RIIO – GD1

Year 3 Report

July 2016

Northern Gas Networks

I am very pleased to report that three years into RIIO NGN continues to perform extremely well, meeting or exceeding many of our key targets. I'm proud to report that we were the UK's top performing gas distributor for customer service in 2015/16, based on the scoring system used by our regulator, Ofgem. We have also demonstrated our strong social conscience by connecting nearly 2,500 new fuel poor customers to our network, a 40% year on year increase. While this is great news, we intend to keep our foot on the gas. There's still much more we can do to improve our environmental performance, develop stronger and more strategic partnerships and provide an even more tailored service to our customers.

It's a fascinating time to be in the gas industry, with the debate about the future of UK energy gathering pace. This changing landscape is reflected in much of our work over the past year. We've been collaborating with regional partners and central government to make the case for gas, in its various forms, as a crucial part of the UK's future energy mix. This has given rise to some truly inspiring pilot projects, which in time, could transform the way we power our cities and vehicles. Our people will be key to delivering this future, so we have been investing heavily in developing our culture and skills across the network.

We recognise that affordability is the key concern for our customers and this year has seen us deliver further efficiencies through our use of new technology and working methods both in the field and in our back office. It turns out there really are new ways to dig holes, find leaks, weld pipes and manage quality control. We have continued to invest heavily in the gas network as we focus on replacing the poorest performing parts of our network. Our overall results have seen us deliver significant savings against our allowances which will result in twelve million pounds being returned to our customers.

It is critical under RIIO that as well as driving efficiency we deliver the outputs required across safety, reliability, customer, environment, connections and social obligations. There are 51 commitments in total and I am delighted we've beaten most of our key targets, and came very close with others. Our focus on output delivery will continue to be relentless.

Mark Horsley, CEO, Northern Gas Networks

This annual report on RIIO contains lots of detailed technical information on our business and our forecasts for the future. It is a report submitted to our regulator Ofgem but as we did with our RIIO business plan we are making the same information available to all our stakeholders by making this report publicly available. As a network operator we recognise the importance of transparency in all our operations.

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Executive 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. RIIO has provided the Gas Distribution Networks (GDNs) with extra challenges and opportunities to deliver for our customers. We have adapted our network operating model and vision in order to meet these challenges, and will continue to do so.

We have now successfully completed the third 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) has been 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.

Outputs

Outputs form the cornerstone of the RIIO price control framework. We have committed to delivering 51 outputs across 6 categories in RIIO. The table below summarises our performance against these outputs, split between those that must be achieved each year, and those that are to be achieved over the eight year RIIO-GD1 period.

Primary Output	Deliverable	RAG Status	
One Year Outputs		**2015/16**	
Connections	Guaranteed standards of performance	G	
Environmental	Leakage	G	
Safety (emergency response)	97% controlled escapes	G	
	97% uncontrolled escapes	G	
Safety (repair)	12 hour escape repair requirement	G	
	Repair risk – management of repairs	G	
Safety (major accident hazard prevention)	GSMR safety case acceptance by HSE	G	
	COMAH safety report reviewed by HSE	G	
Customer satisfaction	Planned interruptions survey	G	
	Emergency response survey	G	
	Connections survey	G	
	Complaints handling	G	
Eight Year Outputs		**2015/16**	**8 year**
Connections	Introduce distributed gas entry standards	G	G
Social obligations	Fuel poor connections	G	G
	Carbon monoxide awareness	G	G
	Stakeholder engagement	G	G
Environmental	Leakage	G	G
	Provide biomethane connections information	G	G
Reliability (loss of supply)	Duration of planned interruptions	Ofgem are currently reviewing this area	
	Duration of unplanned interruptions		
	Number of planned interruptions		
	Number of unplanned interruptions		
Reliability (network capacity)	Achieving 1 in 20 obligations	G	G
Reliability (network reliability)	Maintaining operational performance	G	G
Safety (mains replacement)	Iron mains risk (based on MPRS)	G	G
	Sub deduct networks off risk	G	G

Figure A: Actual and Forecast Output performance

Overall we have seen a strong outputs performance in 2015/16, particularly in Customer Service. We are forecasting to at least maintain performance or improve in all areas over RIIO-GD1.

We achieved a strong performance against our **safety** outputs this year. The highlights include:

- **Mains replacement** – our strategy is to target the poorest performing mains to maximise customer benefits. As a result the outputs associated with risk removed from the network, gas in buildings and the number of fracture and corrosion failures are comfortably better than target; and
- **Emergency and repair** – we achieved a near 100% response rate for both the 1 and 2 hour emergency response standards, significantly outperforming the 97% target. We continued to focus on the annual repair risk output which enabled us to deliver a 25% year on year performance improvement, and are now outperforming the target by 46%.

Our **reliability** outputs showed a mixed performance this year:

- **Planned and unplanned interruptions** – Ofgem are currently reviewing this area. There may have been errors when setting the targets which would make the individual targets either unachievable or not challenging enough. It is also important to ensure the targets drive the right behaviour. We have provided Ofgem with updated forecasts, and they intend to consult on this area in 2016; and
- The remainder of our reliability output targets were met or exceeded, with three gasholders decommissioned this year, one ahead of our overall programme.

Overall we achieved an excellent performance on **customer service** this year:

- We improved our performance in all categories and were ranked number one for customer service by Ofgem. Our complaint handling performance worsened slightly but was still well ahead of the output target.

We delivered a satisfactory performance against our **environmental** outputs this year:

- The **shrinkage and environmental emissions** outputs are both ahead of target. Several factors have helped here, notably our approach to the mains replacement programme where we have targeted our leakiest pipes, as well as the introduction of remote pressure monitoring and control equipment at targeted governor stations to support our pressure management activities; and
- The **use of virgin aggregate** and **spoil to landfill** outputs are both behind our internal targets, spoil to landfill has improved year on year, whereas the use of virgin aggregate worsened. Improving both of these is a key target moving forward.

Our **social obligations** outputs have seen a good performance this year. We connected 2,458 **fuel poor** households to the network this year, a c700 increase on last year. We have now agreed a revised target of 14,500 fuel poor connections over RIIO with Ofgem, and are close to the cumulative target.

In terms of our **connections** outputs, we have delivered a very strong performance. One of the outputs was very marginally behind target compared to two last year, however the targets for all of our outputs here were set very high, well above the licence baselines.

Totex performance

In order to deliver these outputs we received a £262m Totex allowance in 2015/16. We spent £227m in the year, an outperformance of £34m. This compares to an outperformance last year of £29m. The main driver for this variance is a year on year c£3m real decrease in our Totex expenditure.

Our capital investment in the network increased significantly year on year as our workload plans accelerate to deliver several major projects. However this was more than offset by efficiencies achieved in our operating costs, and reduced replacement mains laid workload.

The £34m outperformance is shared with our customers under the Totex incentive mechanism, with customers receiving 36% of the outperformance in future years through reduced bills.

Incentives

We have had an excellent year when measured against our various incentives:

- We achieved the maximum **customer service** incentive available of £2.1m this year, and received no penalties under the **complaints handling** incentive;
- We reduced the volume of gas leaking from our network, improving our performance against the **environmental emissions** and **shrinkage** incentives to £3.4m; and
- We reduced capacity booking at offtake sites, earning £3.2m under the **exit capacity** incentive.

Innovation

In total we invested nearly £2.9m in innovation projects this year under the **network innovation allowance** – an increase of £0.5m from last year. We currently have thirty two projects under way, having completed fourteen, including notable successes such as stub end abandonment, and remote water removal systems

We currently have two project under way under the **network innovation competition**. Our 'low carbon gas preheating' project has been progressing well and we now have all equipment installed and are beginning the data collection phase. We are also progressing a 'city compressed natural gas' fuelling station project in conjunction with Leeds city council.

Revenue and customer bills impact

Our forecast for total revenue over RIIO-GD1 has decreased from £3.222bn last year to £3.206bn, an average reduction of over £2m per annum. The primary driver for this has been reduced forecasts for the Retail Prices Index (RPI) which is used as part of the annual process to set our unit prices.

In terms of customer bills, we are forecasting that the average annual domestic customer bill will decrease from £130 to £124 over RIIO-GD1, a real reduction of 4.6%. Underlying this forecast is a reduction in customer demand resulting in an increase in unit charges.

Financial performance and incentives

Ofgem said when agreeing the RIIO price control settlement that they expected gas networks delivering exceptional performance could achieve double digit returns against the Return on Regulatory Equity (RORE). We have historically been the most efficient network and as detailed above have had a strong overall performance against all of our outputs and incentives this year. As a result we have achieved a RORE of 11.65% in 2015/16. This is a marginal increase from 10.76% last year, mainly due to the improvement in Totex performance detailed above.


NORTHERN GAS
NETWORKS

Introduction

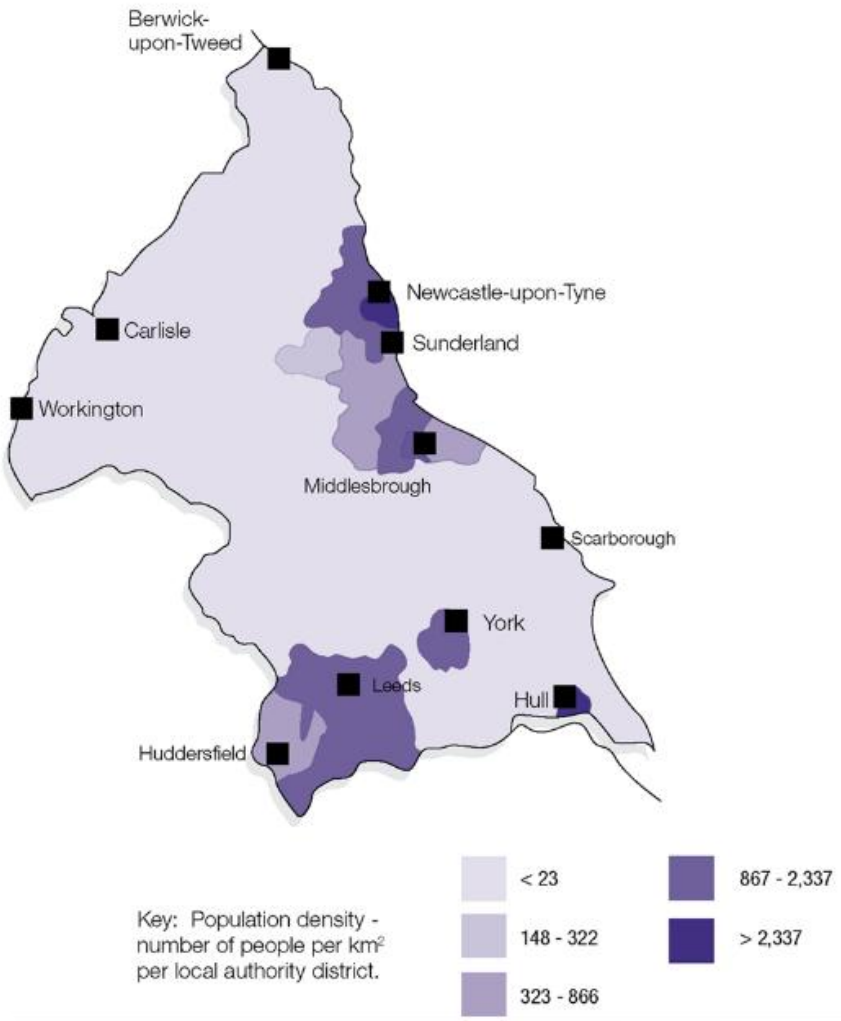
1

1 Introduction

Northern Gas Networks (NGN) is the licenced gas distributor for the North of England. We are responsible for the safe and efficient delivery of gas to homes and businesses in West, East and North Yorkshire, the North East and northern Cumbria.

Our network:

- Has 36,000km of pipeline.
- Covers 24,000km2.
- Serves 2.7 million customers.
- 50% of our customers are located in two of the largest conurbations in the UK.
- The remainder are in sparsely populated rural areas taking in four national parks.
- Our network transports c70,000 GWh of energy annually.
- We are a significant regional employer with a highly skilled workforce of more than 1,400 staff and 800 contractors.
- We invest c£130m annually in the infrastructure of the region.



Gas distribution networks (GDNs) are licensed and regulated under the terms of the RIIO-GD1 price control model. This model sets allowed revenues that the GDNs can recover from consumers, in exchange for delivering a range of services to an agreed set of standards. The model also incentivises good performance whilst penalising companies for poor performance.

The RIIO-GD1 price control began on 1 April 2013 and runs to 31 March 2021. This report aims to provide stakeholders with information on our performance against the price control obligations for the third year of the price control, as well as cumulatively since the price control began. It also provides forecasts for the remaining five years of the price control.

The report is structured to reflect the RIIO-GD1 framework:

- **Revenue:** the revenue we are allowed to collect and the impact on the average gas bill.
- **Incentives:** our performance against the incentives set in the price control, and the impact on our operations.
- **Innovation:** the impact of the innovative projects under way, both in our network and in collaboration with others.
- **Outputs:** our performance against the six output areas, namely:
    - Network safety
    - Network reliability
    - Customer service
    - New connections
    - Social obligations
    - Protection of the environment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Revenue and Customer Bills

2

2 Revenue and Customer Bill Impact

This section considers;

- Our overall allowed revenue and the impact on customer bills
- Revenue “allowed” compared with what we have actually collected
- A breakdown of what makes up allowed revenues; and a year on year forecast comparison
- How much income we have earned from incentives

2.1 Introduction

The total amount of transportation revenue we can collect each year is calculated in line with the amount set out in our licence.

There is an update process each year to adjust these revenues to reflect the latest costs and to include any incentive impacts (known as the annual iteration process which occurs each November).

This also ensures that monies are returned to customers on a timely basis, two years after the end of each regulatory year.

The key areas that drive the amount of revenue network companies can collect are:

Base revenue

- Revenues set out in the licence as determined by the price control settlement;
- Updated cost of debt allowance driven by the iBoxx 10 year trailing average (and the associated impact on WACC);
- Adjustments relating to Totex out / underperformance – establishing the amount network companies can keep vs. amounts to be returned to customers;
- Latest pension deficit valuations and the impact on deficit funding allowances in the future;
- Any tax allowance implications resulting from either changes to legislation or tax rate changes (subject to a materiality threshold); and
- RPI – prices are set based on HM Treasury forecasts and trued up to reflect actual RPI two years after.

Cost ‘true-ups’ on non-controllable (pass through) areas

- Costs that are ‘non-controllable’ are always fully funded in revenue; and
- Prices are set based on a forecast of costs with any difference between actual and forecast adjusted for two years after.

Incentives

Incentives that can increase or decrease our revenues during RIIO-GD1 are:

- Overall customer service (inclusive of customer service, complaints and stakeholder engagement);
- Shrinkage and environmental emissions volumes;
- NTS exit capacity volume bookings; and
- Discretionary rewards.

There are other incentives which are assessed at the end of RIIO-GD1 which will affect revenues in the next price control from 2021 onwards.

Customer demand

- Whilst over the long term network companies can only collect what is 'allowed' (after calculating the above), there may be timing differences from year to year due to how revenue is physically collected (known as the 'K' correction factor).
- The vast majority of our revenue is charged out on a network capacity basis, in terms of a pence per peak day kilowatt hour basis. Prices are set in advance of a regulatory year and include a forecast of network capacity – which always results in a slight difference once actual levels are known.
- If actual demand is lower than our forecast then we will under collect revenue – and have to collect more two years after to bridge the gap; and
- If actual demand is higher than our forecast then we will over collect revenue – and have to return income two years after.

The following sections show the detail with reference to the above and also show the impact on customer bills over the eight years of RIIO-GD1.

2.2 Allowed Revenue and Customer Bill impact

Figure 2.1 shows our actual and forecast allowed revenues for the 8 years of RIIO-GD1. Allowed revenue for 15/16 was £421m, an increase year on year of +£9m / +2.2% largely driven by inflation.

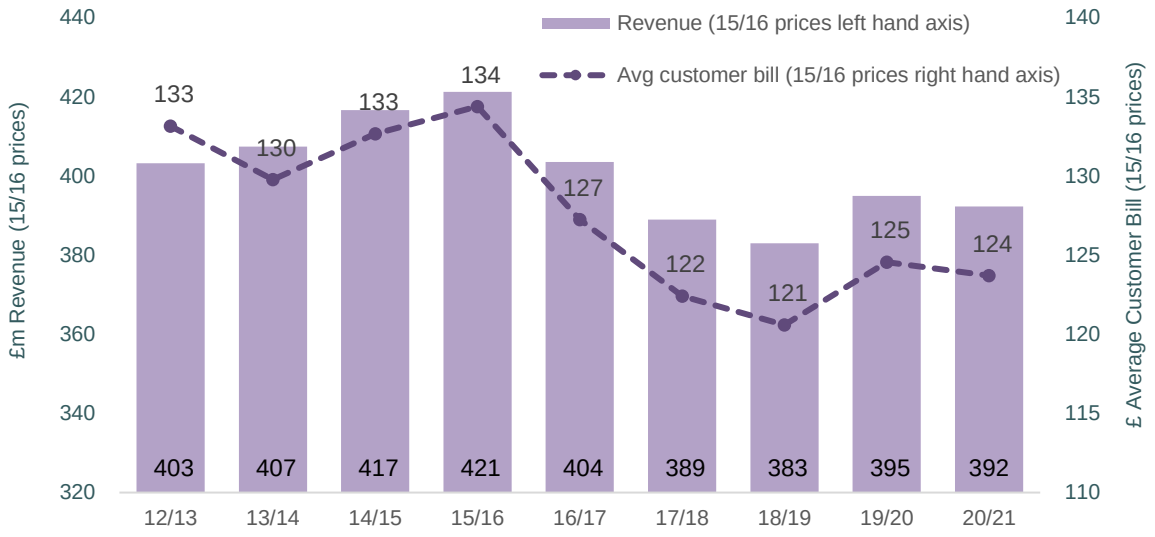


Figure 2.1: Allowed Revenue and Customer Bills

- Applying our forward looking Annual Quantity (AQ) profile (gas demand) to typical domestic household consumption of 14,215 kWh would result in the average annual customer bill falling from £134 in 2015/16 to £124 by 2020/21. This represents a reduction in real terms of 4.6% from 13/14 to 20/21 levels. Note that this methodology is in line with that published in the 14/15 Ofgem annual report.
- Assuming a 3% reduction in AQ's each year throughout RIIO-GD1, and average RPI inflation at 2.5%, results in an average price increase per year of c.5.3%.

15/16 Prices	Actuals				Forecast					RIIO Avg.
	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	
Revenue (£m)	**403**	**407**	**417**	**421**	**404**	**389**	**383**	**395**	**392**	**401**
Average NGN AQ (Kwh Domestic only)		14,800	14,710	14,215						
% change to peak day demand	(4.2%)	(1.4%)	(3.5%)	(6.6%)	(3.0%)	(3.0%)	(3.0%)	(3.0%)	(3.0%)	**(3.3%)**
Avg. cust bill (£)	133	130	133	134	127	123	121	125	124	**127**
RPI %	3.1%	2.9%	2.0%	1.1%	2.0%	2.7%	3.1%	3.2%	3.3%	**2.5%**
Price change %	10.2%	5.1%	4.9%	6.1%	4.2%	1.9%	4.6%	9.4%	6.0%	**5.3%**

Figure 2.2: Allowed Revenue and Customer Bills Summary

2.3 Allowed Revenue vs. Collected Revenue

Table 2.3 shows the differences between “allowed” and “collected” revenue. Because prices are set in advance of the regulatory year differences can arise as some of the elements are forecast. Customer demand (Annual Quantities) is the major driver of these differences.

(£m 15/16 Prices)	Allowed Revenue	Collected Revenue	Over / (Under Recovery)	
	£m	£m	£m	%
13/14	407.4	410.5	3.1	0.8%
14/15	416.6	413.9	(2.7)	(0.6%)
15/16	421.2	415.0	(6.3)	(1.5%)

Figure 2.3: Allowed Revenue vs. Collected Revenue

2.4 Breakdown of Allowed Revenue

Table 2.4 below shows the breakdown of our allowed revenue forecast - showing the separate building blocks added to the base allowed revenue from the price control settlement.

Most adjustments start from 15/16 due to the 2 year lag process. As a result 15/16 revenue of £421m includes incentive income earned for performance during 13/14 regulatory year.

