for £1.8m of this decrease. We also saw a £0.6m reduction across net staff and professional and consultancy costs which had peaked previously in order to support the development of our asset strategy and asset health methodologies;
- A decrease in operations management of £0.4m through reduced net staff costs, achieved through continued business process improvements across all of our back office processes that support our field based activities. We have further optimised all of our work patterns in Dispatch, reduced head count in our Streetworks teams through process improvements and the use of technology, and seen benefits from reduced overtime and average salaries across our supervisory workforce;
- A decrease in System Control costs of £0.3m. Costs had temporarily increased in previous years to cover succession planning and training.

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 three this year. We now plan to complete six over the next two years leaving only one holder to be completed in the final year.

	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	3	1	23

Figure 7.4 : Gasholder decommissioning forecast

7.4.2 Emergency and Repair costs and associated outputs

Emergency and repair costs have seen a combined increase of £1.0m, whilst achieving a very strong performance in our emergency and repair outputs.

As part of our Repex programme we have consistently targeted replacing some of our poorest performing pipes, which will be a key driver for improving our emergency and repair performance over RIIO-GD1. However this year we experienced short periods of more extreme winter weather in March in particular which affected both costs and workload.

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

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 this year. This validates our approach to the Repex programme, where we have focused on the riskiest pipes. However workload was broadly flat year on year in all areas, with a minor increase in the number of PREs, reports varying by only 4, and a minor decrease in resulting repairs. This apparent slowdown in workload reduction 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. This increase in workload over winter had a knock on impact on costs as well during this period and is the driver behind the £1.0m increase in costs retained within the Emergency and Repair activities this year. We have very robust extreme weather plans that ensured we had sufficient resource to manage this peak. We have also 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 extreme periods.

Innovation is also helping keep our emergency and repair costs down in particular. This year we estimate we have delivered c£0.6m in Opex in the main from the use of;

- 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;
- Our Dog Survey team, which finds escapes quicker and reduces the number of holes drilled; and
- Back Blade Protectors on digging equipment which reduces road scarring and expensive reinstatement.

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

Figure 7.6 : Emergency response forecasts

In 2017/18 we have again performed significantly above the targets in spite of the weather driven workload spike we saw in March in particular – achieving 99.61% and 99.72% 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. We were also assisted by generally milder weather conditions, but we are increasingly seeing significant rainfall and flooding. Our forecast for the rest of RIIO-GD1 takes into account the relatively mild weather experienced in the last five years compared the previous price control, and therefore reduces for 2018/19 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 2017/18, 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. This includes a rigorous challenge and review process to ensure repairs are completed in a timely manner;
- 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 some difficult to find leaks. We estimate the sniffer dogs reduced one major incident in Burmantofts by approximately 24 hours.

However our risk score has increased from 2016/17 to 2017/18. We saw a spike in scores in March as a result of the relatively extreme weather we experienced then, with repairs staying open proportionally longer due to workload volumes. Our forecast takes this into account but also recognises this was a relatively short term issue. We then expect to make year on year improvements, whilst outperforming the target every year during RIIO-GD1.

	RIIO annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Annual repair risk	<34.5m	34.4m	24.8m	18.6m	17.4m	19.3m	25.4m	24.8m	24.3m

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.

	RIIO year 5 target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
% repairs completed within 12hrs	61.0%	62.3%	62.9%	64.4%	62.3%	66.1%	>61.5%	>62.0%	>62.5%

Figure 7.8 : % repairs completed within 12 hours forecast

We achieved 66.1% in 2017/18 against a target of 61.0%, 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 are no formal year on year targets.

Unplanned Interruptions	RIIO year 5 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	12,900	12,700	12,500	101,598
Number related to major incidents	-	0	0	1,430	2,756	765	2,700	0	0	7,651
Total Number	-	11,464	13,034	14,289	15,183	14,479	15,600	12,700	12,500	105,249
Duration	5.9	4.8	4.2	4.4	4.8	5.6	5.3	5.2	5.1	39.5
Duration related to major incidents	-	0	0	7.4	4.7	2.0	8.0	0	0	22.1
Total Duration	-	4.8	4.2	11.8	9.5	7.6	13.3	5.2	5.1	61.5

Figure 7.9 : Number and duration of unplanned interruptions

We had 14,479 unplanned interruptions in 2017/18 with a duration of 7.6mm. This included two major incidents impacting more than 250 properties, at Burmantofts and Helmsley, which saw 765 customers off gas between them. Adjusting for these incidents, our underlying performance is 13,714 unplanned interruptions with a duration of 5.6mm, a c10% increase overall from 2016/17.

The number of interruptions is above the average yearly RIIO target of 12,960, but cumulatively we are ahead of the 8 year target phased target, having had 63,498 interruptions compared to a pro rata target of 64,798. 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. We did in fact see 5 other significant incidents this year impacting 471 customers in total, which helped drive the increase seen.

Importantly the duration of the interruptions this year is below target, 5.6 million minutes (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 23.8 million minutes duration compared to the target of 29.5 million minutes.

Our forecasts for the remainder of RIIO-GD1 assume a year on year improvement, but also assuming a more typical winter. We will deliver the 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. We anticipate the peak for smart meter installation will be in 2018/19.

Output – Customer Satisfaction Survey results for unplanned interruptions

In 2017/18 we have delivered a score of 9.45.

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.

7.4.3 Maintenance and Other Direct Activities

Maintenance costs have marginally increased by £0.4m this year, primarily in non-routine maintenance which is more unpredictable by its nature. Overall maintenance work varies year on year due to the different maintenance schedules each type of asset is subject to. We retendered our outsourced maintenance activities towards the end of last year and expect to realise efficiency improvements in the rest of RIIO-GD1.

Other direct activities have decreased by £0.9m. We saw a £0.5m reduction in Xoserve operating cost recharges following changes to the funding and governance arrangements for Xoserve. We have also seen a £0.4m reduction in one off costs captured here.

7.5 Year on Year Indirect Opex performance

Indirect Opex 17/18 prices (£m)	2016/17	2017/18	Variance
Business Support			
IT and telecoms	6.4	6.5	0.0
Property management	2.5	2.8	0.3
Human resources	0.9	1.1	0.2
Audit, finance and regulation	4.2	3.6	(0.5)
Insurance	2.7	3.2	0.5
Procurement	0.8	0.9	0.1
CEO and group management	5.0	5.0	0.0
Training and apprentices	2.0	1.7	(0.3)
Indirect Opex total	**24.5**	**24.8**	**0.4**

Figure 7.10 : Indirect Opex year on year variance

Indirect Opex overall has seen a £0.4m year on year increase in costs across business support and training and apprentices. This overall increase is driven by:

- A £0.3m increase in property management costs. We have made significant investments in our offices and depots in the last two years, 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;
- A £0.2m increase in Human Resources driven by succession planning which has meant some net staff costs have been increased for a period of time;
- A £0.5m decrease in Audit, Finance and Regulation costs. This is mainly driven by annual movements in professional and consultancy costs which can vary significantly year on year;
- A £0.5m increase in insurance costs, driven by a £0.4m increase in employee liability claims which can vary materially each year, and a £0.1m increase in insurance premium costs;
- A £0.3m reduction in Training and Apprentices. We are currently revising our end to end training approach and plans with the aim of insourcing much of the activity and developing a state of the art training centre. This will support our aim to become a best in class employer and further drive the cultural change we have been implementing in RIIO-GD1.

7.6 Year on Year Non Controllable Opex performance

Non Controllable Opex 17/18 prices (£m)	2016/17	2017/18	Variance
Shrinkage	4.9	5.1	0.2
Ofgem Licence	1.4	1.8	0.4
Network Rates	38.7	42.7	4.0
Established pension deficit recovery plan payment	28.9	10.8	(18.1)
PPF levy costs	0.1	0.0	(0.1)
Pension scheme administration costs	0.5	0.9	0.4
NTS Pension Recharge	7.3	7.2	0.0
Bad debt	0.1	-0.1	(0.2)
NTS exit costs	7.6	7.6	0.0
Network Innovation (ex IRM)	2.8	2.6	(0.2)
Non Controllable Opex total	**92.2**	**78.7**	**(11.7)**

Figure 7.11 : Non Controllable Opex year on year variance

Overall non-controllable Opex costs have decreased by £13.5m in real terms. The key variances are:

- An increase in gas shrinkage costs due to increased gas prices offset by our improvement in leakage performance;
- A comparative increase in the Ofgem Licence costs. Last year we received a rebate lowering the net costs in that period;
- An increase in our Network Rates payments as a result of the recent resetting of these rates;
- A decrease in our pension deficit recovery payment. We made an extra one off £19.1m contribution to reduce our existing deficit last year. This was part of the arrangements we made to increase the recovery period and reduce the short term costs to customers through implementing an Asset Backed Contribution (ABC) scheme. This ABC arrangement also reduces the potential for a trapped surplus being created;
- An increase of £0.4m in pension scheme administration costs, which were one off costs associated with setting up the ABC scheme; and
- A decrease in Network Innovation costs, which vary every year dependant on the number and type of projects underway.

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£1.2m of efficiencies in Totex, c£0.5m in Repex through our Stub End abandonment projects, and £0.6m in Opex in the main from the Core'n'vac, Dog survey team, and Back Blade Protector projects.

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 17/18 prices (£m)	13/14	14/15	15/16	16/17	17/18	Cumulative Total	Cumulative Allowance	Variance
Work management	14.6	17.0	18.6	19.0	15.9	85.0	113.6	(28.5)
Emergency	10.7	10.9	10.9	10.7	10.9	54.1	83.3	(29.2)
Repair	17.9	16.0	14.3	13.9	14.7	76.8	89.2	(12.3)
Maintenance	9.1	10.0	10.4	10.5	10.9	50.9	46.8	4.1
Other direct activities	7.4	7.3	7.0	7.0	6.0	34.8	66.6	(31.8)
Total direct opex	**59.7**	**61.3**	**61.2**	**61.0**	**58.4**	**301.7**	**399.5**	**(97.8)**
Business support	25.7	26.3	21.9	22.4	23.1	119.4	108.5	10.9
Training/apprentices	2.6	2.6	1.9	2.0	1.7	10.9	22.3	(11.4)
Total indirect opex	**28.4**	**28.9**	**23.8**	**24.5**	**24.8**	**130.3**	**130.8**	**(0.5)**
Total controllable opex	**88.1**	**90.2**	**85.0**	**85.5**	**83.3**	**432.0**	**531.7**	**(99.7)**

Figure 7.12 : Opex cumulative position

Cumulatively we have outperformed the controllable Opex allowance of £531.7m by £99.7m (18.7%). The majority of the outperformance is in Direct Opex.

7.8 Opex forecasts

Opex forecasts 17/18 prices (£m)	17/18 forecast	17/18 actuals	Variance
Work management	17.8	15.9	(1.9)
Emergency	11.5	10.9	(0.6)
Repair	16.4	14.7	(1.7)
Maintenance	10.2	10.9	0.7
Other direct activities	6.0	6.0	0.1
Total direct opex	**61.8**	**58.4**	**(3.4)**
Business support	22.3	23.1	0.8
Training/apprentices	2.6	1.7	(0.8)
Total indirect opex	**24.8**	**24.8**	**0.0**
Total controllable opex	**86.6**	**83.3**	**(3.3)**

Figure 7.13 : Opex forecast comparison

In our 2016/17 submission we forecast that our 2017/18 controllable Opex would be £86.6m. Our outturn costs have been £3.3m lower at £83.3m. The table above provides details of the variances by activity. The main drivers for this variance are:

- A £1.9m decrease in work management costs. The main driver was decrease in our holder demolition costs as we demolished three holders this year, one less than originally planned, and spent slightly less on environmental remediation. Together these account for £0.7m of the variance. The balance was driven by the cost savings we have achieved in Asset Management, Operations Management and System Control which have been realised earlier than we anticipated. Costs had previously peaked in Asset Management and System Control in order to support the development of our asset strategy and asset health methodologies and to manage succession planning;
- A combined decrease in Emergency and Repair costs of £2.3m. In our forecasts we assumed winter conditions would be more severe and typical of the longer term than the relatively mild conditions seen recently. We did experience some periods of more extreme weather that saw costs increase £1.0m year on year, but this was still a relatively mild winter compared to those seen in the last price control;
- Variances in maintenance work, primarily in non-routine maintenance which is by its nature more unpredictable. We have also outsourced much of our maintenance activity and the expected benefits have not been fully realised yet; and
- A net £0.1m increase in Business Support. We saw Training costs reduce more than expected as we revise our end to end training approach with the aim of insourcing much of the activity and developing a state of the art training centre. This was offset by increased employee liability claims (£0.4m) which are unpredictable and can vary materially each year, and a £0.1m increase in insurance premium costs, together totalling £0.5m. We also saw property costs increase more than expected as we revise our property portfolio, and increases in Stakeholder and other CEO costs over and above forecast.

