RIIO-GD1

Business Plan

Northern Gas Networks

A guide to this document

This document is the business plan of Northern Gas Networks (NGN) for the period from April 2013 to March 2021.

Its primary purpose is to demonstrate to NGN's customers and other stakeholders that the company has an effective and efficient business plan for the eight years of the price control. The plan sets out how NGN will continue to maintain the physical network in optimal condition, how we will invest wisely to ensure its continued safety, how we will meet our customers' expectations and continue to deliver value for money. The plan meets the requirements of our economic regulator, Ofgem, to provide a high level of detail to support our business case.

This price review period is the first for gas distribution which is based upon the principles of RIIO (Revenue = Incentives + Innovation + Outputs) and is known as RIIO-GD1. The RIIO model replaces the previous RPI-X regime and is designed to better meet the investment and innovation challenge by placing more emphasis on incentives to drive the innovation needed to deliver a sustainable energy network, at value for money, for existing and future customers.

The document is divided into the following sections.

Section 1 – Executive summary

This is a high-level overview of the entire document, summarising the contents of each section.

Section 2 – Northern Gas Networks

NGN was created in June 2005 with the sale of four of the eight gas distribution networks owned by National Grid. This section explains how NGN works to a corporate vision which is supported by a range of performance measures. It details how NGN has performed against these measures for the past six years, delivering natural gas in the most cost-efficient way to 2.6m users across Northern England.

Section 3 – Business and operating environment

NGN must operate within a legal and regulatory framework which dictates required performance levels. This brings with it a range of challenges: some are specific to the gas distribution industry; some are as a result of the economic situation; and some are geographic issues. This section details these challenges and NGN's approach to managing them.

Section 4 – Innovation strategy

Innovation allows a company to adapt the way in which it delivers its services, reacting to a changing environment to ensure it continues to deliver optimal performance. When NGN was created it chose to operate a unique asset management model, which it is now changing as the company reacts to the challenges of a new price control period and the move to a low carbon economy in the UK. This section explains how NGN has and will continue to use innovation.

Section 5 – Stakeholder engagement

The views of customers and other stakeholders are important to NGN. They provide a vital direction and focus to improve our service delivery. For this price control period we implemented an enhanced engagement programme to ensure all stakeholders were given an opportunity to engage with us and their feedback has delivered a reduction in our initial expenditure plans. This section explains how NGN has historically gathered stakeholders' views, what we did for the business plan and our plans for the future.

Section 6 – RIIO-GD1 output forecasts

NGN has detailed 56 output measures in six business activity areas in this business plan, covering the eight years of the RIIO-GD1 price control period. Section 6 contains detailed forecasts of how NGN expects to perform in these areas.

Section 7 – Expenditure forecast

NGN needs to make significant levels of investment in the gas distribution network during RIIO-GD1 to ensure we continue to deliver gas to homes and businesses across the Northern of England in a safe and efficient manner. Our expenditure plans, are explained in detail in this Section.

Section 8 – Revenue and financial forecasts

If NGN is to continue to operate a safe and secure gas distribution network it needs levels of revenue to match its expenditure plans. We must attract the investment which is essential to finance the business and balance the requirements of customers. This section explains how we will achieve this balance and the level of revenue we need to operate.

Section 9 – Impact on customer bills

NGN's business plan is based upon the principle of continuing to deliver value for money for the network's customers whilst maintaining high standards of safety, customer service and environmental responsibility. The financial impact of this business plan on customers' bills is detailed in this Section.

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Northern Gas Networks

2

NGN was created in June 2005 with the sale of four of the eight gas distribution networks owned by National Grid. This section explains how NGN works to a corporate vision which is supported by a range of performance measures. It details how NGN has performed against these measures for the past six years, delivering natural gas in the most cost-efficient way to 2.6m users across northern England.

Executive Summary

NGN is the most efficient gas distribution network in the UK.

This is evident from the benchmarking of the financial performance of the eight GDNs since 2005/06 and has delivered significant benefit for gas distribution customers across the North of England and for gas users across the UK as a whole. We deliver a high value, cost-efficient service to our customers.

The reductions in the cost of operating our network total 18%, which represents early delivery of the demerger dividend which was predicted at the time of network sales in 2005. It was expected to take two full regulatory periods to deliver cost savings of 15%, through the introduction of new network owners and comparative competition. We have delivered the benefit in one regulatory period.

At the same time we have taken massive steps forward in improving safety in our network, removing the risk from ageing metallic mains and reducing the number of accidents in our network. Customer service performance has also seen a significant improvement, with a reduction in the number of complaints of c.74% when compared to 2007. Excellent levels of network asset reliability underpin this performance.

This level of performance has been achieved through the implementation of a challenging network vision, which reflects the primary objectives of the business to be a top performer in efficiency, safety and customer service while at the same time recognising our environmental responsibilities. That vision is being achieved.

We have a strong track record in delivering our commitments to customers and have an industry leading performance which will continue to provide a value or money service throughout the RIIO-GD1 period.

2.1 Key facts

NGN is the licensed gas transporter 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 37,000km of pipeline
- covers 25,000km^2
- serves 2.6m 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 82,000 GWh of energy annually;
- we are a significant regional employer with a highly skilled workforce of more than 1,200 staff and 800 contractors; and
- we invest £120m annually in the infrastructure of the region.

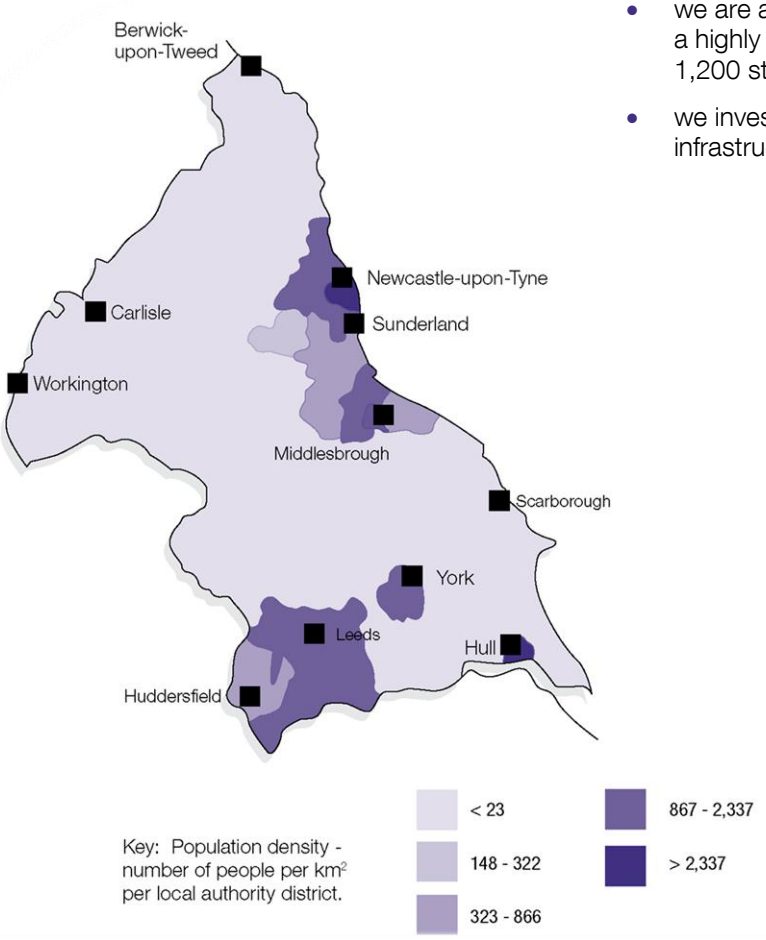


Figure 2.1: The geographic area served by NGN

NGN is owned by a consortium of three partners. The consortium constitutes a robust, well capitalised shareholder group which has significant global experience in the ownership and operation of utility and infrastructure businesses.

We have sought to exploit the synergies and benefits that come from being part of this large, multi-national group of companies and will continue to leverage these commercial relationships to deliver ongoing efficiencies and productivity.

The strong, stable regulatory framework in the UK has been a key factor in attracting investors of the stature of NGN's ownership group. Such investors, with significant experience in international utilities and infrastructure assets, who look to invest for the longer term, will be key players in delivering the necessary investment required to meet the UK's future energy and environmental challenges.

All three owners are committed to building on the network's inheritance of providing safe and reliable operations and to maintaining NGN as a socially responsible corporate citizen in the region. These will continue to be key elements of our business plan as we meet the future challenges over the short, medium and longer term.

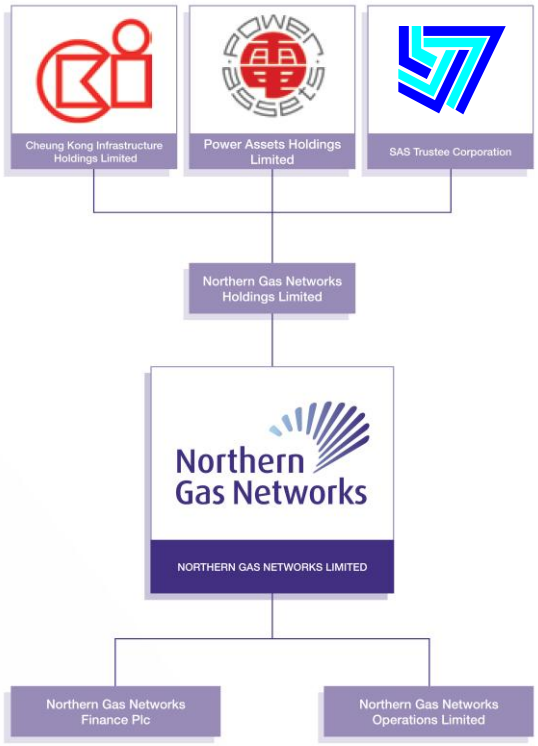


Figure 2.2: NGN's ownership structure

2.2 Corporate vision

A corporate vision was introduced in 2005, reflecting the primary objectives of the business: safely, efficiently and sustainably delivering a secure supply of gas to our customers.

To be benchmarked by Ofgem and the HSE consistently in the top two comparable utilities for safety, efficiency and customer service.

The vision is based firmly within the scope of NGN's role as a monopoly utility service provider and has provided a robust basis against which we have successfully addressed the challenges faced since June 2005. This vision remains appropriate as NGN adapts to the additional challenges that a changing energy market will present as the UK moves towards a low carbon economy.

Our corporate vision is supported directly by our business values which reflect the way our employees deliver their roles and activities. The consistent demonstration of our values in our day to day business activities has helped build a culture that drives sustainable business performance.

- Believing in a workplace free of accidents and injuries.
- Valuing and rewarding our employees for their contribution to the business.
- Motivating our contractor partners to continuously improve performance for mutual benefit.
- Treating customers as we would wish to be treated.
- Maintaining high standards of corporate governance.
- Taking pride in being a respected part of the community.
- Achieving the expectations of our owners.

2.3 Performance since 2005

We have a strong record of industry leading performance since 2005.

- Set new benchmark standards for cost efficiency to drive increasing value for our customers.
- Safety performance has reduced to record low levels the number of people injured in our network.
- Customer service performance has improved year on year as we drive down the number of complaints.

2.3.1 NGN has already delivered the demerger dividend

An assessment of our performance since 2005 provides a very good benchmark of the effectiveness of our corporate strategy and, importantly, NGN's ability to deliver the commitments set out in this business plan for RIIO-GD1.

It was predicted that the sale of the gas networks by National Grid in 2005 would result in significant reductions in controllable operating expenditure (Opex) over two regulatory periods through new ownership and comparative competition, referred to as the demerger dividend.

NGN has delivered this benefit in just one regulatory period, through driving consistent year on year efficiencies whilst improving customer service and safety.

This represents early delivery of the full demerger dividend as the benefit to customers of network sale.

Customers benefit from lower transportation charges immediately and will continue to benefit from 2013/14 instead of waiting until 2018/19.

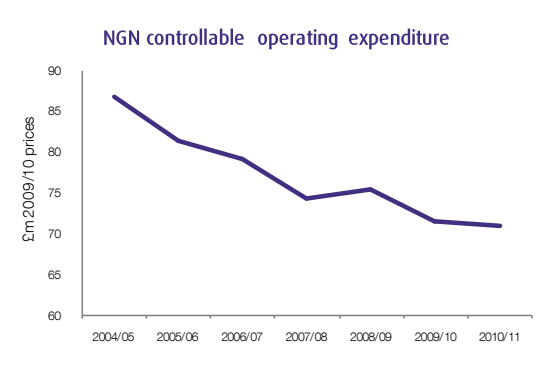


Figure 2.3: Controllable operating expenditure (Opex)

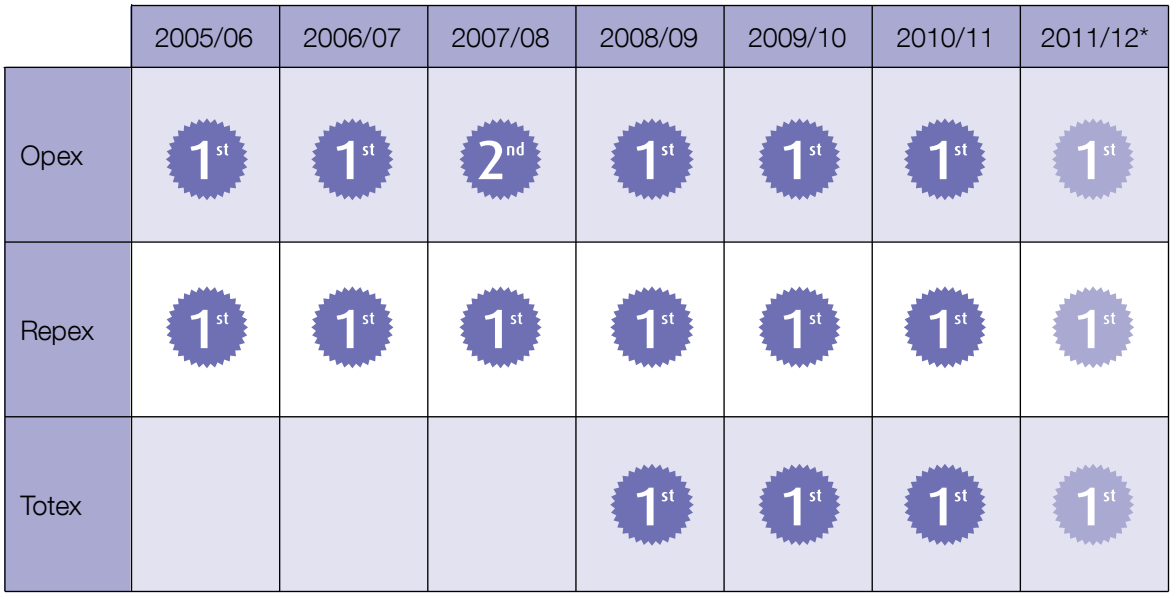
This equates to an industry leading 18% real reduction in controllable Opex since 2005.

2.3.2 Efficiency

At the start of GDPCR1 NGN was assessed to be the most efficient GDN. By setting these frontier levels of performance, we have enabled Ofgem to set the benchmark for all GDNs, so delivering significant levels of value for all gas distribution customers.

We have continued to set frontier levels of performance and provide the standard by which other GDNs should be assessed. In using this approach Ofgem will be able to return further significant amounts of value to customers during RIIO-GD1.

Our performance over the last seven years has demonstrated how the company has successfully developed a culture of continual improvement, clearly driving corporate initiatives to improve efficiency.



*Forecast

Figure 2.4: Ofgem's efficiency analysis of NGN

NGN's frontier performance allows the regulatory framework to create enormous benefit for gas customers across the UK by moving all companies to the benchmarked frontier level of efficiency. Setting all GDN expenditure allowances in line with NGN's frontier levels of efficiency will reduce costs for gas customers' right across the RIIO-GD1 period.

Based on a range of techniques, we can be seen to have delivered significant value for customers through extending the frontier. This benefit could total in excess of £200m in RIIO-GD1. Rewards for frontier performers creates the correct incentive framework both within and across regulatory periods. As an example, the graph below shows the aggregate annual industry cost savings (using 2008/09 and 2009/10 industry costs) that NGN has driven through operating as the most efficient GDN rather than an average GDN.

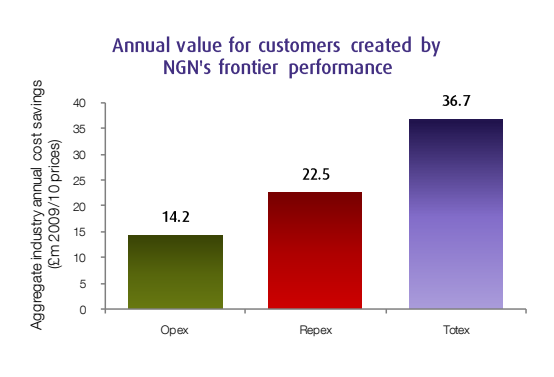


Figure 2.6: Value created by NGN frontier performance

In addition to Ofgem's analysis we have corroborated NGN's performance throughout this business plan with our own benchmarking, including international benchmarking exercises with gas distribution operators in the US and Japan, and comparative assessment of various parts of NGN's operations. These confirm our status as a frontier performer within gas distribution and also in comparison to other sectors.

2.3.3 Customer service

The importance of customer service to NGN is demonstrated by our corporate vision. Together with safety and cost-efficiency, customer service is prioritised as being a business-critical activity which is crucial to the continued success of the company.

Number of complaints

We have reduced the number of complaints received by the business by c.74% since 2007.

We believe reducing the number of complaints is a key performance indicator. It is a measure of the quality of our operational (front line) delivery and customer service.

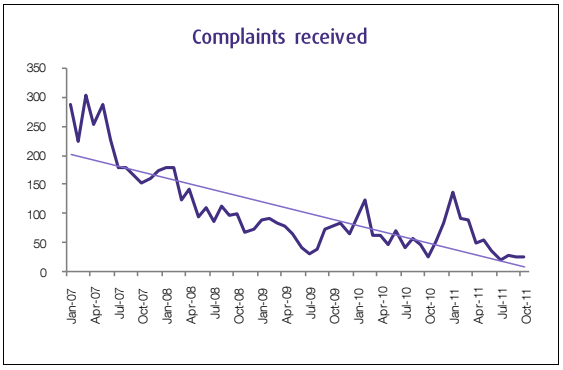


Figure 2.7: Number of complaints received

Reducing the number of complaints we receive will continue to be a key focus and a key indicator of our customers' overall satisfaction with the service we are providing.

Customer satisfaction surveys (CSS)

Undertaking quarterly surveys of customers' opinions was started in 2005, for customers who had experienced an unplanned gas supply interruption (repair and emergency) and for those who had experienced a planned supply interruption (replacement).

A survey of connections customers was started in 2008. NGN's customer service scores in the surveys since 2008/09 are set out below.

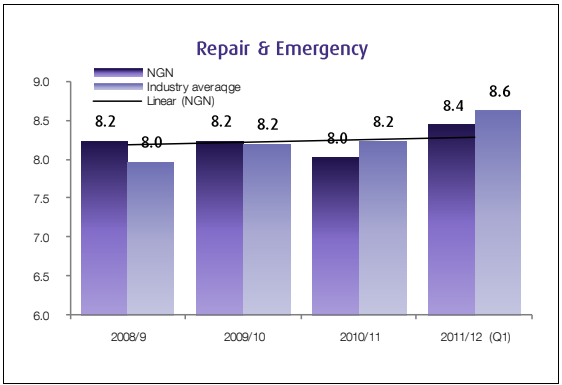


Figure 2.8: Ofgem CSS Repair & Emergency

Standards of customer service across the GDNs are consistently high with customers rating performance across the three categories at an average of 7.7 out of 10. The average 'spread' between the highest and lowest scoring GDNs is typically less than one point.

Since 2008/9 (when scoring was introduced on a consistent 1 - 10 basis) NGN has achieved scores at or above the industry average for repair and replacement. Whilst our performance in connections was initially below average, this has improved significantly to where we are well above average in 2010/11 and are now a consistent upper quartile performer.

We remain committed to consistently achieving a top two level of performance in the customer service surveys.

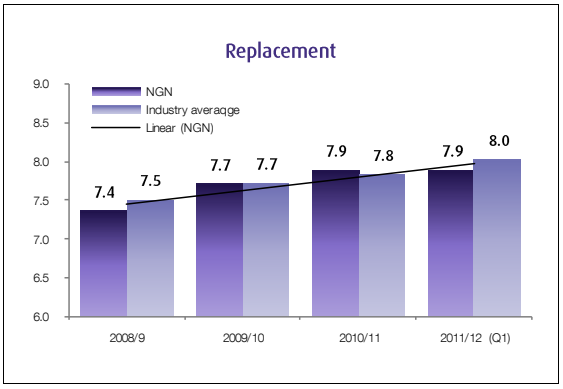


Figure 2.9: Ofgem CSS Replacement

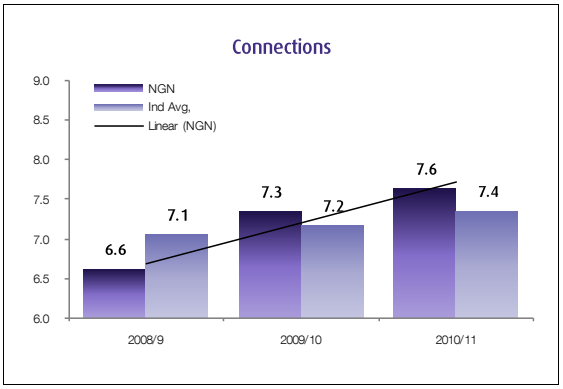


Figure 2.10: Ofgem CSS Connections

2.3.4 Health and safety

The importance of safety is highlighted by feedback from stakeholders, where it is consistently ranked as an important element of our activities. NGN is committed to protecting the safety, health and welfare of our employees, those who work directly for us and on our behalf. We believe it is our responsibility to deliver our operations in a way which protects public safety at all times.

In 2007 NGN achieved certification to the Occupational Health and Safety Standard, OHSAS 18001, and we have an integrated health, safety and environmental management system. OHSAS 18001 demonstrates NGN's commitment to health and safety including, amongst others, to:

- Lower or eliminate the risk of ill health or injury to our employees, contractors, visitors and members of the public;
- Comply with applicable laws, regulations and other requirements;
- Continually improve our health and safety performance through the development of targets and objectives; and
- Conform to national health and safety best practice.

Working to OHSAS 18001 means that NGN can manage risk, demonstrate diligence, gain assurance, prevent downtime, and potentially reduce liability claims and insurance premiums.

We believe that all work-related injuries and illnesses are preventable. We have integrated safety and occupational health considerations into all our business decisions to help ensure the safety of our workforce and the public.

These principles, allied to a strong management commitment to safety and a financial incentive framework for all employees and contracting partners, have resulted in a demonstrable improvement in safety performance.

Operational safety

Since taking ownership of the network we have significantly reduced the number of lost time injuries (LTIs) within our workforce, both our direct employees and those of our contract partners. We have also significantly reduced the number of members of the public (MOP) injured as a result of our works.

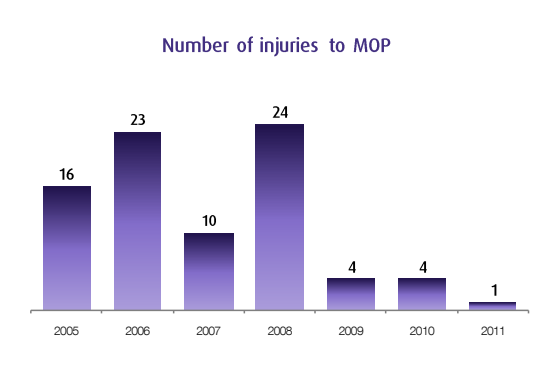


Figure 2.11: Number of injuries to MOP

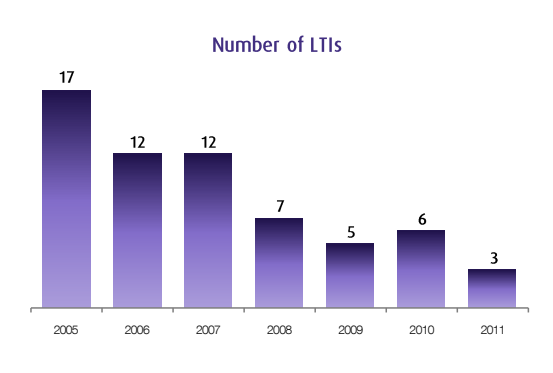


Figure 2.12: Number of LTIs

We have successfully introduced initiatives such as the It's Your Call scheme that encourages staff and members of the public to report to us directly any incidents or practices that they believe pose a risk to operational safety.

We have an overall objective to reduce the number of LTIs and MOPs on our network to zero. We have set ourselves stretching targets over the RIIO-GD1 period to achieve this objective.

Asset safety

Additionally, since 2006 we have almost halved the amount of risk in the distribution network from our iron mains. By targeting our replacement programme to address those iron mains that pose the greatest risk to the public we have succeeded in removing a higher percentage of risk per km of main.

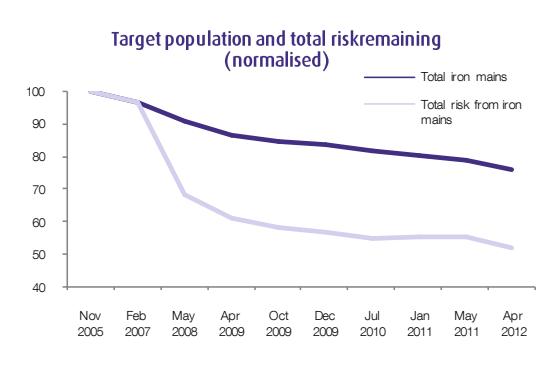


Figure 2.13: Target population and total risk remaining (normalised)

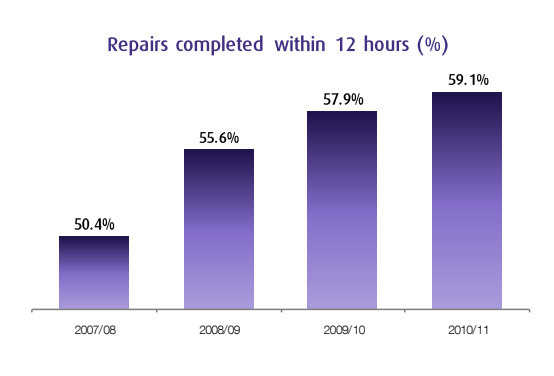


Figure 2.14: Percentage of repairs completed within 12 hours

We have ranked consistently in the top two performers in the percentage of repairs completed within 12 hours.

Environmental impact

NGN is fully aware of the impact that our operations have upon the wider environment and the local communities we serve. We are committed to operating our business in an environmentally responsible and sustainable manner, ensuring at all times that any potential adverse impact upon the environment is minimised.

We hold ISO 14001 certification. This internationally recognised environmental management standard delivers a focus on the following:

- Reducing adverse environmental impacts;
- Delivering continual environmental performance improvements;
- Complying with all applicable environmental requirements; and
- Conforming to national environmental best practise.

Natural gas emissions

Methane, the main constituent of the natural gas we transport, is a potent greenhouse gas. The principal contribution we can make to improve the environment is to reduce leakage from our network. This leakage occurs through pipeline joints, seams and other assets as gas is transported through the gas distribution network and represents around 0.06% of total throughput.