15/16 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	**408.1**	**412.5**	**427.9**	**411.1**	**397.8**	**401.0**	**404.3**	**410.0**	**3272.8**	**409.1**
Changes to revenue from original allowances										
Cost of debt	0.0	(2.4)	(4.2)	(6.5)	(9.0)	(11.2)	(14.7)	(20.2)	**(68.2)**	**(8.5)**
Totex Incentive	0.0	0.0	(2.9)	(2.0)	(2.9)	(4.6)	(3.3)	(1.7)	**(17.4)**	**(2.2)**
RPI true up	0.0	0.0	1.4	(5.8)	(8.9)	(2.2)	0.0	0.0	**(15.4)**	**(1.9)**
Cost true ups & NIA	1.3	2.1	(3.9)	(4.5)	(4.4)	(5.3)	3.4	1.3	**(9.9)**	**(1.2)**
Pension Deficit	0.0	0.0	0.4	0.4	0.4	(3.4)	(3.4)	(3.4)	**(8.9)**	**(1.1)**
Repex Tier 2a	0.0	0.0	(1.0)	(0.9)	(0.8)	(0.8)	(0.9)	(0.8)	**(5.2)**	**(0.7)**
Tax trigger	0.0	0.0	(0.4)	(0.2)	(1.9)	(1.7)	(1.5)	(3.1)	**(8.8)**	**(1.1)**
Shrinkage & Exit	0.0	0.0	0.0	0.2	0.3	0.4	0.3	0.3	**1.5**	**0.2**
Total	**1.3**	**(0.3)**	**(10.6)**	**(19.3)**	**(27.2)**	**(28.7)**	**(20.0)**	**(27.6)**	**(132.5)**	**(16.6)**
Incentive Income										
Environmental Emissions	0.0	0.0	2.1	2.8	2.9	3.0	3.0	3.0	16.7	2.1
Customer Service	0.0	0.0	1.8	2.1	2.1	1.9	1.8	1.9	11.7	1.5
Exit Capacity	0.0	0.0	0.0	0.7	3.2	1.8	1.6	1.3	8.6	1.1
Shrinkage	0.0	0.0	0.7	0.6	0.5	0.5	0.5	0.5	3.3	0.4
SH Engagement *	0.0	0.0	1.1	0.6	1.1	0.9	0.9	0.9	5.5	0.7
DRS	0.0	0.0	0.0	0.8	0.0	0.0	0.7	0.0	1.5	0.2
Total RIIO Incentives	**0.0**	**0.0**	**5.7**	**7.5**	**9.9**	**8.1**	**8.6**	**7.5**	**47.3**	**5.9**
DRS from GDPCR1	1.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.2
Capex roller GDPCR1	0.0	3.6	1.4	1.5	1.7	2.0	2.2	2.4	14.8	1.8
Total Incentives	**1.1**	**4.4**	**7.1**	**9.1**	**11.6**	**10.0**	**10.8**	**9.9**	**64.1**	**8.0**
(Over)/Under Collection (K)	(3.2)	0.0	(3.2)	2.7	6.2	0.1	0.0	0.0	**2.8**	**0.3**
TOTAL REVENUE	**407.4**	**416.6**	**421.2**	**403.6**	**388.5**	**382.5**	**395.0**	**392.4**	**3,207.1**	**400.9**

Figure 2.4: Breakdown of Allowed Revenue

2.5 Allowed Revenue movement year on year

Table 2.5 shows a high level reconciliation of the key movements between our revenue forecast year on year:

15/16 Prices	Actual			Forecast					RIIO Total
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	
2015 FORECAST	**407.4**	**416.6**	**421.3**	**403.9**	**387.8**	**392.4**	**397.4**	**395.8**	**3,222.7**
Inflation impact:									
2015 RPI forecast	3.0%	2.8%	3.0%	3.2%	3.1%	3.2%	3.2%	3.2%	3.0%
2016 RPI forecast	2.9%	2.0%	1.1%	2.0%	2.7%	3.1%	3.2%	3.3%	2.9%
Variance %	(0.1%)	(0.8%)	(1.9%)	(1.2%)	(0.4%)	(0.1%)	(0.0%)	0.1%	(0.1%)
Cumulative Variance %		(0.9%)	(2.8%)	(4.0%)	(4.4%)	(4.5%)	(4.5%)	(4.4%)	
Inflation £m impact	**0.0**	**0.0**	**0.0**	**(1.5)**	**(6.2)**	**(7.2)**	**(4.5)**	**(3.4)**	**(22.8)**
Other Changes:									
Cost True Up : Exit Capacity	0.0	0.0	0.0	0.0	0.1	(0.6)	(4.5)	(5.5)	(10.5)
Cost True Up : Shrinkage	0.0	0.0	0.0	0.0	(1.0)	(1.3)	(0.9)	(1.4)	(4.5)
Cost True Up : Pension Def.	0.0	0.0	0.0	(0.0)	0.0	(1.2)	(1.2)	(1.2)	(3.5)
Cost of debt	0.0	0.0	0.0	0.1	0.3	0.1	(0.8)	(1.9)	(2.2)
Totex Incentive	0.0	0.0	(0.1)	0.5	(0.0)	(0.7)	(0.6)	0.8	(0.1)
Stakeholder Engagement	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.1	0.6
Exit Capacity Incentive	0.0	0.0	0.0	(0.0)	(0.1)	0.2	0.1	0.0	0.3
Other	0.0	(0.0)	0.0	0.2	0.1	0.2	0.1	0.1	0.6
DRS Forecast	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7
Fuel Poor Extra Allowances	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	2.5
Under collection from 15/16	0.0	0.0	0.0	(0.0)	6.5	0.1	0.0	(0.0)	6.6
Cost True Up : Rates	0.0	0.0	0.0	(0.0)	0.1	(0.2)	8.4	8.4	16.6
2016 FORECAST	**407.4**	**416.6**	**421.2**	**403.6**	**388.5**	**382.5**	**395.0**	**392.4**	**3,206.5**
YOY Movement	**0.0**	**(0.0)**	**(0.1)**	**(0.3)**	**0.7**	**(10.0)**	**(2.4)**	**(3.4)**	**(15.6)**

Figure 2.5: Year on Year Revenue Movements

Table 2.5 shows the biggest movement year on year is inflation – by 20/21 the cumulative difference year on year is 4.4% lower which significantly reduces revenue by £23m across RIIO-GD1. The other material variances:

- **Business rates:** we have included an increase of 25% from 1st April 2017 which gets reflected in revenue allowances 2 years later in 19/20. All network assets are currently being revalued by the valuation office – early indications suggest a 25% increase with a final position expected in October 2016. For every 10% increase in charges from current this increases revenue allowances by c£4m.
- **Exit Capacity charges** are reflective of the latest long term NTS prices for the 24 offtake sites in the NGN region. Prices have reduced year on year which results in lower costs for NGN and hence lower revenue allowances.
- **Shrinkage costs** year on year reflect the latest market gas price forecast which has reduced by c.10p per therm since the July 2015 forecast was completed.
- During 15/16 we **under collected income** by £6.5m because of changes to Annual Quantities from October 2015. Peak Day consumer demand reduced by 6.6% - this is a bigger reduction than usual as it includes an adjustment to rebase weather data/consumer behaviours which is made every 5 years.

2.6 Reduction in revenue

The main areas driving reductions in revenue are cost of debt, totex outperformance and RPI and cost true ups. These are detailed below:

Cost of debt

The allowance within the Final Proposals for cost of debt was set at 2.92%. This was based on the iBoxx index 10 year trailing average as at 31 October 2012 (deflated by 10 year breakeven inflation). This gets updated annually as part of the November annual iteration process (AIP) and has since been reduced to 2.72% as at 31 October 2013, 2.55% as at 31 October 2014 and 2.38% at 31 October 2015. Whilst Ofgem assumes that the latest actual rate (currently 2.38%) will apply to all forecast years, we have forecast with the following assumptions:

- Actual data up to 13 June 2016;
- Thereafter no change to 10 year breakeven inflation and no change to average BBB and A credit spreads; and
- Underlying gilt yields increase in line with market expectations for future interest rates.

Table 2.6 below shows the actual and forecast data for RIIO-GD1:

15/16 Prices	Actuals				Forecast				RIIO Total	Avg. Year
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
Final Proposals Allowance	2.92%	2.92%	2.92%	2.92%	2.92%	2.92%	2.92%	2.92%		
Ofgem AIP updates		2.72%	2.55%	2.38%						
NGN forecast					2.26%	2.06%	1.81%	1.44%		
Revenue Impact	**0.0**	**(2.4)**	**(4.2)**	**(6.5)**	**(9.0)**	**(11.2)**	**(14.7)**	**(20.2)**	**(68.2)**	**(8.5)**

Figure 2.6: Cost of Debt Index

Our 2015 forecast showed cost of debt reducing to 1.61% by 20/21 compared with our latest forecast above of 1.44%. The key drivers of this movement are:

- The starting point for the calculations was higher – the actual daily cost of debt value at 13 June 2016 was 1.07% compared with a previously forecast rate of 1.22%; and
- There was a further flattening of the yield curve implying that interest rates will not rise as quickly as the June 2015 assumption.

Totex Incentive Mechanism

Totex covers Controllable Opex, Capex and Repex:

- 2015/16 outputs have been delivered for £34m (13%) lower than our Totex allowance of £261m. Our current forecast for RIIO-GD1 as a whole is to deliver Totex for 16.1% lower than allowances;
- When we outperform Totex we return money to customers through the IQI mechanism. Table 2.7 below shows our forecast outperformance and the amount we can keep (64%) and the amount to return to customers (36%); and
- On average we will return c. £2.2m back to customers each year, albeit the revenue mechanics result in some being returned in year through fast money and the remainder over 45 years via slow money.

15/16 Prices	Actuals			Forecast					RIIO Total	Avg. Yr
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
Totex Allowance	251	258	261	259	244	244	245	244	**2,006**	**251**
Actuals / RIIO forecast	215	230	227	222	213	222	213	211	**1,753**	**219**
Variance	35	28	34	37	31	22	32	34	**253**	**32**
Variance %	14.1%	11.0%	13.0%	14.2%	12.9%	8.9%	12.9%	13.9%	**12.6%**	**12.6%**
Incentive impact (£m)										
How much NGN keeps (64%)	23	18	22	23	20	14	20	22	**162**	**20**
How much NGN gives back (36%)	13	10	12	13	11	8	11	12	**91**	**11**
When this is reflected in revenue (2 years after, through fast and slow money, and with tax allowance restated)										
Revenue adj.	0.0	0.0	(2.9)	(2.0)	(2.9)	(4.6)	(3.3)	(1.7)	**(17.4)**	**(2.2)**

Figure 2.7: Totex Incentive Mechanism

RPI True Up

- When prices are set for the following regulatory year a forecast of RPI is included based on the previous November's HM Treasury forecast data; and
- Once actual RPI is known this is included within the allowed revenue formula and any differences "trued up" 2 years later. Table 2.8 below shows the differences and adjustment needed 2 years later.

(15/16 prices)	Actual RPI known			16/17 F'cast						
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	RIIO Total	Avg. yr
Forecast RPI used to set prices	2.7%	3.1%	2.6%	2.3%						
Actual RPI	2.9%	2.0%	1.1%	2.0%						
Variance %	0.2%	(1.1%)	(1.5%)	(0.3%)						
£m RPI true up	**0.0**	**0.0**	**1.4**	**(5.8)**	**(8.9)**	**(2.2)**	**0.0**	**0.0**	**(15.4)**	**(1.9)**

Figure 2.8: RPI True up

Cost True Ups

- The cost lines shown in table 2.9 are areas where network companies receive an allowance to match the cost. A forecast of these costs was included within base revenues and once actual costs are known they are trued up 2 years later; and
- 90% of Network Innovation costs are funded as well. A forecast of the costs is included when prices are set and then updated to reflect actual costs once known.

15/16 Prices	Actual			Forecast					RIIO Total	Avg. Year
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21		
Shrinkage	0.0	0.0	(2.7)	(5.6)	(6.8)	(6.8)	(6.4)	(6.9)	**(35.3)**	**(4.4)**
Exit Capacity	0.0	0.0	(4.2)	(2.1)	(3.3)	(3.6)	(4.0)	(5.5)	**(22.6)**	**(2.8)**
NTS Pension Deficit	0.0	0.0	(0.0)	0.0	2.2	2.1	2.1	2.1	**8.4**	**1.0**
Rates	0.0	0.0	0.3	0.4	0.9	0.4	9.0 *	9.0 *	**20.1**	**2.5**
License Fee	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	**1.3**	**0.2**
Non Controllable	**0.1**	**(0.0)**	**(6.5)**	**(7.0)**	**(6.8)**	**(7.7)**	**1.0**	**(1.1)**	**(28.1)**	**(3.5)**
Network Innovation Allowance	1.2	2.1	2.7	2.5	2.4	2.4	2.4	2.4	**18.1**	**2.3**
Total Incl. NIA	**1.3**	**2.1**	**(3.9)**	**(4.5)**	**(4.4)**	**(5.3)**	**3.4**	**1.3**	**(9.9)**	**(1.2)**

Figure 2.9: Cost true ups

* It is worth noting that we have included a forecast 25% increase in business rates with effect from 1st April 2017. All network companies' business rates are currently under review by the valuation office – whilst the final position will not be known until October 2016 early indications suggest a 25% increase. Network companies will face higher charges from 17/18 and receive the additional revenue allowance in 19/20. As a guide every 10% increase in rates charges from current will result in an additional c. £4m revenue allowances 2 years later.

2.7 Incentives

RIIO-GD1 incentives to date have seen us earning £5.7m from 13/14, £7.5m from 14/15 and £9.6m from 15/16. Income earned is subject to the 2 year lag so will be collected during 15/16, 16/17 and 17/18.

15/16 has increased year on year due to additional income earned from reducing capacity bookings across our 24 offtake sites which drives the exit capacity incentive mechanism.

We are also receiving incentive income during RIIO-GD1 that relates to GDPCR1 performance:

- DRS monies from 11/12 and 12/13 have been collected in 13/14 and 14/15 (£2m in total);
- Capex incentive income has been spread across all years of RIIO-GD1 (£14.8m in total); and
- These are detailed on the table shown in section 2.4.

The areas detailed below show the measures that support the incentive income related to customer service, shrinkage and environmental emissions and exit capacity incentives.

Customer Service and Stakeholder Engagement

We have achieved an excellent outcome in our customer service outputs, achieving the number one 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. Recognising our own awards success last year, over the last twelve months we have judged awards at the UK Customer Experience Awards, the UK Employee Experience Awards, and the Institute for Customer Service Awards.

We recently undertook the mid-point check for our Institute of Customer Services accreditation. We were awarded this accreditation in 2014 and whilst it lasts for three years, there is a requirement to conduct the customer and colleague surveys again after 18 months. We improved our scores for both of these surveys.

We anticipate that we will continue to sustain and improve on this strong performance, and continue in our pursuit to deliver the best possible experience for our customers. More detail on each individual measure can be found in the following sections, together with our forecast for the rest of the RIIO period.

- Our incentive forecast assumes we will maintain our maximum incentive position and incur no cash complaints penalty; and
- Stakeholder Engagement award of £1.1m and £0.6m are included in our revenue position and we calculate 15/16 to be £1.2m based on our score of 6.8 announced on 20th July 2016.

Customer Service £m 15/16 Prices	13/14				14/15				15/16			
	Act	Tar	Var	Inc. (£m)	Act	Tar	Var	Inc. (£m)	Act	Tar	Var	Inc. (£m)
Planned	8.38	8.09	0.29	**0.5**	8.65	8.09	0.56	**0.7**	8.86	8.09	0.56	**0.7**
Unplanned	9.25	8.81	0.44	**0.7**	9.38	8.81	0.57	**0.7**	9.52	8.81	0.57	**0.7**
Connections	8.61	8.04	0.57	**0.7**	9.01	8.04	0.97	**0.7**	9.12	8.04	0.97	**0.7**
Total	**8.75**	**8.31**	**0.43**	**1.8**	**9.01**	**8.31**	**0.70**	**2.1**	**9.17**	**8.31**	**0.70**	**2.1**
Stakeholder	**6.75**			**1.1**	**5.5**			**0.6**	**6.8**			**1.2**

Figure 2.10: Customer Service and Complaints scores

Complaints

Complaints Scores	Weighting	13/14	14/15	15/16
D+1	10%	39.5%	19.0%	17.2%
D+31	30%	1.5%	1.3%	2.7%
Repeats	50%	1.2%	0.7%	1.1%
Ombudsman	10%	0.1%	0.0%	0.0%
Complaints Metric Score		**4.99**	**2.66**	**3.08**
Ofgem Target		**11.57**	**11.57**	**11.57**
£ Penalty		**nil**	**nil**	**nil**

Figure 2.11: Complaints scores

Shrinkage and Environmental Emissions Incentive

NGN is 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 been set output targets to reduce the amount of shrinkage and leakage from our network over RIIO-GD1.

Table 2.12 below shows the target and actual volume levels and the incentive income due from this level of outperformance. Our forecast assumes we will maintain our GWh outperformance in the future years of RIIO-GD1.

The operational initiatives in place to support the reduction in volumes are detailed within the Environmental Outputs section.

15/16 Prices	Actuals			Forecast					RIIO Total	Avg. Year
	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	372	361	350	339	328	**2,947**	**368**
Variance	38	48	51	51	51	51	51	51	**395**	**49**
Variance %	8.4%	10.8%	11.9%	12.1%	12.5%	12.8%	13.2%	13.6%	**11.8%**	**11.8%**
Incentive (£m)	**-**	**-**	**0.7**	**0.6**	**0.5**	**0.5**	**0.5**	**0.5**	**3.3**	**0.4**
Environmental Emissions GWh:										
Allowed volumes	434	420	408	398	386	376	364	354	**3,140**	**393**
Actual / forecast	399	375	360	350	338	328	316	306	**2,773**	**347**
Variance	35	45	48	48	48	48	48	48	**367**	**46**
Variance %	8.1%	10.7%	11.7%	12.0%	12.4%	12.7%	13.1%	13.5%	**11.7%**	**11.7%**
Incentive (£m)	**-**	**-**	**2.1**	**2.8**	**2.9**	**3.0**	**3.0**	**3.0**	**16.7**	**2.1**

Figure 2.12: Shrinkage and Environmental Emissions Incentive

Exit Capacity Incentive

Within the allowed revenue licence formula exit capacity is separated into 2 areas as follows:

- Exit capacity costs – NGN has to pay for capacity rights to flow a level of gas through the 24 National Transmission System (NTS) offtake sites to meet 1 in 20 winter weather conditions. The cost for this commitment is treated as non-controllable and we receive an allowance to match the cost. (15/16 costs were £7.5m); and
- Exit capacity incentive – whilst the above area is a pass through cost reducing this cost will ultimately benefit end consumers and networks are incentivised to reduce the bookings compared with the original license allowed volumes.

Table 2.13 shows the actual and forecast volumes and the incentive result from this level of outperformance. The NTS price for the incentive is known up to 18/19 – in following years we have assumed the same rate.

15/16 Prices	Actuals				Forecast				RIIO Total	Avg. Year
	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	540	540	540	540	540	**4,454**	**557**
Variance	1	22	78	84	84	84	84	84	**521**	**65**
Variance %	0.1%	3.6%	12.6%	13.4%	13.4%	13.4%	13.4%	13.4%	**10.5%**	**10.5%**
Incentive (£m)	**-**	**-**	**0.0**	**0.7**	**3.2**	**1.8**	**1.6**	**1.3**	**8.6**	**1.1**

Figure 2.13: Exit Capacity Incentive

The above forecast includes an indicative view of our latest position from the July 2016 Gemini bookings process which will become effective from 1st October 2016. We have further reduced our bookings to 540 Gwh and will continue to review capacity requirements for the remaining years of RIIO-GD1, albeit some sites are fixed due to being tied in with user commitment charges from decisions made pre RIIO.

Outputs

3

3 Outputs

3.1 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 sets out the outputs NGN is required to deliver during RIIO-GD1, our progress against these targets for 2015/16 and our forecasts for the next five years.

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.

3.2 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 2015/16.

One Year Outputs	RIIO-GD1 Year 3 target	15/16	RAG
Emergency response			
97% of uncontrolled gas escapes attended within 1 hr	97%	99.76%	G
97% of controlled gas escapes attended within 2 hrs	97%	99.96%	G
Repair			
Annual repair risk (m)	<34.5	18.6	G
Percentage of repairs completed within 12 hrs	60.5%	64.4%	G
Major accident hazard prevention (MAHP)			
Compliance with the Control of Major Accident Hazards regulations (number of breaches)	0	0	G
Compliance with the Gas Safety (Management) Regulations (GS(M)R) (number of breaches)	0	0	G
Sub-deduct networks 'off-risk' by the end of RIIO	9	0	G

Figure 3.1: '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 3 inferred target	15/16	RAG
Mains replacement			
Risk removed (incidents/year $x10^{-6}$) as measured by MRPS	13,898	29,893	G
Number of Gas in Buildings (GIB) events	144	24	G
Number of fractures and corrosion failures	2,742	685	G
Length of main taken 'off-risk'(km) (funded)	483.0	460.2	G
Length of main taken 'off-risk'(km) (customer driven)	16.0	7.2	G
Number of non-PE services replaced	30,932	27,765	G
Asset health and risk metrics	Phased plan	On target	G

Figure 3.2: 'Eight Year' safety outputs performance

We are making excellent progress delivering our safety outputs. More detail and explanation on each individual measure can be found in the following sections, together with our forecasts for the whole RIIO period.