RIIO-GD1 forecast

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

Opex forecasts 2017/18 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19	19/20	20/21	TOTAL
Work management	14.6	17.0	18.6	19.0	15.9	15.8	15.8	14.8	131.3
Emergency	10.7	10.9	10.9	10.7	10.9	11.2	11.0	10.8	87.2
Repair	17.9	16.0	14.3	13.9	14.7	16.2	16.1	16.0	125.1
Maintenance	9.1	10.0	10.4	10.5	10.9	10.5	10.4	10.3	82.1
SIUs	-	-	-	-	-	-	-	-	-
Other direct activities	7.4	7.3	7.0	7.0	6.0	5.5	5.2	5.1	50.6
Of which Xoserve	4.2	4.6	4.5	4.0	3.3	2.8	2.5	2.4	28.2
Total direct opex	**59.7**	**61.3**	**61.2**	**61.0**	**58.4**	**59.2**	**58.5**	**56.9**	**476.3**
Business support	25.7	26.3	21.9	22.4	23.1	22.8	22.4	22.0	186.7
Training/apprentices	2.6	2.6	1.9	2.0	1.7	2.5	2.5	2.5	18.4
Total indirect opex	**28.4**	**28.9**	**23.8**	**24.5**	**24.8**	**25.3**	**24.9**	**24.5**	**205.1**
Total controllable opex	**88.1**	**90.2**	**85.0**	**85.5**	**83.3**	**84.6**	**83.4**	**81.5**	**681.4**
Licence/network/other	50.3	51.6	53.7	72.4	58.8	52.2	52.1	51.9	442.4
NTS exit costs	7.3	9.3	8.0	7.6	7.6	3.9	11.0	19.2	73.9
Shrinkage	9.4	6.7	5.3	4.9	5.1	5.5	5.6	5.1	47.6
NTS pensions contribution	5.2	5.3	7.4	7.3	7.2	7.2	7.2	7.2	53.9
Total non-controllable	**72.1**	**73.0**	**74.4**	**92.2**	**78.7**	**68.8**	**75.9**	**83.5**	**617.7**

Figure 7.14 : Opex forecasts

Work management includes our profile for holder demolition, completing three holders each in the next two years then one in the final year. 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 five years. We would expect to outturn lower than this when the winter weather is mild. We expect to deliver further net efficiency savings of £0.6m by 2020/21.

Within business support we are forecasting a further c£1.3m of efficiency savings across the various activities, including further savings in our IT and Telecoms functions. In addition xoserve costs are forecast to fall by the end of RIIO, impacting Other Direct Activities.

Training and apprentices expenditure follows our expected recruitment plans and demonstrates our commitment to reinvigorating our workforce and investing for the future. Over the next year we expect to redevelop this activity, insourcing much of the work and developing a state of the art training centre. We are also supporting our contractor base with their recruitment and training activities, which in some places negates the need for us to recruit direct.

In terms of non-controllable expenditure:

- The variances in Licence/network/other are driven by a decrease in our pension deficit recovery payment, as part of the arrangements we made to increase the recovery period and reduce the short term costs to customers through implementing an Asset Backed Contribution (ABC) scheme;
- NTS exit costs vary primarily due to price fluctuations offset by our reduced bookings. We expect to see material price increases from October 2019 due to National Grid's current work to rebalance these charges nationally;
- Shrinkage costs reduce based on our reducing forecasts for gas shrinkage volumes, but vary in line with forecast gas prices; and
- NTS pension contributions are based on the latest forecasts from the NTS.

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 2017/18 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 17/18 prices (£m)	Allowance	2017/18	Variance
LTS, storage and entry	16.2	11.4	(4.8)
Connections	7.4	10.0	2.6
Mains Reinforcement	5.1	2.2	(2.9)
Governors (Replacement)	1.7	1.5	(0.3)
Other Capex	15.2	27.3	12.1
Including : IS and telecoms	4.8	14.1	9.3
Including : Vehicles	0.4	3.2	2.8
Capex total	**45.7**	**52.4**	**6.7**

Figure 8.1 : Capex variance to the allowance

The table above summarises our actual capital expenditure in 2017/18 against the allowances by activity type. Overall we invested £6.7m more than the allowance of £45.7m. Further detail on the capital investment in each asset class can be found in the sections below.

8.2 Asset Health

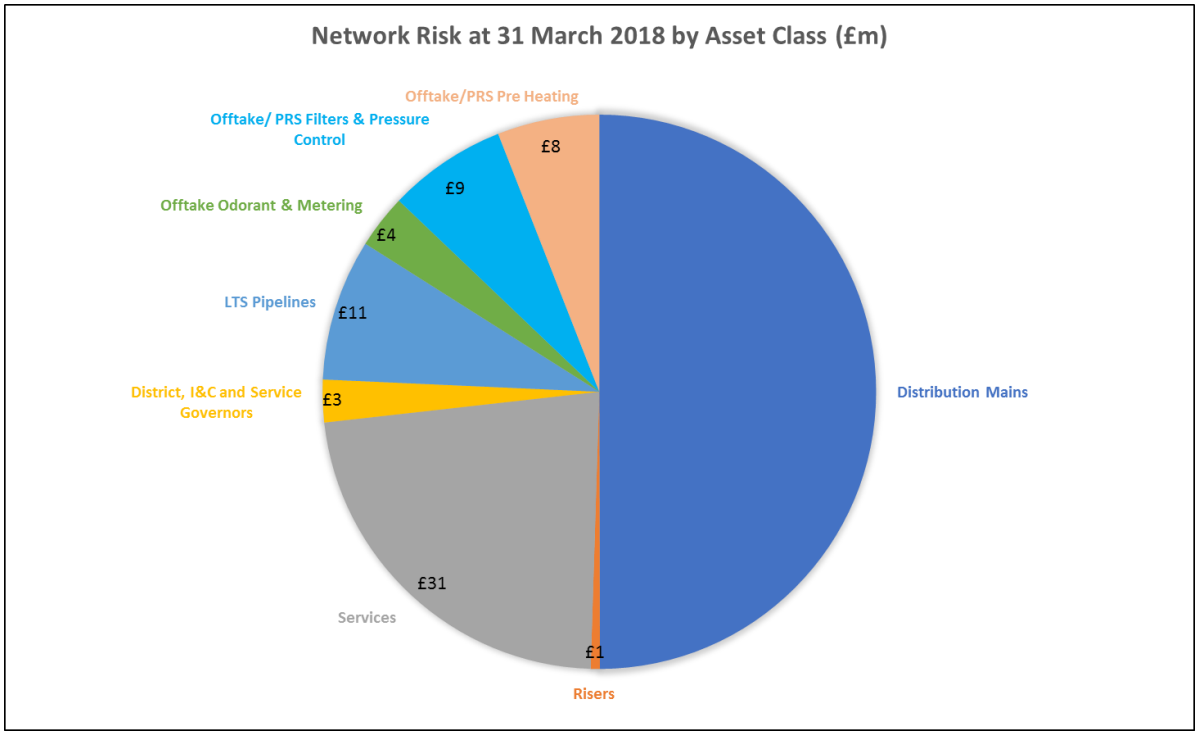
The Network Output Measures Methodology (NOMs) was developed to consider the assessment of asset health and criticality, using the principles of monetised risk. NGN has used this methodology to develop a standardised set of regulatory reports which show the monetised risk value for each key asset group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

The monetised risk values within the July 2018 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.

Ofgem are in the process of establishing RIIO-GD1 risk targets with each GDN. To ensure consistency of approach and comparability a data refresh of our base data set has not been undertaken for RRP 2018. NGN has used its existing base data with a further year's deterioration (applied through the NOMs Models) and added interventions undertaken in the regulatory year 2017/18 to report its current and forecast risk positions. This approach was agreed across all GDN's through the Safety and Reliability Working Group. Where data deficiencies have been identified, we have outlined future data improvement initiatives. These initiatives are outlined in NGN's Implementation report (which will be submitted to Ofgem as a separate report by 31 July 2018). The NOMs methodology allows the use of pooled, shared or elicited data, however, there are a number of GDN-specific datasets and values for NGN and these will form part of those data improvement initiatives going forward.

NGN's 2018 RRP submission provides NOMs outputs for our rebased 2013 GD1 start position, our current performance based on intervention activities undertaken to 2018 and our forecast 2021 position without further intervention and also based on current planned interventions.

NGN's GD1 starting monetised risk position was £158m. The current total network risk at 31 March 2018 is £135.7m as shown below. This compares to a total network risk of £136.3m reported for 31 March 2017.



Without further intervention, this risk will increase to £149m at 2021 based on our modelled outputs. The delivery of NGN's current planned work for Years 6-8 of RIIO-GD1 to 2021, based on the current risk position at 2018, will reduce the risk to £129m at 2021, this compares to £131m at 2021 that was reported at 2017.

The forecast additional £2m risk reduction compared to last years' RRP is due to:

- Increased forecast riser workload due to Grenfell and Gateshead incidents;
- The delivery of our security strategy for offtakes and PRS which has increased the number of fence replacements. Within the models, fence replacements have a large impact on reducing of monetised risk;
- Full site rather than previously forecast system upgrades on offtakes and PRS; and
- Governor demolitions – our predictive modelling is forecasting removal of the highest risk assets, however as governor demolitions are dependent on other workloads such as reinforcement we expect that a lower removal of risk than will be delivered once specific sites are identified. These dependencies are not currently built into these models.

As with 2017, the Iron Mains population holds NGN's highest total risk at a 2018 monetised risk value of approximately £48m. The length of iron mains replaced so far in RIIO-GD1 is in-line with business plan targets, so NGN are confident that the to-be forecast risk removed target will be achieved by the end of the period.

8.3 LTS, storage and entry

8.3.1 Costs and Workload

LTS, storage and entry 17/18 prices (£m)	Allowance	2017/18	Variance
LTS pipelines		1.3	
LTS diversions		2.4	
NTS offtakes		3.0	
Gas entry points		0.0	
PRSs		4.7	
Storage		0.0	
Total	**16.2**	**11.4**	**(4.8)**

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

The table above summarises our actual capital expenditure for LTS, storage and entry against the 2017/18 allowance. Overall, we have invested £11.4m against an allowance of £16.2m, an under spend of £4.8m.

Our £1.3m expenditure on **LTS pipelines** has primarily been in the following areas:

- Overcrossing upgrades (£0.9m) – upgrades to overcrossing to improve the condition of the asset. Investment includes repairs to pipe defects, blasting and painting, wrapping, repairs to brackets, and security upgrades. Investment on overcrossings is prioritised on a risk basis;
- Ball Valve upgrades (£0.2m) – As part of the Pressure Systems Safety Regulations (PSSR) NGN undertake In line inspections (ILI) on OLI1 pipes. As part of this process the ball valves of pipeline being inspected are upgraded prior to the inspection to make sure they are safe during operation;
- Pig Trap Bridal upgrades (£0.1m) – As part of the In Line Inspections (ILI) pipelines which do not have a permanent pig trap facility require portable pig traps to be brought to site and bridal pipework to be manufactured and installed; and
- Cathodic Protection upgrades (£0.1m) – Due to condition a number of transformer rectifier units are being replaced with more reliable units.