Since 2005, we have reduced leakage by more than 10%, approximately 185,000 tonnes of carbon equivalent (tCO2e). We have achieved this through a programme of pipeline replacement, reducing system operating pressures, treatment of pipeline joints and seals, the capture of gas vented during street works and managing gas escapes within the agreed standards of service.

Carbon emissions

We also actively measure, monitor and manage our non-leakage business carbon footprint which in 2010/11 equated to 11,376 tCO2e. This is the amount of carbon which we emit to the atmosphere through the operation of our vehicle fleet, the energy we use in our offices and depots and in the day-to-day operations of our business.

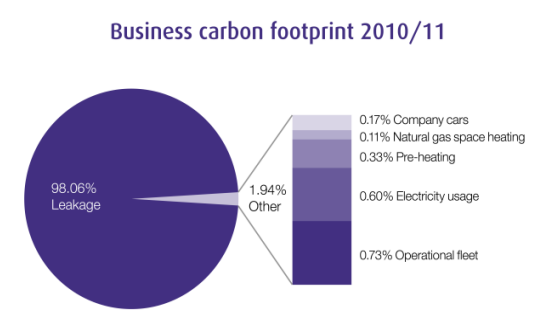


Figure 2.15: NGN's business carbon emissions 2010/11

We have made significant progress in reducing our impact on the environment since 2005. There is more we need to do over the next decade. We are committed to making further significant progress in the future.

NGN has a strong track record of delivering its commitments since 2005. This business plan is built directly upon the industry leading performance detailed above and delivers additional and continual improvement across RIIO-GD1.

In 2009, a new methodology to benchmark total costs was developed and the results show that NGN is clearly the frontier performer under the new measure. The conclusion on NGN's performance is fairly simple, as set out in the RIIO-GD1 Strategy document:

> **"The matrix identifies NGN as the lowest cost performer across Capex, Repex and Opex and highlights they continue to be the frontier performing GDN..."**

Repex and Capex	Bottom 25%	Between 50 – 75%	Between 25 – 50%	Top 25%
Top 25%		National Grid – West Midlands	Wales and West Utilities Wales and West Utilities	Northern Gas Networks
Between 25 – 50%	National Grid – East of England National Grid – East of England National Grid – North West National Grid – North West		Wales and West Utilities	Scotland Gas Networks
Between 50 – 75%	National Grid – North West National Grid – East of England	National Grid – West Midlands National Grid – West Midlands		Scotland Gas Networks Scotland Gas Networks
Bottom 25%		National Grid – London National Grid – London National Grid – London	Southern Gas Networks Southern Gas Networks Southern Gas Networks	
	Total Opex			

Key:
2010/11 performance
2009/10 performance
2008/09 performance

Figure 2.5: Ofgem's total cost benchmarking

Business and operating environment

3

NGN must operate within a legal and regulatory framework which dictates required performance levels. This brings with it a range of challenges: some are specific to the gas distribution industry; some are as a result of the economic situation; and some are geographic issues. This section details these challenges and NGN's approach to managing them.

Executive Summary

NGN's purpose is to deliver natural gas to 2.6m users across the North of England, safely, cost-efficiently and sustainably, at all times meeting the legal and regulatory demands on our business.

The role of gas distribution will change as the UK transitions towards a low carbon economy, but we believe that gas has a significant role to play in the future energy mix.It is in the UK's interest to maintain strong and efficient gas distribution networks in order to meet the Government's environmental objectives, at significantly lower cost than other alternatives.

Demand for gas has been reducing in our region for several years and we forecast that this trend will continue during RIIO-GD1. However, there will be a need to reinforce the network to meet localised organic changes in customers' demand patterns and to maintain a focus on safety, reliability and value for money.

The economic outlook presents a gloomy picture in the short and medium term. Economic growth in our region has remained below the UK average since 1990 and the impact of the recession was, and continues to be, more markedly felt in the North. These key economic elements have been included in our business plan.

NGN is a major contributor to the regional economy of one of the most economically challenged areas in the UK. The vast majority of NGN expenditure is retained within the regional economy. Every £100 of NGN expenditure on suppliers and staff contributes between £191 and £206 to the regional economy through the multiplier effect.

Additionally, there are a range of unique regional factors which impact upon NGN and add an additional cost burden to the delivery of our operations. These include the fact that we have the lowest customer density with the greatest network coverage of all the eight GDNs. While we have two of the UK's largest six conurbations within our region, we have the lowest population density of anywhere in England or Wales. We believe these additional costs should be recognised and reflected in our benchmarking and cost allowances.

3.1 Background

NGN has a unique role in the business environment of the North of England. We are responsible for the safe, continual delivery of natural gas to users, transporting the fuel over long distances, through towns and cities, into the homes and businesses of 2.6m customers. We are largely invisible, even unrecognised, yet our role is of great importance to those who rely on us for uninterrupted supplies of gas for their daily use.

We are a critical element in the region's infrastructure and are the primary delivery route for energy in the North of England. During periods of peak demand our network is transporting up to four times as much energy as the electricity networks in our region.

The energy industry in the UK faces significant challenges if the issues of the environment, sustainability and consumer energy requirements are to be effectively addressed while maintaining the historical focus on reliability, safety and value for money.

This plan takes full consideration of the business environment in which we operate, recognises the key drivers for change in the short, medium and longer term and the stern challenges which we face at regional and national level.

3.2 Legal and regulatory framework

NGN operates in a legislative and regulatory framework determined by three elements of primary legislation: the Gas Act (1986), the Health and Safety at Work Act (1974) and the Environmental Protection Act (1990). We operate under a Gas Transporter's Licence granted by Ofgem which defines the broad range of licensed activities and responsibilities and sets out the rules and standards to which the company must adhere.

This framework focuses our obligations on quality of service to customers, ensures the safe operation of the network and regulates prices to ensure that we carry out our activities in an efficient, non-discriminatory manner.

3.3 RIIO

In 2009, the traditional RPI-X approach to network price controls was updated with the introduction of the RIIO principles. This provides a broader toolkit with which networks and Ofgem can address the future energy and environmental challenges faced by the UK. These key principles are fully embedded in our plan for RIIO-GD1 and beyond.

- Outputs focused – at the heart of our plan is the commitment to the efficient delivery of specified outputs in RIIO-GD1;
- Stakeholder led – outputs, levels of expenditure and the impact upon customer bills reflect the views expressed by our stakeholders;
- Strong incentives for efficient delivery – the plan is based upon industry leading levels of efficiency and significant continuing productivity and service improvements;
- Requirement for innovation – the plan includes a strategy for innovation to address the key challenges in RIIO-GD1 and into the future; and
- Ensuring investment is financeable – the plan includes a fully justified and financeable package that maintains strong investment grade credit ratings.

3.4 Longer term challenges

The need for change in the energy industry has been embraced by the Government and the extent of the challenge from climate change is widely accepted. Legislation was introduced in 2008 to create a legally binding, long term framework to cut greenhouse gas emissions. This means that the UK cannot continue to produce and consume energy into the future as we do currently.

These policy developments raise the question of what role gas has to play in the future energy mix. To help inform this debate, NGN along with all other GDNs and National Grid Gas Transmission, via the Energy Networks Association Gas Futures Group (ENA GFG), undertook a long-range scenario based modelling study of the future utilisation of gas to 2050, and the consequential impacts of this for gas networks. The study analysed four key scenarios with each identifying a separate pathway to delivering the Government's policy objectives to cut greenhouse gas emissions by 2020 and further by 2050.

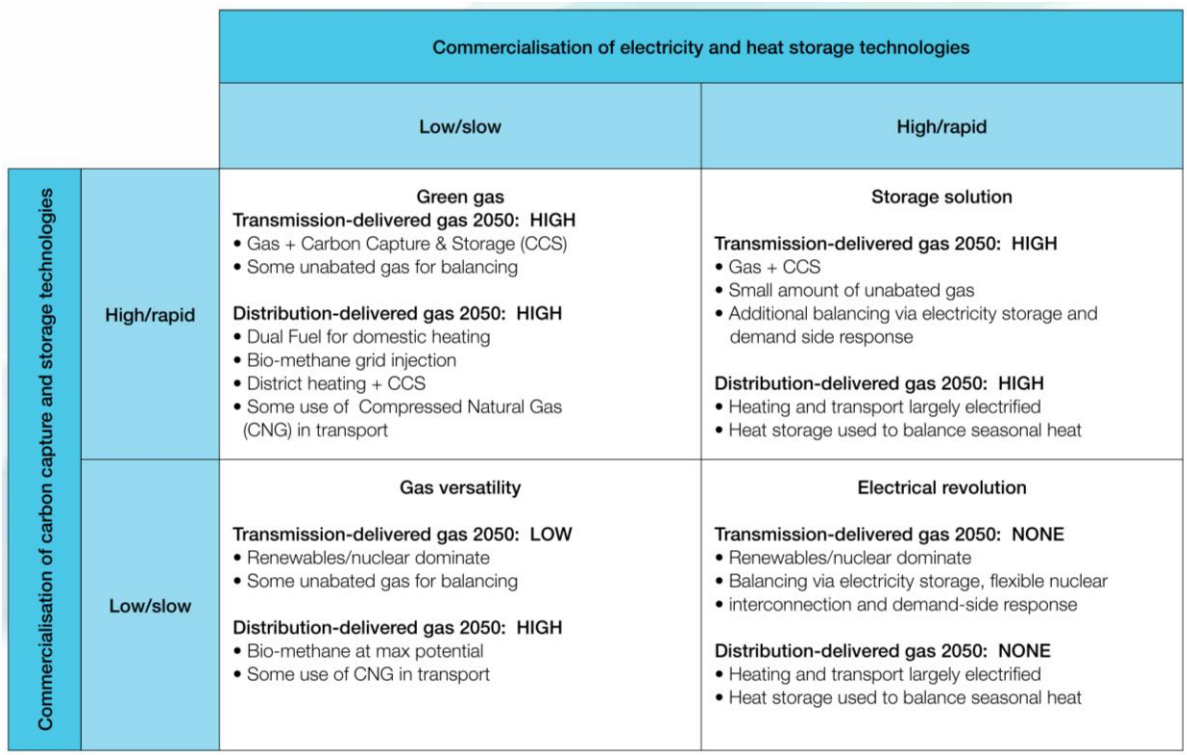


Figure 3.1: Gas Futures Group scenario analysis

The key messages from this analysis are as detailed below.

- An ongoing role for gas is fully compatible with achieving the Government's environmental objectives;
- Gas could offer a cost-effective solution for a low carbon transition whilst meeting the significant peak heat demand (more than £700bn lower than electrical revolution over the 2010 to 2050 period);
- All potential pathways to a low carbon future will require significant investment in new technology, including carbon capture and storage, biomethane injection, dual fuel and/or district heating systems; and
- Maintaining gas will enhance the diversity of the energy supply mix and provide necessary flexibility at times of low renewable output.

Alongside these issues, international market developments such as the discovery of large resources of shale gas, have the potential to fundamentally change the economics of the energy mix in the UK and deliver reductions in energy costs in the longer term. Additionally, there are renewed uncertainties about the future role of nuclear energy in the UK. Given the level of uncertainty that exists on all these issues, there appears to be significant value in retaining the option for a 'high gas' future both in the transition to a low carbon economy and also as part of the longer term energy mix.

This plan is based upon a core assumption that gas and the gas distribution networks have a significant role to play in the transition to a low carbon economy and a potentially significant role in the energy mix of the future. Consequently, the capabilities of the gas distribution networks must be retained if the benefits identified above are to be delivered.

3.5 Regional economic outlook

During 2008/09 and 2009/10 the UK economy experienced the most severe economic recession since the 1930s, with six consecutive quarters of negative GDP growth before a final return to growth in 2010. The economic recovery in the period since then has been fragile with output falling back during late 2010. This period of tentative economic recovery has also been characterised by a period of high inflation, fuelled extensively by high energy and commodity prices which have acted as a significant brake on further recovery as disposable incomes have fallen in real terms.

Yorkshire and the North East of England, NGN's geographical heartland, are being hit especially hard as public expenditure cuts, rising unemployment (particularly amongst the young) and an increased cost-of-living, impact upon communities that have, historically, been the most vulnerable to deteriorating economic conditions. Businesses in the north, across most industry sectors, are suffering, with construction still to begin its recovery and public sector job losses exceeding any anticipated private sector growth. The demographic backdrop to this economic landscape is a trend for continued population growth; up to 1 million in Yorkshire and the North East by 2035.

Changes in national and regional economic conditions have a direct and sometimes significant impact upon key aspects of our activities and the wider gas distribution network. The economic downturn during 2009 and 2010 led directly to a significant reduction in the demand for gas with throughput on our system falling by around 4% in 2009 compared to 2008 before recovering modestly during 2010. Likewise, applications for new connections to our network fell sharply during 2008, 2009 and 2010 as the impact of recession slowed the development of new housing; high energy prices seemingly deferring decisions to switch to gas.

At the time of writing, the likely period of transition from recession to more sustained economic growth is still highly uncertain. The Bank of England projections of GDP growth are very widely spread and to some degree reflect the recent dip in the economy. They could be viewed as presenting a not overly optimistic picture in the very short term.

The key economic assumptions underlying this plan include the following.

- Gross Value Added (GVA) growth for our network is assumed to remain flat at last year's rate (1.49%) for a further two years as Britain struggles to recover from the recession. It is then anticipated to return to the same three year economic cycle that has been experienced with an average rate equal to the long term non-recessionary average. GVA growth in our relation has been below the average for Britain in the period 1990 to 2009, with the impact of the recession being marginally more sever in both 2008 and 2009;
- Gas prices have shown significant increases since 2002 for households and effectively from 1999 in the non-domestic market. These have been driven by the wholesale gas price, which has in turn been driven by rising oil prices. Prices are forecast to maintain 2011 levels (in real terms) across the plan period; and
- After a period of relative low increases in the Retail Price Index (RPI), Consumer Price Index (CPI) and RPIX (RPI minus mortgage payments) during the first three quarters of 2009 all indices rose sharply in the last quarter of 2009 and continued to rise during 2010 and into 2011. RPI in this plan is forecast to fall to 3.3% by 2013 and settle at 2.5% from 2018 onwards.

Our region has one of the highest levels of fuel poverty in England with approximately 24% (660k) of all households in our region being classed as fuel poor. The current economic climate is likely to see this rise. In partnership with a number of parties, we help by providing access to lower cost gas heating.

3.6 Contribution to Regional Economy

Given the current economic conditions, the activity and long-term commitment of NGN, a major investor in the north, is a very significant component of the region's economy. Our business plan has earmarked up to £150 million per year for capital expenditure on the replacement and development of our asset infrastructure; a similar sum is estimated for operational activities associated with the day-to-day running of its business.

A recent study by Leeds University attached as Appendix A20 has sought to measure this contribution. The study demonstrates how important NGN's investment and expenditure is to the economic health of our area of operations; not just in terms of the total amount spent but crucially in terms of the extended 'multiplier' effect upon businesses and people in the north of England.

The study used a 'local multiplier' approach to identify the extent to which NGN expenditure and investment is 'retained' within the regional economy, rather than 'lost' to other geographical markets within or outside the UK. In addition to the publically-available demographic and economic statistics, the main data sources for the analysis have been: a comprehensive listing of suppliers (by value and location) providing products and services to NGN; an indication of the residential distribution and disposable income associated with NGN employees.

The study concluded that the local multiplier effect for NGN was in the range of 1.91 to 2.06 which using a mid-range point suggests that for every £100 of NGN expenditure on suppliers and staff costs a further £98 of expenditure is generated within the regional economy. The multiplier effect based on this business plan for the RIIO-GD1 period could equate to circa £2.6 billion, a financial impact on the north of England economy of £330 million each year.

As a regionally-focused organisation, with a long-term outlook, NGN plays a critical part in the economy of the north of England; an important investor in the region as it seeks to recover its economic well-being.

3.7 The demand for gas on NGN's network

The amount of gas being delivered through NGN's network has fallen significantly in recent years. Total annual demand for gas was 14% lower in 2010/11 when compared to 2005/6. These reductions have been driven largely by sustained high energy prices and the economic recession which have stimulated increased energy efficiency and changes in the patterns of usage of gas.

Peak demand, while estimated to have fallen over the same period, has been more resilient to the drivers of change in annual throughput. Cold winters in 2009/10 and 2010/11 in particular have demonstrated that the relationship between annual and peak demand is not linear and that periods of very cold weather will see demand for gas increase accordingly.

Our forecasts of throughput for the period to 2021 are based upon the likely economic scenario and take account of the impact of continued high energy prices and the wider environmental agenda on the demand for gas on the network. Annual throughput is forecast to continue to fall over the period as consumers continue to change the way in which they consume energy, despite relatively strong growth in underlying economic drivers. This is shown below.

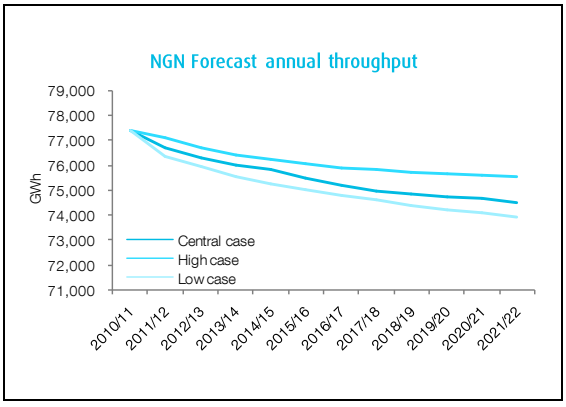


Figure 3.2: NGN forecast annual throughput

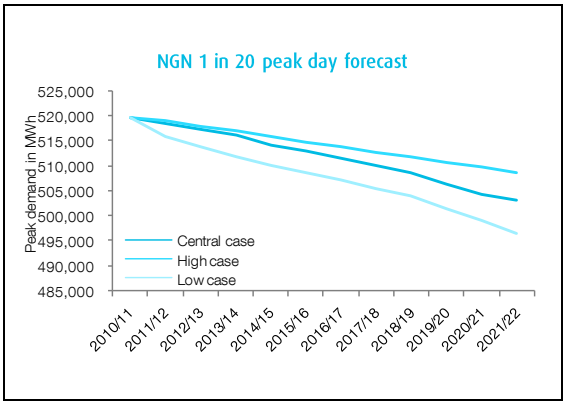


Figure 3.3: NGN forecast peak day 1 in 20 demand

Our demand forecasts have been derived against three economic and energy efficiency scenarios. Each represents a valid background against which to assess future levels of demand across the period, taking into consideration the large range of future uncertainties that surround key economic drivers. We have chosen the central scenario as the basis of our demand forecasts in RIIO-GD1. These scenarios are set out in Appendix A2.

Annual demand is forecast to fall a further 5% during the RIIO-GD1 timeframe, largely driven by reductions in the domestic sector as consumers become more efficient in how they consume their energy. The industrial and commercial (I&C) and manufacturing sectors also expect to see reductions in demand. This is against a background of nationally increasing demand for energy over the whole period.

Peak day demand (1:20) is forecast to fall by only 3% over the period. Recent history has shown that demand profiles are becoming more 'peaky' in nature as consumers respond to economic conditions and high energy prices. This trend is forecast to continue over the next 10 years with peak demand forecasts being more resilient than average annual demand as consumers reverse their more frugal behaviour during the periods of coldest weather.

The investment programme set out within this plan has been tested directly against the range of peak demand forecasts outlined above. A key point to consider is that none of the three scenarios provides a requirement for any general network reinforcement to support growth in demand. However, the plan does reflect a requirement for small localised, reinforcements to overcome specific constraints on the network.

3.8 Regional factors

Our operating environment contains a range of geographic, social and commercial factors which influence the level, type and costs of activities we carry out. These 'regional factors' can be identified as those which impact upon NGN in a manner that is not consistent with other GDNs and must be addressed when drawing any direct comparisons within the industry.

These include the following:

- ### Geography and demographics

  Our network has the lowest customer density with the greatest network coverage of all the GDNs. We are also impacted by having some of the largest conurbations in the UK on the periphery of our region, in particular on the east coast. This results in a requirement to provide a higher level of resource and facilities to serve the more remote regions. This imposes additional operating costs to maintain the four 'rural' depots in the network. The NGN region has two of the UK's top six conurbations yet 97% of the region has the lowest population density outside Scotland and contains four national parks. We calculate that maintaining higher resource levels and depots to service these areas is equivalent to a further c.£4m per year, impacting our operating costs.

- ### West Yorkshire

  There are unique combinations of factors in this region, including 'steel rail' services (secondary mains usually found in back gardens). Pennine bedrock and the street design of our mill towns have added a clear premium to mains and service replacement costs which can be clearly seen in contractor rates when compared to the north of our region. This equates to c.£3m additional annual costs.

- ### Loss of meterwork

  Meterwork has been used historically by the GDNs to offset the standing time of the emergency response workforce. In 2008, NGN was not successful in retaining these contractual arrangements, leading to the stranding of resource costs of c.£10m annually within the regulated business. We have reduced these by more than 60% by 2010/11 to efficient levels. However NGN still faces c.£4m of recurring costs annually. No other GDN has yet faced this issue and can still allocate large elements of cost from the regulated business into non-regulated activities.

Further details on these regional factors can be found in Appendix A18.

Innovation Strategy

4

Innovation allows a company to adapt the way in which it provides its services, reacting to a changing environment to ensure it continues to deliver optimal performance. When NGN was created it chose to operate a unique asset management model. NGN is now building on the strengths of this model as the company reacts to the challenges of a new price control period and the move to a low carbon economy in the UK.
This section explains how NGN has and will continue to use innovation.

Executive Summary

Innovation is the lifeblood of a successful organisation. It delivers the incremental and sustainable changes in business performance to keep the organisation at the leading edge of its capabilities.

NGN's industry leading performance over the last six years was built upon our innovative approach to setting the benchmark for efficient, safe and customer-focused service delivery. The way in which we historically operated the business, using the strategic asset management model, was a first in the gas industry. Now we face the challenges of moving to a low carbon economy against the backdrop of a turbulent economic situation, we will innovate to ensure we continue to manage a cost-efficient and customer-driven business.

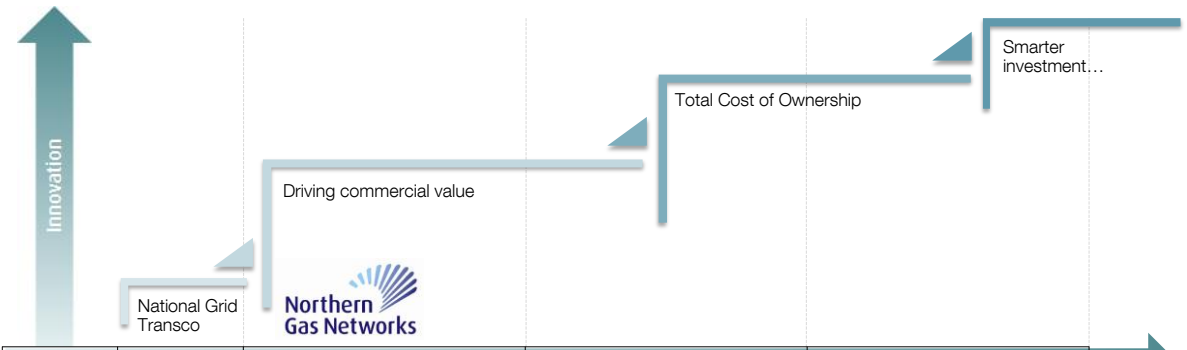
Our organisation is evolving to give a clear focus on the Total Cost of Ownership (TCO). We are implementing an integrated business model, taking a holistic view of asset management to meet the complex performance challenges and cost pressures of the future. It will be driven by Total Network Management (TNM) which provides a deeper approach to asset management. This will drive investment decisions across single and multiple output measures to inform expenditure based upon providing the best value for money.

We will work inclusively with business and industry partners, our employees and other stakeholders, to benchmark ourselves against other leading international businesses and ensure we remain the most cost efficient, safest and customer focused GDN in the UK.

Our new business model and approach to managing the network are wholly consistent with the principles of RIIO. We will use innovation as a tool to research, evaluate and implement new ways of doing things, sustaining our frontier position and driving increasing levels of value for our stakeholders.

4.1 Background

NGN has a strong track record in developing and implementing targeted innovation. This is a product of the unique challenges we face in the provision of our core services. Innovation has encompassed corporate, commercial, technical and process developments which have all delivered significant benefits to customers and stakeholders since 2005. This includes delivering the 'demerger dividend' early and generating an 18% reduction in controllable operating expenditure.



Time period	Pre-2005	2005 to 2010	2011 to 2013	RIIO-GD1
Key business challenges	• Day to day management of the network.	• Step change in commercialisation and efficiencies to meet demerger expectations. • Disciplined control of demerger cost and delivery of step changes in operational performance.	• Continue to meet stakeholder expectations. • Continue to drive productivity and value for money. • Ensure the network can transition to a low carbon economy.	• Responding to new and smarter technology. • Other sources of gas in the network. • Potentially changing usage pattern of energy.
Key innovations	• PE pipes. • Insertion.	• Market-tested strategic asset management model underpinned by a commercial asset services agreement. • Partnering with a strong utility partner.	• Total Cost of Ownership approach. • New business model. • Measurable asset health. • Total Network Management. • International benchmarking.	• A variety of technology-led solutions. • Potential new approaches to using smarter data and distributed sources of gas.

Figure 4.1: Innovation track record

The unique strategic asset management business model which was implemented when NGN acquired the network in 2005 was itself a significant innovation in the UK's energy sector. It was specifically targeted at managing the cost pressures, uncertainties and service obligations through a period of significant change following network sales. Additionally, within this performance based framework there existed strong incentive arrangements to develop innovative responses to these key challenges. These were a significant stimulus for challenging existing practices within the business.

However, we recognise the significant challenges that the wider energy industry in the UK will face in the short, medium and long term. We have a significant role in ensuring our gas distribution network can fully play its part in the move to a low carbon economy. We must also maintain our focus on the continuing challenges of improving overall levels of service, meeting our stakeholders' expectations and delivering further improvements in efficiency and productivity.

We also recognise that a step change is required across the industry and within NGN in the scope and level of innovation necessary to meet these challenges.

The changes we have already made to our business model, and the approach we are taking to our management of the network, (which are described elsewhere in this plan), are clear indications of how we are proposing to respond to these challenges as part of our innovation strategy. This strategy dovetails with NGN's new approach of Total Cost of Ownership by having a balanced portfolio of projects which are reviewed and tested prior to potential implementations.

This section sets out NGN's innovation strategy and also demonstrates how the use of funding, research and development, trialling and implementation, will be employed in RIIO-GD1.

4.2 NGN's innovation strategy - Total Cost of Ownership (TCO)

Innovation and the ability to respond effectively to the evolving requirements of our customers and stakeholders is and will remain, a key element of the continued success of NGN.

As part of our business model we have a clear performance challenge for increased innovation across the organisation. This performance challenge and the delivery of new innovative solutions will become part of the process by which we measure the effectiveness of our business, staff and contracting partners.

> Working in partnership to put innovation at the heart of our business, to deliver our stakeholders' expectations in the short, medium and long term.

A key element in the delivery of this strategy is a thorough understanding and appreciation of the range and variety of challenges that NGN as a business must respond to in the short, medium and longer term. Summarised below are the key challenges that we will face in the RIIO-GD1 period. These will enable us to identify the new technology, commercial arrangements, processes and services which will be required to address them.