3.2.1 Mains replacement

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 but can 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 third 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, and the number of Gas in Buildings and Fracture and Corrosion events.

When considering mains abandonment workload, it has recently become clear that we and Ofgem have differing views in some cases as to what workload counts against which abandonment target. We invested significantly in 2014/15 to get ahead of our view of the targets, but under Ofgems' interpretation this is not the case. This discrepancy and our mains abandonment workload is considered in more detail in the next sections.

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 annual target	13/14 Actual	14/15 Actual	15/16 Actual	16/17	17/18	18/19	19/20	20/21
Risk removed (incidents/year x10^{-6})	13,898	43,119	41,213	29,893	25,661	20,949	23,073	18,812	17,231
Number of GIB events	144	38	35	24	40	39	38	37	36
Number of fracture and corrosion failures	2,742	815	883	685	1,400	1,350	1,300	1,250	1,200
Number of services replaced	30,932	29,580	31,292	27,763	31,052	31,027	33,770	31,727	31,727

Figure 3.3: Mains replacement forecasts

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%)

Figure 3.4: 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 within the programme.

Our approach of targeting the pipes with the highest risk score early in RIIO-GD1 in order to maximise customer benefit has resulted in a significant risk reduction over the first three years. In 2015/16 the total risk removed was 29,863, which gives a cumulative total of 114,225. The total RIIO-GD1 output target is to reduce risk by 111,191 over the eight year period, and so we have already achieved the output, which 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.

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 is 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. This leaves 3,910.4km of fixed workload, covering the other Tiers.

The table below illustrates the breakdown of these output targets, our performance to date, and forecasts for the remainder of RIIO-GD1:

Type (km)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total	Total Allowed	Inferred annual target
Tier 1	445.4	487.8	439.8	444.0	444.0	500.0	458.3	458.3	3677.6	3584.0	448.0
Tier 2b	2.9	4.2	7.2	4.0	4.0	4.1	4.0	4.0	34.5	128.0	16.0
Tier 3	21.2	17.6	11.6	21.5	21.6	21.6	21.6	21.6	158.4	158.4	19.8
Rechargeable Diversions	7.4	5.7	3.5	5.0	4.5	4.5	4.5	4.6	40.0	40.0	5.0
Sub Total	**476.9**	**515.3**	**462.1**	**474.6**	**474.2**	**530.2**	**488.4**	**488.5**	**3910.4**	**3910.4**	**488.8**
Tier 2a	8.7	8.1	8.2	7.0	6.0	6.0	6.0	6.0	55.9	0.0	0.0
> 30m	40.7	54.9	38.2	37.2	35.9	38.9	34.3	32.9	312.9	269.6	33.7
<=2" steel	16.9	20.7	7.7	14.0	14.0	14.0	14.0	14.0	115.4	120.0	15.0
>2" steel	8.8	7.6	5.3	4.0	4.0	4.0	3.0	3.0	39.7	81.6	10.2
Other	10.4	10.7	8.6	9.0	9.0	9.0	9.0	9.0	74.7	0.0	0.0
Sub Total	**85.4**	**102.0**	**68.0**	**71.2**	**68.9**	**71.9**	**66.3**	**64.9**	**598.5**	**471.2**	**58.9**
Total	**562.3**	**617.3**	**530.1**	**545.8**	**543.0**	**602.1**	**554.7**	**553.4**	**4508.9**	**4381.6**	**547.7**

Figure 3.5: Length of iron main taken off-risk performance

In recent discussions with Ofgem it has become clear we have differing views as to precisely what workload counts against each of the output targets, with Tier 1 mains being the primary area of difference. This difference of interpretation has largely been driven by the complexities of the underlying workload, its drivers, and the ongoing discussions and data submissions that took place during the setting of these targets during the RIIO-GD1 price control process.

At the beginning of RIIO-GD1 we had 8,368km of Tier 1 iron mains within 30m of a property. This translated to an annualised workload of 440km per annum in order to fully deliver the Tier 1 programme by 2032. This is in accordance with the targets agreed with the HSE in relation to their iron mains risk reduction enforcement policy.

Our interpretation of the final allowances was that we were then allowed an additional 8km per annum to address mains that migrate from being zero risk scoring to positive risk scoring during the 8 year period. This is usually as a result of encroachment or 'dynamic growth' on the network so that the pipes would in future fall within 30m of a property. This enabled us to make a judgement when designing projects to include an element of pipe that was currently >30m from a property if we judged it likely that future economic developments would change this, and that it would be more efficient to complete the work now as one project rather than return later.

In addition we were set an assumed 16km workload per annum for rechargeable diversions, but as these are funded by the customer we didn't receive funding within our price control allowances. This workload is customer driven, and our interpretation of the final proposals was that this workload was excluded from the targets set to achieve the HSE's Enforcement Policy. This was based on the uncertainty of this work in relation to volume, material and risk, which are all outside our control.

Ofgem's interpretation of the targets is different from the above. They have concluded that the 8km of workload related to dynamic growth must be within 30m of a property, and that if there is any shortfall in Rechargeable Diversions workload then the gas networks must make up the shortfall. The clear implication is that we will have to complete more work than is strictly necessary in this price control to deliver the replacement programme by 2032.

These areas of difference have a significant impact on how we have judged our performance to date and the workload we will have to complete in order to hit our safety outputs. Overall we expect we will have to complete c94km of extra Tier 1 work to make up for the shortfall in Rechargeable Diversions, and a further c56km of work within 30m of a property. This extra 150km of work is in effect pulling work forward from RIIO-GD2, and is likely to cost in the region of £15m over the remainder of this period. We would expect to complete the majority of it between 2018 and 2021 if Ofgem conclude this is necessary. We expect to have further discussions regarding this issue. However, to illustrate the issue our forecasts of workload and costs assume the extra work is delivered.

Tier 1 Mains (pipes with a diameter of 8 inches or less) – the annualised abandonment target for Tier 1 iron mains is 464km per annum. This is made up of two elements:

- **448km** – The annual workload must be sufficient to meet the specified yearly workload agreed by the HSE for completion of the programme by 2032; and
- **16km** – Rechargeable diversion works driven by customer activity, not NGN. The majority of the costs for the work are recharged to the third party requesting the main to be diverted.

We abandoned 439.8k of Tier 1 HSE mains this year, just below the annualised target of 448km. Cumulatively however this puts us 29.1km ahead of target. Importantly this does not include any >30m pipe we would normally include here under our assumptions for dynamic growth pipe. 19.7km of the 25km of >30m pipe in the table above was associated with Tier 1 mains, which would have put us 48.8km ahead of target.

Customer driven rechargeable diversion works have been significantly below forecast for the first three years of RIIO, 14.3km against an allowance of 48km, a shortfall of 33.7km. As this work is driven solely by customer requests and funded directly by those customers, we cannot control the volume of work either within year or across the RIIO-GD1 period.

Considering the two together and assuming we have to make up the shortfall in rechargeable diversions work, we are 4.6km behind the targeted total mains taken off risk as currently defined by Ofgem. However we are ahead when you compare the total amount of mains replaced to the amount we have been funded for in the allowances.

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. These pipes must be abandoned, remediated or assessed for continued safe use within the RIIO-GD1 period.

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 workload and financial allowances 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.

As a result our actual workload is below the allowed 10.2km per annum – cumulatively we have abandoned 21.7km of pipe against a target of 30.6km. However our actual workload is higher than would be implied by a simple average of the length of the actual Tier 2a population. This is in line with our overall strategy to deliver more benefits for customers earlier in the RIIO-GD1 period.

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 24.8km. Cumulatively we have completed 67.1km against a target of 74.4km. For the remainder of RIIO-GD1 we expect to recover this position whilst delivering an annual programme broadly in line with the 24.8km per annum as set out in our business plan, whilst focussing on delivering the highest value projects as early as possible within the overall programme.

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
GIB events (any concentration level)	1,153	144	38	35	24

Figure 3.6: GIB events performance

The number of GIB events during the first three years of RIIO is well below the annualised target of 144, and in part, is a reflection of the targeted replacement programme. This performance also reflects the further reductions seen during the year in both public reported escapes and the amount of repair work needed.

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, ground conditions and the deterioration of assets not due for replacement. There is therefore much uncertainty around forecasting future performance.

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 factors beyond the replacement programme, 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
Number of fractures / failures (C1/S1/D1) over RIIO-GD1	21,936	2,742	815	883	685

Figure 3.7: Fractures and corrosion failures performance

The number of fracture and corrosion failure events during the first three 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, which we have based on trends over an eleven year period against the forecast of the remaining length of live iron pipe each year. This provides a prudent assessment over the full RIIO-GD1 period taking into account both our replacement programme and an assessment of the uncertainties driven by the exogenous factors highlighted above.

Number of services replaced

This output relates to the number of 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
Number of services replaced	247,458	30,932	29,580	31,292	27,765

Figure 3.8: Number of services replaced 2015/16 performance

The total number of services replaced during the first three years of RIIO has averaged 29,546, below the average annual target of 30,932. We saw a decrease of c3,500 services replaced in 2015/16 largely as a result of the decrease in Tier 1 mains replacement work carried out.

There are a number of factors behind this lower level of services replacement:

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

We recognise that the health of our service asset population is deteriorating and will continue to do so in the future. This potential increase in service failure would impact customers so we have identified a number of initiatives to address this issue:

- Bulk Service Renewal Programme – we completed c700 Bulk Service Renewal projects in 2015/16. These projects target areas of poor service asset performance. We will use this programme to measure the impact on outputs and assess whether bulk service replacement provides value for money. The results will determine whether we continue the programme for the remainder of RIIO-GD1.
- The identification of Mains Replacement projects that take into account both service asset performance and service density.

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.

3.2.2 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%	97.5%	97.5%	97.5%	97.5%	97.5%
97% of controlled gas escapes attended within 2hrs	97%	99.97%	99.99%	99.96%	97.5%	97.5%	97.5%	97.5%	97.5%

Figure 3.9: Emergency response forecasts

In 2015/16 we have again performed significantly above the targets – achieving 99.76% and 99.96% 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 new Rapid Response Engineers to replace external contractors to support our winter resilience plans. We were also assisted by generally mild winter conditions. However this was offset during peak periods when heavy rainfall and severe flash flooding resulted in three bridge crossings and our pipes being washed away. Our forecast takes into account the exceptionally mild weather experienced in the last two years, and reduces for 2016/17 with the assumption of a more typical winter.

We expect to outperform the output targets in every year of RIIO-GD1.

3.2.3 Repair

The primary outputs for repair are to maintain or reduce annual repair risk and to gradually improve the percentage of repairs we complete within 12 hours.

	RIIO-GD1 year 3 target	15/16
Annual repair risk	<34.5m	18.6m
% repairs completed within 12hrs	60.5%	64.4%

Figure 3.10: Repair 2015/16 performance

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 2015/16, an excellent performance showing a material improvement year on year during RIIO-GD1. The main drivers for this improvement are;

- Ongoing daily monitoring of this output and sharing knowledge and experience across the Network;
- Ongoing training provided to all repair teams to ensure that we assess risk appropriately across the network and that all teams are fully aware of the importance and focus we have on this output;
- A further rebalancing of our workforce to those locations where most work occurs; and
- Expanded use of Core and Vac and Acoustic camera detection techniques which have improved the time to locate difficult to find repairs. We have made further investment in the equipment due to the positive results seen.

We were also assisted by consistent mild winter conditions, though as described above we experienced three incidents as a result of flash floods during severe weather peaks. Our forecast takes into account the overall mild weather experienced in the last three years, and our forecast increases for 2016/17 with the assumption this will be a more typical winter. 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	26.7m	26.0m	25.4m	24.8m	24.3m

Figure 3.11: Annual repair risk forecast

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. 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 3 target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
% repairs completed within 12hrs	60.5%	62.3%	62.9%	64.4%	>60.75%	>61.0%	>61.5%	>62.0%	>62.5%

Figure 3.12: % repairs completed within 12 hours forecast

We achieved 64.4% in 2015/16 against a target of 60.5%, an excellent performance which was achieved through the same drivers as detailed above for Repair Risk.

3.2.4 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 and expect to achieve our target in relation to sub-deduct risk removal.

	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
Sub-deduct networks 'off-risk' by the end of RIIO	135	9	69	34	7	3	2	2	1	135

Figure 3.13: 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. In addition to this a number of measures are used to demonstrate compliance with COMAH including:

- External independent audit of COMAH sites;
- Internal audit conduct periodic audits of our compliance process;
- Emergency plans are produced/reviewed and are placed on operational COMAH establishments;
- HSE notifications are recorded as part of compliance monitoring and output reporting;
- Emergency exercises are undertaken in line with NGN exercise programmes; and
- HSE site interventions also assist in the verification of COMAH compliance.

Our asset strategy and integrity team review the above detail and report compliance to the Asset Risk Management and Safety Director.

In addition, we have a storage strategy to reduce risk from the network by the removal of all low and high pressure storage holders. This eliminates the legislative requirement associated with gas storage, set out in the COMAH Regulations. The strategy also addresses the HSE concern of societal risk associated with operating such assets in close proximity to public dwellings. All high pressure storage is now removed and NGN are currently in the process of de-notifying all remaining low pressure COMAH sites.

We have had no COMAH breaches in 2015/16. 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 2015/16 and expect to in every year of RIIO-GD1.

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.

At the start of RIIO-GD1 there were an estimated 134 sub-deducts connected to our network. One additional site was identified by Xoserve last year bringing the total number of sites to 135. Our target is to remove the risk from these networks by the end of RIIO-GD1. This year we have re-engineered eighteen sub-deduct networks and removed twelve secondary meter installations to remove the identified risk, at a cost of £0.1m. Another four sites have been identified as no longer being sub-deducts.

We expect to remove c50% of the remainder with the next twelve months using a risk based approach. The remaining outstanding sub deducts will be phased over the rest of RIIO-GD1.

3.2.5 Asset Health

The RIIO-GD1 gas transporter licence requires the Gas Distribution Networks (GDNs) to develop a Network Output Measures (NOMs) methodology for asset health and monetised risk. The NOMs methodology was completed and submitted to Ofgem on the 31st March 2016 in compliance with the provisions of Special Condition 4G.

NOMs outputs are used to establish the current and predicted deterioration in asset health and monetised risk over time and the associated improvement as a result of asset investment. The first report using the new methodology has been submitted in July 2016. Ofgem have confirmed this first submission is outside of the normal data assurance requirements.

Post-July 2016, the following compliance requirements will be met:

- March 2017: Complete validation of NOMs
- 31st March 2017: Publish revised NOMs methodology
- July 2017: Provide a regulatory reporting return with RIIO-GD1 start and end tracking

The monetised risk values within the July 2016 return are derived from the asset-specific MRS (Monetised Risk Solution) Microsoft Excel models, which are based on the Network Output Measures Health & Risk Reporting Methodology & Framework (Version 3.0 – March 2016). A change log has been published to document revisions to the methodology as agreed with OFGEM (GDN Asset Health Risk Reporting Change Register V1.0 to be submitted by the SRWG under separate cover).

A significant amount of data collation and analysis has been undertaken to inform the modelling process. Where data deficiencies have been identified, this will lead to future data improvement initiatives. Although the methodology allows the use of pooled, shared or elicited data, there are various GDN-specific datasets and values that will form part of those initiatives in the future.

A RIIO-GD1 start position has not yet been determined under the new NOMs methodology. This will follow in the 2017 submission. The current total network risk is £127m. Unmitigated, this risk will increase to £152m based

on our modelled outputs. The delivery of NGN's current planned work for 2016/17 and the delivery of our GD1 business plan targets to 2021 will mitigate the risk to £129m. These values are subject to the validation exercise planned for 2016/17.

The Iron Mains population holds NGN's highest total risk at a 2016 monetised risk value of approximately £45.2m (with an average of £4,902 risk per km). 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.

3.3 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 3 inferred target	15/16	RAG
Loss of supply			
Number of planned interruptions	50,448	58,925	A
Number of unplanned interruptions	8,408	14,289	R
Duration of planned interruptions (mins-millions of)	27.3	13.7	G
Duration of unplanned interruptions (mins-millions of)	7.8	11.8	A
Network capacity			
Meeting NGN's 1 in 20 planning standard (MWh pa)	509,427	492,560	G
PRI utilisation and capacity	Phased plan	On target	G
Network reliability – maintaining operational performance			
Percentage by volume of offtake meter errors	<0.1% pa	0.0%	G
Number and duration of telemetered faults	211 pa	135	G
Pressure System Safety Regulation (PSSR) Faults (A1 and A2 faults per number of AGIs)	0.50 pa	0.31	G
Gasholder decommissioning	2	3	G

Figure 3.14: Reliability outputs 2015/16 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 three performance on reliability outputs has been good. Whilst we unfortunately had more unplanned interruptions than target, the actual length of time customers were without gas was significantly better than target.

We expect to deliver all our reliability outputs with the exception of the number of unplanned interruptions. We will significantly outperform the target set for customer minutes lost. More detail on each individual measure can be found in the following sections together with our forecasts for the RIIO-GD1 period.

3.3.1 Loss of supply

The loss of supply outputs cover our performance in relation to interruptions, which are classified in two ways:

- **Planned** – prior notification that the gas supply will be interrupted is provided to the customer, typically associated with work planned by NGN, such as mains replacement; and
- **Unplanned** – no prior notification is 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.

	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Number of planned interruptions	403,585	43,276	57,434	58,925	60,736	60,672	67,853	62,502	62,502	473,901
Number of unplanned interruptions	67,263	11,464	13,034	14,289	14,971	14,841	14,712	14,584	14,459	112,354
Total number of interruptions	470,849	54,740	70,468	73,214	75,707	75,513	82,565	77,086	76,961	586,255
Duration of planned interruptions (mins-millions of)	218.46	22.4	30.3	13.7	14.0	14.1	15.7	14.6	14.6	139.4
Duration of unplanned interruptions (mins-millions of)	62.7	4.8	4.2	11.8	7.9	7.8	7.8	7.7	7.6	59.6
Total duration of interruptions	281.2	27.2	34.5	25.5	22.0	21.9	23.5	22.2	22.1	198.9

Figure 3.15: Loss of Supply forecasts

Number and duration of planned interruptions

We had 58,925 planned interruptions in 2015/16, with a duration of 13.7 millions of minutes (mm). The number of minutes lost has reduced through a variety of factors, including an increased focus on the output by senior management, improved training of field resource, and day to day management by our customer care officers.

The number of interruptions is above our year three target, mainly as a result of the type and location of the mains and services we have replaced as we continue to target poor performing mains to deliver the best results for our customers. The three key drivers affecting the number of interruptions are:

- An increase in the proportion of mains replaced via open cut, which increases the number of interruptions required;
- The completion of a programme of c700 bulk service renewals in support of the service replacement output; and
- A reduction in the length of mains we have been able to replace via live service insertion which does not require an interruption.

Our year by year forecasts for RIIO-GD1 take into account the phased mains replacement delivery plan, the primary driver of planned interruptions. We are looking to further 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 also support delivery of this output. Overall we are on track to outperform the minutes lost eight year RIIO-GD1 output target, but not the total number of interruptions.

Number and duration of unplanned interruptions

We had 14,289 unplanned interruptions in 2015/16, with a duration of 11.8mm which is a significant increase on 2014/15. This is as a direct result of 3 major incidents which took place in 2015/16:

- Consett – 748 customers interrupted for 4.2mm;
- Hull – 410 customers interrupted for 2.5mm; and
- Maryport – 272 customers interrupted for 0.7mm.

Adjusting for these incidents, our underlying performance for 2015/16 is 12,859 unplanned interruptions with a duration of 4.4mm, a very similar performance to 2014/15. We had four other sizeable interruptions in 2015/16 which if removed would show an underlying year on year improvement. They were all as a result of floods, and accounted for 314 interruptions and 0.7mm lost.

The number of unplanned interruptions is an improvement on our historical performance, although behind target. The target was set based on an assumption that the number of unplanned interruptions was directly in our control. However the causes and predictability of unplanned interruptions are diverse and random, and as a result they are much less within our direct control than assumed when the target was set. Ofgem are currently reviewing the unplanned interruptions targets.

Our forecasts for the remainder of RIIO-GD1 assume a targeted 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, and may result in as many as c70,000 extra unplanned interruptions in that year alone.