LTS Diversions has seen a significant year on year increase, primarily as a result of the following projects:

- Aislaby (£0.9m) – non-rechargeable diversion of a section of a high pressure pipeline due to land slip in order to prevent loss of supply. Design and procurement is complete with build ongoing and due completion in 2018;
- TransPennine Railway Diversion (£0.7m) – non-rechargeable diversion of a high pressure Network Rail overcrossing. Design and procurement complete however build is suspended until decisions are made in respect to the TransPennine Route Upgrade (RTU) programme by the Department for Transport; and
- Bullerthorpe to Towton (£0.7m) – rechargeable diversion due to a new office and leisure development at Thorpe Park. Build complete.

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 2017/18 NGN invested in the following sites, either in terms of design, procurement or construction:

- Offtakes;
  - Humbleton (£0.3m) – Design completion and procurement for the preheating upgrade;
  - Towton (£2.0m) – Build completion of the volumetric regulator upgrade; and
  - Saltwick (£0.4m) – Design completion and procurement for the odorant and metering upgrade.
- PRS's;
  - Carcroft (£0.6m) – Build completion of the full site upgrade;
  - Durham Lane (£1.4m) – Build completion of the preheating upgrade and ongoing construction of the filtering upgrade;
  - Saltend (£0.4m) – Design completion and procurement for the preheating upgrade;
  - Brenda Road (£0.2m) – Design completion and procurement for the preheating upgrade; and
  - West Cumberland Hospital (£0.4m) – Phase one build of the medium pressure reinforcement is complete. Phase two of the build of the preheating upgrade, new district governor and PRS decommissioning due 2018.

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 17/18 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	79	77	74
Utilisation 50% < I <=70%	52	58	56	59	57	60	60	60	64
Utilisation 70% < I <=80%	45	25	27	22	27	26	24	22	22
Utilisation 80% < I <=100%	44	49	44	41	30	25	27	32	32
Utilisation > 100%	0	10	9	8	5	3	2	1	-
Total	192	193	195	194	194	194	192	192	192

Figure 8.3 : Asset utilisation and capacity forecasts – RRP Table 2.5 and 6.5

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.

Our target is to improve our asset utilisation position over RIIO-GD1. The table above shows our current forecast for this output. We will achieve this be designing appropriate site upgrades in order to improve the utilisation figures.

The updated methodology for measuring PRI capacity that was adopted for the 2016/17 reporting period has been replicated for the 2017/18 reporting period. The methodology uses the same constraint parameters and measures capacity using the same PRISM software, however, in order to maintain continuity and improve accuracy, the maximum flow figures for analysis are derived from the Graphical Falcon 1:20 model as opposed to flows derived from the PK6 modelling. 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.

Variations from RIIO Target and 2016/17 Submission

- The total of 194 sites in the 2016/17 matches the total number of sites in the 2017/18 submission;
- Although there has been a change in utilisation bands in some instances based on the updated methodology, 3 sites remain above 100% for 2017/18 reporting. Plans have been made to reduce capacity utilisation, but in the meantime they are closely monitored and we use other PRS sites to balance the network;
- The capacity utilisation at Rawcliffe 7 bar NTS Offtake is no longer above 100% following an increase in the minimum expected inlet pressure;
- The capacity utilisation at Baldersby 2 bar NTS Offtake is no longer above 100% following a reduced Pk6 figure; and
- The current forecast for a total of 191 sites at the end of the RIIO period, takes into account the decommissioning of Clay Flatts 3" and Clay Flatts 4" (Storage) PRIs and the transfer of the load onto the Derwent Howe Industrial Estate PRI, which previously fed the British Steel plant at Workington. It also takes into account the removal of Little Saltwick offtake and the transfer of the load onto Big Saltwick which will now feed into the North Seaton system.

The differences in the numbers in the various capacity utilisation bands are due to the year to year variations in forecast flows and inlet pressures resulting from re-validation of models and changing demand forecasts. Going forward the aim is to improve capacity utilisation analysis and reduce the capacity utilisation levels wherever possible. With this in mind a programme of review and re-analysis has been put in place in order to optimise the outcome for each site prior to the compilation of data for the 2019 submission.

8.4 Connections

8.4.1 Costs and Workload

Connections	2016/17	2017/18	Variance
Workload			
Mains (km)	28.8	32.3	3.4
Services (number)	7,912	7,201	(711)
Governors (number)	1	2	1
Risers (number)	27	6	(21)
Costs (17/18 prices £m)			
Mains	1.8	2.9	1.1
Services	12.1	11.1	(1.0)
Governors	0.0	0.2	0.2
Risers	0.0	0.0	0.0
Gross Cost	**13.9**	**14.2**	**0.3**
Contribution	(4.7)	(4.2)	0.6
Net Cost	**9.2**	**10.0**	**0.9**
Net Allowance	**7.5**	**7.4**	**0.1**

Figure 8.4 : Connections workload and costs variance

The table above summarises our connections performance against the 2017/18 allowance, and against our 2016/17 outturn. Overall this year we have spent a net £10.0m, £2.6m over the allowance of £7.4m.

Our net costs have increased by £0.9m compared to 2016/17, which is mainly due to:

- A decrease in contributions of c£0.6m. This is a timing difference, as we report on a cash basis for connections, and so there is often a timing difference between incurring the costs and receiving payment;
- Mains laid increased by 3.4km, which accounts for c£1.1m of this increase in costs. This workload change is driven by the type and location of projects, which can vary significantly year on year;
- In terms of services workload, we saw a decrease of 44 Non Domestic connections and a decrease of 667 Domestic connections, made up of Existing Housing and Fuel Poor, however there was a slight increase in New Housing. This equates to a c.£1m reduction on costs; and
- An increase of one Governor and a cost of c.£0.2m makes up the remaining variance from last year.

8.4.2 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 now agreed a new target with Ofgem of 14,500 fuel poor connections in the same period. In order to achieve this we have 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.

	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	2634	900	900	14500
Phased Target	1500	1500	1917	1917	1917	1917	1917	1917	14500

Figure 8.5 : Fuel poor workload forecast

During 2017/18 we wanted to get further ahead and successfully completed 2,099 fuel poor connections. This cumulatively puts us 1,315 ahead of the 8751 phased RIIO Target. Following removal of one of the qualifying criteria for FPNES from July 2019, we expect a slightly increased performance in 18/19, followed by a significant reduction in the remaining two years of this regulatory period.

8.4.3 Customer Satisfaction Survey results for connections

In 2017/18 we have delivered a score of 9.14.

Over the last twelve months we have restructured our connections teams, bringing quotation and design under one roof, and putting planning alongside delivery within each of the nine operational patches. The benefits of this are two-fold. The first stage of the customer process is now delivered by one team, who can take responsibility for owning the customer journey. In addition to this, our delivery teams will have total control of how they physically do the work, ensuring that local knowledge can be taken into account when managing customer expectations.

8.4.4 Output – Connections Standard of Service

We have had another excellent year in Connections; we delivered six out of seven outputs at almost 100%. All seven outputs are significantly above existing OFGEM guaranteed standards and we have exciting plans in place to achieve even better results over the next few years.

The Connections Review mentioned in our last report has resulted in a fully integrated back office team, all based in the same location. This will deliver many benefits such as increased customer service with fewer internal handoffs, which should result in a speedier response.

The table below compares our RIIO-GD1 output target with our actual performance to date and forecast performance for the remainder of the RIIO-GD1 price control period.

	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%	99.6%	99.6%	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%	99.6%	99.6%	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%	99.6%	99.6%	99.6%
% of land enquiries where response sent within 5 working days	99.6%	99.5%	99.6%	100.0%	99.43%	98.26%	99.6%	99.6%	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%	99.6%	99.6%	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%	100%	100%	100%
% of connection jobs substantially completed on date agreed with customer	95%	97.2%	98.6%	98.4%	98.50%	97.69%	95%	95%	95%

Figure 8.6 : Connections forecast outputs

8.5 Mains Reinforcement

Mains reinforcement	Allowance	2017/18	Variance
Workload			
Mains < 180mm (km)		4.5	
Mains > 180mm (km)		2.5	
Total	**17.5**	**6.9**	**(10.6)**
Governors (number)	8	1	(7)
Costs (17/18 prices £m)			
Mains < 180mm		1.0	
Mains > 180mm		0.9	
Governors		0.3	
Total	**5.1**	**2.2**	**(2.9)**

Figure 8.7 : Mains reinforcement workload and costs variance

The table above summarises our actual mains reinforcement expenditure against the 2017/18 allowance. We invested £2.2m on mains reinforcement and associated governors, delivering 6.9km of reinforcement mains and one governor. This equates to a unit cost of c£270 per metre, which shows improvements on unit costs achieved in RIIO-GD1 to date. The reasons for the unit cost improvements is due to the workload mix which comprised of longer lengths of smaller diameter projects, Creyke Beck being an example where we laid 1.75km of 250mm PE pipe at a unit cost of below £200/m. It is important to remember that unit costs will vary dependent on the type, length, location and complexity of the projects undertaken. The unit cost for the District Governor installed at Penrith was significant at £317k due to the size of the governor and additional costs for E&I and fencing upgrades that were required and contaminated land that was discovered during construction.

This is a significant outperformance against the £5.1m allowance to deliver 17.5km of reinforcement main. The key driver is the reduced mains laid workload, which is nearly 71% 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. Although we are forecasting a slight increase in the Peak demand this year, 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	2017/18	Variance
Workload			
District Governors		36	
Service Governors		27	
Total	**30**	**63**	**33**
Costs (16/17 prices £m)			
District Governors		1.3	
Service Governors		0.2	
Total	**1.7**	**1.5**	**(0.3)**

Figure 8.8 : Governor replacement workload and costs variance

We have invested £1.5m in our overall governor replacement programme in 2017/18. When designing the programme, we prioritise sites based on maintenance frequencies, capacity, physical condition of the unit and the locality using the 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. This year has seen the largest number of civil upgrades to district governor housing than all other years as we are seeing an increasing deterioration of this asset class resulting in worsening condition. The number of district governor replacements is in line with previous years however the unit cost is slightly reduced on last year which reflects the different mix of governor size installed. We are currently trialling a new strategy for service governors which aims to replace service governors prior to the 10 year maintenance with a view to reducing overall totex costs.

8.7 Other Capex

Other Capex 17/18 prices (£m)	Allowance	2017/18	Variance
System Operations	-	0.2	-
Infrastructure and Systems	4.8	14.1	9.3
Xoserve	-	0.7	-
Plant, tools and equipment	-	2.4	-
Land, buildings, furniture fittings	-	4.4	-
Vehicles	0.4	3.2	2.8
Security (Exc PSUP)	-	0.3	-
PSUP	-	0.3	-
Other	-	1.8	-
Capex total	**15.5**	**27.3**	**11.8**

Figure 8.9 : Other Capex variance to the allowance

The table above summarises our actual Other Capex expenditure against the 2017/18 allowances. We have invested £27.3m in the areas detailed in the table against an allowance of £15.5m.

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 2019/20. 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 existing systems architecture is complex, which makes it difficult to access data and information, and create relationships between data sets. The current SAP platform is 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 have decided to implement the SAP 4 HANA platform, with a range of cloud based modules. This will include a full data migration into a newly created data model. The functionality offered by this product is considered to be the best available in the market, and it is more cost effective than switching to any other product.

Currently we are focused on a number of technology areas:

- 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;
  - 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 SAPs cloud platform application technology; and
  - New scheduling and dispatch technology through SAP's MRS (multi resource scheduler).
- 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.