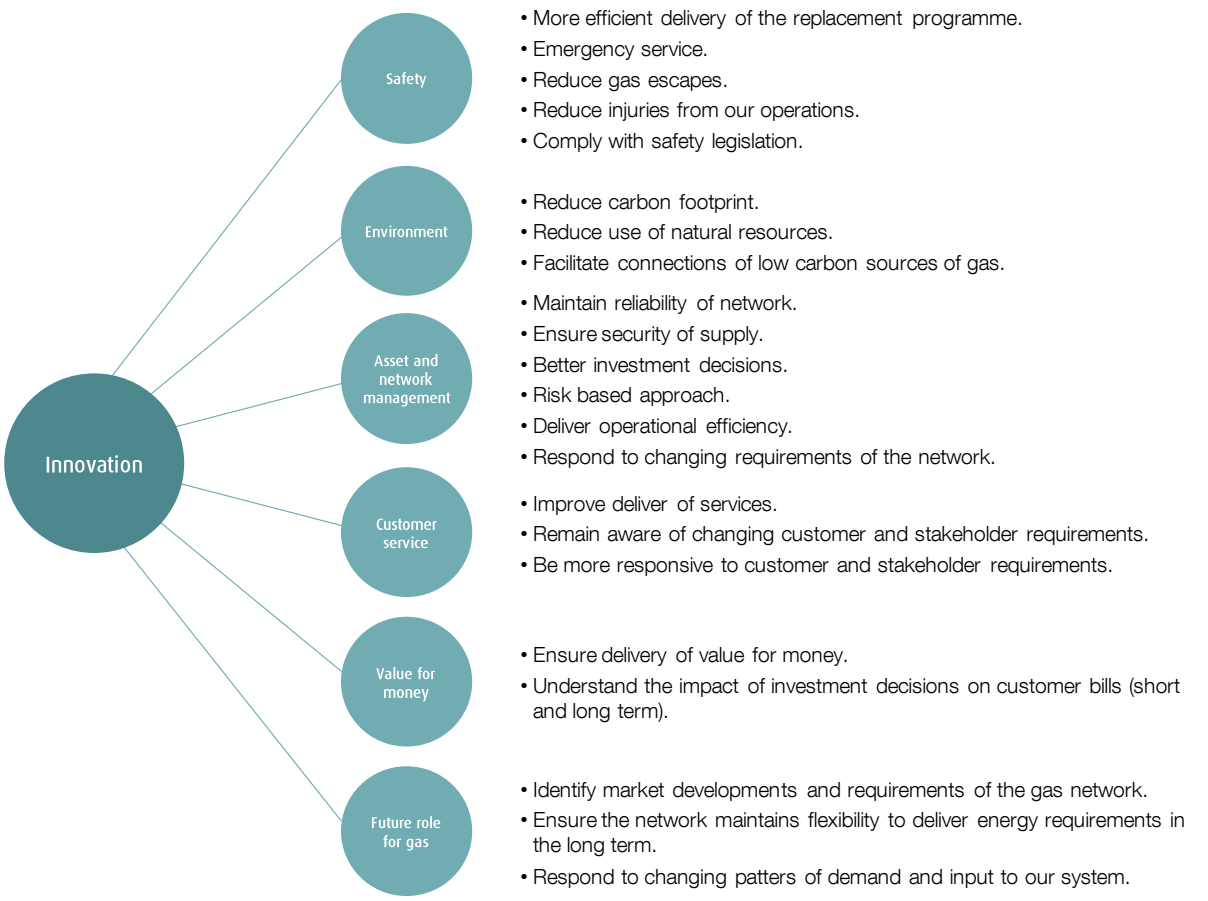


Figure 4.2: NGN's key strategic challenges RIIO-GD1

These challenges have been identified and evaluated in partnership with a wide range of stakeholders, including employees, customers, contracting partners, suppliers, consumer groups and local and national government representatives. It is only by maintaining this level of dialogue across all our stakeholder groups that we can be certain that we are fully evaluating the issues and identifying potential responses to these challenges. This principle will form a key element of our stakeholder engagement strategy across RIIO-GD1.

To meet these challenges we have developed a new approach: Total Cost of Ownership (TCO). The TCO approach is at the heart of our innovation strategy and has four main building blocks, overleaf.

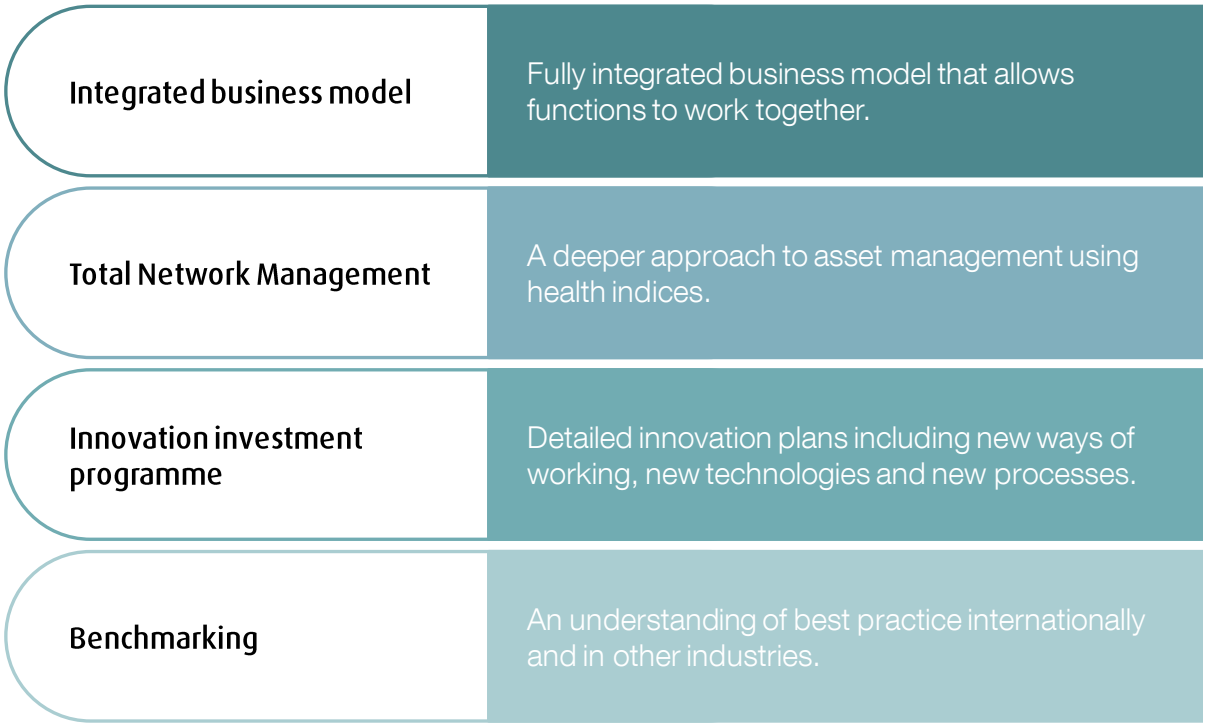


Figure 4.3: NGN's innovation strategy – TCO approach

NGN's TCO approach has provided the focus for our innovation strategy to support the challenges in RIIO–GD1. This approach embraces the management and operation of network assets and drives informed decisions to deliver in the most efficient way the required outputs for customers and other stakeholders. TCO delivers a holistic to asset stewardship which is necessary to meeting the increasingly complex challenges and cost pressures GDNs will face over the next decade. In particular the business has to deliver:

- better customer service;
- a reduction in safety risks;
- fewer gas leaks and service interruptions;
- less impact on the environment;
- improved sustainability;
- improved asset health;
- further operating cost efficiencies; and
- investment in processes, skills and workforce renewal.

The remainder of this section describes each element of the TCO approach.

NGN's innovation strategy is TCO, which assesses expenditure on the whole asset life impact across the investment stream to ensure an overall holistic benefit to operations. By balancing our innovation investment across network integrity, customer operations and replacement activities we will ensure the greatest value is obtained.

4.3 Integrated business model

When the network was purchased in June 2005, NGN identified the specific challenges it faced in delivering the corporate vision and operating the new acquisition.

In particular NGN wished to drive a rapid improvement in efficiency and performance, and identified a need to bring external commercial pressures to bear on as much of the business as possible. An innovative business model was selected under which the roles of asset ownership and asset services were legally separated. In this way it was possible for the larger part of the business, asset services, to be outsourced to the commercial market, whilst retaining in-house the critical elements of asset management and ownership.

Following a competitive procurement exercise, United Utilities Operations Limited (UUOL) was engaged under an Asset Services Agreement (ASA), whereby UUOL managed the operations and maintenance (Opex), as well as delivering capital (Capex) and replacement (Repex) programmes on behalf of NGN. The ASA was based on a target cost 'open book' commercial framework and contained incentive mechanisms to deliver out-performance of key targets.

This business model was in place from June 2005, to October 2010, and was an important element in our achievement of frontier performance within GDPCR1. We reviewed the business model in the context of future challenges, specifically the capacity to deliver an integrated approach to asset stewardship into the future, and United Utilities' decision to divest its non-core assets, including UUOL. NGN brought the asset services activities, carried out by UUOL, back in-house, integrating 1,200 staff in the process. Importantly, we will retain the commercial focus created through the ASA and continue to drive incentive mechanisms aligned to out-performance throughout supply chain and our direct labour organisation.

By bringing asset services and asset management and ownership together under the singular management of NGN, it has been possible to establish the new approach (TCO), and to deliver the holistic approach to asset stewardship which is required to meet increasingly complex challenges and cost pressures over the next decade. In particular the business has to meet the challenges described in the previous section.

With these challenges in mind, we have adapted our business model as described in Figure 4.4.

The business model is based on three closely-coupled functions working together to maintain or improve asset performance at the lowest TCO.

The three functions of Asset Risk Management, Customer Operations, and Programme Investment are supported by a Corporate Office, as illustrated in Figure 4.4 below.

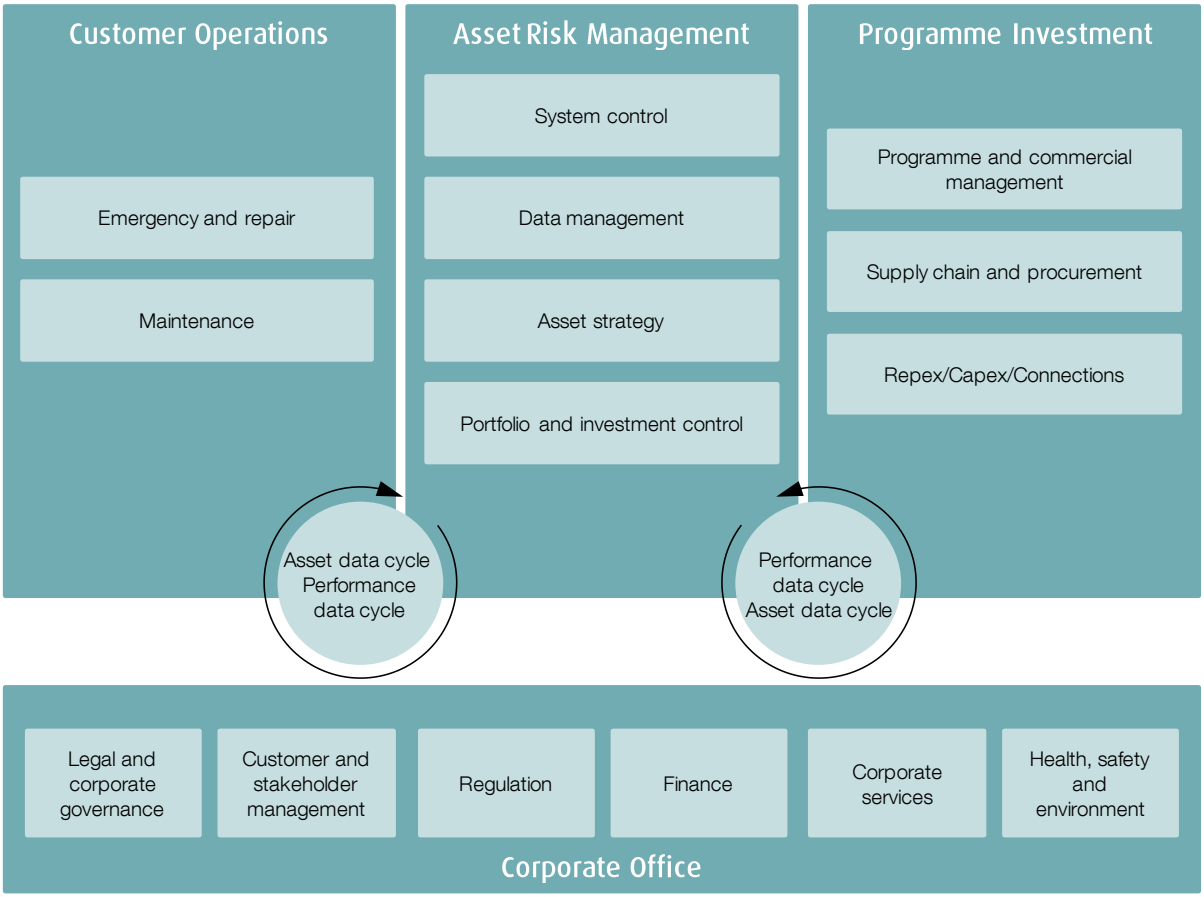


Figure 4.4: NGN's new integrated business model

As shown in the diagram, and described below, the functions are each responsible for specific work processes, which have been designed to make best use of relatively homogeneous skill sets within each function, and to have well defined criteria for measuring success.

Interaction between the functions is critical to the success of the model and this is highlighted above by the two cycles for performance data and asset data.

4.3.1 Asset Risk Management (ARM)

The key goal is to become smarter about how we operate and sustainably manage network assets. This requires ARM to build strong asset management systems, to exercise effective 24/7 system control room operations, and to collect accurate data on asset condition and performance. Its key interfaces are with day-to-day operations through the system control function, which acts as a primary source of network performance data, and with Programme Investment, where it provides analysis of asset data to drive optimal investment decision-making. Consequently, this function is responsible for identifying the overall scope of work to be delivered across the network.

4.3.2 Programme Investment

This function takes the overall scope of work from Asset Risk Management and delivers investment as efficiently as possible. In particular it optimises work packages based on, logistically-efficient work packages in each area or zone, solution-efficient investment through application of innovative techniques, and cost-efficient implementation through managing the supply chain and procurement process.

Through supply chain management, Programme Investment is also able to leverage its commercial skills and work scope synergies across the whole business, and especially between Customer Operations and itself. Programme Investment manages the procurement and supplier relationships to achieve a best overall outcome in terms of cost, flexibility, risk, delivery timescales and commercial terms. We incorporate relevant line-of-sight performance criteria for customer service and safety.

4.3.3 Customer Operations

This is the part of our business which is most visible to customers, dealing with emergencies, repairs and maintenance. It is the prime deliverer of customer service, ensuring that customers' needs are met on a day-to-day basis. In carrying out network operations and maintenance activities, it also has a key role in providing data to Asset Risk Management about asset condition and performance.

A key strength of the business model is the emphasis placed on linking the three core business areas. Accurate and timely data and information flows between Asset Risk Management, Programme Investment and Customer Operations drive the effectiveness of this model, ensuring that investment, commercial and operational requirements are being continuously optimised.

4.3.4 Corporate Office

The Corporate Office supports the business as it strives to be the best in sector. It is responsible for legal, governance, and financial control; running the management systems for, and providing specialist advice on health, safety and the environment; customer and stakeholder engagement; interfaces with regulators; and human resources.

NGN places a strong emphasis on skills development with some 250 skilled apprentices planned to join the business in RIIO-GD1.

The reorganisation of NGN's business into the structure described above provides the platform for responding to the short, medium and longer term challenges of RIIO-GD1, and is the key underpinning of the commitments set out within this business plan.

4.4 Total Network Management (TNM)

The development and implementation of this new integrated business model has been carried out alongside a new TCO focused approach to managing the network, we have termed this Total Network Management (TNM). The challenges presented by the RIIO-GD1 framework, and by the wider industry and economic environment, require changes to the way in which we deliver our services. Specifically we are applying TCO to prioritise network expenditure to manage risk and to deliver the RIIO-GD1 outputs.

We have been progressing and developing this approach since June 2005, including accreditation for PAS 55 the internationally recognised standard for asset management.

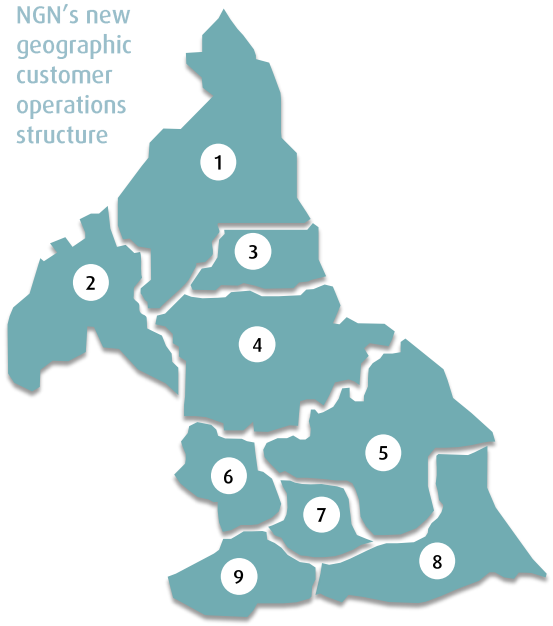


Figure 4.5: NGN's geographical patch structure

Our asset management system requires a life cycle view; an optimal mixture of interventions through capital investments, operational activities and maintenance. The overall level of intervention required is determined by performance needs, driven mainly by customer and environmental impact, risk appetite - both internal and external, and asset health and criticality.

We use systematic and co-ordinated activities and practices to manage our physical assets in line with PAS 55 principles. The standard, which also drives new technology, innovation and best practice, has been a key element in the development of our network, ensuring it is fit for purpose and efficient in delivering outputs.

These initial developments have provided the necessary basis for the implementation of TNM in RIIO-GD1. TNM specifically takes a holistic approach to managing assets and operating the network, which is highly data-centric, and uses informed decisions to arrive at the most efficient way to deliver the required outputs for customers and stakeholders. The approach comprises several key building blocks as described below:

- A geographical focus supported by central analysis, planning and scheduling;
- Ability to drive performance at a local level, close to the customer and the asset, focusing leadership on the customer and efficiency – planning the right resource, in the right place, at the right time; and
- Supported by a relatively high resolution of geographically mapped performance data, allowing targeting of resources and investment.

4.4.1 Defining asset performance requirements and asset health

NGN considers asset performance both at individual asset level (e.g. the required capacity of a Pressure Reduction Installation (PRI), and at network level (e.g. the level of leakage in an area of network). We often use the Network Area Polygon (NAP) zone as a unit of analysis when considering network performance. A NAP is a small unit from which we can obtain a range of statistics and metrics. Our network is divided into 215 such NAPs. Performance criteria are defined for each asset and condition or health data is then required to determine whether or not an intervention is required to bring the asset back within acceptable levels of performance.

Typically the lack of condition data has been a major obstacle to carrying out a comprehensive assessment of proactive asset management programmes. Historically, replacement has been based on age criteria, mandated replacement, or run-to-fail. We have already collected a base-line set of condition data for many of our assets and will establish robust data across the entire asset base during RIIO-GD1. We have data relating to the health of assets, broken down into 22 separate categories. For example, we hold information relating to pressure, pipe material, leakage history, pipe diameters, Monoethylene Glycol (MEG) concentration levels and expenditure for each NAP.

4.4.2 Asset condition and criticality assessment

In order to assess whether the risk of asset failure is critical, we consider the impact of failure, taking account of factors such as proximity to people or buildings, seriousness of failure mechanism, and number of customers affected by loss of service.

The combination of asset health assessment and criticality is then combined to form an asset health index. This then serves as a driver to prioritise asset investment, or other form of intervention.

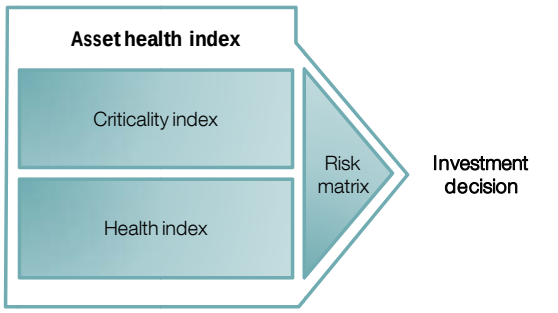


Figure 4.6: Asset health index

Following completion of the asset health and criticality assessments, network risk figures are created for each asset category by mapping the figures against a matrix to produce the asset health index as shown below.

Asset health index

Criticality index / Risk matrix	HI1	HI2	HI3	HI4	HI5
C1	RI4	RI3	RI2	RI1	RI1
C2	RI5	RI4	RI2	RI2	RI1
C3	RI5	RI5	RI3	RI2	RI2
C4	RI5	RI5	RI4	RI3	RI2

Figure 4.7: Asset health and criticality risk index

The index can be used to inform asset investment decisions, specifically to prioritise investment within each class of asset. Increasingly, as the data becomes more refined, it will be possible to use the asset health indices as a basis for trade-offs between different asset categories.

These indices will act as output measures and form a major part of our asset management strategy over the next decade.

We have developed a set of asset health indices to support our TNM approach. Of the 26 asset categories that required reporting for RIIO-GD1, we have assets within 22. For these categories we have to date:

- Implemented an asset health methodology with defined grading (HI1 to HI5);
- Implemented and asset criticality methodology with defined grading (C1 to C4);
- Implemented an asset risk measure based on the above health and criticality measures with defined grading (RI1 to RI5); and
- Run a first cut data population to identify the gaps in current asset data which we plan to close by the end of 2012 (excluding telemetry and control).

We have linked all our planned network capital expenditure in Section 7 to asset health indicators and explicitly set out these links in Appendix A11 and Appendix A19.

4.4.3 Asset health indices

Figure 4.8 summarises asset health data for each of the 22 categories across the business, and illustrates the projected change in asset health profile across RIIO-GD1, taking into account our expenditure plans.

Although further development is required, NGN's current asset condition data is of sufficient quality to enable it to apply TNM from the start of RIIO- GD1.

Asset Categories			Asset distribution based on risk index at 31 March 2011					Asset distribution based on risk index at 31 March 2021				
			Risk Index					Risk Index				
								Expected (50%)				
			RI1	RI2	RI3	RI4	RI5	RI1	RI2	RI3	RI4	RI5
1	Storage Telemetry	no of installations	0	49	4	0	0	0	0	0	0	0
2	>7 bar Telemetry	no of installations	43	118	268	93	176	6	78	11	148	455
3	<7 bar Telemetry	no of installations	0	50	2,963	54	89	0	39	143	0	2,974
4	Block Valves	no	1	9	66	14	3	0	0	66	13	13
5	Valves	no	22	1,614	651	286	3,427	22	1,438	651	286	3,603
6	Pig Traps	no	0	25	0	0	0	0	25	0	0	8
7	Sleeves (Nitrogen & other)	no	0	0	0	0	116	0	0	0	0	116
8	LTS Pipelines	km	110	321	495	244	24	0	347	598	229	19
9	>7 bar Special Crossings	no	4	147	397	0	92	0	85	404	0	151
10	<7 bar Special Crossings	no	0	1,716	0	0	0	0	1,560	0	140	16
11	Distribution Mains (Iron)	km	403	3,228	7,094	0	0	395	2,528	4,309	0	0
12	Distribution Mains (PE)	km	0	0	0	412	21,023	0	0	0	415	24,515
13	Distribution Mains (Steel)	km	167	396	1,310	283	0	167	395	944	283	0
14	Distribution Mains (other)	km	0	0	0	0	0	0	0	0	0	0
15	Services	no	7,937	60,633	858,371	12,287	1,566,943	7,615	59,218	578,403	12,607	1,848,328
16	MOB Risers	no	92	216	4,803	3,957	3,697	115	225	4,603	3,979	3,841
17	Operational Holders	no	0	43	0	0	0	0	0	0	0	0
18	Non Operational Holders (Mothballed & Decommissioned)	no	0	4	0	0	0	0	0	0	0	0
19	High Pressure Vessels	no	0	2	4	0	0	0	0	0	0	0
20	NTS Offtakes	no	107	149	39	47	5	71	112	22	99	43
21	PRSs	no	450	971	153	268	76	375	836	103	404	200
22	District Governors	no	121	414	411	314	1,095	59	261	411	366	1,258
23	I&C Governors	no	10	16	48	53	114	0	5	55	62	119
24	Service Governors	no	0	237	1,339	1,010	385	0	0	0	186	2,785
25	LPG Storage	no	0	0	0	0	0	0	0	0	0	0

Figure 4.8: Asset health and criticality risk index

4.4.4 Innovative solutions through Total Network Management (TNM)

Prioritising assets for improvement using TNM enables us to take an innovative approach to finding the optimal solution, which is not always wholesale asset renewal. For example, network leakage can be addressed in several ways, ranging from replacing large tracts of mains, through to carrying out remedial work on joints or modifying PRIs to reduce local network pressures. We also continually review and innovate in the techniques and standards that we apply. For example, the use of coring and vacuum excavation and a revision to the minimum separation distance between joints in the network have recently been introduced.

4.4.5 TNM in action

The overall TNM approach is illustrated in Figure 4.9. Although it will require a period of time to be totally embedded in the organisation, significant value from TNM is built into our RIIO-GD1 business plan, and TNM is already delivering significant benefits for our customers.

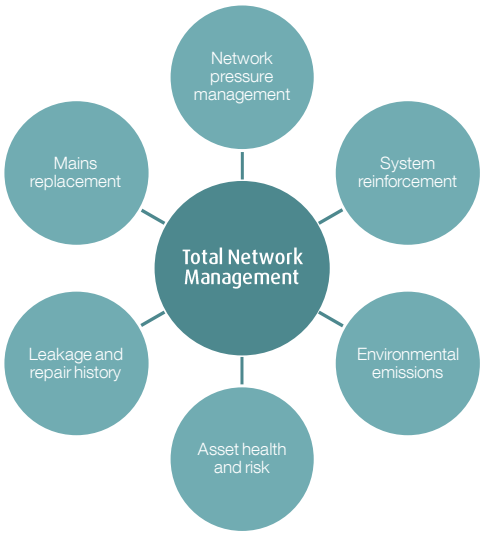


Figure 4.9: Total Network Management

TNM considers a wide range of factors to identify where it is most appropriate to focus expenditure to deliver improvements across single and multiple output measures.

The approach allows clear trade-offs to be made between alternative solutions and types of expenditure to deliver the best value for money.

A further insight to TNM is best offered by reference to the examples which follow.

4.4.6 TNM applied to leakage reduction

NGN uses data recovered from the NAPs to monitor asset performance and health. By analysing the incidence of repairs in each NAP, it is possible to correlate leakage against network condition. In the past leakage has been reduced in part as a by-product of the iron mains replacement programme. As a consequence, it was not always possible to take into account wider factors in optimising expenditure across the whole network.

By taking a more holistic approach to managing the iron mains replacement programme, we are able to focus investment more meaningfully. Figure 4.10 and Figure 4.11, opposite, show historical repair rates in our main urban areas. The top chart shows data for NGN (North) and the bottom chart for NGN (South). Historically these two areas would have attracted similar levels of investment, but through TNM it is possible to focus investment where leakage is highest. It can be seen that the southern area has much higher repair rates (and leakage) than the north.