We believe that we will not achieve the current RIIO-GD1 target for the number of unplanned interruptions, but will continue to outperform the target duration of such interruptions and as a result significantly exceed the target for reduction in customer minutes lost.

3.3.2 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 the modelling and capacity planning processes within NGN. 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.

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)	512,701	500,315	502,916	492,560	489,338	487,789	483,140	483,457	480,035

Figure 3.16: Meeting NGN's 1 in 20 planning standard forecast

Asset utilisation and capacity outputs

Offtakes enable gas to be taken from the National Grid managed National Transmission System (NTS) into NGN's high pressure pipe network. Pressure Reduction Installation's (PRI) 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, then we invest to upgrade or replace the asset.

Our output targets for improving the utilisation of our assets are outlined below.

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	62	62	61	59	59
Utilisation 50% < I <=70%	52	58	56	59	57	52	50	48	48
Utilisation 70% < I <=80%	45	25	27	22	32	38	38	43	44
Utilisation 80% < I <=100%	44	49	44	41	37	38	42	41	41
Utilisation > 100%	0	10	9	8	6	4	3	2	0
Total	192	193	195	194	194	194	194	193	192

Figure 3.17: Asset utilisation and capacity forecasts

On an annual basis we 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 improve our asset utilisation position over RIIO-GD1. The table above shows our current forecast for this output. We will achieve this by designing appropriate site upgrades in order to improve the utilisation figures. Variances are also driven by year to year variations in forecast flows and inlet pressures resulting from re-validation of models and changing demand forecasts.

The key variances from 2014/15 to 2015/16 are:

- The 195 sites in 2014/15 included Durham Lane 40/10bar PRI, which has now been decommissioned.
- The forecast for 192 sites at the end of RIIO 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.

- The capacity utilisation at East Bierley 17/2bar and Whitby 38/1bar PRIs came back below 100% following validation of the below 7bar systems in these areas.
- Baldersby Offtake capacity has increased to above 100%. However, the peak 6 flow of 9,525 scmh includes the Sowerby Gateway development (1,500 scmh). This comprises of 925 dwellings (672 scmh) plus 45 commercial units (828 scmh). It is unlikely this site will be fully developed by Winter 2016/17.

3.3.3 Network Reliability

Maintaining operational performance

The primary output associated with Network Reliability is maintaining levels of operational performance across the network. This will be measured by the four outputs outlined below.

	Year 3 inferred target	15/16	RAG
% by volume of offtake meter errors	<0.1%	0%	G
Number of 'now' faults * duration in hrs / number of telemetered AGIs	181	135	G
Number of PSSR A1 and A2 faults per number of AGIs	0.50	0.31	G
Gasholder decommissioning	2	3	G

Figure 3.18: Network reliability 2015/16 performance

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 error's of no greater than 0.1% of total throughput (measured in GWh).

	Year 3 inferred 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%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%

Figure 3.19: 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 have received no new meter error reports in 2015/16. We expect to be within target for every year of RIIO-GD1.

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 3 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	196	105	63	135	126	114	103	97	90

Figure 3.20: Telemetered faults forecast

In 2015/16 we scored 135 against a final proposals target of 181 continuing our outperformance for this output, an excellent performance. The actual figure 135 was slightly over the forecast figure of 130 submitted last year.

The score has increased from the very low 63 last year. The main drivers for this was an increase in fault numbers from a new Biomethane site, and a specific fault where we experienced a significant delay in obtaining parts for equipment. 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	0.51	0.43	0.26	0.31	0.50	0.49	0.49	0.48	0.47

Figure 3.21: PSSR faults forecast

The RIIO-GD1 target for the proposed new measure is <0.51 faults per inspection. We have achieved 0.31 faults per inspection in 2015/16, well below the target. The target reduces year on year throughout RIIO-GD1, and we expect to outperform this target every year.

Gasholder decommissioning

We currently have 44 low pressure gasholders at 31 sites spread across the network which are no longer required to operate the network. We have a gasholder decommissioning programme that 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 completed the decommissioning of three holders in 2015/16, one more than in our original plan. We are now planning on accelerating the programme further, as detailed in the new forecast below.

	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	5	2	4	3	3	23

Figure 3.22: Gasholder decommissioning forecast

3.4 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 3 target	15/16	RAG
Customer satisfaction survey			
Unplanned interruption (Overall satisfaction score from 0-10)	9.0	9.5	G
Planned interruption (Overall satisfaction score from 0-10)	8.5	8.9	G
Connections (Overall satisfaction score from 0-10)	8.4	9.1	G
Complaints			
Complaints metric	11.6	3.1	G
Stakeholder engagement			
Maximise rewards under the stakeholder incentive target (score from assessment panel)	>5.0	6.8	G

Figure 3.23: Customer service outputs 2015/16 performance

We have achieved an excellent outcome in our customer service outputs, achieving the number one 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. Recognising our own awards success last year, over the last twelve months we have judged awards at the UK Customer Experience Awards, the UK Employee Experience Awards, and the Institute for Customer Service Awards.

We recently undertook the mid-point check for our Institute of Customer Services accreditation. We were awarded this accreditation in 2014 and whilst it lasts for three years, there is a requirement to conduct the customer and colleague surveys again after 18 months. We improved our scores for both of these surveys.

We anticipate that we will continue to sustain and improve on this strong performance, and continue in our pursuit to deliver the best possible experience for our customers. More detail on each individual measure can be found in the following sections, together with our forecast for the rest of the RIIO period.

3.4.1 Customer Satisfaction Surveys (CSS)

Customer satisfaction surveys involve interviews with customers based on the interaction that they had with NGN in relation to:

- A new or altered connection;
- An unplanned interruption to a gas supply as a result of a gas leak; or
- A planned interruption as a result of work targeted by NGN.

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, as detailed in the table below.

	NGN RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Unplanned interruption (Overall satisfaction score from 0-10)	9.0	9.3	9.4	9.5	9.5	9.5	9.5	9.5	9.5
Planned interruption (Overall satisfaction score from 0-10)	8.5	8.4	8.7	8.9	8.7	8.8	8.8	8.8	8.9
Connections (Overall satisfaction score from 0-10)	8.4	8.6	9.0	9.1	9.1	9.2	9.2	9.3	9.3

Figure 3.24 Customer satisfaction survey forecasts

Ownership and empowerment continue to be at the heart of delivering an exceptional customer experience. As this has now become business as usual, we decided to move away from holding our weekly customer discussion. This had been in place for nearly five years from January 2011 until September 2015. Many customer focus groups were starting to emerge independently across the business, and this demonstrated the business was creating its own momentum. One of these groups is called Team 10, and is run entirely by operational front line colleagues – one from each of our 9 operational areas, plus a member of our Customer Care Team. Together they discuss problems, formulate solutions, share best practice, and learn from each other's mistakes. The energy and drive of groups such as this will ensure that we continue to improve incrementally year on year.

Over the last twelve months we have conducted extensive customer research so that we can start to provide a more tailored service. This year we focussed specifically on vulnerable customers and micro-businesses, looking at their customer journeys in order to pinpoint where we can make specific targeted improvements for these customer groups. Over the coming years we will target different customers so that we can fine-tune the service for each group.

Looking ahead, we are working really hard to make sure that we are able to get feedback from all the customers that we impact. We have recently introduced a system called Rant and Rave, which allows customers to provide their feedback by text. We are also exploring how customers react to different satisfaction questions, and how this might give us better data to identify improvement areas. This should really help to make sure we can deliver for all our customers, and sustain our class leading performance.

3.4.2 CSS results for unplanned interruptions

In 2015/16 we have delivered a score of 9.5, an increase from 9.4 in 2014/15.

Our 9 patch operation model has remained in place, and this has helped to deliver a local, quality service to our emergency and repair customers. We have continued to use Team 10 to help drive improvements forward. In addition, two of our nine patches created an initiative called the Customer Interface Centre (CIC). Peer to peer coaching is an important part of the CIC, with engineers obtaining 'in-moment' feedback from customers, and any issues being promptly resolved by the engineers. This has not only helped to improve customer scores, but has also helped to increase colleague engagement.

We have also continued to work hard to improve our incident response process. In the winter of 2015/6 we were heavily tested by flood related gas incidents. Our main focus in every incident is to get 'feet on the ground' and concentrate on face to face communication. This approach is something that our customers and stakeholders have commended us for.

3.4.3 CSS results for planned interruptions

In 2015/16 we have delivered a score of 8.9, an increase from 8.7 2014/15.

We have continued to prioritise our replacement activities in the warmer summer months in order to minimise disruption of gas supplies in the colder winter months. Early in 2015 we trialled the Considerate Constructors Scheme (CCS) on a number of replacement schemes. We quickly identified that the CCS could help focus improvements across all aspects of our replacement activities, and we rolled the initiative out Network-wide. At the annual CCS awards we were delighted to receive 19 awards in total (3 bronze, 11 silver, 5 gold), and were commended for our outstanding community engagement. We are the only GDN to be a member of the CCS, and we will continue to use the CCS as a benchmark for our replacement activities.

3.4.4 CSS results for connections

In 2015/16 we have delivered a score of 9.1, an improvement on our score of 9.0 in 2014/15. We have continued to build on the improvements of the last two years, driving change directly from within our connections business.

We launched our on-line payment system in April 2015, and 33% of customers are now choosing to pay via this service. We have also streamlined how connections alterations are delivered, using a 'one stop shop' approach. This has reduced the alterations process from 4-6 weeks to just 7 days, with some jobs even being completed on the same day as the application is made. Customers are highly satisfied with this, and this will have contributed to our improved performance this year.

3.4.5 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 2015/16.

	Complaint Scores
Percentage of complaints unresolved after one working day	17%
Percentage of complaints unresolved after 31 working days	3%
Percentage of repeat complaints	1%
The number of Energy Ombudsman (EO) decisions that go against NGN as a percentage of total complaints received	0%

Figure 3.25: Complaint metric breakdown

The above scores for 2015/16 generate a weighted complaint score of 3.1, which does not generate any penalties. Penalties would only be imposed if our score was 11.57 or more. Whilst 3.1 is slightly higher than our performance of 2.7 in 2014/15, it is still a strong performance, and we are confident that we can 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	4.8	2.7	3.1	2.7	2.4	2.2	2.0	2.0

Figure 3.26: Complaints metric forecast

Over the last twelve months we have continued to focus on resolving issues first time, every time, and this is reflected in our improved performance for complaints outstanding after D+1 – 17% this year compared to 18% last year. We have continued with our daily complaints call, and extended this to 7 days a week, 365 days a year. This ensures that our customer processes mirror our operation obligations, to respond to customer emergencies 24/7.

We recognise that there has been a slight dip in performance for complaints outstanding after 31 days, and repeat complaints. We have taken steps to improve both these areas. For complaints outstanding after 31 days, we now require daily updates once they have passed 10 days outstanding. This should help to maintain the focus on closure as soon as possible. For repeat complaints, we have created a jeopardy report that highlights any customer issues that could be at risk of becoming a repeat complaint. This is helping to both keep customers updated, and to also keep track of any ongoing operational issues.

3.4.6 Stakeholder engagement

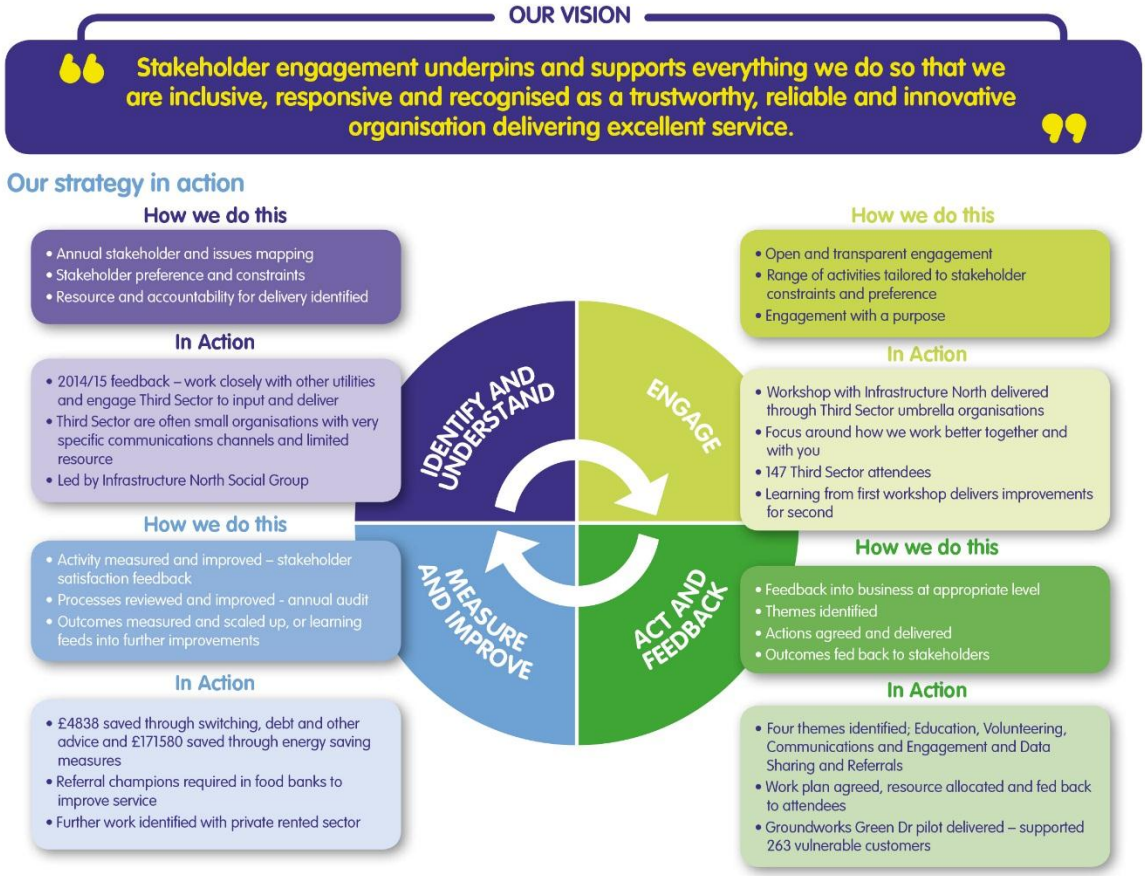
At NGN we firmly believe that stakeholder engagement and our response to feedback can lead to stronger outcomes for our stakeholders, our customers, our colleagues and our business.

Our strategy

Over the past four years, in support of an ambitious programme of business improvement, we have embedded a robust engagement strategy. This is driven by senior management, delivered by all, aligned with our wider business objectives and independently audited each year.

"NGN continues to build on its strong foundation of stakeholder engagement across the company, developing innovative approaches and seeking to collaborate with others in the industry where possible. As in previous years, the strengths of the company's approach are its business culture, the strategic nature of the response to stakeholder needs, and the provision of resources to deliver engagement and respond to stakeholder inputs."

SGS independent audit report, March 2016



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 third year in a row and our approach to auditing throughout the year is helping us to continually measure and improve how we engage. In 2015/16 we have:

- Increased our collaboration with the third party sector – helping us to focus our efforts, maximise the benefits and increase the reach of our social programmes;
- Launched NGN and You – http://www.northerngasnetworks.co.uk/ngn-and-you/ – following feedback from stakeholders we have refreshed our web-site making it easier for stakeholders to access the information they want and feedback on issues of interest;
- Formalised our stakeholder panel – ensuring we have a cross section of key stakeholders regularly inputting to our current and future plans; and
- Introduced depot days – inviting local stakeholders and communities into our depots to understand more about what we do and feed back.

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 roll out of the Considerate Constructors Scheme, refining and scaling up our social responsibility programmes, to ensuring that the future of gas is on the national agenda. We have identified over 130 significant outcomes as a result of stakeholder engagement in the year – benefitting our stakeholders, customers and colleagues.

Stakeholder Incentive Scheme

In 2015/16 we achieved a score of 6.8 from the independent panel, a significant improvement on our score of 5.5 last year. We have worked extremely hard this year to better demonstrate how input from our stakeholders is shaping our business and leading to measurable improvements and benefits, and believe this is a very good result.

3.5 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.

3.5.1 Broad measure

Eight Year Output	Inferred annual target	15/16	RAG
Total capacity of biomethane connected (MW)	No target	722,700	G
Total capacity of biomethane enquiries/applications in progress (MW)	No target	2,639,300	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%	89%	A
Voluntary standards of service: 30 day response to capacity study under 7 bar	100%	100%	G

Figure 3.27: Environmental broad measure 2015/16 performance

In 2015/16 we have seen a steady continuation in the number of enquiries received in the year as the interest in biomethane connections continues. This also recognises that the Renewable Heat Incentive (RHI) provided by Government to support such investment is reviewed every three months, and has consistently been reduced as more connections have been made. The RHI at the time of any new connection is fixed for 20 years. This has provided a clear incentive for interested parties to accelerate their plans and obtain the best possible RHI rate.

We have connected eight new biomethane plants providing a total capacity of c723GW in 2015/16. With the continued interest there is a likelihood of a further five projects being delivered in the next 12 months. The level of interest and uptake will always be dependent on movements in the RHI.

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. These will be expanded to include quotation timescales, work scheduling and work completion when we have more experience of the market place. We expect to maintain a strong performance against our voluntary standards.

	RIIO annual target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Total capacity of biomethane connected (GW)	No target	0	115	722	452	452	361	271	181
Total capacity of biomethane enquiries/applications in progress (GW)	No target	1,139	2,856	2,639	2,639	2,639	1,320	1,320	990
Information provision and connection charging for distributed gas	No target	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 3.28: Environmental broad measure forecast

3.5.2 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	15/16	RAG
Shrinkage gas			
Shrinkage baselines (GWh)	433 GWh	382	G
Leakage baselines (Gwh)	408 GWh	360	G
Business Carbon Footprint (BCF)			
BCF excluding shrinkage	None	8,476 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	33,520 Tn 25%	A
Amount of spoil to landfill sites	<13,000	17,311 Tn 10%	A
ISO14001 major non conformities	None	0	G

Figure 3.29: Environmental narrow measure 2015/16 performance

Our 2015/16 performance on the narrow measure was satisfactory overall. An excellent performance on shrinkage gas reduction (which is 95% of our business carbon footprint) was coupled with a mixed performance on the other emissions and natural resource use outputs.

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	459	445	433	423	412	401	390	379
Shrinkage actual	421	397	382	372	361	350	339	328
Leakage baselines	434	420	408	398	386	376	364	354
Leakage actual	399	375	360	350	338	328	316	306

Figure 3.30: Shrinkage and leakage forecasts

We have outperformed both shrinkage and leakage targets in 2015/16 and plan to further outperform the annual targets throughout RIIO-GD1. We will achieve this through a combination of:

- Targeting our iron mains replacement programme at the leakiest pipes with the highest risk;
- Reducing system pressures through strong governance and close working practices between our pressure management, network validation and network maintenance teams, as well as the introduction of remote pressure monitoring and control equipment at targeted governor stations; 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.

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.

We have continued to strengthen the BCF collation process during 2015/16. Improvements in this were the primary reason for the increase in our reported business carbon footprint last year, and this has had a further impact this year. However our total BCF, excluding shrinkage, has reduced by 7% since 2014/15. This is due to a number of initiatives including:

- Business mileage (-6%);
  - Using teleconferencing and videoconferencing facilities where practical;
  - Employing colleagues to operate in the vicinity of their home location; and
  - No travel day initiatives.
- Direct commercial vehicles (-13%);
  - Efficient Euro 6 engines in our replacement fleet vehicles;
  - Changes in our business model with the outsourcing of operational maintenance activities;

- Speed limiters, Greenroad technology, on-board weight indicators, Econetic auto stop/start technology; and
- Driver training and awareness.

- Energy Use (-3%);
  - Implementation of energy efficiency initiatives identified during the Energy Saving Opportunity Scheme audits; and
  - Office and depot rationalisation – reduction of three sites.
- PE pipe (-30%) – a 14% reduction in the length of mains work.

During 2016/17 we will continue to enhance the collation process of management information and drive BCF performance through the inclusion of specific objectives and target KPIs within our repex delivery contracts. These will focus specifically on optimising the use of ordered PE and fittings whilst minimising the resulting PE waste. We continue to undertake challenge and review of third party data at contract management meetings. Where relevant new contract awards will include specific environmental KPIs.

We plan to implement additional energy efficiency initiatives which will lead to a reduction in our BCF over the course of RIIO-GD1.

A Network Innovation Allowance (NIA) funded trial of two compressed natural gas (CNG) vehicles is under way in alliance with Leeds City Council (LCC) and Cenex. The trial supports our Network Innovation Competition (NIC) funced project, in conjunction with LCC, in relation to the commissioning of a commercial CNG refuelling point.