Most of the **Plant, Tools and Equipment** expenditure (£2.4m) was associated with the following work:

- Welfare pods (£0.6m) – A commercial decision to reduce totex through part purchase and part hire welfare pods rather than solely hire. These pods are used by our engineers working on our Repex, Emergency & Repair and Connection sites;

- Network loggers and low points (£0.6m) – Installation of validation loggers which are used to validate network models and by system control to understand how the network is behaving and make informed decisions to manage pressures;
- Window cutters (£0.2m) – Procurement of innovative new tools which halve the time taken to cut ductile iron pipe. The use of this tool reduces the duration that the gas main is isolated by over one hour on every insertion having a clear positive impact on the restoration of gas to customers;
- PV4 installation (£0.2m) – Purchase of solar panels and PV4 batteries for the pressure profilers. This equipment will negate the need to change the batteries which only have a one-year life; and
- Dewatering units (£0.2m) – Procurement of 2no. water tankers which are used within our Repair activity to remove water ingress in our pipes.

The balance is made up of many small projects to replace tools and small items of plant across the network.

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. This year we have invested £4.4m on three upgrades; floors 1 and 2 of our head office Thorpe Park in Leeds, Elland Depot just south of Halifax and Hendon Depot in Sunderland.

During this year we spent £3.2m on **Operational Vehicles** which is an overspend against the allowance of £2.8m. The capital expenditure included £2.1m on our ongoing vehicle replacement programme to ensure we have a fit for purpose fleet which improves our efficiency in the field. A risk based model is used to determine which vehicles are in greatest need of replacement based on actual data rather than any set mileage/age criteria. During 2017/18 we purchased 54 onboard power vehicles for the emergency and repair teams. We also purchased 4no. Dropside vehicles, two for our maintenance contractor and two CNG fuelled vehicles for our emergency and repair support teams at a cost of £0.4m. Finally, we invested £0.7m on purchase of 22no. vehicles for our maintenance contractor's E&I team which is a commercial decision to own the vehicles and lease them back to the contractor rather than pay for the use of their leased vehicles including fee uplift.

Within the **Other** category over 60% of the expenditure relates to major upgrade works on overcrossings including repairs to the pipework, supports and upgrades to the security. Over 30% 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.

8.8 Capex cumulative position under RIIO

Cumulative Capex 17/18 prices (£m)	13/14	14/15	15/16	16/17	17/18	Cumulative Total	Cumulative Allowance	Variance
LTS, storage and entry	9.7	16.1	21.1	15.5	11.4	73.7	85.9	**(12.1)**
Connections	7.1	7.3	10.5	9.2	10.0	44.1	35.9	**8.2**
Mains Reinforcement	3.1	1.9	3.4	2.2	2.2	12.8	26.3	**(13.5)**
Governors replacement	2.2	1.5	1.9	1.7	1.5	8.8	8.7	**0.1**
Other Capex	21.8	25.3	27.8	32.6	27.3	134.8	130.6	**4.2**
Including : IT	5.8	5.2	6.4	16.6	14.1	48.2	32.2	**15.9**
Including : Vehicles	4.3	4.8	2.9	2.6	3.2	17.8	20.0	**(2.2)**
Total	**44.0**	**52.0**	**64.6**	**61.2**	**52.4**	**274.2**	**287.3**	**(13.1)**

Figure 8.10 : Cumulative Capex position compared to the allowance

The table above summarises our cumulative Capex expenditure over the first four years of RIIO-GD1 against the allowances for that period. Overall we have underspent the cumulative allowance by £13.1m. The main drivers for this are:

- Reduced mains reinforcement work (£13.5m) 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 (£12.1m) due to timing and efficiencies in delivering both above and below 7 bar capital investment projects;
- Increased Infrastructure and Systems investment (£15.9m) due to our business transformation programme called Future WoW and implementation of the SAP 4 HANA platform, with a range of cloud based modules; and
- Increase investment on Connections (£8.2m) which can be explained through the low unit costs set in the allowances.

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

2017/18 actuals against forecast

2017/18 Capex forecast 17/18 prices (£m)	17/18 forecast	17/18 actuals	Variance
LTS, storage and entry	13.5	11.4	(2.1)
Connections	7.9	10.0	2.1
Mains Reinforcement	2.7	2.2	(0.5)
Governors replacement	1.2	1.5	0.2
Other Capex	27.3	27.3	0.1
Including : IT	11.2	14.1	2.9
Including : Vehicles	3.7	3.2	(0.5)
Total	**52.6**	**52.4**	**(0.2)**

Figure 8.11 : 2017/18 actual Capex position compared to the prior year forecast

The table above summarises our actual Capex in 2017/18 against the forecast for 2017/18 we submitted last year. Overall we spent £0.2m less in 2017/18 than the £52.6m we forecast last year. The forecast proved to be extremely accurate however there were a few variations between asset classes, the main drivers for this are:

- A £2.1m decrease in expenditure on LTS, storage and entry projects. The phasing of some larger projects has meant that we have invested in more planning this year with the projects due to be delivered over the subsequent years of GD1;
- A £2.1m increase in Connections expenditure was primarily driven by an increase in workload. We delivered an increase of 360 fuel poor connections which were at a higher unit cost than forecast driving the majority of the difference, also an increase of 363 new housing connections compiled the variance; and
- A £2.9m increase in IT expenditure. As detailed in section 8.7 above we are transforming our business by investing significantly in our technology and systems and improving processes though a companywide programme called Future WoW.

RIIO-GD1 forecast

The table below summarises our RIIO Capex expenditure forecast, based on the first five years' actual performance and a forecast for the remaining three years. 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 £29.2m over our allowances, which is largely driven by non-network overspend on Infrastructure and Systems which is £34.4m over the allowance and Operational Vehicles which is £7.3m below the allowances. This leaves only a slight variance for all other mainly network spend of £2.0m above the allowance.

LTS, storage and entry expenditure varies year on year given the major project driven nature of the work. We are broadly going to spend our allowance against this asset class and in doing so achieve all our outputs. This year saw the completion of the volumetric regulator upgrade at Towton, a full site upgrade at Carcroft and the preheating upgrade at Durham Lane. We also undertook design and procurement for two site upgrades due for delivery in 2018, Brenda Road and Saltend. The final two years of the regulatory period we are forecasting a slight increase in annual investment as we look to deliver a few larger schemes.

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, where workload peaked last year and then reduces significantly in the last two years of the regulatory period. This delivers our revised fuel poor output commitment following Ofgem's review of the Non Gas Fuel Poor Network Extension Scheme, and the front loading of the work shows our commitment to this key social obligation output.

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.

We are forecasting relatively flat investment in our governors, increasing the numbers of refurbishments in the final few years thereby reducing costs. We are also forecasting to maintain our civil upgrade programme to replace and refurbish buildings to ensure the ongoing protection of our governor assets. We are continuing our service governor totex strategy to replace before their ten year major maintenance.

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 17/18	13/14 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19	19/20	20/21	Total	Allowed
LTS, storage and entry	9.7	16.1	21.1	15.5	11.4	13.8	16.8	20.9	**125.2**	**129.0**
Connections	7.1	7.3	10.5	9.2	10.0	10.8	8.5	8.4	**71.9**	**58.9**
Mains Reinforceme	3.1	1.9	3.4	2.2	2.2	4.1	3.7	3.9	**24.6**	**40.9**
Governors replacement	2.2	1.5	1.9	1.7	1.5	1.8	1.2	1.3	**13.0**	**13.8**
Other Capex	21.8	25.3	27.8	32.6	27.3	32.2	31.6	23.5	**222.1**	**182.8**
Of which IT	5.8	5.2	6.4	16.6	14.1	16.0	7.9	8.8	**80.9**	**46.5**
Of which vehicles	4.3	4.8	2.9	2.6	3.2	0.9	3.1	1.3	**23.2**	**30.4**
Total	**44.0**	**52.0**	**64.6**	**61.2**	**52.4**	**62.7**	**61.8**	**57.9**	**456.7**	**425.4**
Allowance	56.2	60.6	64.6	60.1	45.7	46.0	45.8	46.5	**425.4**	
Variance	**-12.2**	**-8.5**	**0.1**	**1.1**	**6.7**	**16.7**	**16.0**	**11.4**	**31.3**	

Figure 8.12 : Capex forecasts compared to the allowance

9 Repex Performance Review

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

In May 2012 the HSE issued a new enforcement policy on iron mains risk reduction. Under the old policy, the 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 fifth 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 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	18/19	19/20	20/21
Risk removed (incidents/year x10^{-6})	13,898	43,119	41,213	29,893	26,727	23,439	19,419	16,729	14,810
Length of Mains taken off risk	495.2	485.4	521.5	464.2	475.5	516.4	529.9	482.2	482.3
Number of services replaced	30,932	29,305	29,609	27,579	29,275	29,908	34,908	33,439	33,443
Number of GIB events	144	56	42	58	52	60	70	68	66
Number of fracture and corrosion failures	2,742	815	883	685	683	689	900	875	850
Sub deduct networks 'off risk'	100%	7%	58%	83%	90%	90%	93%	97%	100%
Number of Planned Interruptions	64,257	43,276	57,434	58,925	59,677	62,669	61,667	58,710	58,715
Duration of Planned Interruptions (mm)	17.3	22.4	30.3	13.7	15.1	16.4	16.2	15.4	15.4

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%)

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 five years. In 2017/18 the total risk removed was 23,439, which gives a cumulative total of 164,392. 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 nearly 48% 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 years of RIIO-GD1 to reduce year on year 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 47.0km of main, which reduces the overall allowed workload to 3957.4km, an average target of 494.7km.

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 4616.4km of main against a funded target of 4351.5, a 6% 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	448.0	445.4	487.8	439.8	452.9	479.4	484.6	450.0	450.1	3690.0	3584.0
Tier 1 – customer funded	15.4	1.8	2.1	2.9	1.9	2.0	2.1	2.1	2.1	16.9	122.9
Tier 2a	5.9	8.8	7.6	5.3	4.1	7.9	4.4	4.4	4.4	47.0	47.0
Tier 2b	20.4	22.1	18.3	12.2	12.4	24.7	32.5	20.7	20.7	163.5	163.5
Tier 3	5.0	7.4	5.7	3.9	4.3	2.4	6.3	5.0	5.0	40.0	40.0
Iron mains	**494.7**	485.4	521.5	464.2	475.5	516.4	529.9	482.2	482.3	3957.4	3957.4
Iron > 30m	-	8.7	9.3	11.4	10.8	2.7	6.9	6.9	6.9	63.7	-
Steel	48.7	57.6	75.6	45.9	59.5	59.6	65.0	72.0	80.0	515.3	389.8
Other	-	10.4	10.7	8.6	8.6	13.3	9.5	9.5	9.5	80.1	-
Total	**543.4**	562.1	617.1	530.1	554.4	592.0	611.3	570.6	578.7	4616.4	4351.5

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

In terms of **Total Irons Mains** we have abandoned 2,463.0km of main to date at an average of 492.6km. This is 2.1km below the inferred annual target, and cumulatively 10.4km behind the inferred year 5 target. We plan to recover this position and then get ahead of the cumulative target in 2018/19 by abandoning 529.9km of main, 35.2km above the inferred annual target.

The total iron mains target includes an annual allowed workload of 15.4km for customer driven rechargeable mains diversions. To date we have abandoned 10.6km of Tier 1 and 4.2km of Tier 2b/3 iron mains associated

with this type of work. This puts us 62.2km behind the five year target of 77.0km, and is the main driver for the shortfall against the iron mains target detailed above. We have however abandoned a further 34.2km of main associated with rechargeable diversions but the mains have been made from other materials or outside of 30m from domestic properties, so don't count towards the iron mains 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 60km of this type of main in RIIO-GD1;
- **Steel** – we have abandoned 298.3km of steel to date, 54.8km ahead of the inferred 5 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 515.3km over RIIO-GD1, nearly 125km over the allowed volume; and
- **Other** – we have abandoned 51.6km of other materials mains date, and expect to abandon 80.1km 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 481.4km of Tier 1 mains this year, 18km ahead of this target. Cumulatively we have abandoned 2315.9km, which puts us 1.1km behind target. We expect to more than recover this position in 2018/19. Importantly we are 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 47.0km through dynamic growth. Cumulatively we have abandoned 33.7km of main which puts us ahead of schedule to deliver this overall workload. We 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 are just behind 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 113.4km against a target of 127.0km. We expect to recover this position in 2018/19, and then deliver in line with the average annual programme.