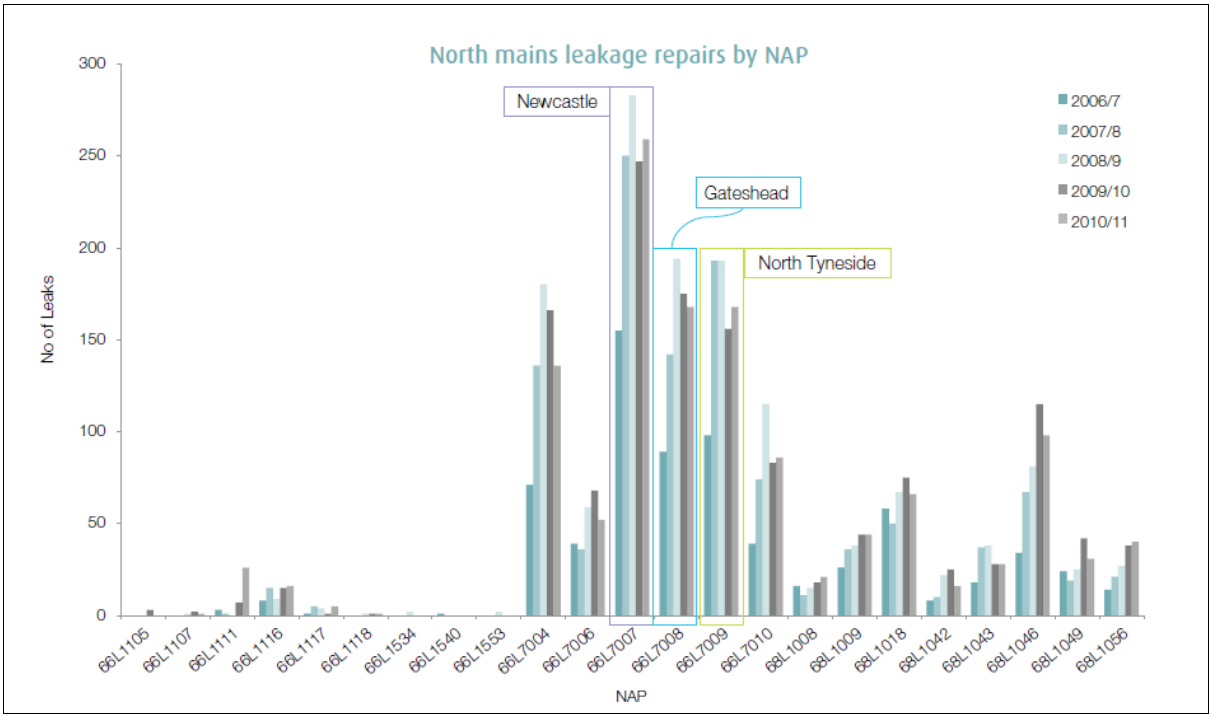


Figure 4.10: North mains leakage repairs by NAP

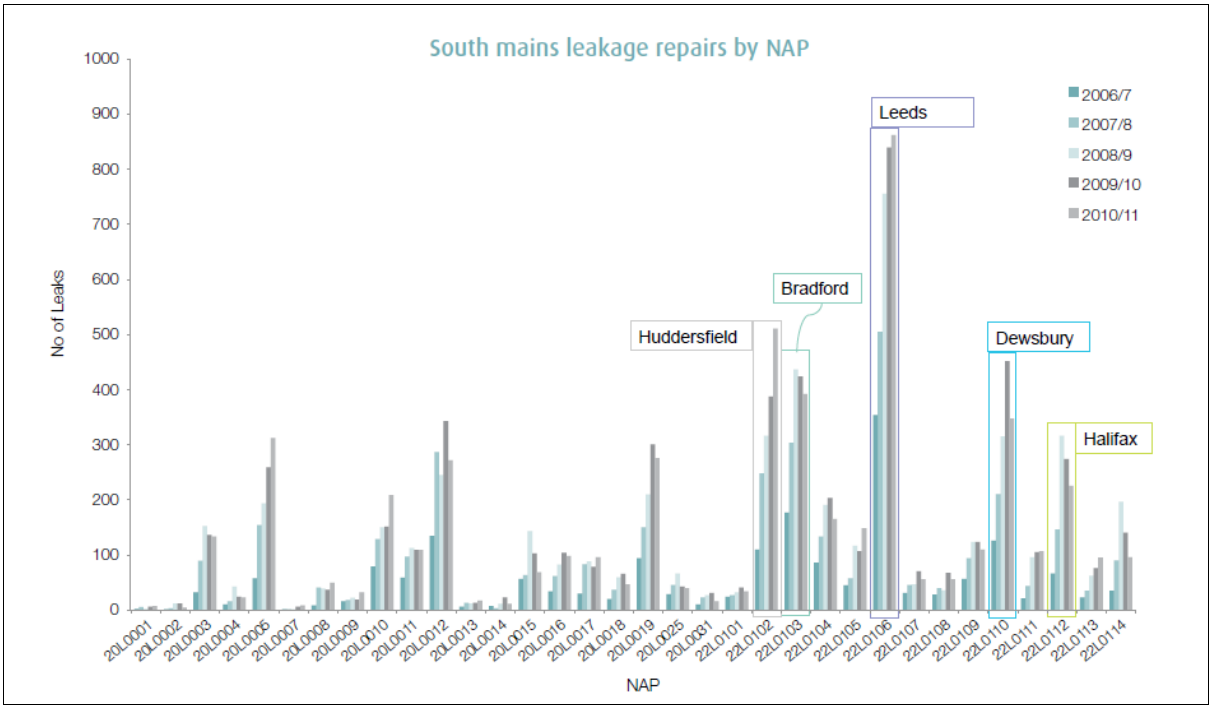


Figure 4.11: South mains leakage repairs by NAP

Re-focusing investment in areas such as Leeds and Huddersfield delivers a more effective return. Further analysis of Leeds' repair data by cause, as shown in Figure 4.12, reveals that the key drivers are failures of steel pipes rather than cast iron, which traditionally has been the focus of investment. It also shows that 4" spun iron (SI) Pipes are the single highest source of leakage.

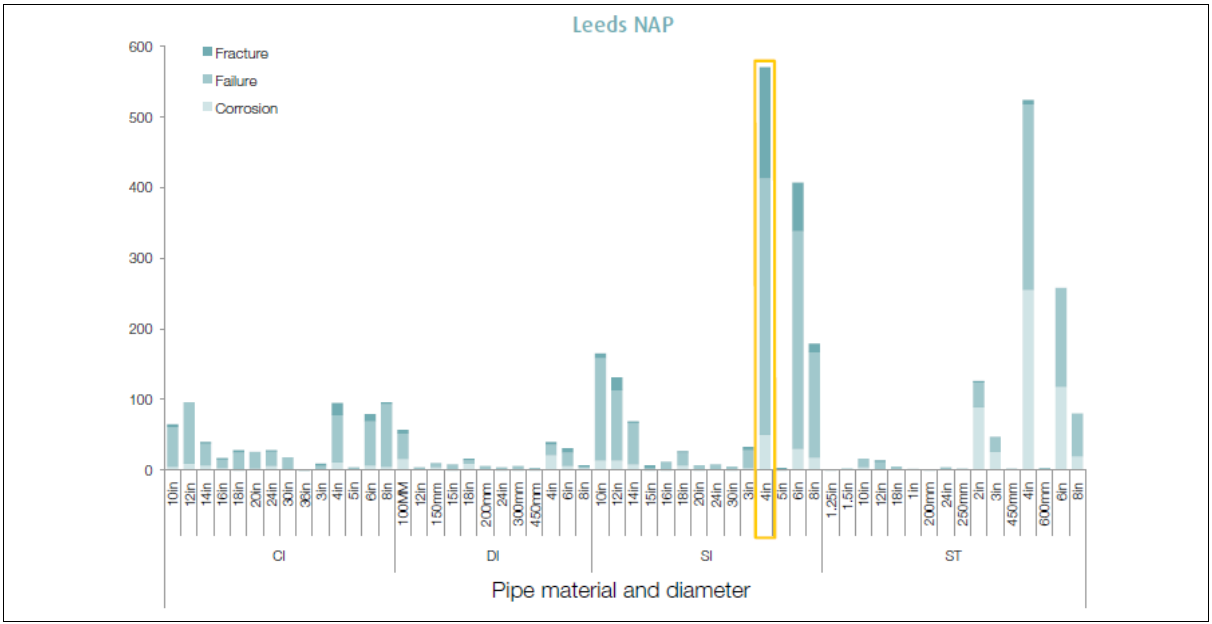


Figure 4.12: Leeds NAP

Conversely, for Huddersfield, the main drivers are 4" and 6" cast iron pipes, illustrating the requirement for different solutions in different NAPs.

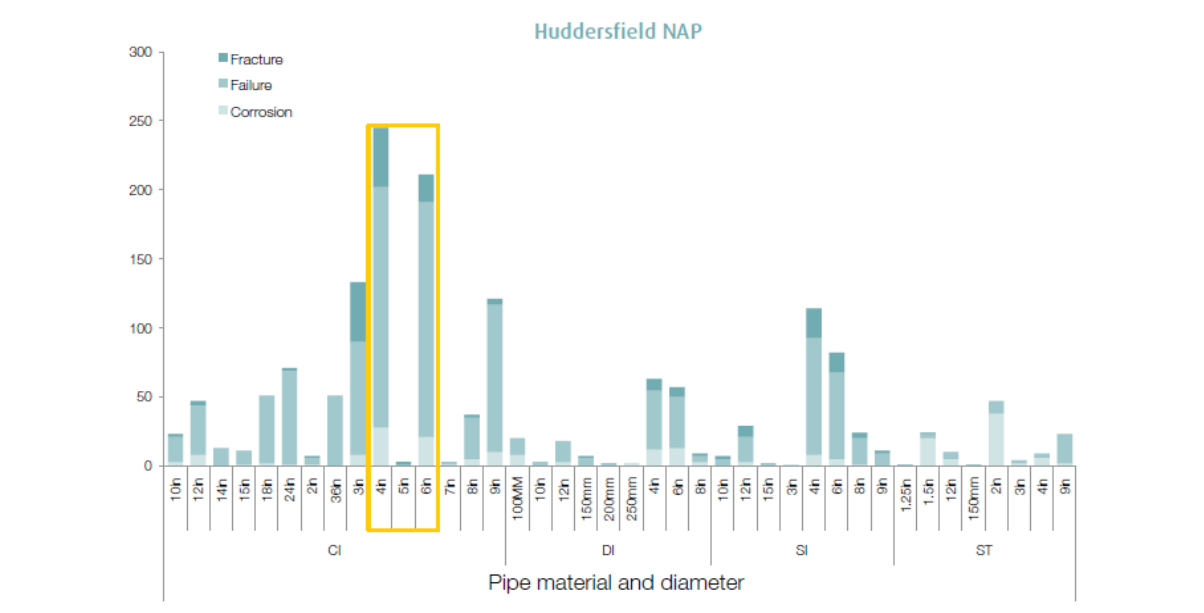


Figure 4.13: Huddersfield NAP

By homing in on the precise asset class that is under-performing, and utilising operational data, (in this case repair rates) to deduce asset condition, it is now possible to design an appropriate remedial programme. In practice the solution entails a combination of pressure management, replacement of pipes in problem hotspots, and pipe lining treatment.

By analysing asset data geographically and at high resolution, it is also possible for the solution to be implemented efficiently from a logistics perspective.

i Leveraging multiple solutions

Leakage management is a good example of where multiple solutions are applied in concert. Figure 4.14 illustrates the relationship between network pressure and leakage.

Pressure is a function of network demand, the performance of PRIs, and accuracy of pressure control systems. It illustrates the importance of our TNM approach in being able to identify opportunities to substitute one form of investment for another, in this case investment in control systems or upstream assets in place of wholesale investment in pipes.

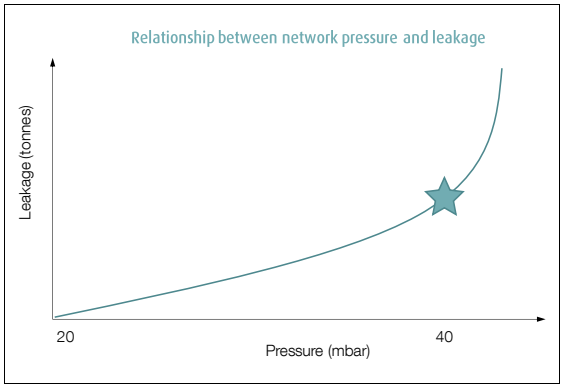


Figure 4.14: Relationship between network pressure and leakage

Leakage analysis has been undertaken for Huddersfield, where 4" cast iron pipes have been identified as the key issue. We consider the problem could be solved over a period of one to two years of concerted replacement efforts, supplemented by active pressure management. System pressures have risen in some areas by 60% in order to meet demand. This carries an inevitable increase in leakage rates, which can be managed down through intelligent active pressure control systems.

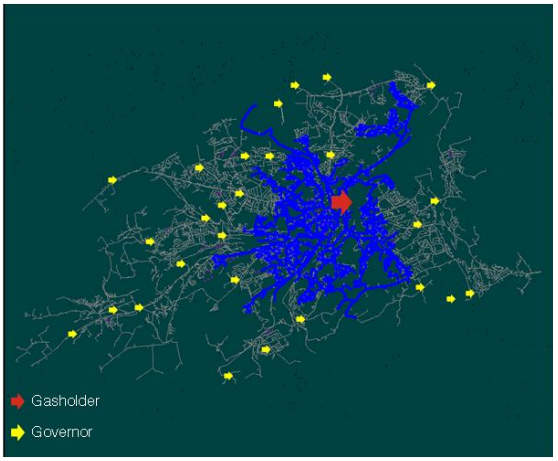


Figure 4.15: Huddersfield gasholder station zone of influence under winter settings

Figure 4.15 shows the Huddersfield station zone of influence and the extent of upstream governors that need to be considered in designing the pressure management control system.

This smart solution demonstrates TNM in action.

The Huddersfield programme also neatly illustrates the advantages of a zonal approach where close engagement with stakeholders is more effective when programmes are identified with local geographic identities. In this particular case Kirklees Council is a key stakeholder.

4.4.7 TNM incorporated into this plan

This plan has been developed incorporating the principles of TNM, seeking to minimise the overall cost of delivering the core outputs in RIIO-GD1. The impact can be seen in several key areas of our proposals.

- Reduced cost for delivery of the Repex programme;
- Reduced emergency, repair and maintenance workloads and costs;
- Enhanced levels of network reliability and asset health;
- Reduced leakage and environmental emissions; and
- Significant productivity improvements in RIIO-GD1.

This new business model and the new approach to the management of the network are wholly consistent with the key principles of RIIO. As a result NGN is well placed to address the industry challenges over the RIIO-GD1 timeframe and deliver our commitments to customers.

4.5 Innovation investment programme

Given our corporate vision, our wider performance challenge and the size and scope of the future issues we face, we are proposing a step change in our innovation activity and expenditure in RIIO-GD1. NGN view its innovation strategy as dynamic, not a one-off, exercise. It will evolve as a result of changes in customer demand and environmental issues. Our transformational business innovation changes including the business model, TNM and Customer. These and others will form part of our business as usual changes. Our climate and culture is being built around delivering a mind-set focused on innovation.

Many of the issues and challenges that we, other companies and the wider energy market will face are only now being fully realised and are in their relative infancy in terms of understanding and what the appropriate response should be.

Under RIIO-GD1 innovation type has very much focused on technological and process incremental projects improving existing product/service/process.However these major challenges and issues require substantial investment with uncertain or unclear outcomes over the long term.

With a Network Innovation Allowance of 0.5% NGN feels it could only focus on the short or medium term projects with fixed costs and known outcomes. As a consequence many of the real transformation breakthrough research and development areas will not be pursued.

By employing the full 1% of our regulated allowance in conjunction with collaborative partners major significant changes will occur with a positive impact on the whole industry.

Each of the proposed projects has been developed as a direct response to the challenges we face. The programme includes a build-up of work in the key areas from 2012 continuing into the RIIO-GD1 period and beyond. Further details of these transformation projects can be found in Appendix A19.

Key:	Business as Usual	Shorter Term	Medium Term	Long Term	Network Innovation Competition	Benefit Areas						
Delivery Method	Innovation Project					Safety	Asset Management	Customer & People	Operational Efficiency	Environment	Social Obligations	Other - Defined Learning
Business As Normal Innovation	Business Model						√	√	√			
	Total Network Management					√	√		√	√		
	Asset Health						√		√	√		√
	Customer & Operations Management					√		√	√			
Network Innovation Allowance - Incremental	Low Carbon Economy Initiatives Alternative Fuels for Vehicles							√	√	√	√	√
	Gas Conditioning Study (MEG)					√			√	√		
	Carbon Monoxide Awareness and Safety Through Alliances					√			√			
	Local Authority, Utilities and highways Alliances							√	√			
	System Control Operation Simulator					√	√					√
	Automation of Supply Chain reporting						√		√			
	Enhanced Smartphone Technologies Direct Updates					√	√	√	√			
	Remote Monitoring & Control					√		√	√			√
	Post Smart Metering Emergency Meterwork for Suppliers (PEMS)							√	√			√
	CCTV inspections					√			√			√
Network Innovation Allowance - Transformational	Innovative Excavation & Reinstatement Technologies					√		√	√	√		
	Developing Strategies for Storage and Leakage					√	√		√	√		
	Customer Interface Platform							√		√		√
	Planning Smart Meter Data Capture, Using to inform the Leakage Model					√	√	√				√
	Reduced Carbonisation of Natural Gas						√		√	√	√	√
	Alternative Aerial/Satellite Surveillance & Gas Detection					√		√		√		
	Turbo Expanders Energy Generation					√		√	√	√		
	Configuring for and managing assets on a smart grid					√	√	√	√			
Network Innovation Competition	Delivering Renewable or Alternative Heat and Power to High Rise Buildings					√	√	√		√		√
	Compressed Natural Gas for Vehicles						√	√		√		√

Figure 4.16: NGN's proposed innovation investment programme RIIO-GD1

4.5.1 Environment

The challenge for NGN in the environmental area is threefold:

i Reduce Business Carbon Footprint (BCF)

We are looking at a range of initiatives to implement in RIIO-GD1 which will reduce our BCF. There are three areas within our innovation programme that have been identified for further research and development:

- Alternative fuel sources for operational vehicles – examining the potential for using alternative low carbon fuels for our fleet, including biomethane. We will also examine the opportunity to work with other utilities in our region to share the benefits of economies of scale and scope;
- Turbo expander energy generation – examining the potential to use technology at our offtakes to utilise the energy currently wasted when pressure is reduced in creating electricity. Also to offset our on-site pre-heating requirements; and
- Cross-utility low carbon roadmap – working with other utilities in our region to identify any overlap in the delivery of carbon reduction programmes.

ii Reduce emissions of natural gas

- Gas conditioning - to optimise the use of MEG as a treatment of pipe joints on the network to maximise potential for leakage reduction; and
- Remote monitoring and control - to optimise governor pressure settings to meet demand based on short term forecasting and actually recorded pressure profiles; remotely manage district pressures without the need to visit site; use fixed network pressure recorders to profile network demands over hourly, weekly and monthly settings.

iii Facilitating the broad environmental agenda

We clearly have a role in delivering the transition to a low carbon economy. We are already active in addressing some of the main challenges and will continue this work during RIIO-GD1 in two key areas.

- Biomethane and non-conventional gas injection to grid – continue planned work in addressing the technical, operational and commercial challenges to bringing to fruition biomethane and other sources of non-conventional gas injection schemes; and
- Alternative uses of gas network – longer term project to evaluate how the gas network can be utilised in future energy scenarios, including localised gas grids, carbon capture and storage technologies.

4.5.2 Safety

There are three areas of safety we plan to address, including:

i Carbon monoxide awareness and testing

We are looking at innovative ways of delivering carbon monoxide and gas safety awareness including the development of a smartphone application. Additionally we propose to introduce technology and procedures that allow our emergency staff to test for the presence of CO while in customers' properties.

ii Alternative aerial/satellite surveillance and gas detection

We will evaluate the use of geographic information systems and modern satellite navigation systems to survey our assets. This will include the feasibility of using unmanned aerial vehicles for monitoring pipelines to detect possible interference.

iii Iron mains risk management

We will investigate how the rate of deterioration in iron mains is changing in different parts of the network in order to anticipate future risk levels and manage them through the replacement programme. Additionally, we will examine alternatives to replacing/abandoning pipe to manage the risk of failure.

4.5.3 Asset and network management

We will examine a range of key areas, including:

i Asset health data and metrics

To continue the development of our risk-based approach to managing operational assets and embed the process within the business.

ii Storage and leakage strategies

Implement plans to remove storage assets across the network. We will implement the TNM approach to ensure a more holistic view of network risk.

iii System control operation simulator

We will design and develop a software programme to simulate the daily system control operation of our network with the ability to run scenarios and analyse different future usage models.

iv Smart metering

We will plan to utilise data from smart meters to inform the network leakage model. We will also examine the potential uses of smart metering data in operating the future gas network.

v PE pipe succession asset life and condition

We need to understand the full asset life of first, second and third generation polyethylene (PE) pipes, and determine suitable maintenance programmes, as required by the Pipeline Safety Regulations.

vi Asset electronic tagging

We will test the feasibility of tagging assets so that historic asset performance and maintenance records can be accessed 'live' and kept up to date. This technology is more advanced than barcode technology and can hold more information.

vii Fully automated despatch system

We will develop an automated despatch system, requiring minimal human input, to manage our industrial workforce. This will improve the technology used by emergency and repair teams.

viii Innovative excavation and reinstatement technologies

We will use new technology to reduce the number of excavations. We will also focus on maximising the use of recycled material, and maximise the use of non-intrusive repairs.

ix Inspection and detection technologies

We will develop technologies that will detect faults or locations relating to our assets. These include but are not limited to: ground probing radar; bell joint location; PE mains tracing; and GPS pinpointing.

This programme reflects our current thinking and appreciation of the issues that exist at this time. The programme will be augmented and extended as we progress through the period and some additional projects will be identified and others discarded as the results of initial research and investigation become available.

This represents a comprehensive plan to address the key issues and challenges we will face over the period supported by a robust framework to identify and deliver significant benefits to customers and stakeholders in the short, medium and longer term.

4.5.4 NGN's innovation in biomethane entry connections to the gas distribution network

NGN has already demonstrated its ability to innovate to meet the future requirements of the network in working with the emerging biomethane market. Our achievements to date include the following.

- NGN made the first connection offer in the UK to a commercial biomethane scheme;
- NGN was the first GDN to define and publish a process for dealing with biomethane connection enquiries including specified standards of service for response times;
- NGN has established partnerships with a range of biomethane developers (e.g. individual farm projects, water companies) and other parties to work on initiatives which have increased the industry's understanding of biomethane connection; and
- NGN's work on biomethane was recognised in this year's Discretionary Reward Scheme.

In terms of future innovation we detail three examples of our work.

i Commercial/contractual innovation

We have been developing a connection agreement and application process in partnership with biomethane developers to ensure they have maximum flexibility to procure some or all connection equipment making the process as contestable as connectees desire. This approach ensures barriers to entry are minimised whilst delivering efficient connections.

ii Upwards compression

Biomethane producers tend to be geographically fixed linked to the anaerobic digester producing the gas e.g. farms and sewage plants. This means the plants have to connect to the part of NGN's network closest to them. If this is a rural location there will be insufficient capacity on the gas network to accommodate such connections. To overcome this problem we are trialling a new technology, "upwards compression."

This technology will enable biomethane plants to inject gas to the low pressure network, then compressed and transported up the pressure tiers, alleviating potential constraints on the distribution mains.

If successful, this would enable biomethane plants to connect anywhere on NGN's network without constraint throughout the year. Clearly this would increase the scope for biomethane connection on NGN's network and across the UK.

We are undertaking this work in partnership with a commercial developer. A feasibility study and simulation using live system data were successfully completed in 2009 and 2010.

We are now about to start a field trial of the compressor equipment on an isolated area of the network. If the field trial is successful the compressor will be tested on a commercial site and can then be rolled out as a new technology. All results will be shared with the other GDNs and the wider industry.

iii Monitoring equipment test bed

Biomethane connections comprise a number of different assets. Some of this equipment is required to ensure the quality of gas (and calorific value) entering the distribution network is within standard Gas Safety (Management) Regulations (GSMR).

At present only a limited number of types of monitoring equipment have been approved for use by Ofgem. However, there is a much greater range available on the market. Expanding the choice of equipment should increase competition and drive down costs in this market to the benefit of bio-methane developers.

To facilitate this we have designed a 'test bed' which will be installed at biomethane connections and run in parallel to the standard approved equipment. This will allow NGN and other collaborating parties to test alternative monitoring equipment. The data generated will enable this equipment to obtain the necessary approvals.

As we connect biomethane plants over the next few years we will also install these test beds to ensure the widest range of equipment is trialled and approved. We will share all data and information from the trials with the wider industry.

4.5.5 Governance and process to support innovation

NGN view the innovation strategy as a dynamic plan which is constantly added to, tested and measured for success. For NGN this is not a one-off exercise where a plan is created and followed for the RIIO-GD1 period. Industry and network challenges will change and a process needs to be in place to allow NGN to respond to this.

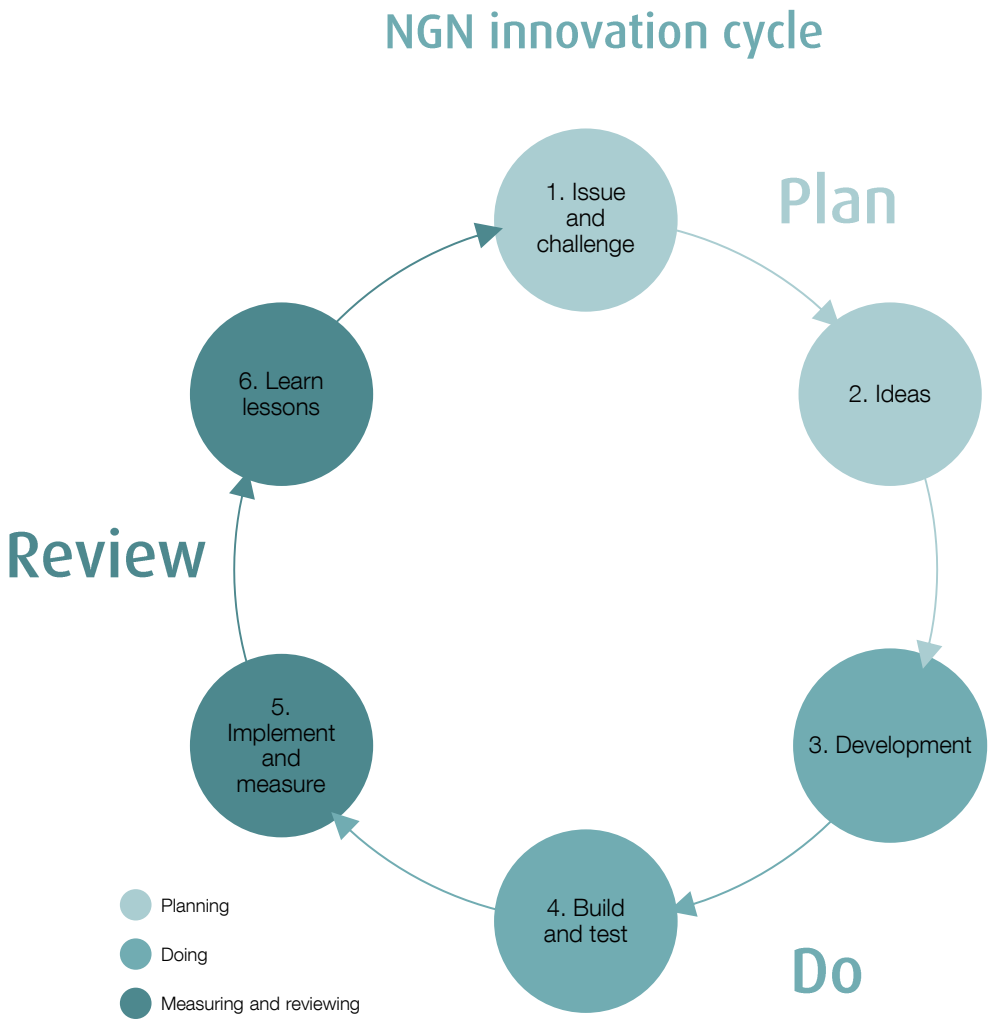


Figure 4.17: NGN innovation cycle

A clear governance structure and set of regular, core activities allows NGN to keep robust control of the expenditure and direction of innovation. The core activities, their purpose and frequency are outlined below.