We are working with Newcastle University, Newcastle City Council, Your Homes Newcastle and ITM Power to support the introduction of a hydrogen refuelling station in Newcastle. The proposal is to develop across each of the parties a fledgling hydrogen vehicle trial. There is great enthusiasm for this new zero carbon technology to be a part of the Newcastle infrastructure. The outcome of initial meetings, proposals and feasibility studies will determine whether NGN pursue this option within RIIO GD1.

Our BCF is calculated across three categories, described as Scopes 1, 2, 3. The table below provides forecast figures, based on a 0.5% year on year reduction, driven solely on our direct emissions, Scope 1 (excluding shrinkage) and Scope 2 emissions, as these are currently defined and understood.

Scope 3 was not captured in our RIIO GD1 Business Plan. Our Scope 3 forecast is based on the worst case scenario utilising data from the past three years. This allows for changes in lengths and diameters of the replacement workload, totality of contractor data and requisite third party travel resulting from business needs.

	13/14 Actual	14/15 Actual	15/16 Actual	16/17	17/18	18/19	19/20	20/21
NGN non-shrinkage BCF (Scope 1 and 2) - tCO2e	8,722	9,244	8,476	8,434	8,392	8,350	8,308	8,266
NGN non-shrinkage BCF (Scope 3) - tCO2e	12,821	16,248	15,287	17,737	17,737	17,737	17,737	17,737
NGN non-shrinkage Total BCF - tCO2e	21,543	25,492	23,763	26,171	26,129	26,087	26,045	26,003

Figure 3.31: Business Carbon Footprint forecast

Other emissions and natural resource use

Statutory remediation of contaminated land

No specific targets have been set for statutory land remediation. During 2015/16 we continued our programme of reviewing our portfolio of sites with potential for land contamination. A total of 48 desk based and 18 intrusive land contamination surveys were completed across 54 sites in the year, in order to provide an updated assessment of the environmental risk and potential liability associated with each site.

Of these assessments, the most notable was the intrusive investigation of our AGI site built on the former Knottingley Gasworks. The project was commissioned following discussion with Wakefield Council which identified potential risks to controlled waters from the former use of this land as a gasworks. We completed an intrusive site survey and detailed environmental modelling. This successfully demonstrated to the Council and the Environment Agency that the site poses a low risk to environmental receptors in the vicinity.

We have completed three remediation projects during 2015/16 to reduce the health risks posed to site users, neighbours and trespassers to acceptable levels:

- Garforth AGI and Birkshall Holder Station: Capping of isolated hotspots of exposed soil contamination (cyanide and asbestos) which was identified during the 2014/15 intrusive site surveys; and
- Dewsbury AGI: Capping of an isolated hotspot of soil recording slightly enhanced radioactivity at a shallow depth which was identified during the 2015/16 intrusive site survey.

We expect to carry out further assessments and remediations 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	60	25	15	12	12

Figure 3.32: Statutory remediation of contaminated land RIIO forecasts

Use of virgin aggregate and amount of spoil to landfill

We have achieved a 6.8% reduction in tonnes of excavation spoil sent to landfill during 2015/16 (1,254 tonnes), with a reducing trend month-on-month throughout the year. We anticipate this trend to continue in the future. Since 2013/14 the tonnage of spoil we have sent to landfill has reduced by 72% for a comparable workload. This is a strong performance, especially when you consider the prevalence of heavy clay ground conditions in many parts of our network which recycling centres are often unwilling to accept.

Our usage of virgin aggregate increased during 2015/16 by 4,127 tonnes (14%), but remained 4,309 tonnes (11%) below our performance in 2013/14. Virgin aggregate usage showed a reducing trend throughout 2015/16 as a result of the work we have done with our contractors and local recycled aggregate suppliers, detailed below. We anticipate this trend to continue in the future.

The Yorkshire Highway Authorities Utilities Committee (YHAUC) continues to impose comparatively stringent quality requirements in order for recycled aggregate to be registered on their database and approved for use within the region for reinstatement. As a consequence there are only six sites producing YHAUC approved recycled aggregate which we can use, with all of these located in the south of our Yorkshire network region. Some of these sites do not produce approved recycled aggregate between October and March due to production issues, further hindering our ability to maximise our use of recycled aggregate. A member of our Environment

Team has joined the YHAUC Recycling Group Committee to lobby for further providers in the region and promote closer working with other utilities in our area on this matter to help us improve our performance.

During 2015/16 we have completed the following work to improve our spoil to landfill and virgin aggregate usage performance:

- Lobbying local recycled aggregate suppliers in the Yorkshire area to open new outlets providing spoil recycling facilities and recycled aggregates approved by YHAUC. This resulted in two new YHAUC approved recycling centres opening in previously poorly provided parts of our network (Hull and Barnsley) in June 2015 which our contractors are now using;
- Provision of our contractors with a database of recycling centres within our entire network area where they can deposit spoil for recycling and/or purchase recycled aggregates for use in reinstatement;
- Educating our own staff and contractors in the importance of recycling spoil and using recycled aggregate via a dedicated workshop in collaboration with an external recycling supplier, and regular performance progress updates at Environment, Health and Safety meetings;
- Regular interrogation and challenge of contractor spoil to landfill and virgin aggregate usage performance, including frequent direct face-to-face coaching of our contractors on how they can improve their performance; and
- Inclusion of spoil to landfill and virgin aggregate usage KPIs with a significant weighting within our contractor's 'League Table' challenge where performance is recorded, verified and rewarded as appropriate.

Looking to the future, we have introduced the following practices to drive improvements in our performance:

- Monthly Senior Management Team review meetings to maintain a focus on this issue;
- Reviews and challenges of each individual contractor's performance during performance one-to-one sessions with our Head of Construction Services; and
- Continued lobbying of recycling providers in the Yorkshire area to establish new centres providing approved aggregate.

We have also invested significantly in new technology to enable us to more precisely position our excavations and minimise their size, all of which should reduce the amount of spoil generated and aggregate required for reinstatement in the future. This new technology includes:

- Purchasing of two new 'core and vac' vehicles fitted with innovative acoustic camera technology which allows precision location of gas main leaks and repair within smaller, more accurately positioned excavations. These are anticipated to be fully operational by mid-2016;
- Development of innovative in-situ methods of abandoning gas main stub-ends which significantly reduces the size of the necessary excavations, typically by at least 80%; and
- Development of innovative methods for identifying and removing water ingress within gas mains and service pipes. These comprise a combined camera and pump which can be inserted directly into gas mains/services at strategic locations to identify and remove water. Previously water ingress location required excavation of numerous holes to locate and remove the water.

	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%)	33,520 (25.44%)	30,700	30,200	29,700	29,200	28,700
Amount of spoil to landfill sites (t)	<13,000	61,555 (35.99%)	18,565 (10%)	17,311 (9.92%)	15,600	15,600	15,600	15,600	15,600

Figure 3.33: Use of virgin aggregate and amount of spoil to landfill sites RIIO forecasts

ISO 14001 major non-conformities

We had an excellent annual surveillance assessment in September 2015 with no observed weaknesses. We are currently working with the University of Leeds Sustainability and Consultancy department to identify the additional requirements of the new ISO 14001:2015 standard, compared to the ISO 14001:2004 standard to which we are currently accredited. The outcome of this project will be a gap analysis and action plan to identify what we need to do to update our Environmental Management System to the new ISO 14001:2015 standard.

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 3.34: ISO 14001 major non-conformities output forecasts

3.6 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	15/16	RAG
Number of fuel poor network connections	1,500	2,458	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 3.25: Social obligations outputs

We have achieved all outputs in this category in 2015/16. Cumulatively we are ahead of schedule on the number of fuel poor connections completed. This gives us some 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.

3.6.1 Number of fuel poor network connections and Social Issues

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.

	RIIO target	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
Number of fuel poor network connections	14,500	1,164	1,707	2,458	2,057	1,859	1,765	1,776	1,791	14,577

Figure 3.36: Fuel poor workload forecast

During 2015/16 we have completed 2,458 fuel poor connections, in line with our revised phased programme to provide at least 14,500 connections over RIIO. We expect to complete proportionally more connections over the next two years, then see a gradual reduction over the rest of RIIO.

As a major employer and service provider in the North of England, we have both an obligation and wide ranging opportunities to support the communities in which we operate, across a broad range of issues. We are engaged in several activities to support this obligation, which we fully intend to expand over RIIO-GD1. These activities are closely related to our work on fuel poor connections and are managed as one work stream.

The following is a summary of the key activities we are currently undertaking to ensure that we are able to match our promises in this area.

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 has been particularly successful, however we recognise that we currently engage with only 20% of c170 Registered Social Landlords. We are now working to raise awareness with others directly by engaging to talk though our services, and through promotion by advertising in collaboration with other GDNs in the National Landlord Magazine;
- We are using technology and data to map communities that can benefit from assisted connections, and we are working with two large Local Authorities covering rural areas to identify potential schemes that may bring gas supplies to isolated communities; and
- We were in a consortium of four local authorities which won 40% of the national funding from the DECC Central Heating funding for first time central heating. We continue to support these schemes by employing two full time staff to support installations, and through active engagement at Steering Group/Coordination levels.

Off-gas communities – rural

Last year we successfully piloted a 'Warm Hubs' scheme in remote rural areas with Community Action Northumberland, which established communal places equipped to provide a place of warmth and community during winter. This helps to combat the challenges of low income / vulnerable people living in cold unheated homes. We have now committed to a three year programme to roll out more 'Warm Hubs' across the whole of Northumberland.

In parallel we are promoting the scheme to other areas for widened participation. The scheme goes from strength to strength and has seen interest from Community Groups, the Church, and the British Legion, along with Pubs and cafes all keen to get involved.

Energy Challenges

- Multi Storey Buildings (MSB): We are continuing to work with Newcastle University, Newcastle Council and Northern Power Grid to consider energy solutions for MSBs. This is largely a social science engagement considering expectations and challenges for those living in high rise buildings. This year we focussed on literature review and data capture, and now look forward to the outputs of the analysis and engagement with tenants.
- Working in partnership with the Children's Society in Bradford, we have been able to access and support a significant number of 'hard to reach' vulnerable people. Energy switching sessions, energy conservation and nutritional programmes have all been delivered to support fuel poor and vulnerable customers. The programme completed and we had a parliamentary launch of the findings in February 2016. We are now working with the Children's Society on a programme that will go wider than Bradford, with a focus on education / life skills for young people.

Pop Up Energy Cafes

Following a successful trial we have continued implementing a series of Pop Up Energy Cafes, informal community based activities promoting fuel switching, energy savings, and the DECC Central heating fund. We have engaged with several third party organisations to make presentations, and have supplied a large number of energy monitors free to attendees. These have proved a success and we are looking to expand them further across our network over the remaining RIIO period.

Green Doctors – home visits

In partnership with Northern Powergrid we engaged with Groundwork to support their initiative called 'Green Doctors'. This was trialled, visiting 65 homes to provide a range of in house measures and advice, covering draft proofing, fuel switching, energy saving devices, and water conservation. The scheme was a success resulting in average lifetime savings across the homes visited of £17,160. We now intend to expand the trial as a community event in order to broaden engagement.

Cold Snaps

Working with Rural Action Yorkshire we funded the purchase and training to use a thermal imaging camera. We engaged with three rural communities, and used the camera to review thermal images of their properties in order to provide advice at follow up community events. The report is currently under construction, but it is likely this will be extended for Fuel Poor communities, building on the learning from this piece of work.

3.6.2 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 workstreams to achieve this, in addition to the collaborative work we carry out with the other gas networks.

Firstly, our emergency staff use Gascoseeker devices which detects the level of methane and CO in customers 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. Our internal target was to get c1,600 questionnaires returned, however through promotion we have managed to get nearly 3,900 returned in 2015/16.

For vulnerable customers we continue to provide CO alarms, but prefer to promote through education wherever possible.

Secondly, we have an ongoing programme of activities to improve general customer awareness of CO and its dangers. This includes:

- 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, and are confident that the number of entries will increase from previous years.
- iFest – following the success of ICOP, we led the development on a new smart device game targeting festival goers, alerting them to the risks from portable BBQs. The game went live in June 2015 and was promoted through social media, receiving very favourable feedback. We will continue to use both ICOP and iFest to raise awareness of CO to young adults.
- Gas Safety Week – to support gas safety week and promote awareness of CO we sourced and staffed a stall in the busy shopping centre at Eldon square Newcastle. This provided direct engagement and awareness raising opportunities with the public. Additional presentations were made to shopping centre staff.
- Training an Army – we have started a programme of training community and third party individuals from our stakeholder group who have access to communities we don't. They are trained in CO awareness by an external trainer, which we fund. So far we have trained around 30 individuals.

3.7 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.

One Year Outputs	RIIO annual target	15/16	RAG
% of standard connection quotes issued in 6 working days	99.6%	99.98%	G
% of non-standard connection quotes below 275kwh issued in 11 working days	99.6%	99.98%	G
% of non-standard connection quotes above 275kwh issued in 21 working days	99.6%	100.0%	G
% of land enquiries where response sent within 5 working days	99.6%	100.0%	G
% of commencement and completion dates for connections below 275 kwh provided within 20 working days	99.6%	100.0%	G
% of commencement and completion dates for connections above 275 kwh provided within 20 working days	100%	97.6%	A
% of connection jobs substantially completed on date agreed with customer	95%	98.4%	G

Figure 3.37: Connections 2015/16 outputs

We have had an excellent result in Connections this year, with five of the outputs achieved with near 100% scores, and six out of seven outputs green this year compared to five last year. Our performance targets are very challenging and are significantly above the existing guaranteed standards.

In addition this year we have also measured our performance against the Council of European Energy Regulators (CEER) targets. These represent a stretch on the existing GSOS standards, and through this we expect this to deliver further benefit to our customers.

These results cement the progress we have made to date, and are further backed up by the improvement in our connections customer satisfaction score from 9.0 to 9.2. We expect to maintain or improve our performance for all the outputs over the next five years.

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%	99.9%	99.9%	99.9%	99.9%	99.9%
% of non-standard connection quotes below 275kwh issued in 11 working days	99.6%	99.5%	99.6%	99.98%	99.9%	99.9%	99.9%	99.9%	99.9%
% of non-standard connection quotes above 275kwh issued in 21 working days	99.6%	97.5%	98.7%	100.0%	99.9%	99.9%	99.9%	99.9%	99.9%
% of land enquiries where response sent within 5 working days	99.6%	99.5%	99.6%	100.0%	100%	100%	100%	100%	100%
% of commencement and completion dates for connections below 275 kwh provided within 20 working days	99.6%	99.3%	99.8%	100.0%	99.9%	99.9%	99.9%	99.9%	99.9%
% of commencement and completion dates for connections above 275 kwh provided within 20 working days	100%	100%	98.5%	97.6%	99.0%	99.0	99.0	99.0	99.0
% of connection jobs substantially completed on date agreed with customer	95%	97.2%	98.6%	98.4%	97.5%	97.5%	97.5%	97.5%	97.5%

Figure 3.38: Connections forecast outputs

Our connections delivery model has undergone material changes over the last 2 years. We now have a new but fully established design team and back office support aligned to a new direct labour workforce who work closely together to deliver the best possible service.

In the last year we have continually reviewed and improved our delivery model. Notable activities this year include:

- We have developed and implemented a new ‘smarter’ Audit Framework, increasing the focus on business critical elements with a corrective action and feedback mechanism;
- We have improved our processes and governance to improve our project costing and data integrity;
- Increased the level of awareness within Connections to appreciate the overall connections process and impacts of non-conformance; and
- Created dashboards to monitor performance to ensure consistency and continuously monitor and improve performance.

As part of our good to great programme, we have implemented a number of new initiatives to benefit customers, stakeholders and the business. These include:

- On line payments: The ability for a customer to pay direct online. Previously payments were managed by our cheque process. This now allows our customers an alternative and secure payment option and has the ability to speed up the delivery process;
- Indicative doorstep quotes: Giving our surveyors the option to talk through the job with a designer and give our customer an indicative cost on site. We have improved our costing process so these quotes will be sufficiently accurate to allow the customer the opportunity to decide whether their enquiry is feasible there and then;
- Improvement and development team: This team has been specifically developed to look at our end to end processes and ensure they meet the changing demands of our customers. They will then be responsible to facilitate the changes and monitor their success; and
- Performance dashboard: This dashboard lets us see the level of service we are achieving, in terms of
    - Customer; includes customer satisfaction scores.
    - Integrity; Provides audit feedback data.
    - Efficiency: The speed and quality of the task they undertake.


Northern
Gas Networks

Innovation

4

4 Innovation

4.1 Introduction

Many elements of the RIIO framework are intended to encourage innovation. These include strong emphasis on delivering outputs and lengthening the price control period to provide companies with more certainty of the rewards for successful innovation.

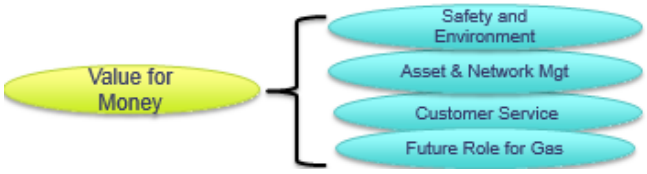
RIIO-GD1 includes a stimulus package to fund innovation where the commercial benefits may be uncertain and therefore stakeholders are unwilling to fund research and development projects speculatively. This stimulus package has three mechanisms where NGN can obtain additional funding for innovative projects.

- Network Innovation Allowance (NIA) – to fund smaller innovation projects that will deliver benefits to customers;
- Network Innovation Competition (NIC) – an annual competition to fund selected flagship innovation projects that would deliver low carbon and environmental benefits to customers; and
- Innovation Roll-out Mechanism (IRM) – to fund the roll-out of proven innovations which will contribute to the development in GB of a low carbon energy sector or broader environmental benefits.

4.2 Network Innovation Allowance

4.2.1 Refining our innovation strategy

We reviewed our strategy for 2015/16 NIA expenditure against our four focus areas. Although overall actual expenditure was in line with our strategy we used the result to refine our strategy for 2016/17, which now has a stronger emphasis on our Safety and Environment focus area.



	Recommended % of NIA Spend (£2.6m) 15/16	Actual % of total NIA portfolio value	Recommended NIA Spend 16/17
Safety and Environment	15%	7%	20%
Asset & Network Mgt	35%	48%	35%
Customer Service	5%	1%	10%
Future Role for Gas	45%	44%	35%

Weaving Innovation into the fabric of NGN

We have four new additions to the innovation team. These new team members add 136 years' worth of experience to the department. The team are working hard to increase the profile of innovation across NGN. Our vision is 'To Weave Innovation into the fabric of NGN'. This means that we don't want to be seen as a department, we want to facilitate and encourage idea generation across the whole of NGN.

4.2.2 Projects and expenditure

In total we have invested nearly £2.9m in innovation projects this year – an increase of £500,000 from last year. This demonstrates the effectiveness of our innovation strategy, our ability to generate ideas, and the benefits of working together with the other gas networks. This expenditure covered forty four projects in total.

Cumulatively, at the end of 2015/16, we have:

- Completed fourteen projects;
- Thirty-two 'live' projects under way;
- Won an IGEM Industry Award for Innovation Products;
- Approved twelve new projects for funding; and
- Forty one new suggestions under review.

In 2015/16 we successfully completed a suite of projects which have demonstrable benefits for the customer. These benefits manifest themselves in avoided costs, more efficient work streams, less impact on the environment, increased safety and reduced disruption to the customer. The following highlights a selection of projects which were led by NGN.

Total Stub End Abandonment

Focus area: Asset and Network Management

Actual Spend: £173,955

Project Summary:

As part of our replacement programme gas distributors are tasked with decommissioning all small diameter gas pipes close to buildings by 2032. Previous techniques for capping off these pipes left a short 'stub' of live pipe, where the small pipe abutted a larger diameter main. This presented the dilemma of potentially having to dig up these stubs. When they are connected to Tier 2 or 3 pipelines these operations are hazardous, expensive and disruptive to both customers and the public. In conjunction with our supplier, Steve Vick International, we've refined the legacy technique used to cap off a pipe without leaving a stub. After an extensive development and trial phase the improved process is now being used extensively across our region.

Benefits:

To date 115 stubs have been completed using this new method. Average cost avoidance per job is £5,350 on average when compared to the traditional techniques. Based on our experience during the field trials it is realistic to assume that the new method is going to be used on 100 jobs per year which could result in nearly £0.5m annual savings. In addition the new technique should result in c1620m^3 less of surplus excavation material being sent to landfill.

Remote Water Removal System

Focus area: Asset and Network Management

Actual Spend: £275,262

Project Summary:

When water finds its way into our network from flooding or a burst water main it can often take days to remove, leading to major disruption for customers. We teamed up with engineering specialists Synthotech to develop a faster way of tackling water ingress. The process uses a remote camera which is sent down pipes to spot water

and simultaneously pump it out. This groundbreaking technology has recently proved its worth on several major water ingress incidents, helping us to restore customers' gas supplies more quickly.