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.

	Max. number of events (RIIO-GD1)	Inferred annual target	13/14 actual number of events	14/15 actual number of events	15/16 actual number of events	16/17 actual number of events	17/18 actual number of events
GIB events (any concentration level)	1,153	144	56	42	58	52	64

Figure 9.4 : GIB events performance

The number of GIB events during the first five years of RIIO 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 actual number of events	14/15 actual number of events	15/16 actual number of events	16/17 actual number of events	17/18 actual number of events
Number of fractures / failures (C1/S1/D1) over RIIO-GD1	21,936	2,742	815	883	685	683	689

Figure 9.5 : Fractures and corrosion failures performance

The number of fracture and corrosion failure events during the first five years of RIIO 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 actual services replaced	14/15 actual services replaced	15/16 actual services replaced	16/17 actual services replaced	17/18 actual services replaced
Number of domestic services replaced	247,458	30,932	29,305	29,609	27,579	29,275	29,908

Figure 9.6 : Number of services replaced

The total number of domestic services replaced during the first five years of RIIO has averaged 29,135, below the average annual target of 30,932. We saw an increase of c600 services replaced compared to last year, largely as a result of the increase 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 five 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 five 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 and to recover the shortfall in service volumes seen in RIIO-GD1 so far. However we recognise that the health of our service asset population is deteriorating and will continue to do so in the future, and this potential increase in service failure would impact customers. Therefore we will continue to monitor the number of services replaced, and will potentially use a 'Bulk Service Renewal' programme should cost benefit analysis suggest it would be cost effective.

With these initiatives, we believe that it is prudent to continue to forecast that services replacement during RIIO-GD1 will broadly meet the output targets whilst also improving the underlying health of the services asset base, improving safety and reliability for customers.

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.

	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Sub-deduct networks 'off-risk' by the end of RIIO	135	9	69	34	9	0	5	5	4	135

Figure 9.7 : Major accident hazards prevention forecast

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. This year no sub-deduct networks have been removed. We are under continuing negotiation to transfer the operatorship and ownership of 12 of the remaining 14 sites to a 3rd party. We need to ensure the 3rd parties understand the safety and maintenance obligations they will be responsible for managing. The remaining 2 sites are under review.

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 c98% of the total number;
- Service alterations at the request of a customer – which accounts for c2% 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	62,669	60,248	149	2,272
Duration of planned interruptions	17.35 mm	16.4 mm	16.1 mm	0.0 mm	0.2 mm

Figure 9.8 : Number of planned interruptions

The table above details our 2017/18 performance. We had 62,669 planned interruptions with a duration of 16.4 millions of minutes (mm). As expected this was mainly driven by the replacement programme, which accounted for 60,248 interruptions with a duration of 16.1 mm. This was a 5% increase in volume from last year, driven by a broadly equivalent increase in total mains abandonment. We also saw a 3% increase in the average minutes lost per interruption from 259 minutes to 268 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 2017/18 we have delivered a score of 8.85.

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 17/18 prices (£m)	Workload
Tier 1 – Mains laid	53.2	512.5 km
Tier 1 – Associated services	10.6	39,017
Tier 2a – Mains laid	2.5	7.7 km
Tier 2a – Associated services	0.1	216
Other – Mains laid	15.6	48.6 km
Other – Associated services	0.6	1,474
Diversions – Mains laid	1.3	9.2 km
Diversions – Associated services	0.1	170
Other services	7.2	5,940
Risers	0.1	57
Sub deducts	0.0	0
Total	**91.2**	
Allowance	**107.6**	
Variance	**(16.4)**	

Figure 9.9 : 2017/18 Repex costs and workload

The table above sets out our 2017/18 Repex costs and workload, along with the cost allowance. Overall we spent £91.2m against an allowance of £107.6.0m (after adjusting for lower than allowed Tier 2A workload). This £16.4m saving will be shared with our customers under the Totex sharing mechanism.

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

- Using direct contracts with end service providers to deliver the work in the field, rather than contracting through larger intermediary contractors. This removes the profit of the intermediary and gives us greater control of the field activities, improving efficiency and customer service; and
- Reviewing and rebuilding our pre construction processes – project selection, project build and various pre construction 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 £0.5m for 2017/18. 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’.

We have also used Control Point extensively, a technique developed outside of the innovation stimulus. This is a piece of equipment that measures the effectiveness of new joints enabling any remedial work to take place on site without a revisit. We estimate this has saved c£0.7m of future avoided costs.

9.3.2 Mains and Services year on year performance

Mains and Services (17/18 prices)	2016/17			2017/18		
	Net Costs £m	Workload	Unit Costs £	Net Costs £m	Workload	Unit Costs £
Tier 1 + steel – Mains laid	54.8	485.9	113	53.2	512.5	104
Tier 1 – Services	13.5	36949	365	10.6	39017	272
Tier 2a – Mains laid	1.6	4.1	396	2.5	7.7	321
Tier 2a – Services	0.0	36	638	0.1	216	505
Other – Mains laid	8.7	33.2	262	15.6	48.6	320
Other – Services	0.5	1247	380	0.6	1474	409
Diversions – Mains laid	0.9	11.1	79	1.3	9.2	137
Diversions – Services	0.1	126	426	0.1	170	448
Other services	8.3	6307	1315	7.2	5938	1207
Total mains laid	66.0	534.3	124	72.5	578.0	125
Total services	22.3	44,665	500	18.6	46,815	397
All in mains cost	**88.3**		**165**	**91.1**		**158**

Figure 9.10 : Repex year on year variance

In terms of year on year performance, the all in mains laid unit rate averaged £158 per metre in 2017/18 against the 2016/17 equivalent of £165 per metre, an overall decrease of 4.5%.

In terms of the breakdown in unit costs, when you consider mains and services together our Tier 1 costs have decreased by c10%, mainly driven by further savings from our delivery model. Tier 1 work makes up c89% of the total workload delivered this year, with a 6% overall increase in mains laid.

Tier 2a unit costs have decreased by c15%, but this has been more than offset by a 20% increase in the Other Mains unit costs. Workload across these tiers is in general more complex and unit costs can vary more dependent on the actual workload. We have increased mains laid in both of these areas, from a combined 37.2km to 56.3km

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 as mentioned above makes up c89% of our overall workload this year, 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 this year. 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%	29%	(10%)	1%	3%	2%
>75mm to 125mm	45%	58%	14%	6%	4%	(2%)
>125mm to 180mm	14%	11%	(2%)	9%	15%	6%
>180mm to 250mm	2%	1%	(1%)	25%	30%	4%
>250mm to 355mm	0%	0%	0%	40%	35%	(6%)
>355mm to 500mm	0%	0%	0%	14%	13%	(1%)
>500mm to 630mm	0%	0%	0%	4%	1%	(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 a total of 57 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. This year no sub-deduct networks have been removed, but we have firm plans to deal with the remaining 14 networks at risk.

9.4 Repex cumulative position under RIIO

Cumulative Repex 17/18 prices (£m)	13/14	14/15	15/16	16/17	17/18	Cumulative Total	Cumulative Allowance	Variance
Repex	96.4	101.2	91.2	88.6	91.2	468.6	528.5	(60.0)
Total	**96.4**	**101.2**	**91.2**	**88.6**	**91.2**	**468.6**	**528.5**	**(60.0)**

Figure 9.12 : Cumulative Repex position compared to the allowance

Cumulatively we have outperformed the £528.5m Repex allowance by £60.0m (11.4%).

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 2463.0km of iron main against an inferred 5 year target of 2473.4km, which puts us 0.4% behind target. However in addition we have also abandoned 43.0km of main outside of 30m of domestic properties, and 51.6km of Other Mains, based on cost benefit analysis. We have also abandoned 298.3km of steel against an inferred 5 year target of 243.6km.

9.5 Repex forecasts

2017/18 actuals against forecast

2017/18 Repex forecast 17/18 prices (£m)	17/18 forecast	17/18 actuals	Variance
HSE driven mains and services	76.0	66.4	(9.6)
Non HSE driven mains and services	20.3	24.7	4.4
Risers	0.0	0.1	0.1
Total	**96.2**	**91.2**	**(5.0)**

Figure 9.13 : 2017/18 actual Repex position compared to the prior year forecast

The table above summarises our actual Repex expenditure in 2016/17 against the forecast for 2016/17 we submitted last year. Overall we spent £91.2m, a £5.0m decrease from the forecast (5.3%). The main drivers for this is workload volume and overall unit cost. In terms of volume we completed 592km of mains abandoned against a forecast of 600km (1.7%). In terms of unit cost we saw our overall unit rate decrease by 4.8% against a forecast decrease of c1%.

RIIO-GD1 forecast

Repex forecasts 16/17 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
HSE driven mains and services	70.4	76.7	68.6	69.9	66.4	66.4	62.0	62.0	**542.4**
Non-HSE driven mains and services	26.0	24.4	22.6	18.6	24.7	29.8	26.4	27.8	**200.3**
Risers	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	**0.7**
Repex totals	**96.4**	**101.1**	**91.2**	**88.6**	**91.2**	**96.4**	**88.5**	**89.9**	**743.3**

Figure 9.14 : Repex forecasts

The table above summarises our RIIO-GD1 Repex expenditure forecast, based on the first five years' actual performance and a forecast for the remaining three years. 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. We are investing more in 2018/19 to make up the current 0.4% shortfall in iron mains abandonment work and to get ahead by the end of that year to provide some leeway in the final two years of RIIO-GD1.

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 outputs 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 2017/18 and our forecasts for the next three years. 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 51 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 2017/18.

One Year Outputs	RIIO-GD1 Year 5 target	17/18	RAG	
Emergency response				
97% of uncontrolled gas escapes attended within 1 hr	97%	99.61%	G	Link
97% of controlled gas escapes attended within 2 hrs	97%	99.72%	G	
Repair				
Annual repair risk (m)	<34.5	19.3	G	Link
Percentage of repairs completed within 12 hrs	61.0%	66.1%	G	Link
Major accident hazard prevention (MAHP)				
Compliance with the Control of Major Accident Hazards regulations (number of breaches)	0	0	G	Below
Compliance with the Gas Safety (Management) Regulations (GS(M)R) (number of breaches)	0	0	G	Below
Sub-deduct networks 'off-risk' by the end of RIIO	9	0	G	Link

Figure 10.1 : 'One Year' safety outputs performance

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

Eight Year Outputs	RIIO-GD1 Year 4 inferred target	17/18	RAG	
Mains replacement				
Risk removed (incidents/year x10^{-6}) as measured by MRPS	13,898	23,439	G	Link
Number of Gas in Buildings (GIB) events	144	64	G	Link
Number of fractures and corrosion failures	2,742	689	G	Link
Length of main taken 'off-risk'(km)	492.9	516.4	G	Link
Number of services replaced	30,932	29,908	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 10.4km behind the inferred year 5 target for length of mains taken 'off risk' which is just 0.4% behind schedule. The number of services replaced is lower than target mainly as we have seen fewer services replaced when completing emergency response work, driven by the relatively mild winters we have experienced. We are currently 6% behind target here. 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

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. All low pressure COMAH sites have been decommissioned and denotifed. This eliminates the legislative requirement associated with gas storage set out in COMAH regulations.

We have had no COMAH breaches in 2017/18. Our target is to have no breaches during RIIO-GD1.

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 the safety case required by this legislation. The culture of compliance with the safety case is embedded throughout NGN.

Our output target is to maintain full compliance with GS(M)R during RIIO-GD1. We have achieved this in 2017/18 and expect to in every year 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 5 inferred target	17/18	RAG	
Loss of supply				
Number of planned interruptions	64,646	62,669	G	Link
Number of unplanned interruptions	12,960	13,714	G	Link
Duration of planned interruptions (mins-millions of)	21.3	16.4	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 (MWh pa)	505,357	478,846	G	Below
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	<0.1%	G	Below
Number and duration of telemetered faults	166 pa	95	G	Below
Pressure System Safety Regulation (PSSR) Faults (A1 and A2 faults per number of AGIs)	0.49	0.37	G	Below
Gasholder decommissioning	3	3	G	Link

Figure 10.4 : Reliability outputs 2016/17 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.