Stage	Area	Actions	Purpose	When	Responsibility
Plan	Issue & Challenge	Supply Chain Engagement	Gather new ideas for innovation topics and challenges and share success	Quarterly	Stakeholder Manager
		Employee Suggestions Review	Business Areas to review all new suggestions and identify issues. Prioritise for implementation	Quarterly	Business Area Innovation Leader
		Stakeholder Review	Obtain feedback from stakeholders	Annually	Stakeholder Manager
	Ideas	Business Area Review	Each business area to report on how there will demonstrate they are meeting the Innovation Performance Challenge: Implemented Ideas Short Term Plan Long Term Plan	Half Yearly	Business Area Innovation Leader & Chair of NIG
		Senior Management Review	Review completed work and progress of all projects, control and monitor approved projects	Half Yearly	Chair of NIG
		Network Innovation Group (NIG)	Ensure governance process is operating, review business areas performance against challenge, monitor approved costs and spend, review business cases, recommend projects for approval, manage innovation budget, produce annual report	6 weekly meetings Annual Report to Senior Management	Chair of NIG
Do	Development	Business Case Approval	Develop idea into workable solution. Produce business case with options and costs. Obtain necessary approval. Review NIC &Ofgem Innovation Plan	Quarterly Business Review	Business Sponsor
	Build & Test	Test Solution	Undertake trial, test idea, obtain feedback and measure benefits. Follow timescale set out in business plan	Stage gate review within Business Case	Project Manager
Review	Implement & Measure	Manage Implementation	Undertake full implementation based on trial results with agreed modifications. Manage implementation, track spend and measure results.	Stage gate review within Business Case	Project Manager
	Learn Lessons	Post Investment Appraisal	Review project costs and objectives against original plan. Develop learning from process feed back into issues and challenges. Report outcomes to NIG	Submission of Completion Document	Project Sponsor & Chair of NIG

Figure 4.18: NGN innovation process monitor

i Network Innovation Group (NIG)

This group forms the main governance control mechanism for all NGN's innovation initiatives. It reports to the NGN Senior Management team via the Director of Asset Risk Management, who is the group's sponsor.

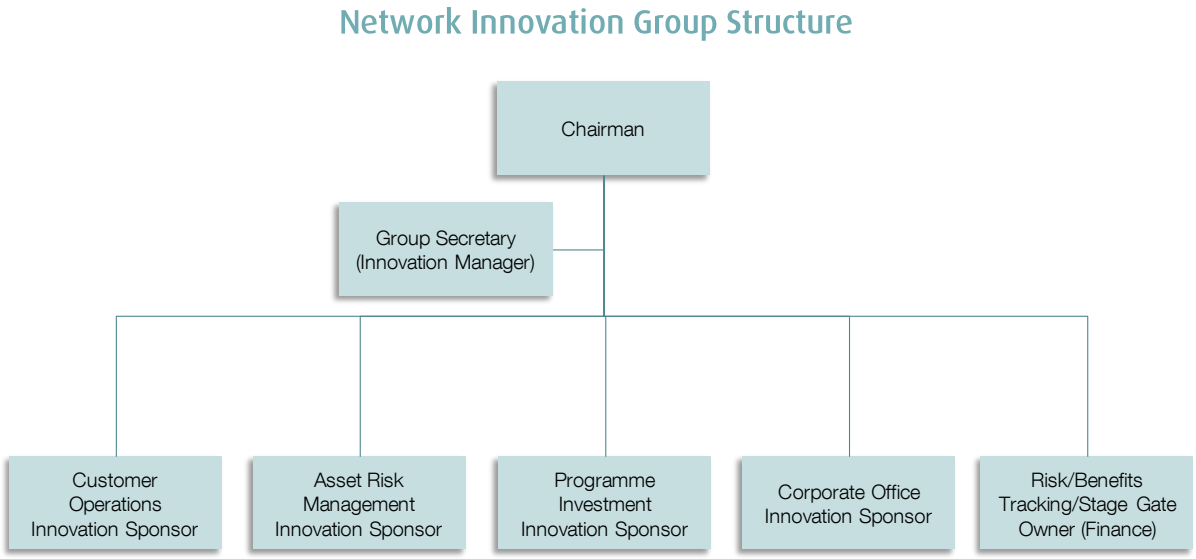


Figure 4.19: NIG structure

The group draws upon expertise from across the business, ensuring that the pressures and challenges that the company is facing are clearly identified and our innovation portfolio is robust and fully representative. This first step in the innovation process is supported by a framework which looks to capture ideas and suggestions from a wide base of stakeholders.

ii NGN employees

We have an employee suggestion scheme where ideas, comments and challenges are submitted and reviewed by the NIG. Suggestions that meet the assessment criteria are progressed to project appraisal and submitted for approval. This forms part of a culture of innovation which is being developed across the organisation. Employees receive rewards for ideas which are progressed to deliver business and/or customer benefits.

iii Contracting partners and suppliers

Our contracting partners and suppliers play a significant role in the delivery of our core services. They bring with them valuable knowledge and experience from the wider market place. We currently have very close working relationships with all our major suppliers, operating a programme of developing and introducing innovative products. We look to share experiences in the use of new techniques, technologies and commercial arrangements that can address the challenges we face.

iv International best practice

We have close ties with several international utilities and seek to identify areas of best practice and evaluate how these can be translated to our own operations. Additionally we also utilise the significant international experience of the wider shareholder group of companies to identify and evaluate alternative technologies, working practices and commercial arrangements.

v Partnership and collaboration

The development of NGN's innovation agenda has clearly identified the benefits of collaboration and partnership in the evaluation, research, development and implementation of innovative ideas and in the identification of ideas and concepts.

vi Stakeholders and customers

RIIO-GD1 stakeholder engagement has shown the value this process can bring to identifying the challenges and bringing new approaches to address them. Our future stakeholder engagement will build on this.

The delivery of innovation projects will be through a combination of internal resources collaborating with external organisations and parties. Our experience has shown that this collaborative approach is the most effective means of delivering results across the process of developing innovative projects. The strategy will seek to leverage existing partnerships and build new effective partnerships in the RIIO-GD1 period and share best practice with the wider energy industry.

4.5.6 Implementation methodology

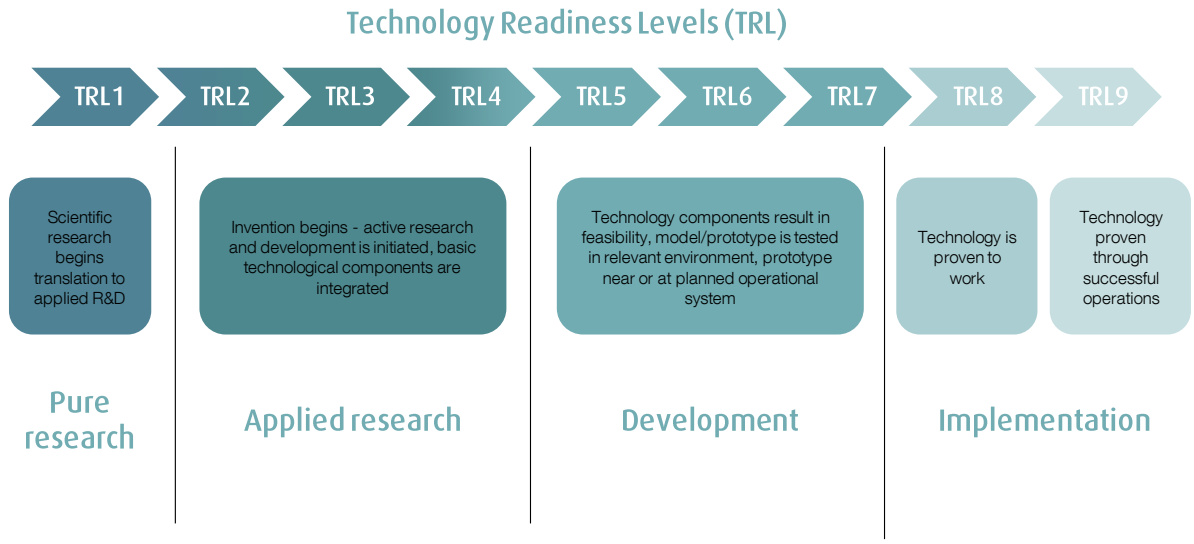


Figure 4.20: Technology readiness process

In order to successfully implement NGN's innovation strategy and realise its vision and objectives during RIIO-GD1, it is essential that we are able to define the innovation life cycle, identifying ideas through to implementation of proven innovations. A clear understanding of this life cycle or spectrum enables NGN to ensure our processes and business structures are aligned so that innovations are identified at the correct stage of development and feed into the appropriate part of NGN's business or collaborating partner.

In addition we can also identify where such innovations align with the objectives and criteria of the various regulatory innovation funding mechanisms.

We use the following nine-part 'stage gate' for all innovations. It is recognised as best practice in most industries. It is important to note that technology and innovation can be a business process or practice as well as a physical asset or piece of equipment.

Technology Readiness Level	Description
TRL 1.	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basis properties.
TRL 2.	Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.
TRL 3.	Active R&D is initiated. Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
TRL 4.	Basic technological components are integrated to establish that the pieces work together.
TRL 5.	Trust in the technology improves significantly. The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment.
TRL 6.	Model/prototype is tested in relevant environment. Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a laboratory environment or in simulated operational environment.
TRL 7.	Prototype near or at planned operational system - Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in an operational environment.
TRL 8.	Technology is proven to work. Actual technology completed and qualified through test and demonstration.
TRL 9.	Actual application of technology is in its final form. Technology proven through successful operations.

Figure 4.21: Technology evaluation and testing process

By aligning each innovation to a stage gate, we can ensure the innovation receives the most expedient treatment. In addition we can evaluate whether the innovation merits progressing to the next stage gate.

i Pure research

This is where ideas are generated and identified. Parties can come to NGN with ideas e.g. employees, stakeholders, specialist companies and academia. NGN can also approach suitable collaboration partners such as universities and research institutes. At this stage the objective is to try to capture all ideas and research with potential practical applications. NGN has put in place a number of initiatives to facilitate this phase of development.

- **Employee suggestion scheme**
  This enables ideas, comments and challenges to be submitted from anywhere in the business. The scheme is actively publicised across the business and employees receive rewards for ideas which are progressed to deliver business and/or customer benefits. This all helps embed a culture of innovation within NGN.
- **NGN's innovation website**
  This is a simple way for the public and stakeholders to submit ideas to NGN. The website also serves as the collaboration platform for the NIG, enabling collaborating partners to submit their ideas. Details can be found at: www.northerngasnetwork.co.uk

- **Utilisation of existing stakeholder engagement and relationships**
  Ideas can be discussed and solicited from existing fora and commercial relationships e.g. suppliers and equipment manufacturers. A key factor here is developing and establishing relationships with collaboration partners such as universities and research bodies.

All ideas are reviewed and tracked and where assessment criteria are met, progressed by the NIG.

ii Applied research and development Implementation

At this stage ideas are translated into tangible applications. Such applications may come to NGN in mid development or will be ideas passing the assessment criteria at the pure research stage. This is also the stage where international best practice can be identified with a view for application in the NGN and the UK. The key is to ensure these projects are developed by the part of the business, or collaboration partner, with the most relevant expertise and experience.

- Market testing and tendering;

  If NGN uses a collaboration partner at this stage it can utilise its existing frameworks to ensure the idea is developed as efficiently as possible and that the best ideas and most creative approaches are selected from the market place. NGN can also leverage relationships with suppliers and equipment manufacturers who have the capability and expertise to develop such projects and prototypes.

- Continual evaluation and re-assessment;

  Another key challenge is to ensure projects in this phase remain valid and are on track to deliver the intended solutions. For example, it may become evident that a similar innovation has already been trialled and patented in which case it will be prudent to cease development. The NIG is key in managing this process. Where projects are terminated, it is essential that all lessons are extracted and disseminated across the business and fed back into the stage gate process.

- Field trials;

  A key to developing technological projects will be using the physical network to trial and test equipment and other innovations in isolated and live areas. Potentially data from such trials can be shared with the wider industry.

iii Implementation

At this stage in the process, the initiative or technology is fully proven and ready for rollout in NGN and the wider industry. Challenges will exist around efficient manufacture, implementation and distribution. At this stage NGN may need to transition from a specialist collaborative partner focused on innovation development to a specialist manufacturer or distributor. We will utilise our existing business structure and processes to roll out the proven innovation within NGN efficiently and on time.

4.6 Benchmarking and best practice

As described elsewhere in the business plan, we have maintained our position at the efficiency frontier since we demerged from National Grid in 2005. We remain committed to retaining our position at the frontier whilst continuing to operate a safe, reliable network.

This section shows how we achieved this position by using market testing, benchmarking and best practices on a national and international basis.

Further detail of our systemic approach to benchmarking can be found in Appendix A3.

4.6.1 Contractual expenditure

Our contractual spend across Opex, Capex and Repex is annually c.£145m. It is critical that we test the market to ensure our approach to procurement is efficient and that we are at the leading edge of innovation.

Once a definite business need for a product or service has been identified and the procurement process is initiated, contracts have to go through various market testing processes dependant on the contact value. All high value contracts go to full tender and the majority of those under that level require three quotations. As a result, we can be certain that we consistently achieve the best solution, efficiently, for at least 80% of our expenditure in this area, whilst complying with the appropriate EU Utilities Procurement Directive, UK legislation and known best practice.

Wherever possible, we carry out market testing and benchmarking on an international level to allow us to take advantage of market conditions and international innovation. This includes recent investigations into potential PE pipe suppliers outside the UK (as far afield as the Asian markets), our work with US and Japanese gas distribution companies, which is detailed elsewhere in this document, and ensuring that we are taking advantage of the economies of scale available as a result of being part of the wider shareholder group (e.g. IS contracts).

Nationally, we also work with others who have a shared interest to maximise efficiency, such as our deals with Ford and Vauxhall where we collaborated with several other companies.

Our use of the Achilles system allows us to proactively identify and contact suppliers with the necessary skill sets at the prequalification stage.

Once the preferred supplier has been confirmed, we continue to build efficiencies at a contractual level by implementing Key Performance Indicators (KPI's) with pain/gain mechanisms, such as those in the hugely innovative Strategic Asset Management model, the replacement partnership framework agreements and facilities management contracts. This is facilitated by our continued move into NEC and JCT contracts, which are recognised as best practice.

Internally, the drive for efficiency continues once goods have been delivered by proactively managing operational stock rotation to minimise the amount of capital tied up in latent stock at any time.

Regular meetings are held with the other networks and shareholder group companies to allow benchmarking to take place and ensure that we take advantage of innovations and best practice. We will continue to compare key supply contract pricing and strategy best practices with the other GDNs and shareholder group companies.

We will also seek to improve our business intelligence through commodity market testing, such as tracking the price of raw PE polymer (our biggest single goods spend) to ensure cost savings are being passed on from suppliers. There will also be a greater focus on e-procurement.

In addition, sustainability will be a key driver moving into the RIIO period, whereby ethical sourcing, energy efficiency and an increased focus on renewables will be balanced against maintaining our core value of achieving the best solution for the business at the best possible price.

We believe that this strategy is the best way to ensure that we remain at the efficiency frontier, achieve our company vision and most importantly meet the challenges of the RIIO model.

4.6.2 Workforce

Our workforce is at the centre of all of our activities and is critical for maintaining a safe and reliable gas network. It is essential that we benchmark against other companies to ensure we have a cutting edge, flexible and efficient workforce and to identify innovative ways of ensuring our workforce exceed the norm.

Operationally, we ensure that our staff are trained to the standards set by Gas Safe and Energy and Utility Skills, who use national benchmarking data to recommend the best training available for our employees to conform to best practice whilst maintaining a customer focused, reliable, safe, environmentally sound network at the forefront of the efficiency frontier. This in turn feeds into our apprentice development and ongoing workforce training.

All our customer facing staff undergo annual customer training to ensure that the focus remains on customer service best practice.

To ensure our payroll costs are efficient and meet best practice, The Hay Group are used to ensure salary and benefit benchmarking with similar roles nationally and to improve succession planning. This continues to be introduced across the business.

We carry out an annual employee opinion survey, benchmarking us against national and international norms and helping us introduce international best practices to improve workplace productivity.

We are currently trialling the Greenroad scheme, which encourages driving best practice at all levels across the business, thereby improving safety through a reduction in road traffic accidents and improving fuel efficiency (thus improving cost savings and carbon savings) through innovation. It is envisaged that this trial will mature into a full programme by 2013.

NGN has engaged with the National Skills Academy (Energy and Utility Skills) to benchmark and model future workforce requirements. This is an employer-led collaborative solution partnering with education and skills providers, funding agencies and other stakeholders to provide regionally focused skills. These include the following:

- Ability to respond quickly and flexibly to the changing recruitment and training needs of the sector;
- Pooling overall industry skills demand to command an economic price in the skills market and overcome barriers to skills investment;
- Access to best practice pastoral care and specialist training;
- Ability to recruit and train to meet future recognised demand;
- Multi-company attachments and rotation of work placements; and
- Supporting growth in the existing training provision infrastructure.

4.6.3 Examples of benchmarking and best practice comparison

As a company, we are more than aware of the need to constantly compare ourselves to other companies on a local, national and international level if we are to retain our position as one of the UK's most efficient and safest gas networks. Indeed, it is fundamental that this occurs if the challenges set under RIIO are to be met.

We regularly compare and share innovations and best practices with the other utilities in our operational area on a local level, other GDNs, utility companies and ex-public companies on a national level, and a range of companies on an international level.

Evidence of our systematic approach to benchmarking can be found in Appendix A3 and in the following examples.

With a Japanese gas distribution company we have carried out compare, contrast and learn activities on the following:

- Workload planning methodology;
- Mains replacement/insertion methods/ pipeline technology, maintenance regimes and technology;
- Leakage inspection;
- Mains location identification;
- The use of smart metering and slamshut technology;
- Mains data recording/mapping;
- Pressure monitoring and control;
- Leakage/escape performance and emergency response;
- Major incident control and response; and
- Workforce training.

The project has been a huge success and has confirmed areas where we can learn from each other mutually. This will be repeated on a regular basis, with a view to moving into an employee exchange programme.

With a US gas distribution company the discussions were along more tentative lines than with the Japanese company partner but the detail covered was broadly same. There was however considerable learning on winter responsiveness. We plan to build on this relationship in the future.

We have been used as a benchmark by other companies, including an anonymous operator of several UK, airports to compare capital expenditure strategies.

We also regularly benchmark and share best practice on an international level between shareholder group companies on efficiency, social obligations, safety, customer satisfaction and environmental performance.

The Greenroad scheme encourages international best practice for driving safety and fuel efficiency thus reducing cost.

We understand that we are on track to be the first network, at a commercial scale, to inject biomethane into the gas network. Biomethane is carbon neutral, so this activity will help to reduce our carbon footprint and the carbon footprints of our customers, helping the UK reach its climate targets.

Our pioneering work on recycling the material excavated from our trenches rather than using virgin aggregate continues to deliver efficiencies and minimise our impact on the environment.

We have also moved away from using hazardous substances in our mains sealant and spillage treatment kits, which mean that any waste produced has a minimal impact on the environment.

We are an active member of the Institute of Customer Service (ICS) whose code we use to ensure that we are working to national best practice. Going forward we will be working with the ICS to benchmark ourselves at the highest level against national and international companies. We are committed to not only being the best GDN, but amongst the best companies nationally.

4.7 Summary

The TCO approachis at the heart of our innovation strategy. Our new integrated business model has been designed to enable TCO.

The new TNM processes are integral to NGN's TCO approach.

Our innovation plans and approach to the use of benchmarking and best practice will continue to support our drive to build on our frontier position.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Stakeholder engagement

5

The views of our customers and other stakeholders are important to NGN. They provide a vital direction and focus to improve our service delivery. To develop this plan we implemented an enhanced engagement programme to ensure all stakeholders were given an opportunity to engage with us. This built on our existing stakeholder engagement activities and has provided valuable input. This section explains how we have incorporated stakeholder views into our business plan.

Executive Summary

Stakeholders require NGN to manage a value for money, safe, reliable, customer and environmentally focused network. That is our experience based upon six years of two-way communications and reinforced by the engagement programme which we delivered for this business plan.

Our stakeholder engagement process drew upon a cross-section of customers, interested individuals, groups and organisations. We have engaged with them by email, the internet, letter, telephone and face-to-face; individually, in small groups and in large groups. Some were engaged just once; many had several opportunities to become more closely engaged.

This comprehensive strategy not only ensured that we engaged with our stakeholders, but that they were closely involved in the development of our business plans. They were provided with multiple opportunities to deliver their views. They told us their priorities and directed us on where outputs should improve and where they were content for others to be maintained at current levels. They emphasised the need for a value for money gas distribution network, and when they understood our initial spending plans, they clearly told us they were too expensive and directed where we should make adjustments. This reduced our expenditure forecasts by c.£250m over the RIIO-GD1 timeframe.

Not everything which our stakeholders suggested has been included in this business plan. The stakeholders themselves have been informed why and some are described in this section.

Stakeholders have shaped this business plan and delivered a clear message: continue to provide a safe, reliable, customer and environmentally-focused business.

We are committed to delivering this for them and to continuing our inclusive relationship with them.

5.1 Background

To deliver NGN's corporate vision, it is clear that we must work closely with our various stakeholder groups. We must proactively provide them with the opportunity to comment and give feedback on our services, and enable a productive two-way dialogue to be established. The feedback from stakeholders directs and informs operational business decisions, allowing us to identify areas where our services are appreciated and recognised as best in class. It identifies areas where our services are appreciated and recognised as best in class. It identifies areas where our service delivery fails to meet the expectations of our various stakeholder groups and provides an impetus to plans for continual improvement.

We have, over the past six years, established a robust and meaningful stakeholder engagement strategy which delivers credible interaction across all stakeholder audiences. This captures our customers' views on what is important to them, how they rate our performance and how we can improve our service to them in the future. This strategy also includes and open, two-way communication process, under which feedback is reviewed and analysed and used to refine our operational delivery.

As part of the development of this business plan, our existing stakeholder engagement programme was enhanced to include the slightly wider range of issues and longer timescales associated with the RIIO-GD1 period.

Stakeholders were engaged on a range of issues and asked to consider our existing services and outputs, and a number of potential new services and outputs which the company could deliver. We tested the appetite for change by outlining the cost impact of these potential new services. The stakeholder engagement process delivered valuable feedback on this across all customer groups.

NGN has engaged with 1,700 individual stakeholder sand groups to ask them what they need, value and want from a GDN. NGN will continue this critical engagement as part of our on-going business operations.

It is clear that customers want NGN to run a safe, reliable and environmentally-focussed network which continues to deliver value for money.

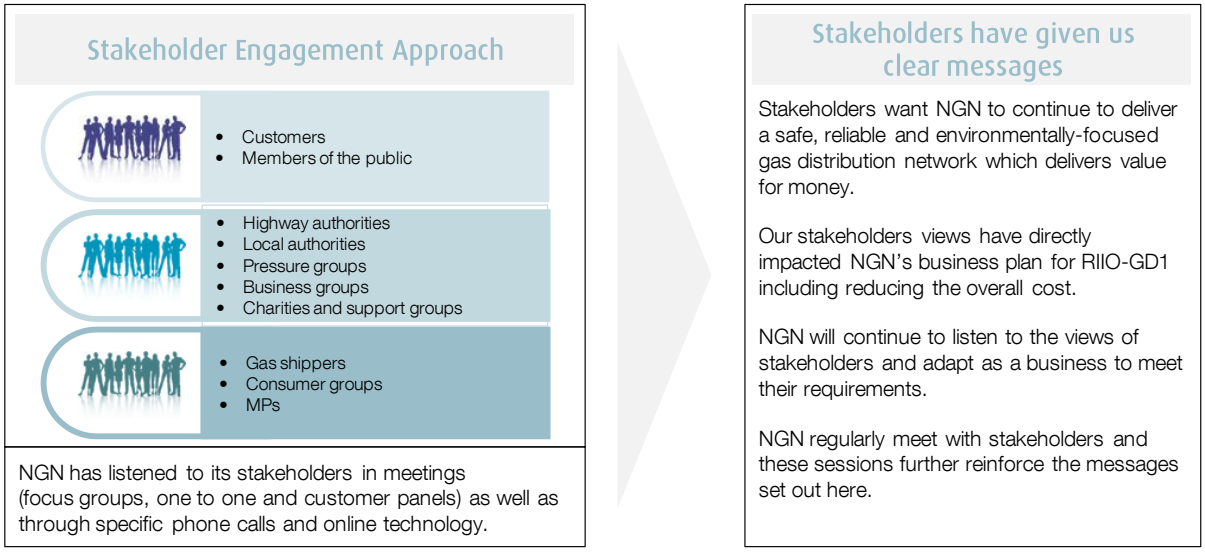


Figure 5.1: Stakeholder engagement summary

5.2 Key messages

The key messages delivered by the RIIO-GD1 stakeholder engagement exercise reconfirmed those gathered in our previous stakeholder feedback. The top priority issues for the general public and customers who have experienced our services (i.e. gas emergency visit, gas mains/ service replaced, new gas connection) are set out below. These results come from the two large customer surveys we undertook.