Service Water Extraction

Focus area: Asset and Network Management

Actual Spend: £74,000

Project Summary:

On occasion water ingress can progress from a main to a service and up to and into the property. This interrupts gas supplies and can lead to customer complaints. Conventionally this problem required the deployment of a 2-man engineering team. NGN developed a suction pump in collaboration with Synthotech which enables a Rapid Response Engineer (RRE), the first to attend site in response to an emergency, to fix the problem quickly and without further support. This new service water extraction technique thereby avoids the requirement for an engineering team and gets customers back on gas quicker.

Benefits:

The main benefits of the service water extraction pump are:

- Time and cost savings by avoiding the requirement for an engineering team to attend site (approximately 3 hours);
- Saving time for an RRE who would have to return to site for one hour, offset by remaining longer on site to remove water (0.5 hours), therefore the saving in time amounts to 0.5 hour; and
- An environmental saving as an engineering team will not have to attend.

This results in cost savings of c£134 per job.

Biomethane Connection Guidelines

Focus area: Future Role of Gas

Actual Spend: £37,484

Project Summary:

This involves the development of guidelines to connect a biomethane plant to the distribution network. These guidelines were developed in collaboration with Northhumbrian Water during the build phase of their anaerobic digestion plant at Howden.

The guidelines have now been published and are being used across the industry.

Benefits:

The introduction of guidelines enables a streamlined connection process which ultimately leads to more biomethane connections which on a national level results in environmental benefits.

Predictive Analytics Part 2

Focus area: Asset and Network Management, Customer Service

Actual Spend: £438,731

Project Summary:

The objective of this innovation project was to explore the possibilities of using advanced data analytics to give additional and beneficial insight and understanding across our activities in the areas of vehicle replacement, job scheduling, pipe replacement and complaints and accolades. In addition as an innovation project one of the primary goals was the gaining of learning and transfer of knowledge into the industry.

Benefits:

In contrast to the projects featured above, this project was a research project which is why only possible next steps and no tangible benefits could be identified as a project outcome. These are detailed below.

Vehicle Replacement:
The purpose of this project was to determine an optimum replacement strategy at the most granular level possible for NGN's fleet of commercial vehicles. This was based on replacement cost, operating cost and reliability. The project demonstrated that reliable forecasting models for expenditure could be developed, however a lack of key input data currently prevents us from refining and implementing these models.

Customer Complaints / Accolades:
The purpose of this project was to identify the relationships between our activities and customer experiences. There were some difficulties in collecting the right data in the right form, but the models developed are able to provide a robust and actionable correlation between enquiries received and those which will escalate to complaints.

Job Scheduling:
The purpose of this project was to forecast emergency calls received and determine the level of resources required to respond to these within the desired times. Daily models were developed and tested which demonstrated robust forecasts for workloads at a useable geographic level two weeks in advance. This could potentially allow for the reduction in standing time (up to 37%) with no impact on the achievement of Standards of Service. Further work is required to understand if these would add value and, if so, what further development would be required to incorporate these into operation.

Pipe Replacement:
The purpose of this project was to see if mains replacement projects could be improved using forecast pipe performance to optimise opex / repex expenditure. The models developed delivered an improved understanding of future pipe performance and demonstrated that a better balance of opex / repex expenditure could be delivered with a doubling of net cost reduction compared with the existing pipe Condition Score.

4.3 Network Innovation Competition (NIC)

Our aim is to submit at least one NIC project for assessment in every year of RIIO. In order to achieve this we have developed a structured multi stage approach to developing NIC projects. We have established several target areas to generate and assess project ideas, and then use the NIA in order to further develop appropriate projects. We are also working in collaboration with Wales and West Utilities and the Energy Innovation Centre to maximise ideas generation and increase the chances of a successful outcome.

4.3.1 Low carbon gas preheating project overview

The transition to a low carbon energy sector in the UK presents GDNs with a number of challenges, including reducing the business carbon footprint (BCF) of operating gas networks. The requirement for GDNs to preheat gas at pressure reduction stations (PRS) to avoid freezing the outlet pipework and ensure continuity of supply is a significant contributor to our BCF. GDNs' preheating requirement is currently delivered using ageing water bath heaters (WBH) or more modern boiler package technologies.

There are several key issues GDNs currently face when appraising investment options for preheating technology. Firstly, the whole life costs and in particular the carbon impact of currently available technologies is not understood. Secondly, there has been limited research or development in this area resulting in no financially viable alternative to existing technologies.

The low carbon gas preheating (LCGP) project seeks to address these issues directly. The project installs two 'alternative' preheating technologies across six NGN sites of differing scale - three Thermo Catalytic Systems (HotCat) and three Low Pressure Steam Systems (LP Steam). Smart metering technology will be installed on each of the six sites to provide data required to calculate and publish the system efficiency of each site and each technology. Additionally, smart metering technology will be installed separately on six sites that employ existing technologies. System efficiencies will be calculated and published for direct comparison.

The installation phase of the project is now complete with all equipment and instrumentation is now designed, delivered, positioned and piped up / wired up on site. The project data collection aspect is in delay due issues with obtaining approval to commission the medium and large alternative technologies. It is anticipated that commissioning will be completed prior to the winter period of 2016/17 thus allowing the team to collect all data required in line with the original project objectives.

Overall the project is on schedule for completion in December 2017 in line with the original project completion date. The current financial forecast shows the project will be delivered slightly under budget.

http://corporate.northerngasnetworks.co.uk/innovation/

4.3.2 City Compressed Natural Gas (CNG) Station

There are currently several small CNG fuelling stations around the UK which serve specific limited customer bases. These existing stations are predominantly for the use of long distance HGV type vehicles and small bus fleets. Currently there are no fuelling stations in the UK of the size which would facilitate the large scale conversion of city based fleets to CNG. These vehicles could include any depot based vehicles, for example garbage trucks, buses, local taxis, and fleet vans such as those operated by NGN.

The most significant obstacle to accelerating the step change towards CNG vehicles is the lack of a proven economic business case to build such a fuelling station. The City CNG Project will provide this business case as a UK proof of concept, which should accelerate private sector investment and growth in the CNG market. The upfront cost of the high pressure connection will be funded via the NIC and paid back as the station becomes economically viable, with the level of repayment linked to throughput. This means that the overall cost of the fuelling station should be zero to UK gas customers. In addition to this there will be a large amount of learning centred on the commercial and regulatory barriers associated with connecting to a Gas Distribution Network.

The City CNG Project is a key part of Leeds City Council's (LCC) commitment to reducing carbon and improving air quality in the Leeds area. NGN and LCC have recently achieved the first key milestone of the project by agreeing A Novel Commercial Arrangement, which underpins the entire project. It is anticipated that the design phase will commence in Q4 2016, when the location of the CNG Station has been confirmed.

4.4 Innovation Roll-out Mechanism

We currently have no projects which would qualify for funding under the Innovation Roll-out Mechanism.


SPITZLIFT
NGN

Cost efficiency

5

5 Cost Efficiency

This section considers:

- Our overall performance against the Totex allowance and incentive mechanism;
- Detailed analysis of our performance against our Operating, Capital and Replacement costs allowances;
- The uncertainties mechanism within the RIIO-GD1 price control; and
- The impact of real price effects and operational changes on our performance, and our approach to benchmarking.

When analysing our costs we consider both the performance in 2014/15 and cumulatively since RIIO-GD1 began. We also provide forecasts for the remainder of the price control period, and explain variances from the previous year's forecasts.

5.1 Totex performance

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.

5.1.1 Totex compared to the allowance

Totex 15/16 prices (£m)	Allowance	2015/16	Variance
Controllable Opex	101.4	80.2	(21.1)
Capex	60.9	61.0	0.1
Repex	99.3	86.0	(13.2)
Totex	**261.5**	**227.3**	**(34.2)**

Figure 5.1: 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 £34.2m this year, compared to an outperformance last year of £28.4m. The main drivers for this variance in outperformance are:

- An increase in capital investment in the network as our workload plans accelerate to deliver several major projects;
- A reduction in Repex mains laid; and

- Increased efficiency in Opex, most notably in IT and Repair.

The £34.3m outperformance is shared with our customers under the Totex incentive mechanism detailed above. Full explanations of our performance are contained in the following section.

5.1.2 Totex forecasts

Totex forecasts 2015/16 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17	17/18	18/19	19/20	20/21	TOTAL
Controllable Opex	83.1	85.1	80.2	84.7	81.0	81.1	79.6	78.8	**653.6**
Capex	41.5	49.1	61.0	49.5	43.0	43.3	43.9	42.6	**373.8**
Repex	91.0	95.5	86.0	87.7	87.1	96.5	88.0	87.1	**718.9**
Totex	**215.6**	**229.7**	**227.3**	**221.8**	**211.2**	**220.8**	**211.4**	**208.5**	**1,746.3**

Figure 5.2: Totex forecasts

The table above summarises our forecast for Totex over the RIIO-GD1 period. Overall we expect our annual Totex costs to drop to just over £210m by the end of RIIO-GD1, a c8% drop from current levels. The main drivers for this are:

- Opex reducing by c£4.0m. The forecasts include an assumption that the exceedingly mild winters we have experienced will not continue, impacting our emergency and repair costs, but this will be offset by the end of RIIO with c5% of efficiencies;
- Capex reducing from just over £50m p.a. average in the early years of RIIO-GD1 to nearer £42m by 2020/21. We expect to increase the efficiency of delivery across all areas of Capex, and are looking to front load investment to maximise the benefits for our customers and ourselves; and
- Repex reducing from over £90m p.a. average in the early years of RIIO-GD1 to nearer £87m by 2020/21. The variances in the forecast above are workload driven. We are targeting to deliver further efficiencies over the rest of RIIO-GD1.

5.2 Opex Performance

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 then business support activities, such as finance, human resources, and IT.

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

5.2.1 Controllable Opex compared to the allowance

Controllable Opex 15/16 prices (£m)	Allowance	2015/16	Variance
Direct Opex			
Work Management	21.5	17.5	(3.9)
Emergency	15.8	10.3	(5.5)
Repair	16.9	13.5	(3.4)
Maintenance	8.8	9.8	1.0
Other direct activities	13.3	6.6	(6.6)
Direct Opex total	**76.2**	**57.8**	**(18.4)**
Indirect Opex			
Business Support costs	20.5	20.6	0.1
Training and Apprentices	4.4	1.8	(2.6)
Indirect Opex total	**24.9**	**22.4**	**(2.5)**
Total controllable Opex	**101.4**	**80.2**	**(21.1)**

Figure 5.3: Controllable Opex compared to the allowance

Overall our 2015/16 controllable Opex costs were £80.2m, outperforming the allowance of £101.4m by £21.1m. This is detailed by activity in the table above.

This outperformance 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.

5.2.2 Year on Year Controllable Opex performance

Controllable Opex 15/16 prices (£m)	2014/15	2015/16	Variance
Direct Opex			
Work Management	16.0	17.5	1.5
Emergency	10.3	10.3	0.0
Repair	15.1	13.5	(1.6)
Maintenance	9.5	9.8	0.3
Other direct activities	6.7	6.6	(0.1)
Direct Opex total	**57.7**	**57.8**	**0.1**
Indirect Opex			
Business Support costs	25.0	20.6	(4.4)
Training and Apprentices	2.4	1.8	(0.6)
Indirect Opex total	**27.4**	**22.4**	**(5.0)**
Total controllable Opex	**85.1**	**80.2**	**(4.9)**

Figure 5.4: Controllable Opex year on year variance

Overall we have seen a real cost decrease of £4.9m in controllable Opex from 2014/15 to 2015/16. Direct Opex increased by £0.1m, whereas Indirect Opex decreased by £5.0m. The sections below provide a detailed analysis of this performance by activity type.

5.2.3 Year on Year Direct Opex performance

Direct Opex 15/16 prices (£m)	2014/15	2015/16	Variance
Work Management			
Asset management	4.2	5.2	1.0
Operations management	8.1	9.1	0.9
Customer management	2.2	1.5	(0.8)
System control	1.5	1.8	0.3
Emergency	10.3	10.3	0.0
Repair	15.1	13.5	(1.6)
Maintenance	9.5	9.8	0.3
Other direct activities	6.7	6.6	(0.1)
Total Direct Opex	**57.7**	**57.8**	**0.1**

Figure 5.5: Direct Opex year on year variance

Work management overall has seen a £1.5m year on year increase in costs across the four activities included here. This overall increase is driven by:

- An increase in asset management of £1.0m. We have demolished three gas holders this year compared to two in 2014/15, which has increased costs by £0.2m. The balance is then driven by variances in net staff costs (£0.4m) and professional and consultancy costs (£0.4m). £0.1m of the staff costs relates to resources that are currently on secondment to the Department for Energy and Climate Change (DECC) to support analysis of the future energy mix. The remainder of the £0.7m increase is driven by short and long term resources to support and further develop our Asset Health and Total Network Management (TNM) approach to strategic asset management. This will enable us to make more informed investment decisions in the future;
- An increase in operations management of £0.9m. £0.5m of this relates to increased resource in our Environmental and Health and Safety team and Dispatch functions. We have increased resource in the former to focus on improving our performance and control in both of these very important areas. We have increased focus in our Dispatch function on our operating activities in order to improve response times and better manage the field activities. The balance of £0.4m is driven by reducing non formula activity related to metering work, which leads to increased management costs remaining in formula costs; and
- A decrease in customer management of £0.7m. £0.5m of this relates to a reduced charge for the National Grid contract for call handling services, and the cancellation of a contract we no longer required for the management of customer queries related to various activities including metering. The balance is driven by refocusing some of our customer employees on Repex activities to improve standards there.
- An increase in System Control costs of £0.3m. We have reviewed our resourcing and work patterns in System Control in order to better manage the function which has led to an increase in resource. Part of the increase is temporary to cover succession planning and training.

Emergency and repair costs have shown a combined decrease of £1.6m, whilst achieving a very strong performance in our emergency and repair outputs. We have achieved:

- A greater than 99.9% performance for attending both controlled and uncontrolled gas escapes within 1 and 2 hours respectively, against a target of 97%;
- An annual repair risk score of 18.6 million against a target of less than 34.5 million; and
- 64.4% of repairs completed within 12 hours, against a target of 60.5%.

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. This year we have also experienced a mild winter overall, which impacted workload and hence performance, overtime payments and contractor costs. This was offset however by periods of severe flooding which resulted in 3 major incidents. In terms of overall workload, the number of public reported escapes (PRE) remained broadly flat at 83,453 compared to 83,446 in 2014/15. We have seen a decrease in repairs from 22,377 in 2014/15 down to 19,933 this year which has impacted costs.

We have continued to feel the benefit of the changes we have made over the past two years in emergency and repair, in particular the introduction of new terms and conditions covering ‘site start’ and ‘site finish’ working patterns, as well as new bonus arrangements, which are now specifically linked to outputs. In addition this year we have seen the following impacts:

- Our emergency costs remained flat at £10.3m this year, in line with the broadly similar PRE workload. We have seen reduced fuel and PPE costs in the year, offset by increased resource as six apprentices have graduated to fully trained emergency personnel; and
- Our repair costs saw a £1.5m reduction from 2014/15. This is partly driven by the reduced repair workload, as well as the benefits we have seen from the ‘core and vac’ equipment we now use following a successful trial which enables us to complete repairs with minimal reinstatement costs. In addition we have seen a c£0.5m saving in fuel, PPE and materials costs, driven by workload and reduced prices.

Maintenance costs have increased by £0.3m, driven by an increase in the number and length of On Line Inspection (OLI) runs completed in the year. Overall maintenance work varies year on year due to the different maintenance schedules each type of asset is subject to, and OLI runs are the main variable this year.

Other direct activities have decreased by £0.1m. Within this activity we saw a £0.3m decrease in costs for Interruptible contracts. Our contract with Iggesund ended part way through last year, with the balance of the impact felt this year. We have seen a £0.3m decrease in materials costs as part of a bottom up review of our materials purchasing and control processes, as well as an overall £0.2m credit for income collected in relation to major incidents. These net cost reductions were partially offset by £0.7m of expenditure on three one off engineering projects. We have experienced major engineering difficulties as a result of a landslip impacting one of our pipes at Aislaby (£0.4m). We also decommissioned some high pressure bullets at Clay Flatts (£0.2m), and decommissioned a pressure reduction station at Urlay Nook (£0.1m) which was no longer required following the closure of a chemical plant.

5.2.4 Year on Year Indirect Opex performance

Indirect Opex 15/16 prices (£m)	2014/15	2015/16	Variance
Business Support			
IT and telecoms	11.1	7.7	(3.4)
Property management	1.8	1.8	0.0
Human resources	0.8	0.7	(0.1)
Audit, finance and regulation	3.7	3.4	(0.2)
Insurance	3.3	2.3	(1.0)
Procurement	0.2	0.3	0.1
CEO and group management	4.1	4.4	0.3
Training and apprentices	2.4	1.8	(0.6)
Indirect Opex total	**27.4**	**22.4**	**(5.0)**

Figure 5.6: Indirect Opex year on year variance

Indirect Opex overall has seen a £5.0m year on year decrease in costs across business support and training and apprentices. This overall decrease is driven by:

- A £3.4m decrease in IT and telecoms expenditure. We outlined in detail last year the significant changes we were making to our IT and telecoms strategy and delivery model, and we are now realising the benefits through reduced operating costs and improved services. In particular we have now completed the award of new service contracts and carried out a full review of our licence requirements;
- A £1.0m decrease in Insurance expenditure. There has been an unforeseen decrease of £0.8m in third party historic claims, mainly for ill health claims. The value of these claims can vary significantly year on year and is unpredictable by its nature.
- A £0.3m increase in CEO and group management costs, primarily as a result of increased expenditure on business communications, corporate social responsibility and stakeholder management - all of which have been made a priority focus for NGN as a key employer and influencer in the North of England. We have expanded our internal resources in this area to maximise our opportunity to make a positive contribution
- A £0.6m decrease in Training and Apprentices costs, which have shown a temporary decrease as we fully review our apprentice requirements for the remainder of RIIO-GD1.

5.2.5 Year on Year Non Controllable Opex performance

Non Controllable Opex 15/16 prices (£m)	2014/15	2015/16	Variance
Shrinkage	6.4	5.0	(1.3)
Ofgem Licence	1.6	1.6	0.0
Network Rates	36.6	37.0	0.4
Established pension deficit recovery plan payment	8.1	8.6	0.5
PPF levy costs	0.1	0.1	0.0
Pension scheme administration costs	0.0	0.5	0.4
NTS Pension Recharge	5.0	7.0	2.0
Bad debt	0.0	0.0	0.0
NTS exit costs	8.8	7.5	(1.2)
Network Innovation (ex IRM)	2.4	2.9	0.6
Non Controllable Opex total	**68.8**	**70.2**	**1.3**

Figure 5.7: Non Controllable Opex year on year variance

Overall non-controllable Opex costs have increased by £1.3m in real terms. The key variances are:

- A decrease in gas shrinkage costs due to reduced gas prices and our improvement in leakage performance;
- An increase in our pension deficit recovery payment. Ofgem increased the allowance to cover pension deficit payments following their triennial pensions review. We have increased our payments accordingly. This has also impacted the NTS pensions recharge;
- An apparent increase in our pension scheme administration costs. We have changed scheme administrator, under our previous administrator we paid a bundled overall contribution and it was not possible to break out the administration costs, so this is not a like for like increase in costs;
- A decrease in NTS exit costs, driven by a reduction in bookings following further detailed analysis and assessments of our requirements at each offtake; and
- An increase in Network Innovation costs, due to increased delivery of projects in this area. Please see section 4 for further details.

5.2.6 Opex cumulative position under RIIO

Opex forecasts 15/16 prices (£m)	13/14	14/15	15/16	Cumulative Total	Cumulative Allowance	Variance
Work management	13.8	16.0	17.5	47.3	64.4	(17.1)
Emergency	10.1	10.3	10.3	30.7	47.5	(16.8)
Repair	16.9	15.1	13.5	45.5	51.7	(6.2)
Maintenance	8.6	9.5	9.8	27.9	26.7	1.2
Other direct activities	7.0	6.7	6.6	20.4	37.6	(17.2)
Total direct opex	**56.4**	**57.7**	**57.8**	**171.8**	**228.0**	**(56.1)**
Business support	24.3	25.0	20.6	69.9	61.2	8.7
Training/apprentices	2.5	2.4	1.8	6.7	12.0	(5.3)
Total indirect opex	**26.8**	**27.2**	**22.4**	**76.4**	**73.2**	**3.4**
Total controllable opex	**83.1**	**85.1**	**80.2**	**248.5**	**302.0**	**(52.7)**

Figure 5.8: Opex cumulative position

Cumulatively we have outperformed the controllable Opex allowance of £302.0 by £52.7m (17%). 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.