Our year five 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

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. 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.

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.

This year we did experience a period of extreme weather in March which was counted as a 1 in 20 event in the North zone of our network. During this period we met all demand with no customer interruptions.

The table below details our latest forecasts. We expect to be fully compliant throughout RIIO-GD1.

	RIIO annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Meeting NGN's 1 in 20 planning standard (MWh pa)	505,357	500,315	502,916	492,560	476,850	478,846	473,411	471,715	470,029

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

10.3.2 Network Reliability

Percentage by volume of offtake meter errors

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

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

	RIIO annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Offtake meter errors	<0.1%	0%	0%	0%	0.0%	<0.1%	<0.1%	<0.1%	<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. We received one new meter error report in 2016/17 which is still under review, but it is expected to fall well below the 0.1% threshold.

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 5 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	166	105	63	135	63	95	90	85	79

Figure 10.7 : Telemetered faults forecast

In 2017/18 we scored 95 against a target of 166 continuing our outperformance for this output, an excellent performance. The score has increased from last year, driven by an increase in fault numbers from new Biomethane sites and Pre Heating equipment related to our NIC project in that area. Our future forecast reflects the potential for faults with new non-conventional gas connections.

Our system control and network maintenance functions have continued focussing on this output. Fault data is reviewed through weekly reports, which drives the reduction and close out of faults quickly and efficiently. They also hold monthly fault meetings to continuously identify further opportunities to reduce faults. It also drives a prioritised replacement programme to remove equipment identified as at the end of its asset life with significant fault risk.

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 annual 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	0.49	0.43	0.26	0.31	0.35	0.37	0.49	0.48	0.47

Figure 10.8 : PSSR faults forecast

The RIIO-GD1 target for the proposed new measure is <0.49 faults per inspection. We have achieved 0.37 faults per inspection in 2017/18, well 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 5 target	17/18	RAG	
Customer satisfaction survey				
Unplanned interruption (Overall satisfaction score from 0-10)	9.0	9.45	G	Link
Planned interruption (Overall satisfaction score from 0-10)	8.5	8.85	G	Link
Connections (Overall satisfaction score from 0-10)	8.4	9.14	G	Link
Complaints				
Complaints metric	11.6	3.4	G	Below
Stakeholder engagement				
Maximise rewards under the stakeholder incentive target (score from assessment panel)	>5.0	6.15	G	Below

Figure 10.9 : Customer service outputs 2016/17 performance

We have achieved an excellent outcome in our customer service outputs, achieving the number two ranking in customer satisfaction amongst the gas networks. We have maintained a strong performance for complaint handling, and performed well in the stakeholder engagement assessment.

We have continued to work with companies outside our sector in order to further develop our learning and experience on managing the customer journey. In March 2018 we achieved the Institute for Customer Service Service Mark Accreditation. This accreditation allows us to benchmark our performance outside sector. For the customer survey we achieved a score of 9.2 – this score placed us amongst the highest performers in customer service – John Lewis at 8.8 and Amazon at 8.0.

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 complaints 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 2017/18.

	Complaint Scores
Percentage of complaints unresolved after one working day	23.0%
Percentage of complaints unresolved after 31 working days	3.0%
Percentage of repeat complaints	0.3%
The number of Energy Ombudsman (EO) decisions that go against NGN as a percentage of total complaints received	0.0%

Figure 10.10 : Complaint metric breakdown

The above scores generate a weighted complaint score of 3.4 which does not generate any penalties. Penalties would only be imposed if our score was 11.57 or more. This is a very strong performance 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	2.7	2.5	2.5

Figure 10.11: Complaints metric forecast

Over the last twelve months our D+1 and D+31 performance has dropped slightly. We have been working hard to make improvements in both these areas, and some key actions have been to move the chairing of the daily customer call to our operational managers. This ensures that ownership and accountability is embedded within the business. We are pleased that we have maintained our strong repeat complaint performance, and that we have continued to have zero ombudsman findings against NGN. For RIIO to date, we have had no ombudsman findings against NGN.

10.4.2 Stakeholder engagement

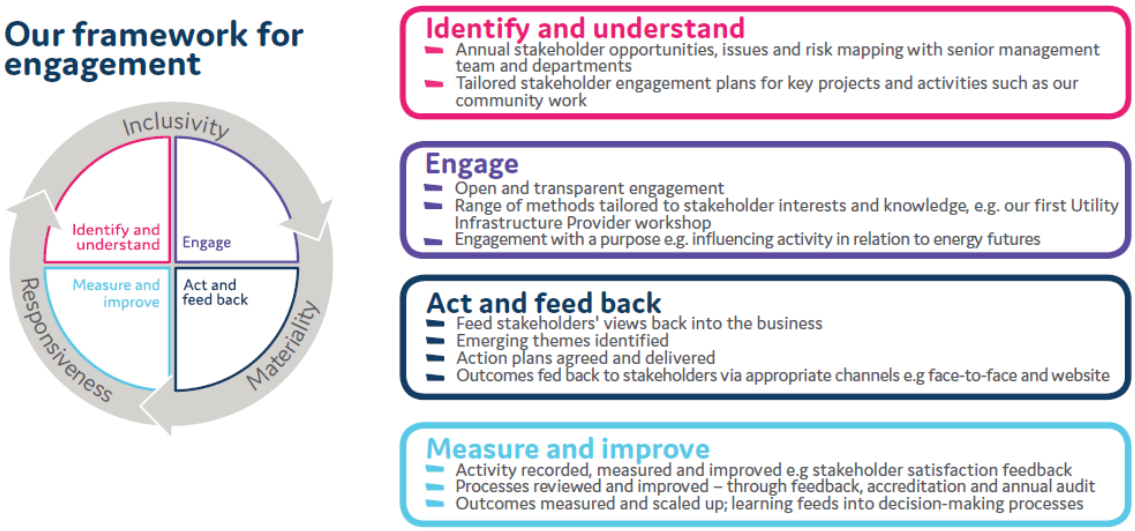
At NGN we firmly believe that stakeholder engagement and our response to feedback can lead to stronger outcomes for our stakeholders, our customers, our colleagues and our business.

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.

"NGN continues to demonstrate best practice in building a company with the customer and the stakeholder at its centre. The strengths of the company's approach are the commitment of the leadership team, the culture of collaboration and responsiveness, a focus on gathering deep insights into stakeholder needs in order to inform strategy and decision making, and the commitment of financial and human resources to deliver engagement and respond to stakeholder inputs."

SGS independent audit report, March 2018



Strengthening our engagement

In order to deliver great outcomes for our stakeholders we need to be great at engaging with our stakeholders. We are pleased to have retained the AA1000SES standard for the fifth year in a row and our approach to auditing throughout the year is helping us to continually measure and improve how we engage. In 2017/18 we have:

- Engaged with more than 45,800 stakeholders from the doorstep to the boardroom, and surveyed more than 18,600 current and future customers to measure their satisfaction and understand their priorities;
- Held a customer and stakeholder conference to engage a broader range of stakeholders on essential elements of service delivery;
- Teamed up with a wide range of stakeholders to develop trailblazing projects;
- Led collaboration among the UK gas networks to secure £10.3m to deliver safety evidence projects across the UK and hydrogen strategies for other major cities;
- Continued to engage emerging stakeholders and those whose voices we rarely hear, such as our joint future customer research with Electricity and Water partners;

- Used ‘Test it’ to gather feedback on our stakeholder report, communicating our bill breakdown and key customer leaflets; and
- Continued to engage with members of our stakeholder panel and sought their views on the future role of the group.

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 driving up standards on our sites through the Considerate Constructors Scheme, training more than 500 colleagues to identify and support customers in vulnerable situation, to ensuring that conversion of the existing gas network to hydrogen features in the UK Government’s ‘Clean Growth Plan’. We have identified more than 160 significant outcomes as a result of stakeholder engagement in the year – benefitting our stakeholders, customers and colleagues.

Stakeholder Incentive Scheme

In 2017/18 we achieved a score of 6.15, the second highest of all the gas networks. We have 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.

Discretionary Reward Scheme

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

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	17/18	RAG
Total capacity of biomethane connected (SCMH)	No target	550	G
Total capacity of biomethane enquiries/applications in progress (SCMH)	No target	18,740	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 2017/18 performance

Throughout 2017/18 we have seen a steady continuation in the number of biomethane enquiries that we have received. However, the enquirers have been reluctant to commit to construction until the new Renewable Heat Incentive (RHI) tariffs were announced in May 2018. The RHI is provided by Government to support such investment such as these. Interest will always be governed by movements in the RHI and 2018/19 will be a pivotal time for decisions being made on the viability of projects.

We have not connected any new biomethane plants throughout this year but have increased the Network Entry Agreement flow rate for one site, providing an additional capacity of 550scmh.

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. We have met all our voluntary targets this year & currently have 10 sites connected to our network.

	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	9,140	0
Total capacity of biomethane enquiries/applications in progress (SCMH)	No target	11,800	29,600	27,390	38,440	18,740	9,140	0	0
Information provision and connection charging for distributed gas	No target	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	17/18	RAG
Shrinkage gas			
Shrinkage baselines (GWh)	412 GWh	352	G
Leakage baselines (Gwh)	386 GWh	329	G
Business Carbon Footprint (BCF)			
BCF excluding shrinkage	None	7,418 Tn	A
Other emissions and natural resource use			
Number of sites where statutory remediation has been carried out	None	3	G
Use of virgin aggregate	<17,000	14,321	G
Amount of spoil to landfill sites	<13,000	308	G
ISO14001 major non conformities	None	0	G

Figure 10.14 : Environmental narrow measure 2015/16 performance

Shrinkage gas

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. Please note the volumes below are now taken from version 1.4 of the leakage model which has been backdated to the start of RIIO.

(GWh)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Shrinkage baselines	455	445	433	423	412	401	390	379
Shrinkage actual	417	397	382	354	352	341	330	319
Leakage baselines	430	420	408	398	386	376	364	354
Leakage actual	395	375	360	332	329	317	307	295

Figure 10.15 : Shrinkage and leakage forecasts

Despite our networks experiencing demand levels higher than what we have experienced since the winter of 2010, we have continued to outperform both our shrinkage and leakage targets in 2017/18. 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. With the introduction of remote pressure monitoring and control equipment at targeted governor stations we endeavour to continue to reduce pressures where possible. This ability to remotely control pressures in some of our biggest networks allowed us to prepare for some of the high demand days experienced in winter 2017/18 at very short notice while still maintaining leakage reduction. Network demand increased significantly during a particularly cold period during the first quarter of 2018, but using this technology we only saw average system pressure rise from 30.62 mbar to 31.31 mbar. For 2018/19 we will be working further on our strategy to ensure the pressure to our network is set appropriately; and
- 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 29.75% to 22.84%, a decrease of 6.9%. Since last year we have implemented 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.

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 Actual	14/15 Actual	15/16 Actual	16/17 Actual	17/18 Actual	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	7,118	6,818	6,519
NGN non-shrinkage BCF (Scope 3) - tCO2e	12,821	16,298	15,287	13,135	14,409	14,356	14,303	14,250
NGN non-shrinkage Total BCF - tCO2e	21,739	25,542	23,763	21,135	21,827	21,474	21,121	20,769

Figure 10.16 : Business Carbon Footprint forecast

Scope 1 and 2 covers gas and electricity energy consumption, direct commercial vehicles and general business mileage. Over the first 5 years of RIIO we have seen a 17% reduction in BCF in this area.

Scope 3 covers indirect emissions such as PE pipe, contractor vehicles, rail and air travel. The variability in performance detailed above is driven partly by data quality. During RIIO-GD1 we have invested time in developing a new carbon footprint calculation tool which has improved the efficiency of our data management and improved our ability to interrogate and understand our data. We are working with our supply chain to ensure that supplied data is accurate and provided in a suitable format and we expect this to continue throughout 2018/19.