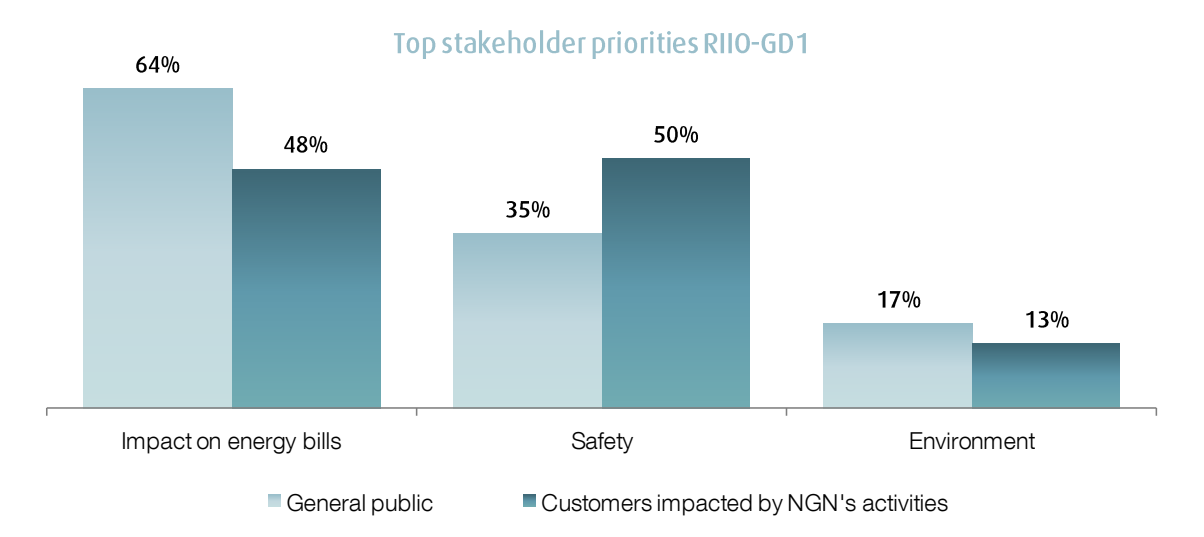


Figure 5.2: Top stakeholder priorities RIIO-GD1

In an environment of very high energy prices and depressed economic conditions it is not surprising that the top priority across almost all groups of stakeholders is a reduction in the cost of delivering our services and our impact upon customers' energy bills. In most instances this was clearly against a background where they did not wish to see any reduction of the levels of service provided by NGN, particularly with reference to safety and reliability, and were seeking assurances that our services represented good value for money.

It became apparent that stakeholders had not previously understood how much of their gas and energy bills reflected network costs. The majority of stakeholders identified that at approximately £130 per year (15-20% of the total gas bill), the services provided by NGN represented overall good value for money and the potential for NGN to impact the overall cost of the gas bill was limited.

However, they clearly expected NGN to continue to deliver value for money and did not want to see any significant increases in the transportation element of their gas bill.

This message was further underlined when a range of the enhanced service options proposed by stakeholders were costed and presented to customers to represent the impact on their bill. In almost all cases this simple willingness to pay exercise identified that customers would prefer to stay with current levels of service if any improvement led to an increase in their bills. This preference and clear statement on presenting value for money has been reflected throughout this plan. Most stakeholders were aware of and clearly identified the inherent safety issues involved in transporting and delivering natural gas and placed a high value on continued levels of safety. This was particularly the case for stakeholders who had experience of NGN or had previously been impacted by our activities.

The over-arching message was that current levels of safety must be maintained.

Stakeholders were broadly aware of how our activities impact upon the environment. Environmental concerns and issues are relatively high on stakeholders' list of priorities. They would like NGN to do more to minimise the impact of our activities on the environment, both in terms of emissions and the use of natural resources, but not at significant additional cost to them.

Most stakeholders had not experienced an interruption to their gas supply and the issue of reliability was not high on their agenda. However, further analysis has identified that stakeholders valued the high levels of reliability that the gas network currently provides and that level should be at least maintained. In short, they took for granted the safe and reliable delivery of gas.

There were several suggestions which stakeholders made, which we evaluated but chose not to implement.

One example which we have discounted was a request to carry out planned mains replacement works only between March and November and not in the winter months.

We have discounted this, and explained our reasons to the customers who requested it. This way of working would place undue pressure to complete the required levels of planned works in a shorter timeframe each calendar year. Removing the ability to work in four months of the year would require a significant increase in the number of people employed for the remaining eight months. This would increase contractor costs (as they would only have work for their teams of engineers for two-thirds of the year), increase pressure on local authority highways planners, and lead to significant increased costs in our mains replacement works, which ultimately would be passed on to our customers.

Another example was a suggestion to deliver a faster service for customers requesting a new gas connection. We discounted this because we already greatly exceed the required standards and improving this would require additional resources, and greater costs, which would be passed to customers.

Some stakeholders also suggested that when an emergency engineer attended a call to the home of a vulnerable customer, the engineer should not leave the property without a live gas supply. This was to address the instances where an engineer had to isolate an appliance, or even the entire supply, as a result of a carbon monoxide problem or a problem with an appliance or appliances requiring further investigation or service work.

We explored this suggestion by quantifying the number of vulnerable customers in our network and worked out a cost based on an estimated average time to carry out the work and estimated costs for parts. In addition there would be the cost of further training for our engineers. Another option was for us to bring in a competent sub-contractor to carry out the necessary work. We calculated the increased cost per household would average a c.16p/year. Legislative changes would also have been required. We decided not to pursue the idea and communicated our response to the stakeholders.

In response to stakeholder feedback we have reduced our forecast expenditure in RIIO-GD1.

Our current expenditure plans represent a reduction of c.£45m per year (c.£360m in total in RIIO-GD1) when compared to our previous plans (on a consistent basis) whilst still delivering improvements in safety, efficiency, customer service and environmental performance. This reduction is shown in Figure 5.3 and Figure 5.4 overleaf.

This has been achieved by assessing our expenditure using a more holistic risk-based approach and identifying the key trade-offs between expenditure categories and the delivery of outputs largely enabled by the changes to the Repex proposals.

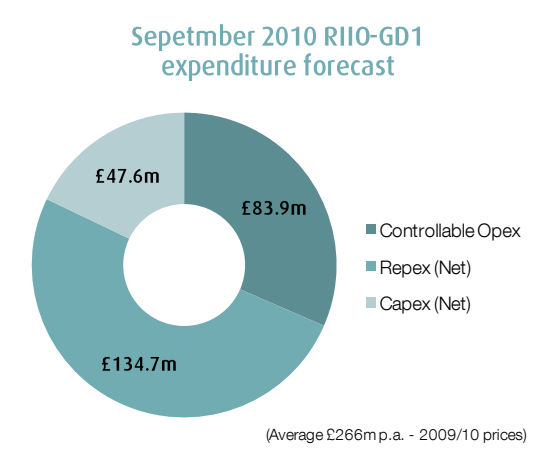


Figure 5.3: Previous RIIO-GD1 business plan expenditure forecast

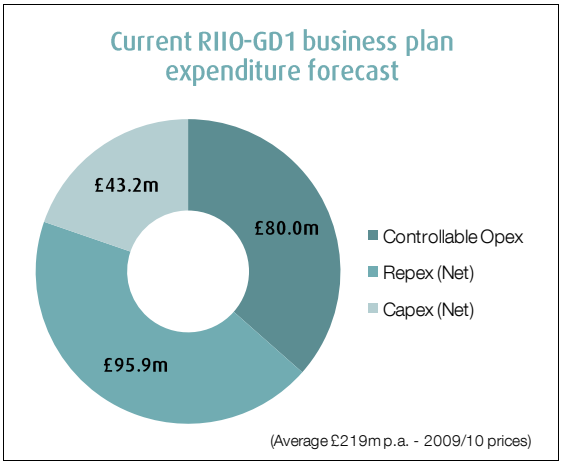


Figure 5.4: Current RIIO-GD1 business plan expenditure forecast

We believe our expenditure plans will deliver what our stakeholders demand: the safe and continuous delivery of gas, with improvements in customer service and environmental performance. More detailed feedback from stakeholders in each of the six output areas and our response to that feedback is set out below.

5.2.1 Safety

Stakeholders valued our approach and commitment to safety issues but challenged us to attend a higher number of controlled emergencies in one hour rather the two hours. Other feedback is detailed below.

Stakeholder feedback: Current rate of replacement activity is suitable and should not slow down despite the interruptions it causes.
NGN response: NGN's proposed updated replacement programme will continue to reduce the risk from iron mains and reduce costs when compared to the continuation of the current programme.

Stakeholder feedback: Replacement activity could be more focused on areas where there are a large number of leaks to reduce the number of visits to the same areas and sites to carry out repair work.
NGN response: NGN's proposed investment strategy is aimed at reducing this impact.

Stakeholder feedback: Response to emergency calls is good and the 97% target for uncontrolled escapes to be attended within one hour is suitable. Stakeholders demonstrated a concern that controlled gas escapes aren't responded to in one hour.
NGN response: NGN will maintain the current controlled and uncontrolled emergency response performance. Additionally NGN is committing to a target of attending 75% of controlled escapes within one hour.

Stakeholder feedback: A varied level of perceived quality of site safety but an overall appreciation of NGN's approach to site safety and injury prevention.
NGN response: NGN is proposing a range of voluntary output measures relating to operational safety.

5.2.2 Reliability

Most of the stakeholders we engaged with had not experienced a supply interruption and told us they took for granted their access to gas. They asked us to continue with this level of service. Other highlighted issues are detailed below.

Stakeholder feedback: NGN should maximise the utilisation/capacity of assets before considering upgrades and replacements.
NGN response: NGN has a good track record in delivering an investment strategy based upon only upgrading or replacing assets when absolutely necessary. We have been developing this strategy throughout Total Network Management approach that directly links accurate information about the condition of that asset with the impact of asset failure on service delivery. The investment programme in this plan is based directly upon this approach.

Stakeholder feedback: Shippers would consider contributing financially to an increase in offtake meter accuracy and reliability; they would also like an audit programme and a penalty for low service standards.
NGN response: NGN is committing to a target of no errors above the classification of 'low significance' during RIIO-GD1. To achieve this, we plan to invest to modify, update or replace assets to improve reliability (e.g. ultrasonic meters), and will continue to improve and amend policies and procedures and continue staff training.

Stakeholder feedback: There should be no degradation in the high levels of network reliability provided by NGN.
NGN response: An investment programme which delivers an increase in asset health in RIIO-GD1 will improve the integrity and reliability of NGN's network. We have committed to a package of reliability outputs that show improved performance over the period.

5.2.3 Customer service

Customers requested some minor fine-tuning of our customer service delivery but generally recognised our inclusive approach. Some of their queries are detailed below.

Stakeholder feedback: Provide key account managers for large NGN customers and provide other front line staff with training to improve service levels. This should include those dealing directly with industry users.
NGN response: All front line staff are being given additional training on customer service. We are placing more emphasis on our front line staff to deliver improvements in customer service. Account management for large sites will be covered by our stakeholder strategy.

Stakeholder feedback: Establish and develop good working relationships with local authorities to enable a synchronised approach to highway works to minimise repeated disruption.
NGN response: This is already being pursued with local authorities and other utilities operating within our geographic area and we anticipate further benefits during RIIO-GD1.

Stakeholder feedback: Simplify external communication to fully inform all stakeholders and use a variety of media, formats and languages to communicate.
NGN response: NGN has an ongoing programme to review its communication strategy to ensure that feedback from stakeholders is addressed.

Stakeholder feedback: Customers are comfortable with complaint resolution within 10 days so the D+1 and D+31 measures are suitable.
NGN response: NGN is committing to a 10% year on year reduction in complaints in the RIIO-GD1 period. Additionally we are committing to a target that 20% of all complaints will be resolved within D+1. All residual complaints are targeted to be resolved within D+31.

Stakeholder feedback: Stakeholder engagement and management has been viewed as inclusive and useful throughout GDPCR1 and the RIIO-GD1 planning process; this should be maintained.
NGN response: NGN has a long term stakeholder engagement strategy that is directly linked to its customer service strategy and which builds upon the successful engagement exercise undertaken as part of the development of this plan.

5.2.4 Environment

Most stakeholders want us to reduce the impact we have on the environment.

We were originally requested to demolish our gasholders and remediate the sites. However, when we informed stakeholders of the cost they revised the output to solely demolish without land remediation. Other environmental issues are detailed here.

Stakeholder feedback: NGN should maintain leakage reduction as a top priority throughout RIIO-GD1.
NGN response: NGN is committed to the delivery of a further 20.5% reduction in the amount of gas that leaks from the network during RIIO-GD1. This is equivalent to 280 GWh of energy or more than 500,000 tonnes of carbon emissions (tCO2e).

Stakeholder feedback: Strong support for GDNs to take an active role in assisting the development of biomethane technology but, do not expect GDNs to finance or subsidise these schemes.
NGN response: NGN has introduced voluntary standards of service for dealing with enquiries and the provision of information. We are actively exploring innovative approaches to address issues surrounding the injection of biomethane.

Stakeholder feedback: NGN sites with contaminated land should be remediated. However, stakeholders do not think that this should result in higher costs.
NGN response: NGN is progressing the commitment to manage our portfolio of 114 contaminated sites. The portfolio will be monitored, high and medium-high risk sites remediated and the environmental impact will be minimised.

Stakeholder feedback: Supportive of NGN's commitment to the use of recycled material and recycling facilities.
NGN response: NGN will maintain the use of recycled aggregate at 80% of total usage across the RIIO-GD1 period.

Stakeholder feedback: Would like visibility of NGN's business carbon footprint (BCF), including the scope three emissions (e.g. business travel and external contractors).
NGN response: NGN actively measures and manages our BCF and we intend to reduce our non-leakage carbon emissions. NGN is committing to a reduction in its BCF over RIIO-GD1.

5.2.5 Social obligations

We were asked to continue with our work to address fuel poverty and to increase our promotion of carbon monoxide (CO) awareness, as shown below.

Stakeholder feedback: When NGN engaged the general public, 76% of those asked believed we have a responsibility to do more about CO issues, such as:

- raising awareness of the risks of CO across the network;
- ensuring the public understand how to prevent the risks of CO;
- actively reduce the risks of CO on our network; and
- stakeholders, such as local authorities, believe NGN should carry out CO detection in properties and leave monitors with vulnerable customers.

NGN response: NGN is committing to delivering two key initiatives relating to CO during RIIO-GD1.

- Delivering a customer awareness programme in conjunction with strategic partners across the network to enhance the understanding of the risks and safety precautions relating to exposure to CO in properties.
- Introducing new procedures that will see engineers carry out atmospheric testing for the presence of CO at every property attended in response to a gas emergency call. NGN is imminently trialling this approach.

Stakeholder feedback: Strong stakeholder support for the continuation of an initiative to connect fuel poor customers to our network.

- The current programme for extending the gas network into socially deprived areas is supported by our stakeholders.
- NGN was challenged to extend the fuel poor scheme.
- It was also suggested that other sectors of society, such as outlying rural areas, should be considered for a similar scheme.

NGN response: NGN is committing to connecting an additional 12,000 fuel poor customers to our network over the RIIO-GD1 period.

5.2.6 Connections

Stakeholders believed our connections service was good but asked for a quicker service.

Stakeholder feedback: Our stakeholder engagement on connections identified several key issues.

- A quicker service, particularly in the scheduling of jobs following acceptance of quotation and completion;
- Providing an agreed plan date within five days of acceptance of quotation, would be a high quality service;
- Current standard of providing a date within 20 days of acceptance is deemed inadequate; 10 days would be a more suitable period; and
- New gas connections should be completed within one week of payment.

NGN response: At this stage NGN does not believe that there is a strong business case to increase the performance target from current standards. However, this plan includes a commitment to challenge the time taken to plan and schedule work following acceptance of a quote and to improve performance where it is efficient to do so.

5.3 Stakeholder engagement since 2005

The additional stakeholder engagement work which NGN undertook for RIIO-GD1 was a natural progression of the work which was already well established in the network.

The major routes of engagement which have been used since 2005 include the following.

Impression cards - An Impression Card is delivered to every property upon the completion of replacement, repair and connections works. These seek views from customers of their experience while our works were underway. We received more than 11,000 returned cards each year.

Complaints - We record and analyse all complaints seeking to identify the underlying cause and target improvement initiatives. We have successfully reduced complaints by c.74% since 2007.

Enquiries - Telephony introduced in 2010 provided the ability to record and monitor the number of incoming telephone enquiries. During 2011 we anticipate around 64,000 enquiries.

Customer liaison officers - The role of a Customer Liaison Officer (CLO) was introduced to be the eyes and ears of the organisation in the planning and pre-construction activities surrounding mains replacement works and also around sensitive repair and emergency work.

Public meetings - When we identify a mains replacement project which may be difficult to complete without significant impact upon the local population, a public meeting was arranged to enable the delivery of key messages about the work.

Website - The NGN website has the facility for customers to contact the company to raise issues, ask questions and make complaints. Annually we receive approximately 850 contacts, of which around 10% are complaints, and are included in the overall numbers recorded in the network.

5.4 Stakeholder input to RIIO-GD1 business plan

RIIO-GD1 provided a timely opportunity for the company to review its approach to both the development of the business plan and for the next decade.

NGN reviewed how stakeholder engagement was delivered in the utility arena in the UK and around the world, identifying areas of best practice to incorporate into our own service delivery. An extensive review was undertaken within the company to determine who to engage with and at what level in the external organisations. We also used an external consultancy to provide expert insight into this area of work.

For the business plan, we developed a strategy which would deliver touch points with all our stakeholder audiences, using the title Your Views Matter to give an easily understood and unambiguous identity to the work programme.

We identified that it was essential to engage with all stakeholder audiences, representing the whole of society: customers, gas users, suppliers and contractors, charities, gas shippers, politicians, local authorities and our own employees.

5.4.1 Stakeholder engagement approach

We developed a stakeholder engagement pyramid to deliver effective engagement across all stakeholder audiences and groups.

We identified the key stakeholders at each level and, for levels two and three, asked each stakeholder their preferred method of communication – mail, email, telephone survey, mail survey, face-to-face, one-to-one or one-to-groups. (The numbers involved at level one mitigated against this approach.) Based on this feedback, and that from our benchmarking work with other companies, we devised the following engagement programme.

We engaged 1,700 separate individuals and organisations throughout the process via a range of routes. Many stakeholders were engaged on several occasions as we sought to ensure that we were interpreting and reflecting their preferences within our proposals and to provide them with the opportunity to see how our plans were developing over the period.

Figure 5.5: NGN's approach to stakeholder engagement

Level 1: We engaged a market research company to advise on the most effective way of garnering and evaluating the views of the general public. The advice they gave, which the company accepted and used, was to select at random a representative number of customers who had completed an Impression Card during 2010, and to write to them asking if they would undertake a short telephone survey. This work was carried out in February and March 2011, with 600 customers responding and delivering initial feedback.

A further 200 different customers were surveyed in April and May 2011, undertaking a survey based on a willingness to pay for additional services.

Additionally, a further 800 customers completed a survey through YourSayPays, an internet-based email process. This work was undertaken in February and March 2011.

All users of the NGN website were also invited to register their views. It was not possible to determine which of the three groups these respondents belong to.

Level 2: We wrote to and emailed a wide range of stakeholders, of whom 76 responded, to open the engagement process, delivering a bespoke 'Our services – Your views matter' publication. Stakeholders were asked if they would be willing to engage with us, their preferred method of communication, and were directed to a micro-site within the company website.

These stakeholders were: farmers and landowners, key senior directors in local government (chief executives, directors of highways, education and social services), leaders of national and regional charities, suppliers and contractors and trades union representatives of our employees.

We devised a bespoke solution to engagement with this group of stakeholders; inviting a smaller group of level two stakeholders to join our new customer panels. This is an enhanced element of our stakeholder engagement programme. We have established two panels, the first covers the north of the network area and the second covers the Yorkshire part of our network.

Membership is by invitation, and consists of contractors and suppliers, the emergency services, representatives of the CBI, local authorities and the third sector (charities). To date, the panels have met three times and have provided key feedback on a wide range of our business activities

In future, the panels will meet three or four times annually, as decided by the members, and will discuss business relevant issues and initiatives, plus wider issues affecting the sector.

Level 3: We identified key stakeholders with whom the company wished to engage, covering gas shippers and MPs with particular interest in, or detailed knowledge of energy. The renewable energy sector was also represented at level three. These key contacts were written to, asked their preferred method of providing feedback, which was unanimously face-to-face, and individual meetings then followed. Some stakeholders' requested several meetings as the process developed.

Our engagement strategy at level two and three was supplemented by an external public affairs agency which provided 'expert' input on engagement at these levels. Further detail of our stakeholder engagement programme is contained in the Appendix A5.

5.4.2 Stakeholder engagement next steps

NGN is committed to building on our continued open and meaningful engagement with our stakeholders through theRIIO-GD1 price control, to shape our business to deliver a safe and efficient operation.

We will continue to meet, discuss and engage with our customers in the channels they prefer. Our stakeholders highlighted that it is important to them that we explain the way in which the company meets its obligations and delivers its services. We will continue to analyse our customers' experiences to improve the way we operate. To deliver this continuous improvement, NGN has a robust engagement plan where we will continue to seek stakeholders' views and opinions, as already described. These views will be used as a catalyst for change. This will be a continual process, embedded in our business, to deliver incremental and sustainable year-on-year improvements across all our activities.

We have already made fundamental changes to the ways in which we engage with stakeholders.. A large number of stakeholders told us they would prefer to communicate with us in person (face-to-face or by telephone) rather than via a paper-based process.

So in August 2011 we ceased to issue impression cards to our customers. We now call our customers immediately after we have carried out any work that affects them asking them to rate our performance. Initially, we plan to source the same number of feedback telephone calls as we had impression cards, around 11,000 per year. This is a clear commitment that demonstrates that we not only source our stakeholders' views but also act upon them.

The results of the telephone surveys are immediately analysed to identify trends and areas for improvement and focus.

We have sharpened the focus of our customer service delivery. During the summer of 2011 our entire operational workforce, in replacement and repair and emergency, took a bespoke training package to enhance their ability to engage effectively with customers. The purpose of this was to embed responsibility for customer satisfaction with all our employees (including contract partners), and encouraged a focus on effective communication with our stakeholders before, during and after any works. We believe this investment will bring incremental and sustainable improvement in our customer service performance throughout the RIIO-GD1 timeframe.

In addition to the existing customer service action plan, we have developed an over-arching stakeholder action plan, identifying separate audiences, specific activities and management engagement with them.

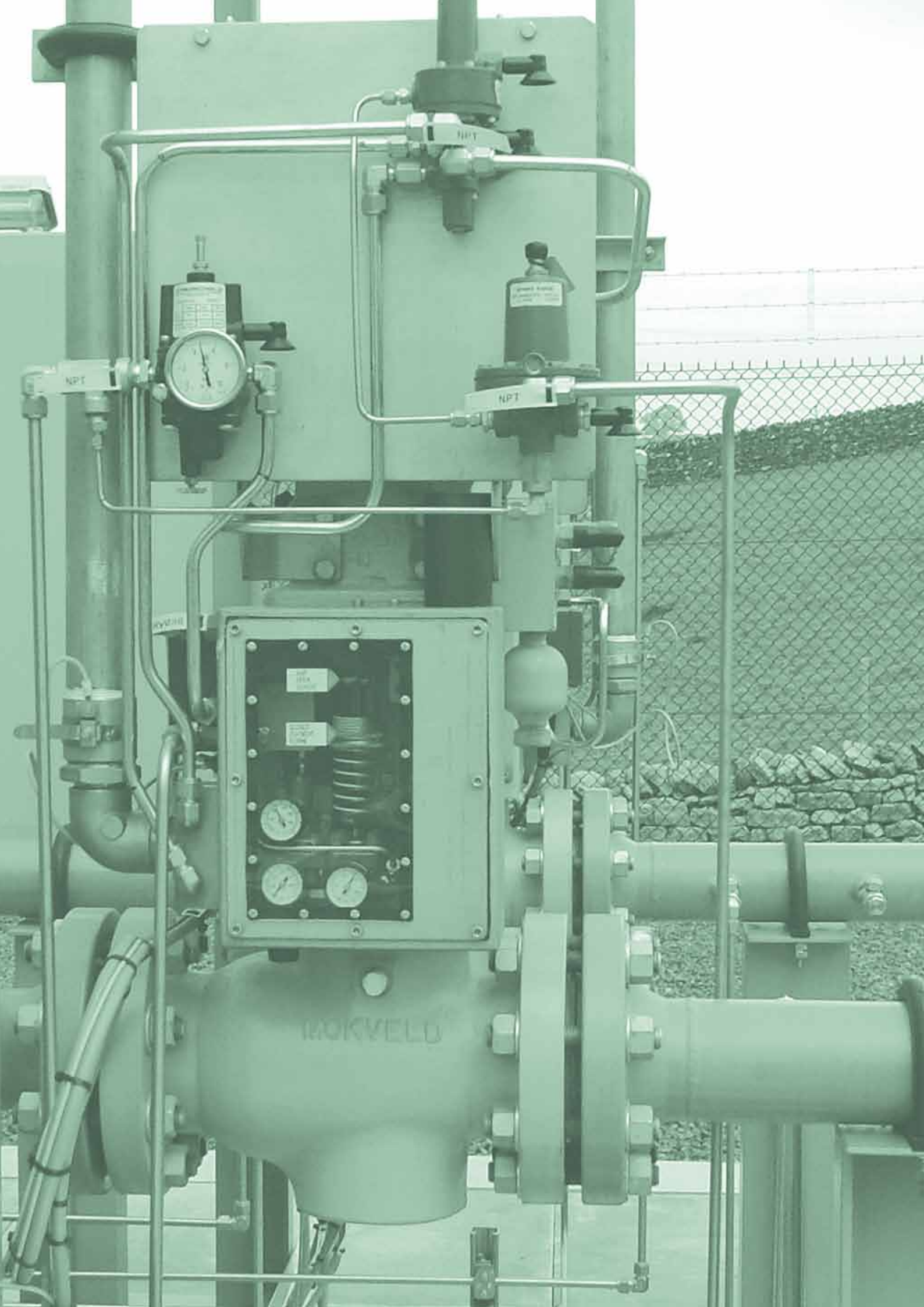
This action plan is the responsibility of the company's Senior Management Team. It is tracked and measured monthly to ensure the targets are met, that process change is identified and delivered, and that the views of our stakeholders are measured and acted upon.

For example, we will introduce a key account manager whose responsibilities will include regular liaison and meetings with our top 50 largest gas user sites; we will use telephone surveys to gauge customers' experience of operational delivery, refining this in the light of feedback; we will continue to arrange meetings of our Customer Panel, engaging on strategic, operational and local activities and issues; and we will continue to deliver our educational programme to schools across our geographic footprint.

We remain committed to the business vision: to be measured by Ofgem and the HSE as a consistent top two performer for cost-efficiency, safety and customer service. In fact, we have the ambition to be the best, best in class of the eight GDNs.

To achieve this, we continue to work with our customers and all stakeholders in a clear and robust way to listen to what is important to them, ask them to measure our performance, analyse their feedback and deliver improved business performance which exceeds their expectations.

Only by delivering an effective and consistent two-way communication process, listening what our customers and stakeholder are telling us and using the feedback to drive improvements, can NGN meet its business vision and progress to being best in class.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Output forecasts

6

NGN has detailed 56 output measures in six business activity areas in this business plan, covering the eight years of the RIIO-GD1 price control period. This section contains detailed forecasts of how NGN expects to perform in these areas. They show what we will deliver for customers.

Executive Summary

Our stakeholders told us what was important to them and what they expected us to deliver on their behalf. With this clear directive we have committed to 56 business output measures for the eight years of RIIO-GD1.

Of these 56 measures, six are voluntary and we will implement them as a direct result of what stakeholders told us. We plan to improve our performance in 35 areas and to maintain current performance in the remaining 21.

This will ensure NGN continues to provide a safe and secure gas distribution network, consistently delivering a value for money service for our 2.6m customers.

We will be measured against challenging targets we have set out in this business plan and will report our performance regularly to stakeholders.