Direct Opex shows a £55.9m outperformance, which is offset by a £3.2m underperformance in Indirect Opex.

5.2.7 Opex forecasts

Opex forecasts 15/16 prices (£m)	15/16 forecast	15/16 actuals	Variance
Work management	16.1	17.5	1.5
Emergency	11.1	10.3	(0.8)
Repair	16.5	13.5	(3.0)
Maintenance	9.0	9.8	0.8
Other direct activities	6.9	6.6	(0.2)
Total direct opex	**59.6**	**57.8**	**(1.8)**
Business support	23.9	20.6	(3.3)
Training/apprentices	2.4	1.8	(0.6)
Total indirect opex	**26.3**	**22.4**	**(3.9)**
Total controllable opex	**85.9**	**80.2**	**(5.7)**

Figure 5.9: Opex forecast comparison

In our 2014/15 submission we forecast that our 2015/16 controllable Opex would be £85.9m. Our outturn costs have been £5.7m lower at £80.2m. The table above provides details of the variances by activity. The main drivers for this variance are:

- A £1.5m increase in work management costs. The main driver for this is a conscious decision to improve the level and quality of our resource across our asset management, environmental, and health and safety teams. There is some duplication of resource here in the short term as knowledge and skills are passed on. Overall this strategy will enable us to develop new thinking and further develop our plans and performance in these very important areas.
- A combined decrease in Emergency and Repair costs of £3.8m. In our forecasts we assumed winter conditions would be more severe and typical of the longer term than the very mild conditions seen in the last two years, however this has not been the case. We have also benefited from very low fuel costs, and in repair the introduction and more widespread usage of core and vac technology;
- Variances in maintenance work, specifically for OLI runs. We have also outsourced much of our maintenance activity and the expected benefits have not been fully realised yet; and
- A £3.3m decrease in Business Support. We have realised more savings in IT and Telecoms earlier than expected, and there has been an unforeseen decrease of £0.8m in third party historic claims, mainly for ill health.

RIIO-GD1 forecast

Opex forecasts 2015/16 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17	17/18	18/19	19/20	20/21	TOTAL
Work management	13.8	16.0	17.5	18.5	17.0	18.0	17.5	17.5	**136.0**
Emergency	10.1	10.3	10.3	11.0	10.8	10.6	10.4	10.2	**83.8**
Repair	16.9	15.1	13.5	15.7	15.5	15.3	15.2	15.1	**122.2**
Maintenance	8.6	9.5	9.8	9.2	9.1	9.0	8.9	8.8	**72.9**
SIUs	-	-	-	-	-	-	-	-	**-**
Other direct activities	7.0	6.9	6.6	6.5	5.1	4.8	4.6	4.4	46.0
Of which Xoserve	3.9	4.3	4.3	4.3	2.9	2.6	2.4	2.2	26.9
Total direct opex	**56.4**	**57.9**	**57.8**	**60.9**	**57.5**	**57.8**	**56.6**	**56.0**	**460.9**
Business support	24.3	24.9	20.6	21.3	21.1	20.8	20.6	20.3	**173.9**
Training/apprentices	2.5	2.4	1.8	2.4	2.4	2.4	2.4	2.4	**18.8**
Total indirect opex	**26.8**	**27.3**	**22.4**	**23.8**	**23.5**	**23.3**	**23.0**	**22.8**	**192.7**
Total controllable opex	**83.1**	**85.1**	**80.2**	**84.7**	**81.0**	**81.1**	**79.6**	**78.8**	**653.6**
Licence/network/other	47.4	48.7	50.7	50.9	60.2	57.7	57.8	57.9	431.3
NTS exit costs	6.9	8.8	7.5	7.4	7.3	5.9	6.7	5.4	55.8
Shrinkage	8.9	6.4	5.0	4.4	4.5	4.5	4.4	4.3	42.5
NTS pensions contribution	4.9	5.0	7.0	7.0	7.0	7.0	7.0	7.0	51.7
Total non-controllable	**68.1**	**68.8**	**70.2**	**69.7**	**78.9**	**75.0**	**75.9**	**74.6**	**581.3**

Figure 5.10: Opex forecasts

We have consistently been a frontier performer for operating expenditure and expect to maintain this position throughout RIIO-GD1. The table above summarises our forecasts for both controllable and non-controllable opex.

Work management includes our profile for holder demolition, from three holders this year up to five in 2016/17. 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 two years. We would expect to outturn lower than this when the winter weather is mild. We expect to deliver further net efficiency savings of £1.5m by 2020/21.

Within business support we are forecasting a further c£1.0m of efficiency savings across the various activities, including further savings in our IT and Telecoms functions after our success here in 2015/16. In addition xoserve costs are forecast to fall by the end of RIIO.

Training and apprentices expenditure follows our expected recruitment plans and demonstrates our commitment to reinvigorating our workforce and investing for the future. 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 an expected c30% increase in Business Rates in 2017/18 following their reassessment by the Valuation Office;
- NTS exit costs vary primarily due to price fluctuations offset by our reduced bookings;
- Shrinkage costs reduce based on our reducing forecasts for gas shrinkage volumes, and forecast gas prices; and
- NTS pension contributions are based on the latest forecasts from the NTS.

5.3 Capex Performance

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 2015/16 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 now 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.

5.3.1 Capex compared to the allowance

Capital expenditure 15/16 prices (£m)	Allowance	2015/16	Variance
LTS, storage and entry	21.7	19.9	(1.8)
Connections	7.1	9.9	2.8
Mains Reinforcement	5.0	3.2	(1.7)
Governors (Replacement)	1.6	1.8	0.2
Other Capex	25.6	26.2	0.6
Including : IS and telecoms	4.0	6.0	2.1
Including : Vehicles	7.3	2.7	(4.6)
Capex total	**60.9**	**61.0**	**0.1**

Figure 5.11: Capex variance to the allowance

The table above summarises our actual capital expenditure in 2015/16 against the allowances by activity type. Overall we have achieved a £0.1m underperformance against the allowance of £60.9m.

5.3.2 LTS, storage and entry

LTS, storage and entry 15/16 prices (£m)	Allowance	2015/16	Variance
LTS pipelines		4.6	
LTS diversions		0.6	
NTS offtakes		9.6	
Gas entry points		0.0	
PRSs		5.1	
Storage		0.0	
Total	**21.7**	**19.9**	**(1.8)**

Figure 5.12: LTS, storage and entry variance to the allowance

The table above summarises our actual capital expenditure for LTS, storage and entry against the 2015/16 allowance. Overall we have invested £19.9m in these areas against an allowance of £21.7m, an under spend of £1.8m. We have accelerated the delivery of workload over the past two years when compared to the first year of RIIO-GD1 when a significant proportion of planning and detailed design work for projects took place.

Our expenditure on **LTS pipelines** has primarily been in two major areas:

- £2.3m on upgrading overcrossings, which deteriorate over time due to weather erosion and can be damaged in the event of flooding. This year we have seen three overcrossings damaged due to adverse weather conditions. Overcrossings are prioritised on a risk basis. This investment upgrades the overcrossing support mechanics, coating and wrapping, flooding protection, as well as security to prevent access by the public. We have also carried out a detailed overcrossings survey in order to develop long term plans. This helps to avoid any potential delays due to access restrictions from third parties such as Network Rail; and
- £1.3m on upgrading the protections and supports for our high pressure pipeline at Brancepath, which was identified as at risk and has required major work.

NTS Offtakes and **Pressure Reduction Stations** are both critical 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. In 2015/16 NGN invested in the following sites, either in terms of design or procurement and build:

- Offtakes
  - c£1.9m Towton
  - c£1.8m Asselby
  - c£2.3m Ganstead
  - c£2.8m Little Burdon
- PRS
  - c£1.3m Knottingley
  - c£2.1m Warden Law

The upgrades covered items such as preheating, regulators, slamshut systems, metering upgrades, flow computers, electrical and instrumentation, generators and civils.

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. This is a specific output detailed in section 3.3.2. We are on track to have no sites above 100% capacity by 2021.

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.

Investment proposals can range from targeting specific pieces of gas delivery equipment e.g. Knottingley, where we upgraded the mechanical apparatus on site, through to a full site rebuild including all equipment and civils work.

5.3.3 Connections

Connections	2014/15	2015/16	Variance
Workload			
Mains (km)	27.9	29.7	1.8
Services (number)	6,866	7,479	613
Governors (number)	1	3	2
Risers (number)	32	21	(11)
Costs (15/16 prices £m)			
Mains	2.4	2.9	0.5
Services	9.8	11.5	1.7
Governors	0.0	0.0	0.0
Risers	0.0	0.0	0.0
Gross Cost	**12.3**	**14.5**	**2.3**
Contribution	5.4	4.7	(0.7)
Net Cost	**6.9**	**9.9**	**3.0**
Net Allowance	**6.3**	**7.1**	**0.7**

Figure 5.13: Connections workload and costs variance

The table above summarises our connections performance against the 2015/16 allowance, and against our 2014/15 outturn. Overall this year we have spent a net £9.9m, £2.8m over the allowance of £7.1m. This allowance now includes an extra £0.6m from 2015/16 as a result of the extra fuel poor workload we have been funded for following Ofgem's review of the Non Gas Fuel Poor Network Extension Scheme.

Our net costs have increased by £3.1m compared to 2014/15, which is mainly due to:

- A £1.9m increase in fuel poor costs as we have completed an extra 751 connections this year, a 44% year on year increase. The majority of fuel poor connections are fully funded by the allowance, so this £2.0m increase directly impacts the net position as well;
- A £0.4m increase in the remainder of our gross connections costs. We have connected 333 fewer domestic services year on year, but this has been offset by connecting 195 more non domestic services, which are typically four times more expensive; and
- A £0.7m decrease in contribution year on year. 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.

5.3.4 Mains Reinforcement

Mains reinforcement	Allowance	2015/16	Variance
Workload			
Mains < 180mm (km)		6.4	
Mains > 180mm (km)		3.5	
Total	**17.9**	**9.9**	**(8.0)**
Governors (number)	8	4.0	(4.0)
Costs (14/15 prices £m)			
Mains < 180mm		1.6	
Mains > 180mm		1.7	
Governors		0.0	
Total	**5.0**	**3.2**	**(1.7)**

Figure 5.14: Mains reinforcement workload and costs variance

The table above summarises our actual mains reinforcement expenditure against the 2015/16 allowance. We invested £3.2m on mains reinforcement and associated governors, delivering 10km of reinforcement mains and 4 governors. This equates to a unit cost of c£320 per metre, which is broadly in line with the equivalent rates achieved in RIIO-GD1. It is important to remember that unit costs will vary dependent on the type, length, location and complexity of the projects undertaken.

This is a significant outperformance against the £5.0m allowance to deliver 17.9km of reinforcement main, mainly driven by workload being nearly 45% below that contained in the allowance.

Our new pressure management function has taken the lead in managing the drivers for potential reinforcement. The section was set up to address capacity constraints on the network without necessarily laying new pipe where there is a more cost effective solution. This has been a driver of increased average system pressures in RIIO-GD1 so far, with a corresponding reduction in environmental emissions incentive payments.

The other driver for reduced reinforcement workload is reduced demand on the gas network. 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. Peak demands have fallen below those levels forecast in the four year period since the 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.

5.3.5 Governor replacement

Governor replacement	Allowance	2015/16	Variance
Workload			
District Governors		35	
Service Governors		11	
Total	**30**	**46**	**16**
Costs (15/16 prices £m)			
District Governors		1.6	
Service Governors		0.2	
Total	**1.6**	**1.8**	**0.2**

Figure 5.15: Governor replacement workload and costs variance

We have invested £1.8m in our overall governor replacement programme in 2015/16, which is the second year in a two year programme to replace or refurbish ERS modules as well as both district and service governors. When designing the programme, we prioritised 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.

Last year we focused on the design of the projects and the bulk procurement of materials, meaning the majority of our actual delivery workload took place this year. This resulted in 46 governors being completed this year, with 54 being completed over the two year programme. Governor unit costs vary materially depending on the size and type of the governor and the exact nature of the work we need to complete.

5.3.6 Other Capex

Other Capex 15/16 prices (£m)	Allowance	2015/16	Variance
System Operations	-	3.0	-
Infrastructure and Systems	4.0	6.0	2.1
Xoserve	-	2.1	-
Plant, tools and equipment	-	7.6	-
Land, buildings, furniture and fittings	-	2.1	-
Vehicles	7.3	2.7	(4.6)
Security (Exc PSUP)	-	0.5	-
PSUP	-	0.0	-
Other	-	2.2	-
Capex total	**25.6**	**26.2**	**0.6**

Figure 5.16: Other Capex variance to the allowance

The table above summarises our actual Other Capex expenditure against the 2015/16 allowances. We have invested £26.2m in the areas detailed in the table, against an allowance of £25.6m.

The £3.0m expenditure spent on **System Operations** included the following:

- **£1.3m system control changes phase 2.** This project aims to improve the performance of both our control and data management systems used to capture information shared with the other gas industry participants. It also aligns the functionality of the system to changes in UNC, and enhances the network alarm management system.
- **£1.2m gas day changes.** This project is compliance driven, responding to changes in both the European BAL and CAM codes. These were agreed by DECC and drove changes to the Thermal Energy Regulations (1996) and UNC. Detailed analysis of the UNC identified a significant number of compliance impacts on our control and data management system.
- **£0.3m communications and outstations replacement.** This project is to replace our obsolete hilltop communications outstations, increasing efficiency in data capture and protecting security of supply.

The £6.0m expenditure on **Infrastructure and Systems** focused on the following projects this year:

- **Ventyx and GIS (£0.8m)**. This project included improvements to enhance the usability of the systems, simplify data capture and introduce greater data validation. These changes have resulted in an 88% reduction in system near misses captured. We also introduced a mobile application to allow asset data to be captured in the field electronically. These changes will also give improved mobile access to NGN's mapped asset details held in the GIS system.
- **Unified communications (£0.6m).** This project replaces the multiple wide area network contracts that we held with a single contract. This will also enable the greater use of unified communications capabilities, such as videoconferences, desktop sharing and significantly increased call management capability.
- **Service Enhancement (£2.4m).** Our IT servers are run across seven datacentres, under various support and operations contracts, with CGI, Enzen and Wipro as service providers. This project is to rationalise this estate and to utilise modern secure private cloud infrastructure. The operation of the current estate equates to £7m of our IT opex. This project will simplify the estate that is currently in place, utilise the latest infrastructure technology and reduce the overall operating cost of IT in NGN. It will also enable

greater flexibility and speed in the provision of environments and infrastructure once in place, enabling a faster pace of change for future systems initiatives.

- **UK Link (£0.7m).** This project upgrades our systems and processes in order to improve the interface between NGN and xoserve as part of xoserve's Project Nexus.

The majority (c£6.3m) of the **Plant, Tools and Equipment** expenditure was associated with modifying governors and installing network loggers to enable remote management of pressures on the network, a continuance of a project begun last year. Remote pressure management is a key strategic project which will give advance warning of customer supply interruption and greater control of average system pressures in order to reduce leakage volumes and hence operating costs. The balance is made up of many small projects to replace obsolete equipment across the network.

Expenditure on **Land, Buildings, Furniture and Fittings** consists of existing and new build related opportunities. Over the last two years we have developed 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. Projects completed during this period include upgrades and building works to our new Leeds depot and offices, Moorside offices in Sunderland, and a new Carlisle depot. We have also begun preparatory work on our head office in Leeds.

During this year we spent £2.7m on **Operational Vehicles.** We have an ongoing vehicle replacement programme to ensure we have a fit for purpose fleet, to improve operational efficiency and support new job roles. We use a risk model methodology to determine which vehicles are in greatest need of replacement based on actual data rather than any set mileage/age criteria. During 2015/16 we purchased 79 vehicles for both new and existing job roles.

Within the **Other** category over half of the expenditure relates to major upgrade works on overcrossings. This is an area of work we expect to increase in the future. The extreme weather events and flash floods experienced in the last two winters has washed away three bridges, including our pipes, and caused major customer disruption. We are now taking proactive measures to prevent this happening in future using a risk based approach. The rest of the expenditure is on various small value projects.

5.3.7 Capex cumulative position under RIIO

Cumulative Capex 15/16 prices (£m)	13/14	14/15	15/16	Cumulative Total	Cumulative Allowance	Variance
LTS, storage and entry	9.1	15.2	19.9	44.2	47.8	**(3.5)**
Connections	6.7	6.9	9.9	23.5	19.8	**3.7**
Mains Reinforcement	2.9	1.8	3.2	8.0	15.1	**(7.1)**
Governors replacement	2.1	1.4	1.8	5.3	4.9	**0.4**
Other Capex	20.6	23.9	26.2	70.6	83.5	**(12.9)**
Including : IT	5.5	4.9	6.0	16.4	15.1	**1.3**
Including : Vehicles	4.0	4.5	2.7	11.3	18.0	**(6.7)**
Total	**41.5**	**49.1**	**61.0**	**151.6**	**171.1**	**(19.5)**

Figure 5.17: Cumulative Capex position compared to the allowance

The table above summarises our cumulative Capex expenditure over the first three years in RIIO-GD1 against the allowances for that period. Overall we have underspent the cumulative allowance by £19.5m. The main drivers for this are:

- Reduced demand-driven mains reinforcement work (£7.1m), as economic conditions have not recovered as expected when the allowances were set;
- Extended lives for our vehicles and timing of replacement. We now use a risk based model to determine replacement rather than a fixed period (£6.7m); and
- Timing and efficiencies in delivering both above and below 7 bar capital investment projects, contained with LTS, storage and entry, and Other Capex.

In terms of efficiencies, we have introduced a more commercial focus to the end to end Capex process with specific targeted efficiencies by activity area. This now includes processes to ensure we are engineering for value, specifically through:

- Investment teams, peer review and challenges of design;
- Smarter planning to long term targets; and
- Revised and improved network analysis to identify the best long term options on a wider scale.

We are specifically targeting synergies and economies of scale across both activity area and geographic location e.g. visit a site once to upgrade all components with one contractor, as opposed to revisiting year on year. We are also using more detailed analysis of asset health, which allows us to better manage trade-offs and decisions between maintenance and replacement of assets.

5.3.8 Capex forecasts

2015/16 actuals against forecast

2015/16 Capex forecast 15/16 prices (£m)	15/16 forecast	15/16 actuals	Variance
LTS, storage and entry	16.3	19.9	3.6
Connections	8.3	9.9	1.5
Mains Reinforcement	1.9	3.2	1.3
Governors replacement	2.2	1.8	(0.4)
Other Capex	28.8	26.2	(2.6)
Including : IT	7.0	6.0	(1.0)
Including : Vehicles	3.9	2.7	(1.2)
Total	**57.5**	**61.0**	**3.5**

Figure 5.18: 2015/16 actual Capex position compared to the prior year forecast

The table above summarises our actual Capex in 2015/16 against the forecast for 2015/16 we submitted last year. Overall we spent £3.5m more in 2015/16 than the £57.5m we forecast last year, a 6% increase. The main drivers for this variance are:

- A £3.6m increase in expenditure on LTS, storage and entry projects. This increase compared to forecast is as a result of us successfully accelerating the construction phase of many projects over and above our original expectations. We underspent in the first year of RIIO in this area because we were largely delivering detailed designs and ordering long lead items to be used for projects which would begin construction over the next two years. This has now been fully recovered;
- A £1.5m increase in Connections expenditure. This is largely due to the extra fuel poor workload we have been funded for following Ofgem's review of the Non Gas Fuel Poor Network Extension Scheme. We have delivered an extra 751 connections this year which increased fuel poor expenditure by £1.9m;
- A £1.3m increase in Mains Reinforcement. Our new pressure management function further reviewed our approach to identifying and delivering reinforcement workload last year which led to an increase in workload over and above that forecast;
- A £1.0m decrease in IT expenditure. As highlighted last year we have fully revised our approach to identifying and delivering projects which has both delivered efficiencies in the process and revised our delivery plan going forward; and
- A £1.2m decrease in vehicle expenditure. Our vehicle expenditure plan is fully revised every year based on risk and business need, and this underspend reflects the latest update.

RIIO-GD1 forecast

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

LTS, storage and entry expenditure varies year on year given the major project driven nature of the work. This is a key area that will be impacted by our revised Capex management approach.

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 3.6.1, where workload peaks this year and then reduces from then on. 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.

Mains reinforcement forecast workload and costs are again impacted by expected economic growth. We are forecasting reduced workload in 2016/17 following the relatively high volumes completed this year, then an increase in future years, offset by marginal cost savings for the rest of the period.