How did we achieve reductions this year?

We are more efficient

We are continuing to modernise and refurbish our portfolio of offices and depots to make them more efficient. In our Leeds head office we have installed new heating and cooling systems which are more efficient in design and zonal so that we don't waste energy heating or cooling empty areas. We estimate this will deliver a 28% saving on gas and electricity consumption, helping achieve the 13% annual reduction in gas usage carbon emissions seen.

We have also achieved an annual 24% reduction in carbon emissions from electricity consumption as a result of:

- 10% lower electricity consumption as a result of refurbishment of our facilities as described above; and
- Changes to the sources of the UK electricity supply (falling numbers of coal fired power stations and increasing renewable energy contribution) which has reduced the DEFRA conversion factor that we use to convert each kilowatt hour of electricity consumed into carbon by 11%.

We're driving less

This year we recorded a 12% reduction in the number of miles driven by our colleagues in non-branded vehicles, down from c5.2 million miles to 4.6 million miles. Improved technology such as video and teleconferencing facilities, and a general focus on minimising business travel has also contributed to this improvement.

However, the DEFRA conversion factor has also changed. The result of this is that for every mile driven, more carbon is calculated as released in to the atmosphere compared to previous years. The interaction of lower number of miles and higher DEFRA conversion factor has resulted in an approximately 5% reduction in carbon emissions from business mileage.

Why did we see some increases?

We replaced more pipes

Mains replacement workload has increased year on year. This increased workload results in greater carbon emissions associated with Scope 1 direct commercial vehicles and Scope 3 contractor vehicles, and the amount of PE pipe that we purchased. Workload increased by 6% which drove increases in carbon emissions:

- Carbon emissions associated with PE pipe increased by 11% due to volumes of pipe purchased.
- Our direct commercial vehicle fleet and contractor vehicles also saw increases in emissions of 4% and 5% respectively. The increased workload meant that we drove more, and purchased and extra c0.1 million litres of fuel. In addition this year we have also included carbon emissions from third party helicopters used in the inspection of our pipeline network within the Scope 3 contractor vehicle definition, contributing a further 64 tonnes of carbon compared to previous years.

Other emissions and natural resource use

Statutory remediation of contaminated land

No specific targets have been set for statutory land remediation. During 2017/18 we continued our programme of reviewing our portfolio of sites with potential for land contamination. Land remediation monitoring and maintenance works were completed across 46 sites during 2017/18, including nine intrusive land contamination surveys and environmental sampling at 13 sites to provide an updated assessment of the environmental risk and potential liability associated with each site.

Three remediation projects were completed or commenced during 2017/18 to reduce environmental risks to receptors at each site as detailed below:

- Redheugh Gas Holder Station: Installation of an innovative solar powered in-situ remediation system to recover coal tar from the base of an infilled approximately 9m deep gas holder tank. During 2017/18 the remediation system recovered approximately 4,600 litres of coal tar and 10,600 litres of contaminated water for disposal;
- Knottingley AGI: Installation of an in-situ remediation system to recover coal tar from the base of an infilled approximately 4.5m deep gas holder tank whilst working in close proximity to live gas infrastructure. During 2017/18 the remediation system recovered approximately 300 litres of coal tar or disposal; and
- Shelley Governor Site: Capping of a hotspot of exposed soil contamination (cyanide, polcyclic aromatic hydrocarbons (PAHs) and asbestos) identified during previous intrusive site survey.

In addition to the above, the remediation works that commenced at Carcroft during 2016/17 were completed during 2017/18 in association with the wider site rebuild project, including removal of cyanide and coal tar impacted soil.

We expect to carry out further monitoring/maintenance works and remediation's throughout RIIO-GD1 as detailed below, with the study sites prioritised based on environmental risk and synergies with scheduled capital works.

	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	31	60	60

Figure 10.17 : Statutory remediation of contaminated land RIIO forecasts

Use of virgin aggregate and amount of spoil to landfill

We recorded a 95% reduction in tonnes of excavation spoil sent to landfill during 2017/18 compared to 2016/17 (5,924 tonnes reduction). Between 2013/14 and 2017/18 the tonnage of spoil we have sent to landfill has reduced by approximately 99% for a similar workload.

Our usage of virgin aggregate decreased by approximately 16% between 2016/17 and 2017/18, equating to a reduction of 2,819 tonnes. Between 2013/14 and 2017/18 our usage of virgin aggregate has reduced by approximately 62% for a similar workload.

The Yorkshire Highway Authorities Utilities Committee (YHAUC) continues to impose comparatively stringent quality requirements for recycled aggregate to be registered on their database and approved for use within the Yorkshire region. As a consequence only nine sites produce YHAUC approved recycled aggregate in the entire NGN network area. All of these sites are located in the south and east of our Yorkshire network region. Some of these centres do not produce approved recycled aggregate between October and March due to the sensitivity of the material and production process to wet winter weather. A member of our Environment Team is a member of the YHAUC Recycling Group Committee and lobbies for further approved recycled aggregate providers in the region and promotes closer working with other utilities in our area.

We have achieved the improvements during 2017/18 by continuing the contractor management procedures introduced during 2016/17, including:

- 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. We have invested a lot of effort in supporting our contracting partners operating in Cumbria to source spoil recycling facilities and supplies of quality recycled aggregates. This has delivered significantly improved results in an area which previously performed poorly; and
- Inclusion of spoil to landfill and virgin aggregate usage KPIs within contracts for mains replacement.

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, enabling 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%)	14,000	13,750	13,500
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%)	300	300	300

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

ISO 14001 major non-conformities

Our annual surveillance assessment in September 2016 was completed. 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 output forecasts

10.6 Social obligations 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.

Eight Year Outputs	Inferred Annual Target	17/18	RAG
Number of fuel poor network connections	1,917	2,099	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	-	-	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 2017/18. Cumulatively we are ahead of schedule on the number of fuel poor connections completed. This gives us flexibility given the external challenges in sourcing and supporting in-house measures particularly around Central Heating Funding. This year we have also focussed on raising awareness of the risks from Carbon Monoxide, and have looked at wider aspects of corporate social responsibility following the introduction of our 'Community Promises' scheme.

Off-gas communities – extensions and infills.

- We are working with partner organisations, predominantly registered social landlords and local authorities, to develop a work book 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 2017/18 we have developed further relationships with more Social Landlords to extend our reach and delivery. We continue to advertise in collaboration with the other GDNs in the National Landlord Magazine, and sponsor the NEA publication, reaching out to energy champions nationwide, and work with community based organisations to access those that could be considered hard to reach.
- We have started to look at the impact on health impacts for those living in cold homes. We are collating current evidence that considers the health benefits of moving from cold and damp conditions, and are looking to develop further working to consider options and potential actions.

Off-gas communities – rural

We continued to support out our 'Warm Hubs' scheme in remote rural areas with Community Action Northumberland. This scheme established communal places equipped to provide a place of warmth and community during winter, which helps to combat the challenges of low income / vulnerable people living in cold unheated homes. This scheme, a three year programme, has seen twenty warm hubs opened, three dementia friendly centres, dementia awareness training and unlocked £750k of external funding for communities. The scheme has won a National Award and we are now testing this model in challenging urban environments, whilst supporting another GDN to open more warm hubs in the south east.

Energy Challenges

Working in partnership with the Children's Society in Bradford, we have focused on understanding the challenges faced by young people. We are now in the second year of a two year programme, initially based in Newcastle, supporting young people who live independently. The programme is delivered via a range of mentoring options, and focuses on employment, financial management, energy awareness and budgeting. The programme will reach 900 young people over two years. The scheme has progressed well in the first year with a clear demand from schools and colleges.

Community Promises Fund

We recognise the benefits of working in partnership with 'trusted intermediaries', and in 2017/18 we developed further our Community Promises Fund, extending criteria to include Priority Services promotion. This fund encourages 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; and
- STEM (Science technology engineering and maths).

In 2017/18 we received around 60 applications resulting in awards to nine community organisations. Two of them are being funded for a second year. We are now working to support these successful organisations with a view to extend the most successful projects further.

A helping hand for our customers

Recognising that some of our customers need extra help, this year we developed our strategy for supporting customers in vulnerable situations. Working with BSI, we have developed a strategy focusing and extending support to;

- Those living with Physical Challenges;
- Those living with Mental health challenges;
- Those that are temporarily vulnerable;
- Those with limited access to services from living in rural areas; and
- Those in financial hardship.

We now progress a range of awareness and training programmes across our network and NGN in order to ensure understanding and support of these potential issues.

Green Doctors – home visits

We have continued our partnership with Northern Power Grid to engage with Groundwork to support their 'Green Doctors' initiative. This is a direct engagement activity providing basic physical insulation, energy efficiency and water saving measures. Due to the success of the pilot, the programme has been extended by a further two years and will support an additional 350 homes.

10.6.1 Carbon monoxide detection and awareness

Under this output measure we are committed to improving awareness of the dangers from carbon monoxide (CO). We are using two work streams to achieve this, in addition to the collaborative work we carry out with the other gas networks.

Our emergency staff use Gascoseeker devices which detects the level of methane and CO in customer's homes. This enables us to determine whether CO is present and to detect the source with a much greater level of accuracy. Our emergency staff now routinely test for CO and have been trained to provide advice and guidance on causes, symptoms and avoidance of risk from CO. They also deliver briefings to individuals in their homes, followed by a questionnaire. The number of questionnaires returned increased by 3,000 to c10,000 this year.

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. We have used local contacts and relationships to promote the competition, with around 160 entries. Two regional winners were awarded prizes at the House of Commons.
- Training an Army – we developed further formal training related to CO and in 2015/16 we became an accredited training centre for BPEC. We have subsequently registered to deliver training ourselves, and to date around 40 people have been trained. These community leaders have a large reach into the community.
- Shopping centre promotion of CO, to reach more people in 2017/18 we developed a short video which was used in three large shopping centres to facilitate engagement with shoppers and educate them regarding the risk and avoidance of harm from CO.
- Bradford Big Screens, as part of Bradford city of Film, we were given the use of the city centre screens, on which we ran information advertisements related to CO and The Priority Services Register, seen by tens of thousands over the period running.

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 7.4.4.

One Year Outputs	RIIO annual target	17/18	RAG
% of standard connection quotes issued in 6 working days	99.6%	99.66%	G
% of non-standard connection quotes below 275kwh issued in 11 working days	99.6%	99.52%	G
% of non-standard connection quotes above 275kwh issued in 21 working days	99.6%	99.68%	G
% of land enquiries where response sent within 5 working days	99.6%	98.26%	A
% of commencement and completion dates for connections below 275 kwh provided within 20 working days	99.6%	99.94%	G
% of commencement and completion dates for connections above 275 kwh provided within 20 working days	100%	100.00%	G
% of connection jobs substantially completed on date agreed with customer	95%	97.69%	G

Figure 10.21 : Connections 2017/18 outputs

11 Uncertainties

RIIO-GD1 provides allowances that allow us to deliver the key outputs. The risk of costs exceeding these allowances is borne by NGN and its shareholders, not customers.

However, where future changes are outside of a company's control, or it is not possible to accurately forecast the level of future costs, then RIIO-GD1 re-opener mechanisms may be triggered. Such mechanisms provide additional (or reduced) revenue to cover in whole or in part the additional (or reduced) costs being incurred.

11.1 Site security

The Department for Business, Energy & Industrial Strategy (BEIS) has engaged with the energy sector for a number of years to develop a program to identify sites that are considered to be of national importance – these sites have been designated as Critical National Infrastructure (CNI). The Centre for the Protection of National Infrastructure (CPNI) has outlined recommendations for security requirements at these designated sites, based on a series of security principles.

Current Position

Pannal Offtake site has been identified and confirmed as Northern Gas Networks (NGN) only categorised CNI site, which consequently requires a security upgrade to meet the CPNI categorisation requirements. National Grid also has a number of assets on four of our offtake sites that will require security upgrading. It has been confirmed that the cost of these four upgrades will be funded by NG. NGN has commenced the planning and design phase of Pannal and spent c£0.3m to year end 2017/18.