The six output areas – safety, reliability, customer service, the environment, social obligations and connections – provide a comprehensive framework and, with the inclusion of our stakeholders' views, give a clear direction where to focus our objectives for RIIO-GD1. For example, we aim to improve customer satisfaction by reducing complaints; we will lessen our environmental impact by reducing gas leakage from our network and cutting our overall carbon footprint; we will take more people out of fuel poverty by connecting them to the gas mains system; we will reduce the risk from old metal gas mains and cut the number of accidents in our network; we will invest efficiently; and we will work to connect biomethane producers and other low carbon gas sources to our network.

NGN will meet the commitments contained in this section and maintain high levels of performance throughout RIIO-GD1.

6.1 Background

The chapter is organised into six sections, each covering one of the output areas. Each section provides:

- a description and explanation of the individual outputs in that category;
- NGN's historic performance for each individual output;
- a high level summary of stakeholder feedback on that category of output and an explanation as to how this has been considered in setting future performance; and
- NGN's forecast performance for each individual output during the period 2011/12 to 2021/22.

The aims for each output are described below.

- **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.
- **Social Obligations**
  Helping to alleviate fuel poverty and actively addressing the concerns and risks of CO.
- **Environment**
  Reducing the environmental impacts of gas distribution.
- **Connections**
  Providing a high quality connections service for both entry and exit customers.

These output categories reflect those outlined in the March 2011 strategy document and include all the individual outputs it contained. In places we have supplemented the plan with voluntary additional outputs which we consider important, relating to our future performance and/or following feedback from stakeholders. For ease of reference the additional outputs are shaded in white in the diagrams at the start of each section.

6.2 Safety

Safety outputs are made up of the following primary measures and secondary deliverables.

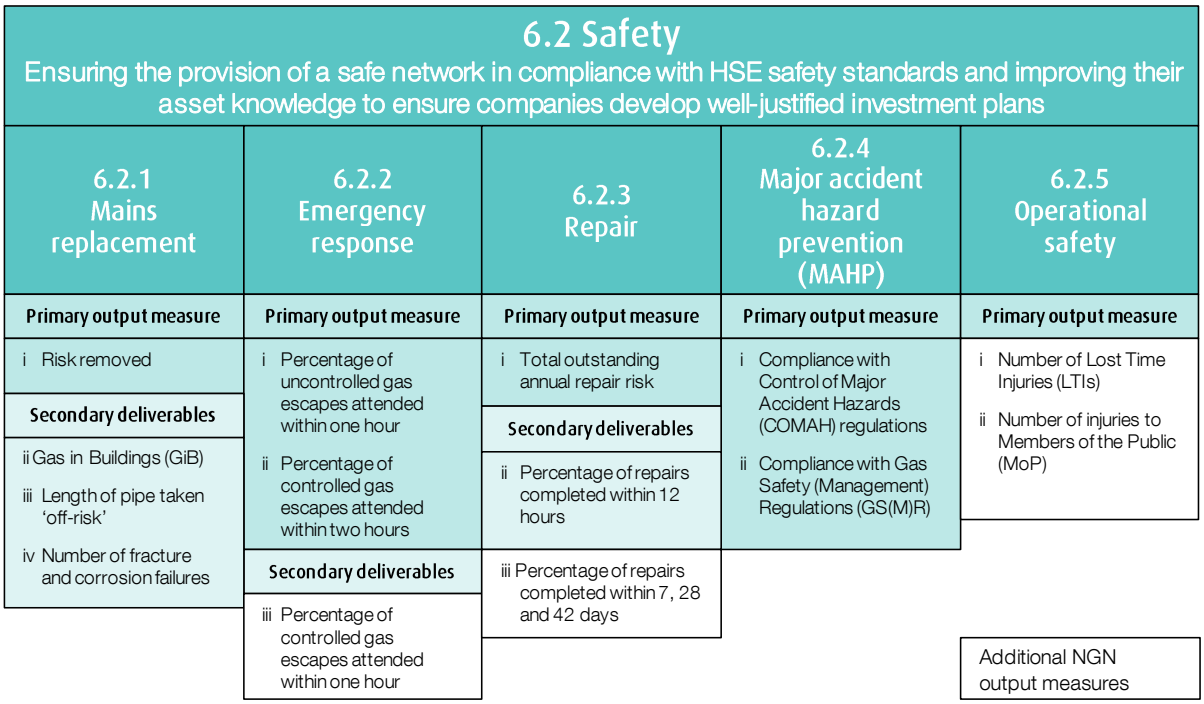


Figure 6.1: Safety outputs

The following table summarises what NGN will do in RIIO-GD1 against each of the output measures for safety performance, measured against stakeholder expectations.

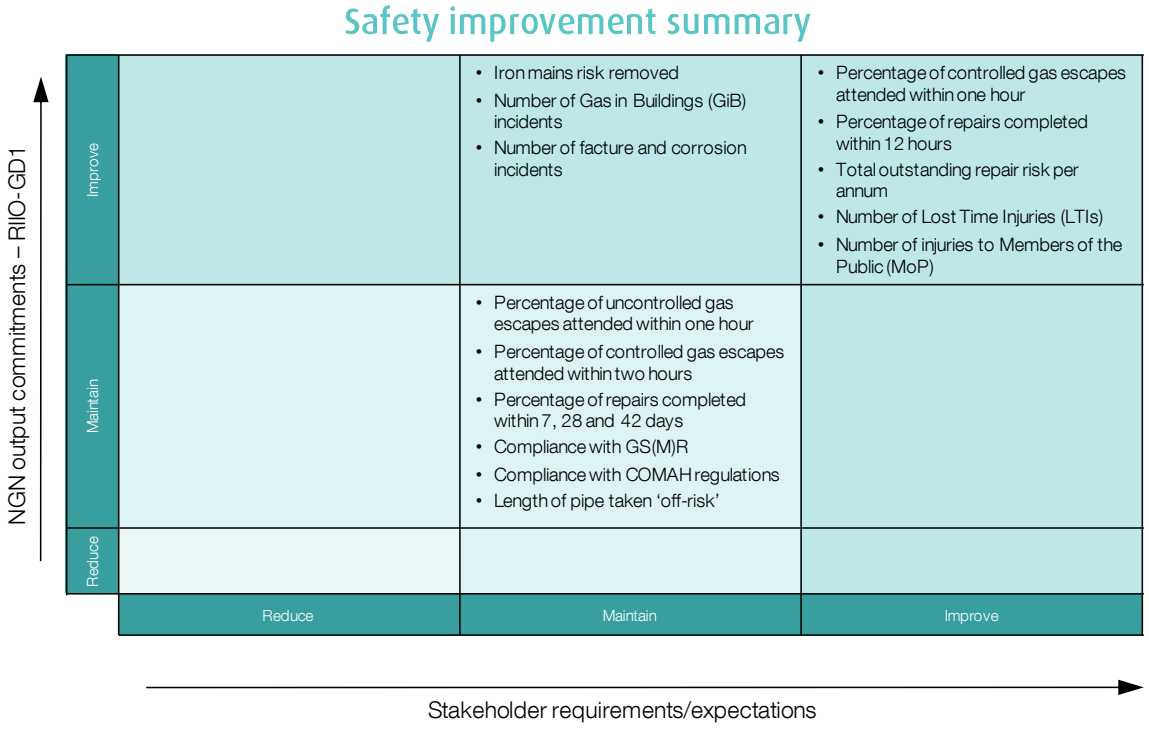


Figure 6.2: NGN safety improvement summary

6.2.1 Mains replacement

The HSE initiated an Enforcement Policy in 2002 for the decommissioning of iron gas pipes within 30 metres of buildings. It prescribes a 30 year programme to reduce the risk of injury to people arising from fire or explosion as a consequence of the sudden failure by fracture or corrosion of iron gas pipes. The risk is measured by the modelling framework for measuring iron main risk (MRPS) which we use to prioritise the programme for iron mains replacement.

During 2011 a series of changes have been agreed to the HSE Enforcement Policy which will come into effect in 2013. Instead of replacing all iron pipes based on a modelled risk score, alternative approaches to managing risk can be deployed for larger diameter mains and factors other than the modelled risk score can be used for determining which smaller diameter mains can be replaced.

The iron main decommissioning and maintenance programme in this business plan is based on the understanding that the HSE will formally agree and sign off this programme. In doing so provide NGN with the same level of assurance under the pipeline safety regulations.

Primary output

i Risk removed

For mains replacement, the primary output is the measure of risk removed from the network as a direct result of this activity. Every pipe within NGN's network has a risk score, which is an indication of historic performance. The amount of risk removed from the network by the iron pipe replacement programme is a key business measure. We are committed to reducing the amount of risk associated with iron gas pipes.

We have reduced the total remaining risk in the network by around 48% whilst replacing around 24% of the iron pipes. We have done this by replacing the highest risk pipes first.

Risk scores for individual pipes can change over time based on the performance and history of the pipe or pipes in the immediate vicinity. This is known as dynamic growth.

Historic performance

We have almost halved the amount of risk in the distribution network since the beginning of 2006. However, the total iron mains risk within the network has increased marginally since the middle of 2010 due to dynamic growth driven by the exceptional winter in 2010/11.

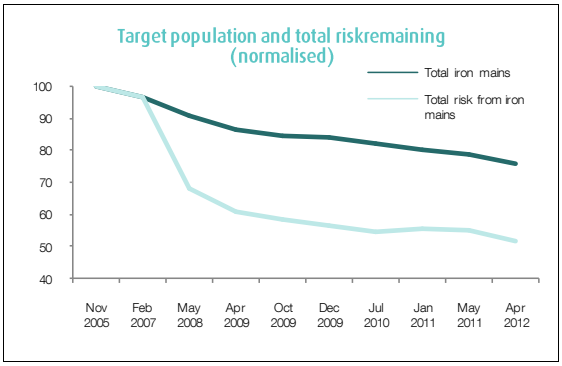


Figure 6.3: Total population and total risk

Target performance

Through RIIO-GD1 we will measure and track performance on the basis of risk removed. The key objective of the replacement programme is to make the network safer for customers and the public.

The delivery of the iron mains replacement programme will remove a forecast profile of risk during RIIO-GD1, as assessed in 2010/11.

The targeted reduction in risk does not account for any movement in the total assessment of risk in the iron mains population during RIIO-GD1. This target is therefore against a static assessment of risk and does not account for any dynamic movements in risk.

Even on a static basis, there is a degree of uncertainty surrounding these figures as the actual risk removed in any period will reflect the specific pipes that are selected for abandonment and their associated individual risk scores. However, we believe this to be a robust central forecast of the risk removed by the replacement programme in RIIO-GD1.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Calculated Risk Removed (Incidents/year)	0.081	0.049	0.0222	0.0148	0.0132	0.0132	0.0132	0.0144	0.0197	0.0113

Figure 6.4: Target performance risk removed

Secondary deliverables

The primary output measure for the repair activity is supported by four secondary deliverables.

- Gas in Buildings (GIBs);
- Length of pipe taken off-risk; and
- Number of fractures and corrosion failures.

ii Gas in Buildings (GiBs)

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.

iii Length of pipe taken off-risk

This is the amount of iron pipe abandoned (taken out of service) during each regulatory year, in accordance with the HSE's approve selection methods. Other iron pipe is abandoned and taken off-risk because of other factors, such as condition. Since 2005 we have consistently delivered or exceeded the annual abandonment target agreed with the HSE.

iv Number of fracture and corrosion failures

The number of fracture and corrosion failures is the number of times these incidents occur on metallic gas mains. It is a key driver of gas escapes – the resultant release of gas can potentially lead to an incident.

Historic performance

The table below shows our performance against these measures since 2005.

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Length of pipe taken off-risk (km)	482	523	529	533	535	532
Number of Gas in Buildings	137	97	150	167	154	168
Number of fractures and corrosion failures	2,687	2,282	2,712	2,833	3,119	3,474

Figure 6.5: Historic performance for mains replacement secondary deliverables

Target performance

Our forecast performance against these three deliverables are shown in the table below.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Length of pipe taken off-risk (km)	526	506	506	506	506	506	506	506	506	506
Number of Gas in Buildings	153	151	150	148	147	145	144	142	141	140
Number of fractures and corrosion failures	2,885	2,856	2,827	2,799	2,771	2,743	2,716	2,689	2,662	2,635

Figure 6.6: Target performance for mains replacement secondary deliverables.

Our forecast length of pipe taken off-risk is derived directly from the new approach to iron mains replacement. The target mains abandoned lengths are therefore fully consistent with the replacement expenditure forecasts set out within this plan (more detail is set out in Section 7).

The target performance is based on the trend of GiBs (number of GiBs per 1,000 km) data from 2005/06 to 2010/11 against the forecast of the remaining length of live iron pipe each year. We are forecasting the number of GiB incidents to fall by around 7% over the period. GiBs are driven by a wide range of external factors including weather, ground conditions and the deterioration of assets. This results in difficulties in identifying trends over time. There is therefore a range of uncertainty around the target figures set out above.

However, we believe that this is a realistic forecast of GiBs during RIIO-GD1.

In a similar way to GiBs, fractures and corrosion failures are influenced by factors beyond the replacement programme, such as material deterioration, change in temperature and ground conditions. Since 2005/06 there has been a general increase in the number of failures despite the replacement of over 500 km of iron mains per year during the same period. However, we are forecasting that like GiBs, fractures and corrosion failures will fall by around 1% per year on average over the period.

6.2.2 Emergency response

NGN has a licence requirement to attend 97% of uncontrolled gas escapes within one hour and 97% of controlled gas escapes within two hours. We view the response to gas escapes as an important element of providing a safe gas network.

Primary outputs

NGN is proposing three key primary output measures for our emergency response – percentage of uncontrolled gas escapes attended within one hour, percentage of controlled gas escapes attended within two hours and percentage of controlled gas escapes attended within two hours and percentage of controlled gas escapes attended within one hour.

i Uncontrolled gas escapes

This refers to a situation where the means of turning the gas off locally cannot be accessed by the individual reporting it (usually because of limited access to a property). The measure is the percentage of the total number of all reported uncontrolled gas escapes attended within one hour by one of NGN's First Call Operatives (FCOs). Performance against this target can be adversely affected by large incidents or very severe winter weather conditions.

ii Controlled gas escapes

This refers to a situation where the means of turning the gas off can be accessed by the individual reporting it and the property can be isolated from the gas network. The measure is the percentage of the total number of all reported controlled gas escapes responded to within two hours by one of our FCOs. Stakeholders challenged NGN whether we could attend a higher percentage of controlled gas escapes within one hour instead of two hour required by the licence standard. In response, an additional output measure has been included within the plan.

Historic performance

Figure 6.7 shows our performance against these measures since 2005.

In the winter of 2010/11 NGN was faced with exceptionally severe weather conditions which significantly impacted our ability to attend site within one or two hours. We had the coldest temperatures seen in the region for 100 years and several weeks of deep-lying snow. This meant travel conditions in the region were severely hampered. This period also coincided with record number of emergency calls. The combination of these factors resulted in us not achieving the requisite standards. Lessons have been learnt from these exceptional events and factored into our business plan.

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
% of Uncontrolled gas escapes attended within 1 hour	97.21%	96.53%	98.96%	97.69%	97.11%	91.57%
% of Controlled gas escapes attended within 2 hours	98.92%	98.5%	99.7%	99.1%	98.0%	94.3%
% of Controlled gas escapes attended within 1 hour	N/A	72.1%	79.3%	81.2%	77.4%	73.3%

Figure 6.7: Emergency response primary output current performance

Target performance

NGN has a licence obligation to attend 97% of all controlled and uncontrolled gas escapes within one and two hours respectively. We are proposing that this target be maintained throughout RIIO-GD1. We are also making a firm commitment to attend 75% of all controlled gas escapes within one hour in response to clear stakeholder preferences.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
% of Uncontrolled gas escapes attended within 1 hour	97%	97%	←			97%				→
% of Controlled gas escapes attended within 2 hours	97%	97%	←			97%				→
% of Controlled gas escapes attended within 1 hour	75%	75%	←			75%				→

Figure 6.8: Target emergency response primary output performance

6.2.3 Repair

NGN employs specific approaches for the management of risk associated with outstanding gas escapes and the completion of a repair to an identified escape. We focus heavily on the prompt repair of escapes due to the potential risk they pose to public safety.

Primary Output

i Total outstanding annual repair risk

This is the total risk score associated with all pipes which require a repair, recorded on a daily basis and totalled over a year. NGN has been developing this new, more holistic risk-based measure since 2010. This approach calculates a risk score for every escape, based upon a range of criteria. The repair of these escapes is then prioritised according to their scores. We now have one full year of data and from this we estimate a baseline total annual repair risk score to be 41,800,000 for one calendar year.

Figure 6.9 shows the profile of repair risk under this new measure during 2010.

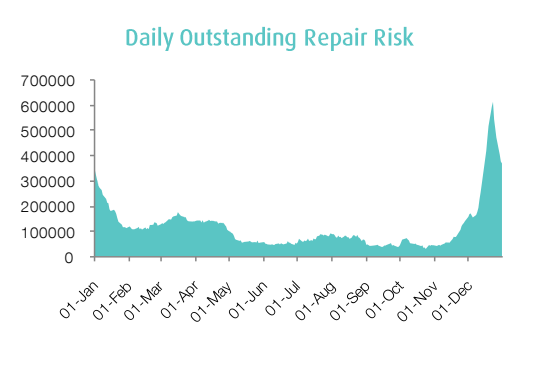


Figure 6.9: Daily outstanding repair risk 2010

NGN also believes it is important to complement this measure with additional measures to ensure all repairs are completed within a reasonable timescale. Using the above measure alone could potentially result in the very lowest risk escapes never being completed. This does not align with stakeholder expectations to minimise road disruption and reduce carbon emissions from escaping gas. We therefore also include additional secondary deliverables related to the age of an escape.

Target performance

The target is to reduce the annual outstanding repair risk score by 1% per year in RIIO-GD1.

Secondary deliverables

The primary output measure for the repair activity is supported by four secondary deliverables.

ii Percentage of repairs completed within 12 hours

When an FCO has responded to an emergency call and made the gas escape safe, additional repair work may be required. NGN is committed to completing the majority of these repairs within 12 hours. We have consistently achieved frontier levels of performance in the percentage of repairs completed within 12 hours, showing a steady improvement in performance over the GDPCR1 period.

iii Percentage of repairs completed within 7, 28 and 42 days

Any escape which is not permanently repaired within 12 hours is recorded as an outstanding escape. We monitor these on a daily basis and measure when they are completed, in the categories of within 7, 28 or 42 days of them being reported. We complete the majority, more than 80%, within seven days and more than 99% are completed within 42 days. Any escape going beyond this timeframe is either in a remote position and so of extremely low risk, or in a traffic-sensitive location requiring highway authority approval. In both cases, the escape is monitored regularly.

Historic performance

The table below shows our performance against these measures since 2005.

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
% of Repairs completed within 12 hours	N/A	N/A	50.4%	55.6%	57.9%	59.1%
% of Repairs completed within 7 days	N/A	87.3%	77.6%	85.7%	85.2%	81.7%
% of Repairs completed within 28 days	N/A	99.0%	96.9%	98.0%	98.6%	96.8%
% of Repairs completed within 42 days	N/A	99.9%	99.7%	99.3%	99.0%	98.7%

Figure 6.10: Percentage of repairs completed within 12 hours, 7, 28 and 42 days

Target performance

We are committed to improving performance to 62.5% of all repairs being carried out within 12 hours by the end of the RIIO-GD1 period. We are targeting a continued increase in performance throughout RIIO-GD1 in line with our commitment to safety.

We are targeting a consistent level of performance in RIIO-GD1 for the 7, 28 and 42 day repair targets.

We believe they are feasible without increasing costs to our customers. Stakeholders agree that this level of performance is acceptable. We will commit to having the significant majority of repairs completed within 42 days by upholding a 99% target. This is not 100% because some repair jobs are inaccessible, for example in the middle of major highways or those which present very little risk in open countryside.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
% of Repairs completed within 12 hours	59.5%	59.8%	60.0%	60.25%	60.5%	60.75%	61.0%	61.5%	62.0%	62.5%
% of Repairs completed within 7 days	85.0%	85.0%	←			85%				→
% of Repairs completed within 28 days	98.0%	98.0%	←			98%				→
% of Repairs completed within 42 days	99.0%	99.0%	←			99%				→

Figure 6.11: Target performance percentage of repairs completed within 12 hours, 7, 28 and 42 days

6.2.4 Major Accident Hazard Prevention

The existing safety requirements for Major Accident Hazard Prevention (MAHP) are set out in legislation and monitored by the HSE and are an essential part of operational safety.

Primary outputs

There are two primary outputs.

i Compliance with the Control of Major Accident Hazards Regulations (1999) (COMAH)

This requires NGN to have a major accident prevention policy backed by a robust safety management system. To comply with COMAH, we submit a safety report for our top tier sites; a document written by us and sent to the Competent Authority (CA) to demonstrate that:

- We have implemented all the necessary measures to prevent major accidents; and
- NGN has limited the consequences of major accidents to people and the environment.

The CA is responsible for checking that site operators take steps to prevent and limit the effects of major accidents.

ii Compliance with Gas Safety (Management) Regulations (GS(M)R)

The Gas Safety (Management) Regulations (1996) (GS(M)R) require gas conveyors to prepare a Safety Case containing the information required by the regulations and have it formally accepted by the HSE before conveying gas. Under GS(M)R, NGN investigates two key areas:

- Explosions due to a gas escape from a domestic gas installation, regulation 7(12); and
- Actual or potential explosions due to a gas escape from the network, regulation 7(13).

NGN liaises closely with the HSE on all aspects of Safety Case management. Regular interface meetings are held where material and non-material changes are discussed, agreed and documented as appropriate. The HSE has a rolling programme of intervention visits under GS(M)R.

Historic performance

There have been no significant non-compliance issues with GS(M)R or COMAH since we took ownership of the network. This underlines our absolute commitment to safety issues.

Target performance

We are targeting continued full compliance with COMAH and GS(M)R. This will be achieved through the continued application of our robust, well understood and thoroughly audited processes.

6.2.5 Operational safety

NGN recognises there is an inherent risk of injury when we are working on the network. NGN has a continuing commitment to protect the safety, health and welfare of all our employees and any members of the public who come into contact with our works and address this by reducing the targets for a variety of measures.

NGN believes that all work-related injuries and illnesses are preventable. Our long term objective is that no one is injured as a result of our operations and we are committed to ultimately having zero accidents on the network.

Our stakeholders told us very clearly that they strongly support our objective and value NGN's approach to all safety-related issues.

Primary outputs

We are proposing two voluntary primary outputs in this category.

i Number of lost time injuries (LTIs)

LTIs refer to instances where an individual has to be absent from work for more than one day due to an injury received whilst carrying out activities for NGN. These injuries typically happen to our industrial employees working on the network, where risks are higher than those carrying out office based roles.

ii Number of injuries to members of the public (MOP)

An injury to a member of the public is any injury that is reported by a member of public which has been suffered as a direct result of activity by our direct labour or contractor staff.

Historic performance

Figure 6.12 below shows our performance against these measures since 2005.

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Number of LTIs	17	12	12	7	5	6
Number of MOPs	16	23	10	24	4	4

Figure 6.12: Current number of lost time injuries and injuries to members of the public

Target performance

NGN is committed to a workplace free of injuries and the long term objective is to reduce the number of LTIs and MOPs to zero. RIIO-GD1 will see us take significant steps towards achieving this objective, reducing the number of LTIs by a further 60% to just two per year, and a further 50% reduction in the number of MOPs resulting from NGN's activities before the end of the period.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Number of LTIs	5	5	5	5	4	4	3	3	2	2
Number of MOPs	4	4	3	3	3	3	2	2	2	2

Figure 6.13: Operational safety target performance

6.3 Reliability

Reliability outputs are made up of the following primary measures and secondary deliverables.

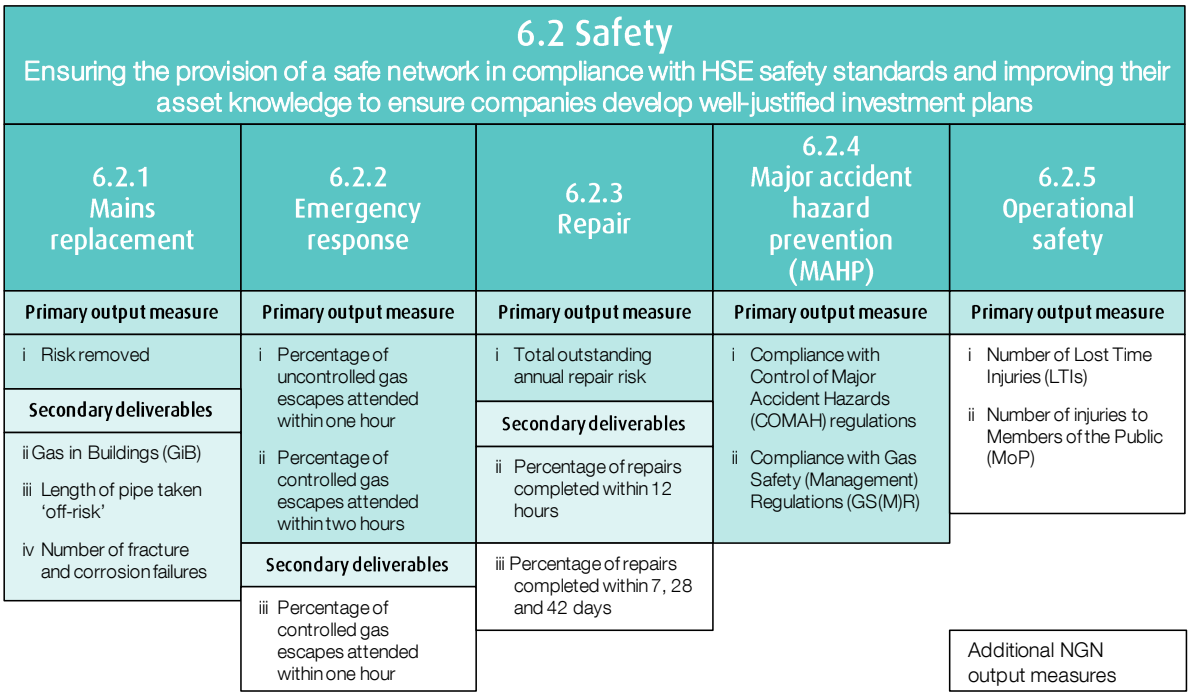


Figure 6.14: Reliability outputs

The following table summarises what NGN will do in RIIO-GD1 against each of the output measures for reliability performance, measured against stakeholder expectations.