We are currently reviewing our governor replacement plans, but are currently expecting to maintain governor replacement workload at similar levels for the remainder of RIIO-GD1.

Other Capex, similar to LTS, storage and entry, varies year on year given the project driven nature of this work. Again, this is a key area that should be impacted by our revised Capex management approach, in particular for plant and equipment expenditure. The other key elements that vary materially year on year are IT and vehicle expenditure.

RIIO Capex forecast 15/16 prices (£m)	13/14 Actual	14/15 Actual	15/16 Actual	16/17	17/18	18/19	19/20	20/21	Total
LTS, storage and entry	9.1	15.2	19.9	12.2	11.4	13.9	13.5	12.9	**108.2**
Connections	6.7	6.9	9.9	7.6	6.9	6.7	6.6	6.5	**57.7**
Mains Reinforcement	2.9	1.8	3.2	2.4	4.0	3.9	3.9	3.8	**25.9**
Governors replacement	2.1	1.4	1.8	1.7	1.8	1.8	1.8	1.8	**14.1**
Other Capex	20.6	23.9	26.2	25.5	19.0	17.0	18.2	17.7	**167.9**
Of which IT	5.5	4.9	6.0	7.1	6.3	6.2	6.2	6.2	**48.5**
Of which vehicles	4.0	4.5	2.7	2.4	1.5	0.2	2.2	2.2	**19.8**
Total	**41.5**	**49.1**	**61.0**	**49.5**	**43.0**	**43.3**	**43.9**	**42.6**	**373.8**
Allowance	53.0	57.2	60.9	56.7	43.4	43.9	43.8	44.5	**403.4**
Variance	**(11.5)**	**(8.1)**	**0.1**	**(7.2)**	**(0.4)**	**(0.7)**	**0.0**	**(2.0)**	**(29.7)**

Figure 5.19: Capex forecasts compared to the allowance

5.4 Repex Performance

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

The majority of work is split into different tiers of main based on diameter band, with any associated services collected against the appropriate tier. For further details on this please see section 2.2.1. The remainder of the work consists of diversions, risers and sub deducts.

5.4.1 Repex compared to the allowance

Replacement expenditure	Net Costs 15/16 prices (£m)	Workload
Tier 1 – Mains laid	49.1	464.7 km
Tier 1 – Associated services	13.8	34,302
Tier 2a – Mains laid	1.7	5.3 km
Tier 2a – Associated services	0.1	167
Other – Mains laid	10.1	27.9 km
Other – Associated services	0.3	583
Diversions – Mains laid	2.6	16.0 km
Diversions – Associated services	0.2	430
Other services	8.1	6,513
Risers	0.0	7
Sub deducts	0.1	34
Total	**86.0**	
Allowance	**99.3**	
Variance	**(13.2)**	

Figure 5.20: 2015/16 Repex costs and workload

The table above sets out our 2015/16 Repex costs and workload, along with the cost allowance.

Overall we spent £86.0m against an allowance of £99.3m (after adjusting for lower than allowed Tier 2A workload). This £13.2m saving will be shared with our customers under the Totex sharing mechanism.

5.4.2 Mains and Services year on year performance

Mains and Services (15/16 prices)	2014/15			2015/16		
	Net Costs £m	Workload	Unit Costs £	Net Costs £m	Workload	Unit Costs £
Tier 1 – Mains laid	52.6	527.1	99.8	49.1	464.7	105.7
Tier 1 – Services	17.3	37,709	460	13.8	34,302	402
Tier 2a – Mains laid	2.4	8.3	290.3	1.7	5.3	324.6
Tier 2a – Services	0.1	146	450	0.1	167	619
Other – Mains laid	10.3	52.6	196.8	10.1	27.9	360.1
Other – Services	0.8	1,790	422	0.3	583	497
Diversions – Mains laid	1.6	11.6	141.9	2.6	16.0	162.5
Diversions – Services	0.1	224	569	0.2	430	446
Other services	10.1	6,167	1,642	8.1	6,513	1,238
Total mains laid	**67.0**	**599.6**	**111.8**	**63.5**	**513.8**	**123.6**
Total services	**28.4**	**46,036**	**617.1**	**22.4**	**41,995**	**534.0**
All in mains cost	**95.4**		**159.1**	**85.9**		**167.2**

Figure 5.21: Repex year on year variance

In terms of year on year performance, the all in mains laid unit rate averaged £167 per metre in 2015/16 against the 2014/15 equivalent of £159 per metre, an overall increase of 5%.

The main drivers for the increased unit costs seen are the increased complexity and engineering difficulty of the projects undertaken. There are two reasons for this. Firstly, we have deliberately targeted projects with the greatest return in terms of risk reduction and the strongest cost benefit analysis, and this is one of the main drivers behind our excellent performance against the risk reduction output target. Secondly, as we complete more of the repex programme the potential work basket decreases which gives us less flexibility to design large cost efficient projects, and this flexibility is likely to reduce further over time. We intend to deliver year on year efficiency improvements to counteract this.

In terms of the breakdown in unit costs, when you consider mains and services together our Tier 1 costs have increased by c2%, mainly driven by a reduced average project length. The material increases have been seen in the other tiers which in general are more complex and vary more dependent on the actual workload. Within Other Mains we have also seen a movement to higher diameter band work which is more expensive. Last year 60% of Other Mains laid was >125mm in diameter, whereas this year it increased to 75%. In the >355mm bands we saw an even more pronounced shift, from 9% of the workload to 15% this year.

5.4.3 Risers 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 have replaced seven risers at a cost of c£10k. All these projects were relatively short in length and not technically challenging.

In 2014/15 we completed a 3 year program to survey the existing population of high rise buildings held on our SAP asset repository. This exercise has resulted in a smaller number of riser replacements being required than anticipated. In 2015/16 we have started an annual sampling survey program for buildings below 5 storeys and therefore we expect costs, workload and complexity to increase in future years.

5.4.4 Sub-deduct year on year performance

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.

In 2015/16 we have re-engineered eighteen sub-deduct networks and removed twelve secondary meter installations to remove the identified risk, at a cost of £0.1m. Another four sites have been identified as no longer being sub-deducts.

5.4.5 Repex cumulative position under RIIO

Cumulative Repex 15/16 prices (£m)	13/14	14/15	15/16	Cumulative Total	Cumulative Allowance	Variance
Repex	91.0	95.5	86.0	272.5	297.2	(24.7)
Total	**91.0**	**95.5**	**86.0**	**272.5**	**297.2**	**(24.7)**

Figure 5.22: Cumulative Repex position compared to the allowance

Cumulatively we have outperformed the Repex allowance of £297.2m by £24.7m (8.3%).

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 deliberately exceeded our interpretation of the Tier 1 mains abandonment target in order to deliver customer and efficiency benefits earlier. However in recent discussions with Ofgem it has become clear we have differing views as to precisely what workload counts against each of the output targets. Under Ofgem's interpretation of the targets we will have to complete c150km extra mains abandonment over the remainder of RIIO-GD1, which is likely to cost in the region of £15m. We would expect to complete the majority of this workload between 2018 and 2021 if deemed necessary. Please see section 3.2.1 for further details.

5.4.6 Repex forecasts

2015/16 actuals against forecast

2015/16 Repex forecast 15/16 prices (£m)	15/16 forecast	15/16 actuals	Variance
HSE driven mains and services	64.1	64.7	0.6
Non HSE driven mains and services	25.6	21.3	(4.3)
Risers	0.2	0.0	(0.2)
Total	**90.0**	**86.0**	**(3.9)**

Figure 5.23: 2015/16 actual Repex position compared to the prior year forecast

The table above summarises our actual Repex expenditure in 2015/16 against the forecast for 2015/16 we submitted last year. Overall we spent £86.3m, a £3.3m decrease from the forecast (4.3%). The main driver for this is workload mix, as we have completed proportionally less high diameter band work across Tier 2a and above than we forecast. Reduced Tier 2a workload is adjusted for in the allowance

RIIO-GD1 forecast

Repex forecasts 15/16 prices (£m)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	Total
HSE driven mains and services	66.4	72.4	64.7	66.5	65.8	72.8	66.4	65.8	540.9
Non-HSE driven mains and services	24.5	23.0	21.3	21.1	21.3	23.6	21.5	21.3	177.6
Risers	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Repex totals	**91.0**	**95.5**	**86.0**	**87.7**	**87.1**	**96.5**	**88.0**	**87.1**	**718.9**

Figure 5.24: Repex forecasts

The table above summarises our RIIO-GD1 Repex expenditure forecast, based on the first three years' actual performance and a forecast for the remaining five 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. Under Ofgem's interpretation of the output targets we will also have to increase workload from 2018 to 2021 in order to deliver all our safety output commitments. See section 3.2.1 for further details.

5.5 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.

5.5.1 Site security

The Department for Energy and Climate Change (DECC) has engaged with the energy sector over a number of years to develop a program to identify sites of critical national infrastructure. The Centre for the Protection of National Infrastructure (CPNI) then makes recommendations for security requirements at these sites. DECC worked initially with National Grid Transmission, who upgraded the physical security of a considerable number of sites. DECC is now developing programs with NGN and the other gas distribution networks.

Current Position

Pannal offtake site has been identified and confirmed as our only categorised CNI site that needs a security upgrade to meet the CPNI categorisation requirements. National Grid Transmission (NGT) also have a number of assets on four of our offtake sites that will require security upgrading. It has now been confirmed that the cost of these four upgrades will be funded by NGT.

Future expectations

DECC has not specified timescales for completing the work, other than that the work must be completed in RIIO-GD1. We are required to detail our proposals for DECC approval. The Pannal site also includes NGT assets that will be incorporated into the security upgrade works. The total site upgrade cost is estimated at £4.1m. We will fund £3.0m with the balance funded by NGT, based upon the percentage of land occupied by the respective companies assets. This level of cost alone would not trigger the individual re-opener threshold.

5.5.2 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 9th February 2015 covering all streets within their boundary, which has had a limited impact on our 2015/16 performance. 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. Again, there has been limited impact on our performance.

In terms of volumes:

- Last year we significantly improved our 'S74 charges received' performance, seeing a 35% year on year reduction. We have seen a further 14% reduction this year.
- There is a slight decrease in Fixed Penalty Notice charges paid within the year despite Bradford commencing issuing FPN's very heavily within the period.

- We have seen a 40% reduction in coring failures in 2015/16. There are currently two authorities (Cumbria and North Tyneside) that carry out coring. East Riding and South Tyneside commenced a trial in March 2016, though any impact will not be seen until the next reporting period.

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, the Department for Transport has been engaging with authorities so there may be potential for schemes to start in the near future.

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

5.5.3 Connections of new large loads

This covers the cost of connecting new large loads (e.g. power stations) that pass the 'economic test' and therefore costs are not fully recovered from the connecting party. Over the past year we have not connected any large loads so have not incurred any additional costs associated with this activity.

5.5.4 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.

5.5.5 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 has now been delayed until 2016. 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 until 2017. 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 c217k smart or advanced meters fitted in our network with approximately 90k fitted in the last year. We have updated our work management systems to track work carried out on these meters, and in the 2015/16 regulatory year we have seen just over c.650 PREs involving a property with a smart meter. Of these call outs, 50% were due to a leak on the meter installation.

Overall this ratio is in line with what we were expecting, and is currently not having any perceptible impact 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 at c70,000 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
Making best use of data	• Understanding the opportunities smart metering data presents for us and our customers
Supporting roll-out	• Participating in a number of key industry groups and engaging with government • Leading the regulatory changes around sharing of suppliers roll out plans • Establishing pilot programmes with suppliers to assess impact and potential solutions • Working with Smart Energy GB to promote roll-out and keep them informed of potential customer impacts

5.5.6 Xoserve (central agency) review

Xoserve is currently funded by NGN, the other GDNs and the NTS under the Funding, Governance and Ownership (FGO) arrangement. However there are proposals to change the FGO, and should this occur then Ofgem will trigger this re-opener under the uncertainty mechanism, with the likely outcome being a reduction in our allowances for Xoserve costs.

Current position

Throughout 2015/16 the Gas Transporters have been working collaboratively with shippers to deliver the future funding and governance arrangements for Xoserve. Utilising a combination of KPMG led programme workgroups and UNC Modification 0565 significant progress has been made in delivering these new arrangements. A phased approach was agreed and in April 2016 shippers were invited to attend and contribute to the Contract and Change management meetings between GDNs and Xoserve, and a Shipper Nomination Committee has been working to nominate up to four new members of the Xoserve Board of Directors.

In January 2016 Xoserve, on behalf of all GDNs, submitted a response to the Request For Information that will enable Ofgem to assess the future funding arrangements and model. This work is ongoing with a decision expected later this year which will amend the Price Control Financial Model in 2017/18 to reflect these new funding arrangements. Costs incurred to date have been accounted for as a combination of Xoserve project costs, and external consultancy costs for KPMG and UNC legal support incurred directly by networks.

Future expectations

As a result of the above it is expected that network costs associated with Xoserve will reduce from April 2017 with shippers then directly paying for services provided.

5.5.7 Non gas fuel poor network extension scheme

Ofgem have now concluded their review of the fuel poor network extension scheme and have made several revisions to the scheme which will take 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.

5.6 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.

5.6.1 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 2015/16 we have focused on consolidating much of the learning we have developed over the last two years from working with organisations such as Superdrug, Direct Line, EdgeHill University, Assa Abloy, as well as the other gas networks. One new area we are currently developing and looking to expand relates to asset management. We have a number of asset management interfaces with external companies including Northumbrian Water, KPMG/ McLaren, and the Gas Networks Collaboration Forum. We will look to exploit these further in order to ensure we have best in class asset management techniques to support our future investments.

5.6.2 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%	0.7%
2015/16	1.3%	1.1%	2.4%	2.7%	(0.3)%

Figure 5.25: Labour RPEs

During the years 2014/15 and 2015/16 our average wage settlement was 2.7%, which at the time of the settlement was in line with the forecast RPI. This was part of a two year pay deal providing certainty for both colleagues and NGN. This package of measures 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. 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.

We will negotiate a new remuneration review with appropriate colleague representatives in autumn 2016, in advance of our two review dates, 1 November 2016 and 1 February 2017, driven by the different terms and conditions we operate. At this time we are considering our strategy for a longer term deal.

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.

Overall in 2015/16 PE pipe and PE fittings prices have dropped, with a significant decrease in the first half of the year. However prices then increased in December, recovering most of the decrease. This overall reduction was driven by the drop in oil prices which had an impact on the indices. The mechanism detailing the constituents and the indices are set during a tender event. The last tender event was executed in 2013 for a 3 year contract with a provision for a 2 year extension. PE pipe is currently being retendered with new contracts expected to be in place for January 2017.

Financial Performance

6

6 Financial Performance

This section considers:

- The Regulatory Asset Value (RAV) for all years of RIIO-GD1; and
- The Return on Regulatory Equity (RoRE) and the individual elements that are driving outperformance

6.1 RAV

Regulatory Asset Value (RAV) represents the value of assets that we own at any given point in time. It is now updated annually as part of the annual iteration process to reflect actual Totex expenditure and the associated incentive impact.

Depreciation and return on RAV allowances are key elements of the revenue calculations and are dependent on the latest RAV position.

The revenue adjustments shown in Section 2 are calculated from RAV – after taking into account the latest Totex forecasts our RAV position is shown below. The November 2015 PCFM has been used as the basis to calculate RAV in future years and is therefore inclusive of any outperformance from totex efficiencies.

15/16 Prices	Actuals			Forecast					RIIO Avg.
	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	
Opening asset value	1,896	1,882	1,894	1,920	1,951	1,978	2,005	2,029	**1,896**
Add : Slow Money (Opex & Capex)	50	52	54	52	48	48	48	47	**398**
Add : Slow Money (Repex)	48	57	61	69	76	85	90	97	**584**
Opening GDPCR1 Adjustment	(17)	0	0	0	0	0	0	0	**(17)**
Total Additions	81	109	115	121	123	133	138	144	**965**
Less: Depreciation	(95)	(96)	(89)	(90)	(97)	(106)	(115)	(126)	(814)
Closing asset value	**1,882**	**1,894**	**1,920**	**1,951**	**1,978**	**2,005**	**2,029**	**2,047**	**2,047**

Figure 6.1: RAV forecast

6.2 RoRE

Ofgem use 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. Ofgem calculate RORE using the cost of equity (6.7%) as the starting point of their calculation as this amount is funded by Ofgem directly in revenue.

The cash value of any outperformance from the incentive mechanisms has been divided by the 35% notional equity portion of RAV to calculate the additional return on equity, which is shown in the table below.

Ofgem's view is that the best performing companies should be able to earn a double digit return (>10%). Our overall RORE for 2015/16 is 11.65%, 4.95% above the baseline cost of equity of 6.7%. Totex outperformance of £34m (15/16 prices) accounts for 3.31% of this. Our forecast for RIIO-GD1 as a whole is 11.03%.

RORE	13/14	14/15	15/16	RIIO Actuals to date		RIIO 8 year forecast
Base cost of equity	**6.70%**	**6.70%**	**6.70%**	**6.70%**		**6.70%**
Totex	3.49%	2.80%	3.31%	3.20%		3.02%
Customer Service	0.34%	0.32%	0.35%	0.34%		0.32%
Environmental Emissions	0.24%	0.33%	0.36%	0.31%		0.34%
Shrinkage	0.08%	0.07%	0.06%	0.07%		0.06%
Exit Capacity	0.00%	0.08%	0.39%	0.16%		0.15%
IQI Income	0.44%	0.46%	0.47%	0.46%		0.44%
RORE	**11.29%**	**10.76%**	**11.65%**	**11.23%**		**11.03%**

Figure 6.2: RORE breakdown

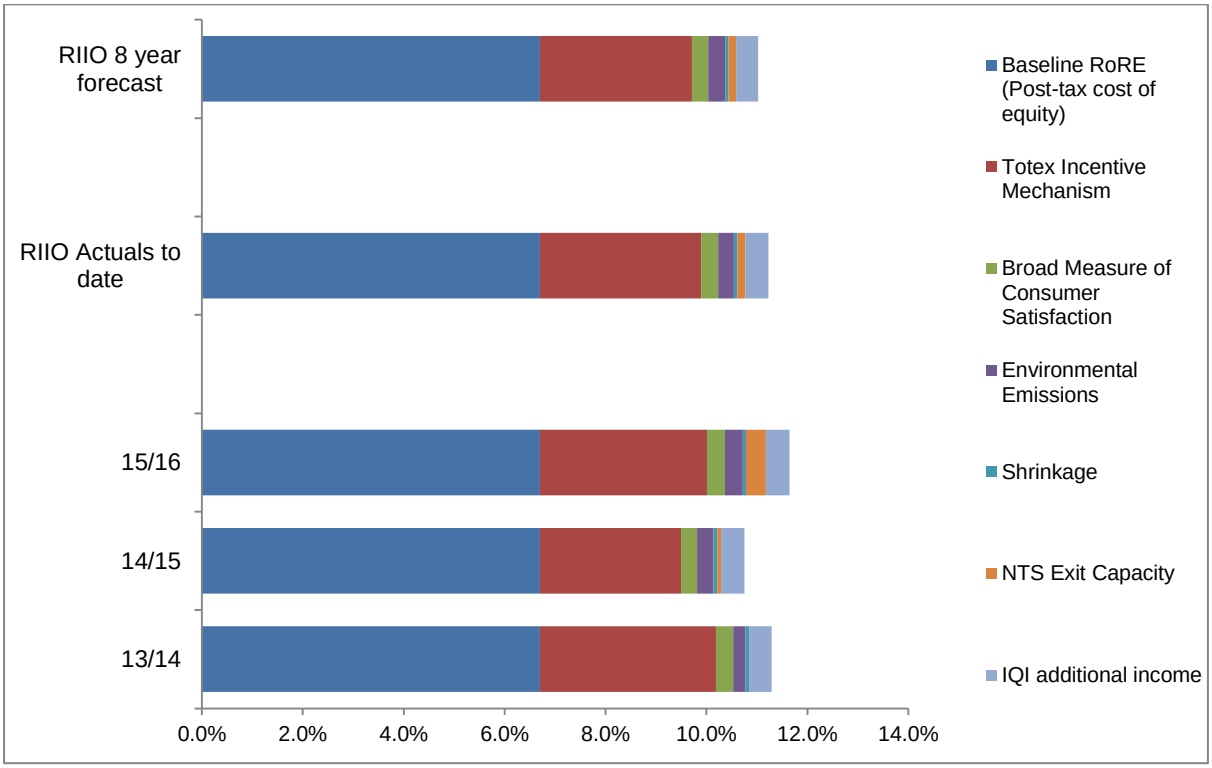


Figure 6.3: RORE graph

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