Future expectations

The work must be completed in RIIO-GD1 in line with our commitments within our regulatory contract. The build and commission phase of the project is forecast to commence in 2019. The total site upgrade cost is estimated at £6.5m, which includes project risk and NGN overheads.

The Pannal site also includes NG assets that will be incorporated into the security upgrade works and NG will share funding of the project based on the percentage of the site footprint that these assets cover. The current split is anticipated to be 72%/28% split between NGN and NG.

We will continue to work with NG to establish and implement a strategy for upgrading four of our sites, based on NG's requirements of meeting CPNI recommendations for their CNI assets housed within the sites.

11.2 Street works

Street works

Street works costs vary considerably between networks as the Highways Authorities in different parts of the country have introduced permit schemes at different times with different approaches. Many authorities are yet to introduce schemes, and so an uncertainty mechanism exists to recover efficiently incurred costs associated with any new schemes or changes to schemes.

Current Position

North Tyneside introduced a new permit scheme from February 2015 covering all streets within their boundary, which has had a limited impact on our performance over the last three years. The Yorkshire Common Permit Scheme commenced in June 2012 covering Leeds, Kirklees, Calderdale and Doncaster, with Bradford,

Calderdale and Wakefield joining the scheme in April 2015. The North Yorkshire Permit Scheme went live at the beginning of February 2018.

Throughout GD-1 there have been some large swings in the amount of overrun charges paid. In 2016/17 we incurred costs of £83,750, which was a 12.5% reduction on the previous year. This year there was a large rise in costs to £342,075, mainly as a result of settling prior years claims.

This year we have seen a reduction in FPNs received from both permit and non-permit authorities, with improvements against most Offence Codes (although with an increase in breaches of permit conditions). Calderdale Council began issuing FPNs for the first time in May 2017 and Wakefield Council did so in January 2018.

Charges related to coring failures continue to decrease from £214,858 in 2016/17 down to £25,666 in 2017/18. The bulk of the received coring failures are from the two authorities with ongoing coring programmes – North Tyneside and Cumbria.

Future expectations

The approval of permit schemes was deregulated in October 2015 removing the requirement for the Secretary of State to approve schemes in England. Whilst it was expected that this would result in an increase in the number of local authorities undertaking permit schemes, this has not yet been seen, although of the 24 local authorities within whose area NGN works, only those detailed above have implemented schemes to date so there is the potential for a large number of schemes to be implemented yet.

Whilst there are no active lane rental schemes in operation, following a Department for Transport consultation in 2017 potential for schemes to start in the future remains.

There is a government proposal (subject to consultation) to introduce seven days working on 'A' roads in an attempt to minimise disruption. The potential costs and impacts of this are yet to be understood.

11.3 Connections of new large loads

Under the Gas Act we are obliged to develop and maintain an efficient and economical pipeline system for the conveyance of gas and to comply with any reasonable request to connect to our system any premises or any pipeline system operated by an authorised transporter.

The "Economic Test", a financial assessment tool, allows NGN to identify new requests for capacity where the level of investment is considered uneconomic. In such cases, we require a connecting party to pay a contribution towards the cost of the reinforcement in order to avoid our existing customers subsidising a new load. However, if a new connection "passes" the economic test, reinforcement costs are not recovered from the connecting party, but are fully borne by NGN.

Due to the inherently unpredictable nature of the large load connections, the associated costs were not included in ex ante Totex allowances, but formed part of a re-opener mechanism, where GDNs are provided with the opportunity to claim additional costs if they arise and if a materiality threshold is reached.

We have been experiencing a significant increase in enquiries regarding large load connections from generators over the recent years with potentially material levels of associated specific reinforcement and this trend is continuing. The first actual new build connection for a generator (Creyke Beck) was completed in 2017 and involved a total cost of £676k, where NGN funded £472k and the customer contribution amounted to £204k. Another connection, which took place in 2018, was fully paid for by the customer. There is the potential for at least eight new connections to be progressed to the build phase in 2018-20 with associated reinforcement costs of £3.0m, where NGN may have to fund £2.7m. We are looking at possible alternatives to pipe reinforcements in order to reduce costs. There is the possibility to reduce existing committed pressures on our network or to increase pressures in the MP network, either or both of which could reduce the need for pipe reinforcement.

11.4 Changes in the connections charging boundary for gas

This mechanism will only be triggered if there is a change from a ‘deep’ to a ‘shallowish’ connection boundary for distributed gas. Moving from a 'deep' to a 'shallowish' connection boundary would mean the connecting customer would no longer pay the full costs of connection up front. Such a mechanism would result in the connecting party paying less in connection charges with the shortfall being funded by NGN.

There are no current proposals to change the connections charging boundary and therefore there are no costs incurred in this area.

11.5 Smart meter roll out

The exact impact on NGN of the roll out of smart meters is uncertain. We do expect an increase in call volumes to the emergency response line, and increased call-outs to deal with problems with our equipment discovered when a smart meter is being fitted e.g. a faulty Emergency Control Valve.

Current and future position

The official national smart meter roll out was expected to start in 2015, but second generation smart meters are only just starting to be installed in 2018. Some energy companies have already started to install smart meters, but given the delay to the national programme we don’t expect to see mass installation of the next generation of smart meters until late 2018 onwards. We have now started receiving more information from the Suppliers about their roll out plans as a result of the industry change request (SPAA) raised by us. Although many of the plans are high level they will allow us to do more internal planning.

We currently have c750k smart or advanced meters fitted in our network with approximately 267k fitted in the last year. We have updated our work management systems to track work carried out on these meters, and in the 2017/18 regulatory year we have seen just over c13,000 PREs involving a property with a smart meter. Of these call outs, only 234 were due to a leak on the meter installation. Approximately 50,000 emergency gas escape related calls were handled by Cadent Gas throughout the year which were identified as directly being related to smart metering.

This is only having minimal impacts on our operations. However this is likely to change when the accelerated roll out plans begin. We anticipate that unplanned interruptions as a result of smart metering installations will peak in 2018/19. This is mainly as a result of inoperable Emergency Control Valves.

Preparations

We have been working closely with the wider industry for several years to support the smart meter roll out. Over the last year this has progressed from an initial emphasis on the regulatory framework and data to incorporate the wider opportunities and risks the rollout presents. Our holistic approach to smart metering over the last year is helping us to mitigate the impact for our customers and proactively support the rollout. The table below summarises the key issues and our approach to them:

ISSUE	OUR APPROACH
Addressing customer and operational impact	• Identify potential impacts • Securing required resource and developing NGN service standards in response to impact • Training our own colleagues • Working with Meter Operator training providers to better understand and inform their processes • Putting measures in place to assess impact and monitor services
Supporting roll-out	• Participating in a number of key industry groups and engaging with government • Establishing pilot programmes with suppliers to share information about interventions and improve operational relationships

11.6 Xoserve (central agency) review

Xoserve is funded by NGN, the other GDNs and the NTS under the Funding, Governance and Ownership (FGO) arrangement. The Gas Transporters, working collaboratively with shippers and Xoserve completed delivery of changes to the governance and funding of Xoserve with the phase 2 go-live on 1 April 2017. As a result of the Ofgem's assessment of future Xoserve costs, an adjustment to GT allowed revenue was made to take account of some costs being directly funded by shippers from April 2017. This adjustment is now taken into account for transportation charges and the enduring funding and governance is now established.

11.7 Non gas fuel poor network extension scheme (FPNES)

Ofgem concluded their review of the fuel poor network extension scheme in 2015 and have made several revisions to the scheme which took effect in 2016. The key conclusions of the review were:

- An increase in the targeted number of connections across all GDNs, with an equivalent increase in allowances. We are now targeted to complete 14,500 connections with an increase in our allowance of £3.2m in 2009/10 prices. The increased workload was in line with our submission to Ofgem;
- The introduction of a fuel poor incentive mechanism to encourage us to deliver even more connections, with a reward or penalty of 2.5% of the assessed efficient costs of the over or under performance. Any volume variance will also be taken account when setting targets in RIIO–GD2;
- District Heating projects are now included within the scheme, though no targets are set here; and
- Various administrative changes are necessary to improve the viability and operation of the scheme.

NGN has been working hard and is on track to deliver the above target, however recent changes to the FPNES present a number of challenges.

In December 2017 with the aim to more effectively target fuel poor households Ofgem changed the criteria for the FPNES by removing the LSOA25 eligibility criterion (which presupposed that a household becomes eligible for a connection if it resides within the 25% most deprived areas, as measured by the government's Index of Multiple Deprivation).

For NGN this change effectively means that the delivery under the Scheme becomes more challenging and more expensive. It will be harder to identify and verify which households are eligible for a fuel poor connection, and it will be much more difficult to deliver community based schemes. Households that have bought houses under "right to buy" are now less likely to benefit from projects led or requested by local authorities/Registered Social Housing Providers. Economies of scale, which we have been achieving through resource optimisation made possible by combining geographically adjacent projects, may be reduced or may no longer be viable.

As the new eligibility criteria will take effect from 1 July 2018 with completion of connections under the withdrawn criterion by July 2019, we have changed our initial work profile in order to maximize the window of opportunity. NGN will continue to support those in fuel poverty. Notwithstanding the additional challenges in the delivery of the FPNES described above, we have not proposed to reopen the current price control.

12 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.

12.1 Benchmarking

Approach to benchmarking and performance improvement – in year and future

We recognise the importance of understanding how companies in a range of sectors outside utilities are run, helping us to be the best at what we do. In order to achieve this we provide our colleagues with a number of opportunities to visit different businesses, both in our local geography, nationally and internationally.

In 2017/18 we have continued developing relationships and expanding our learning with other asset management organisations, as well as to share our own key projects, including the H21 Leeds City Gate Hydrogen project. Gemena Gas visited NGN this year to compare and review all aspects of the UK gas distribution operating model, and we undertook a reciprocal visit to explore opportunities for shared learning. We have participated in conferences regarding the future of energy networks, which included a range of gas, electricity, wind and waste to energy organisations. This has enabled us to share the H21 hydrogen project as well as inform and validate the Energy Solutions strategy NGN is creating. We have visited Canada, New Zealand, China and Europe to share the H21 Leeds City Gate hydrogen project, and to learn from live projects involving hydrogen.

We will look to exploit these further in order to ensure we have best in class asset management techniques to support our future investments.

12.2 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 setting 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%	0.2%
2014/15	1.3%	2.0%	3.3%	2.7%	0.6%
2015/16	1.3%	1.1%	2.4%	2.7%	(0.3%)
2016/17	1.3%	2.1%	3.4%	2.7%	0.7%
2017/18	1.3%	3.7%	5.0%	3.4%	1.6%

Figure 12.1 : 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. These rates have been part of an overall package of measures which have included;

- In 2012, NGN introduced revised terms and conditions of employment applicable for new entrants and those existing colleagues who were promoted internally. The objective of the refreshed remuneration package was to drive efficiency improvements and achieve our outputs. Base pay levels were reduced, weekly contracted hours were increased and occupational sick pay was more reflective of the market. We revised the terms and conditions again in 2017 to cover working hours and further incentivise productivity. The positive impact on the refreshed remuneration arrangements is now being experienced by the business. There has been no detriment to the attraction of talent to the business.
- In line with our ambition to be the best at all that we do, we are striving for increased productivity and output levels and a customer-focused culture of 'right first time'. To help this approach we have also introduced 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.
- As we amend our remuneration packages to better reflect the appropriate reward strategies, we are quickly moving to a position where those colleagues within corporate / central functions are generally all retained on personal contracts. This allows us to incentivise them, setting specific personal objectives and achievements recognised with an annual bonus. This methodology keeps base salary levels at a reasonable level and provides us with the flexibility to reward performance on an annual basis, thereby not increasing the overall salary bill on an enduring basis.

Non-labour RPEs

For 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 2017/18 we have seen one contractual price review which saw an increase of 2.1% on PE Pipe and 3.6% on Electrofusion Fittings.

Northern Gas Networks

we are the network

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