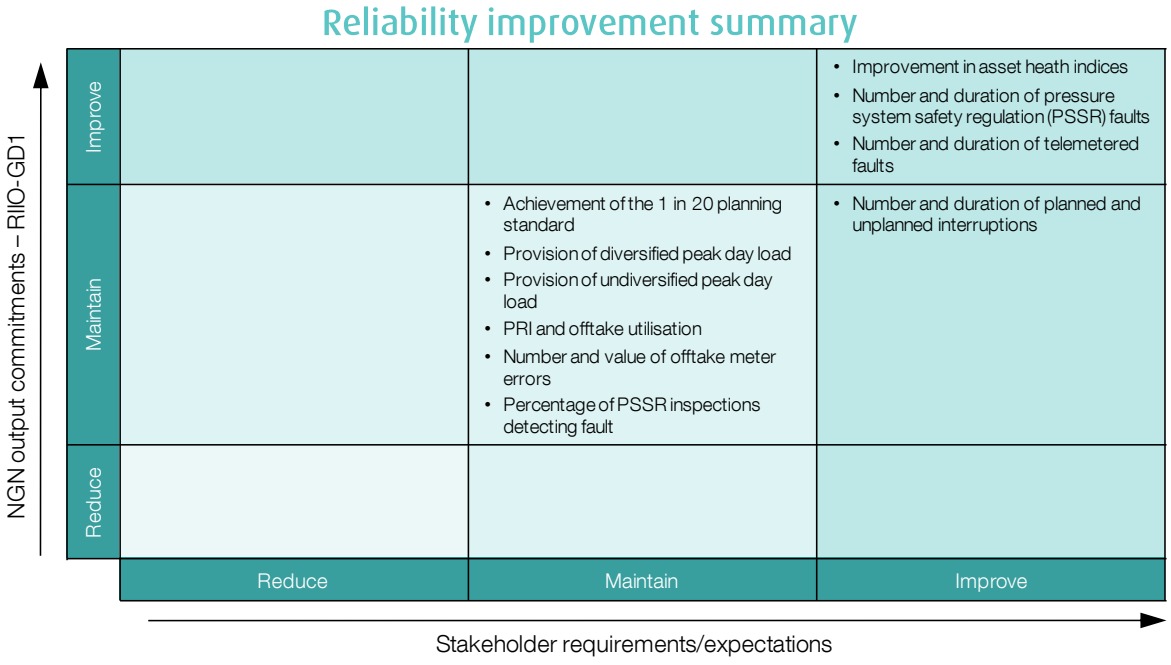


Figure 6.15: NGN reliability improvement summary

6.3.1 Loss of supply

Primary output

i Number and duration of planned and unplanned interruptions

NGN aims to provide a reliable and continuous gas supply to more than 2.6m customers. However, interruptions do occur because for replacement, repair or maintenance work, as well as asset failure and third party activity. We recognise the importance of minimising the impact of these on our customers.

Interruptions are classified in two ways.

Planned – prior notification that the gas supply will be interrupted is provided to the customer. Typically this occurs in connection with work planned by NGN (e.g. mains replacement).

Unplanned – no prior notification is given to the customer. Causes include problems with our assets (upstream of the Emergency Control Valve (ECV)), damage to assets by third parties and water ingress.

Historic performance

Figure 6.16 shows our performance against these measures since 2005.

The likelihood of a customer experiencing an unplanned gas supply interruption is low, on average once every 40 years for a planned interruption and even less frequent for an unplanned interruption.

In addition, the duration of the interruption is usually relatively short for planned interruptions. For mains replacement, the restoration of the supply is coordinated around the customer's availability on the day they are impacted by the work, with the mains replacement teams liaising with the affected customers.

We fully recognise the effect which interrupting a customer's supply has on them and work hard to minimise the duration of the supply interruption. This is reflected in our customer service action plan. We record and monitor our performance in relation to the overall length of the duration and the time taken to restore supplies after gas has been made available to the ECV.

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Number of planned interruptions	33,559	46,081	66,881	61,916	49,937	56,688
Duration of planned interruptions (mins)	14.1m	23.9m	37.5m	31.8m	27.9m	30.4m
Number of unplanned interruptions	6,417	20,223	13,453	9,890	9,530	15,841
Duration of unplanned interruptions (mins)	11.8m	31.5m	8.9m	10.5m	13.6m	15.7m

Figure 6.16: Current interruptions performance data

Target performance

Stakeholders have told us they want to see a reduction in the number and duration of supply interruptions. Unfortunately however, we can only commit to the following.

- Planned – maintain current performance as we need to continue our programme to replace iron mains over the period; and
- Unplanned – maintain performance based on the historic average number and duration of interruptions because the majority are caused by third parties which we cannot influence significantly.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Number of planned interruptions	52,619	52,619	52,619	52,619	52,619	52,619	52,619	52,619	52,619	52,619
Duration of planned interruptions (mins)	28.7m	28.7m	28.7m	28.7m	28.7m	28.7m	28.7m	28.7m	28.7m	28.7m
Number of unplanned interruptions	13,287	13,287	13,287	13,287	13,287	13,287	13,287	13,287	13,287	13,287
Duration of unplanned interruptions (mins)	11.5m	11.5m	11.5m	11.5m	11.5m	11.5m	11.5m	11.5m	11.5m	11.5m

Figure 6.17: Target performance interruption data

Secondary deliverable

ii Asset health and risk matrices

As outlined in Section 4 asset health indices are a key component of our TNM approach.

Asset health indices and risk matrices provide a framework for collating information on the condition of network assets. This demonstrates a measure of the consequence of failure of assets typically measured in terms of system, safety and the environmental implications. By combining asset health and criticality we have developed a risk matrix that in future, with further development, can be used to inform asset investment decisions and be used as a basis for trade-offs between different asset categories. These indices will act as output measures and form a major part of our asset management strategy over the next decade.

NGN has completed a base set of asset health indices for each category of asset present on the NGN network. In order to populate these initial indices, data has been collected and reviewed for each asset health category. This has then been coupled with expert opinion and industry standards to develop the core data. Documented assumptions have been made to determine with/ without investment options, taking into account both risk and condition based replacement as well as capacity driven upgrades.

This exercise has included an assessment of asset health and risk for:

- the current reporting year, 31 March 2011;
- the last year of GDPCR1, 31 March 2013;
- with investment 31 March 2017;
- with investment 31 March 2021;
- without investment 31 March 2017; and
- without investment 31 March 2021.

The detailed asset health indices showing current and target performance are set out in Appendices A11 and A19.

6.3.2 Network capacity

Primary output

i Achievement of the 1:20 planning standard

NGN is required to meet peak customer demand on a 1:20 winter day. This requires our network to have sufficient capacity to ensure that customers' demand for gas is not interrupted during those periods of highest demand. We have consistently met peak demand on our system since taking ownership of the network in 2005.

Even in the winter of 2010/11, with the most severe challenges due to bad weather and high demand, we were able to satisfy our customers' requirements for gas.

Estimates of peak customer demand in the 1:20 weather conditions have been falling since 2005 as the impact of high energy prices, the economic downturn and increased levels of energy efficiency have reduced our customers' requirements. We are forecasting further reductions in the levels of demand on a 1:20 winter day during RIIO-GD1 as a combination of continued high fuel prices, a sluggish recovery from the economic downturn and further energy efficiency initiatives reduce customers' requirements for gas on the coldest days of the year.

The RIIO-GD1 investment programme has fully considered the overarching responsibility to meet the 1:20 requirement. We have not identified any requirement for general system reinforcement to continue to meet this obligation. However, capacity constraints can develop across the network, even in the scenario of falling demand, as localised demand patterns change and require investment decisions to be made on how best to address these constraints.

Secondary deliverables

ii Provision of diversified peak day load

NGN's forecast of 1:20 peak day load is measured as the daily demand (load) which would be exceeded in 1 out of 20 winters. Diversified peak day load refers to the total demand for a group of consumers which will allow each consumer to use gas at different times. This is the basis of the 1:20 peak day demand forecasting methodology and is calculated by GDNs annually. This forecast is used as a direct input to the evaluation of network capacity requirements.

iii Provision of undiversified peak day load

Undiversified peak day load refers to the total daily demand, but does not account for differences in demand of customers across the day.

On this basis, undiversified demand will be higher than diversified demand.

Diversity factors can be calculated as the percentage difference between undiversified and diversified forecasts. There is very little difference between diversified and undiversified Local Distribution Zone (LDZ) demand. Undiversified peak day loads can be calculated from supply offtakes quantities (SOQs) which are estimated and reported by gas shippers for each supply point. These estimates are calculated under a separate process to GDNs and, as such, provide a useful comparison to the GDN forecasts in this area.

NGN's historic and current forecasts of 1:20 peak day demand are set out below and are consistent with all relevant elements of this plan.

Historic performance

The table below shows our performance against these measures since 2005.

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Diversified Peak Day Load (GWh)	552	560	570	520	505	496
Undiversified Peak Day Load (GWh)	N/A	N/A	N/A	619	595	567

Figure 6.18: Current provision of peak day load

Target performance

Peak day demand (1:20) is forecast to fall by 3%. Recent history has shown that demand profiles are becoming more 'peaky' in nature as consumers respond to economic conditions and high energy prices by changing their behaviour and improving energy efficiency. This trend is forecast to continue over the next 10 year, as shown below, with peak demand forecasts being more resilient than average annual demand as consumers reverse their more frugal behaviour during the periods of coldest weather.

A key component of peak day forecasts are diversity factors (SOQs) which are set by gas shippers and are not estimated by NGN. Our plans assume a continuation of current diversity factors in RIIO-GD1.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Diversified Peak Day Load (GWh)	519	517	517	515	513	512	510	509	506	505
Undiversified Peak Day Load (GWh)	592	589	589	587	585	584	581	580	577	576

Figure 6.19: Forecast peak day load

iv NTS offtake and pressure reduction installations (PRI) utilisation

NGN must meet the 1:20 day supply obligation. NTS offtakes enable gas to be taken from the National Grid system into NGN's high pressure pipeline network. PRIs enable onward transportation in the network and ultimately to customers. To meet the supply obligation, our offtakes and PRIs need to be technically compliant and capable of meeting the required throughput volumes over time. If they cannot, we invest in upgrade or replacement work.

Historic performance

There are currently 167 PRIs and 23 offtakes within NGN's network. The diagrams below show the utilisation of these assets at the start and finish of GDPCR1 period.

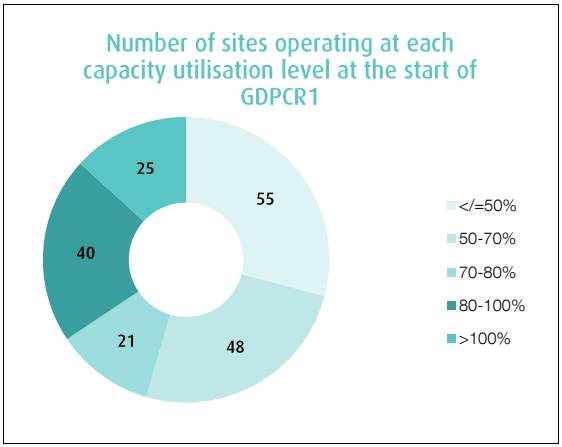


Figure 6.20: Sites operating at each capacity utilisation level as at 01/04/2008

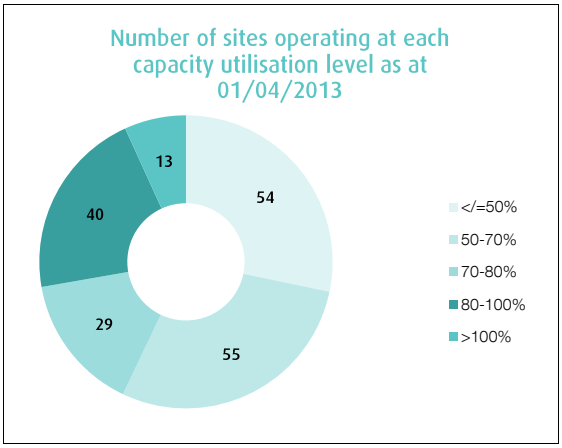


Figure 6.21: Sites operating at each capacity utilisation level as at 01/04/2013

Throughout GDPCR1, our focus for offtake and PRI investment has been to make critical assets compliant in terms of integrity and capacity within our overall financial and manpower constraints. The 13 sites which carry over into RIIO-GD1 represent work in progress. An annual appraisal of all PRIs and offtake capacities ensure that the current work in progress list is updated and any changing supply/demand impacts are built into the dynamic upgrading programme. In this way investment is targeted to the sites when and where it is most needed and the 1:20 supply obligations are met.

Target Performance

During RIIO-GD1 fixed storage will be removed through the gasholder removal programme and there are no proposals to build LTS pipelines: additional NTS flex storage will be utilised. Offtake reform will result in less system flexibility due to NTS constraints.

Our focus in RIIO-GD1 will be to improve asset health and to have full compliance in terms of capacity and utilisation within the more challenging operating constraints. The following charts show the capacity utilisation at the middle and end of the price control period with and without intervention.

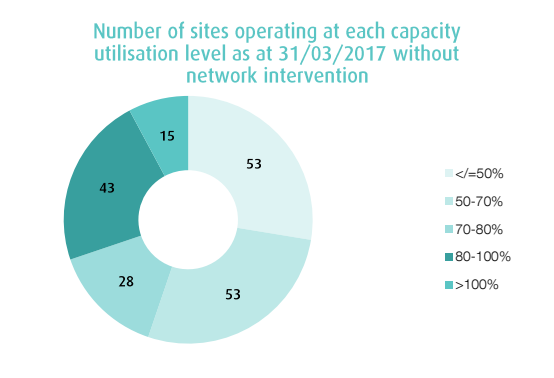


Figure 6.22: Sites operating at each capacity utilisation level in 2017 without network intervention

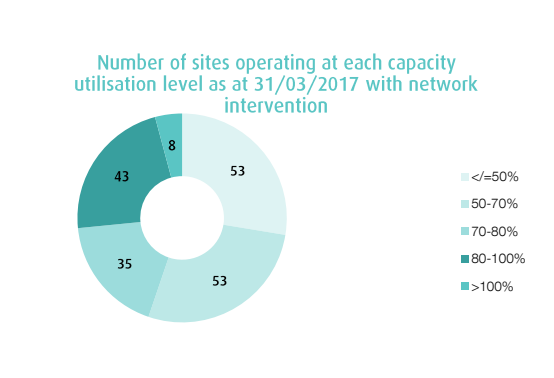


Figure 6.23: Sites operating at each capacity utilisation level in 2017 with network intervention

The proposal is to increase the volume of work throughout RIIO-GD1 by upgrading the capacity of 22 installations.

- Offtakes requiring major upgrading work – 2;
- Offtakes requiring intermediate upgrading work – 5;
- PRIs requiring major upgrading work – 7;
- PRIs requiring intermediate upgrading work – 7; and
- PRI requiring minor upgrading work - 1.

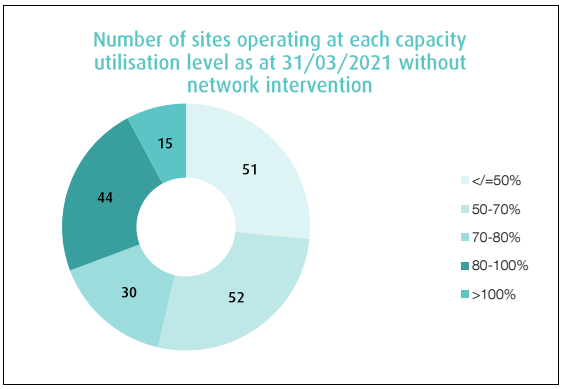


Figure 6.24: Sites operating at each capacity utilisation level in 2021 without network intervention

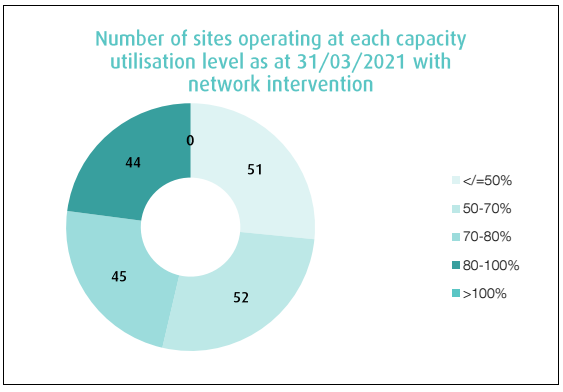


Figure 6.25: Sites operating at each capacity utilisation level in 2021 with network intervention

This annual workload is an increase to that which has been completed historically and is necessary to ensure additional NTS flex storage capacity can be utilised within NGN's system. This proposal will ensure the respective plant is utilised appropriately and that the level of investment is balanced with meeting licence obligations.

6.3.3 Network reliability

Primary output

The primary output associated with network reliability is maintaining levels of operational performance across the network. This will be measured by four secondary deliverables.

Secondary deliverables

i Number and value of offtake meter errors

NGN is responsible for measuring and reporting meter accuracy for the delivery of gas from the National Grid transmission system into our network. There is a process in place, through the Joint Office of Gas Transporters, which requires the identification and reporting of potential meter errors as part of a measurement error notification process.

Historic performance

There are a range of factors which have resulted in, or have the potential to generate, a meter error.

Error faults can indicate non-compliance with industry standards. NGN had 11 meter errors between 2006 and 2010, five of which occurred in 2009/10. All our meter errors are classed as low significance which is the least severe of the three classification categories.

- Low significance - less than 30 GWh hours;
- Medium significance - between 30 and 50 GWh hours; and
- Significant over 50 GWh hours.

Offtake meter error type, number and scale	2005/06	2006/07	2007/08	2008/09	2009/10
Total number of offtake errors	N/A	2	1	3	5
Total scale of offtake errors (GWh)	N/A	8.6	1.78	2.67	14.82
Estimated commodity charge impact on NGN in year	N/A	£2.0k	£0.4k	£0.6k	£3.4k
Network throughput (GWh)	N/A	40,536	39,304	37,768	37,980
Total as % of throughput	N/A	0.02%	0.01%	0.01%	0.04%

Figure 6.26: Current number and value of offtake meter errors

Details of the type of error are shown in Figure 6.26. The financial impact on NGN of these errors has been low because they fall into the low significance category. However, we are aware that the impact of the offtake meter errors can be very significant for gas shippers. There have been instances in other GDNs of significant category incidents.

Our stakeholder feedback indicated very strong preferences from gas shippers to improve the accuracy of offtake meters and avoid where possible any errors.

Target performance

Our target is to have no errors above the classification of low significance with an overall estimated commodity charge relating to errors of less than of £10k per year until 2021.

This target performance will be achieved by continuing with the following.

- Investment to modify, update or replace assets using new technology to improve levels of reliability (e.g. ultrasonic meters);
- Investment in duplication of metering systems;
- Continue to improve and amend policies and procedures to ensure NGN remains at the forefront of industry standards; and
- Continue training of staff – prompt action by system control staff can mitigate the impact of a meter error.

Expenditure forecasts for a programme to upgrade offtake meters are included within this plan. This investment is primarily driven by outputs from asset health indices because offtake meters will be upgraded according to criticality, reliability and condition, as informed by the asset health work.

ii Number and duration of Pressure System Safety Regulations (PSSR) faults

Addressing PSSR faults allows us to limit the deterioration of network assets. Faults are reported by reliability categories, with A1 (imminent danger) being most serious, followed by A2 (significant fault).

Historic performance

The table below shows our performance against these measures since 2005.

Offtake meter error type, number and scale	2005/06	2006/07	2007/08	2008/09	2009/10
A1 faults	0	0	0	0	0
A2 faults	120	96	115	97	113
Closed out to timescale set by competent person	100%	100%	100%	100%	100%
Number of AGIs and PRS sites	212	212	212	213	214
Fault measure (PSSR)	0.57	0.45	0.54	0.46	0.53

Figure 6.27: Current number and duration of PSSR faults

Target performance

A target of reducing the number of faults by the end of RIIO-GD1 to match levels experienced in 2009 has been set and is detailed below.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Fault measure (PSSR)	0.52	0.52	0.51	0.51	0.50	0.50	0.49	0.49	0.48	0.47

Figure 6.28: Target performance number and duration of PSSR faults

iii Number and duration of telemetered faults

By focusing on reducing telemetered faults we can ensure a greater certainty of network performance and a greater ability for our operations staff to correct faults as quickly as possible. Telemetered faults are raised through the alarm mechanism in NGN's control centre and have a set of required (priority) responses; those which are 'now' require an onsite response within two hours.

Historic performance

The table below shows our performance against these measures since 2008.

Telemetered faults	2005	2006	2007	2008	2009	2010
A – Number of 'now' faults	N/A	N/A	N/A	401	550	737
B – Total hour to resolve	N/A	N/A	N/A	39,326	41,220	50,934
C – Number of telemetered sites	N/A	N/A	N/A	269	269	269
Ofgem measure (telemetered) = A*B/C	N/A	N/A	N/A	58,624	84,279	139,548
Average hours to resolve	N/A	N/A	N/A	98.1	74.9	69.1

Figure 6.29: Number and duration of telemetered faults

Target performance

Our forecast performance is set out below. We are planning to reduce the number of faults.

This 'now' faults target will be achieved by investing in improved alarm management systems and improving the health of the underlying assets. Other faults will be reduced through a range of other initiatives identified within this plan. The average time to resolve faults remains constant over the period. As fault numbers decrease, their nature and the action required to resolve them could vary. To forecast a change is not possible due to the number of variables, so a constant average is proposed for RIIO-GD1.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Number of telemetered 'now' faults	750	750	700	650	600	550	500	450	425	400
Total hours to resolve	60,750	60,750	56,700	52,650	48,600	44,550	40,500	36,450	34,425	32,400
Average hours to resolve	81	81	81	81	81	81	81	81	81	81
Ofgem measure (telemetered)	168,768	169,377	147,546	127,221	108,401	91,087	75,279	60,976	54,389	48,178

Figure 6.30: Target performance number and duration of telemetered faults

iv Percentage of PSSR inspections detecting a fault

NGN is proposing an additional voluntary measure for PSSR faults which allows us to measure the percentage of PSSR inspections that result in an A1 or A2 fault. We feel this accounts for the variance in the number of inspections and will give an accurate indication of the performance of the asset.

Historic performance

The table below shows our performance against this measure since 2005

Year	2005	2006	2007	2008	2009	2010
Number of PSSR inspections	N/A	1,707	1,725	1,821	1,853	1,909
% Inspections giving a fault	N/A	7.03%	5.57%	6.32%	5.23%	5.92%

Figure 6.31: Current performance of PSSR inspections detecting a fault

Target performance

For the additional voluntary measure, we are committing to keeping the percentage of PSSR faults identified through inspection to below 6%. This result of the investment programme set out within this plan, and the forecast improvement in asset health, is the key driver of the performance over the period.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
% PSSR inspections identifying a fault	6%	6%	←			6%	→			

Figure 6.32: Target RIIO-GD1 performance of PSSR inspections detecting a fault

6.4 Customer service

Customer service outputs are made up of the following primary measures and secondary deliverables.

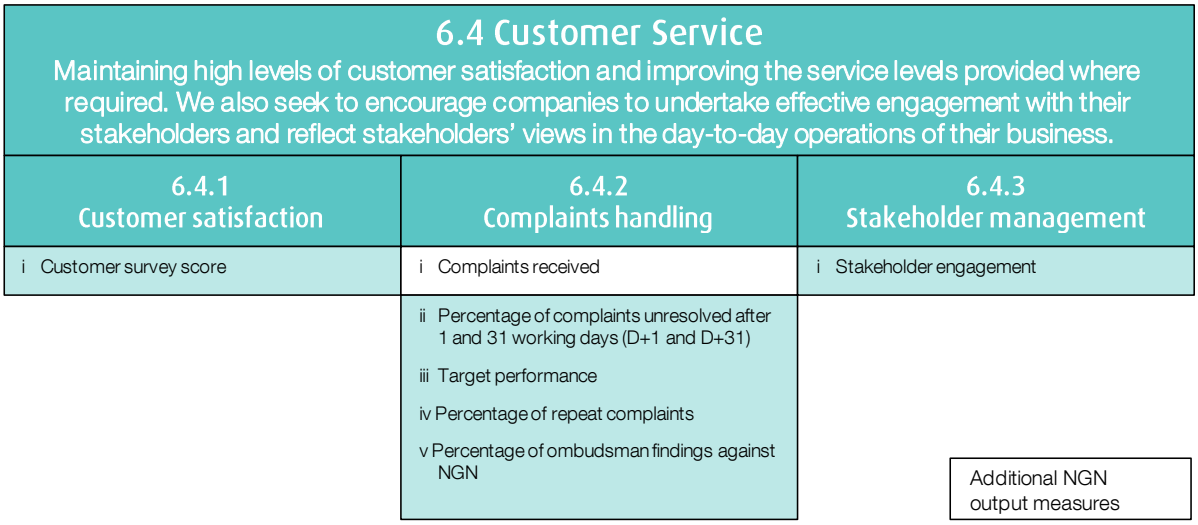


Figure 6.33: Customer service outputs

The following table summarises what NGN will do in RIIO-GD1 against each of the output measures for customer service performance, measured against stakeholder expectations.

Customer service improvement summary

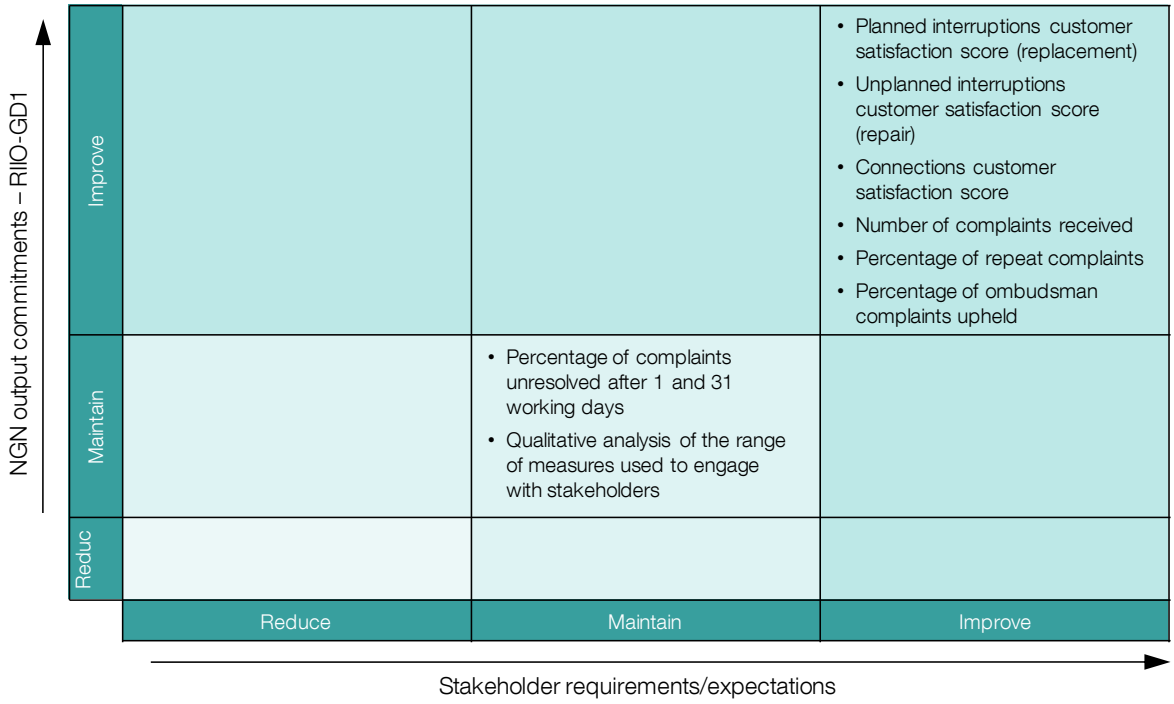


Figure 6.34: NGN customer service improvements summary

6.4.1 Customer satisfaction

Customer satisfaction is measured by the results of three surveys carried out covering customer experience with our emergency and repair service, replacement activities and connections service.

The output framework for customer service covers three areas: customer satisfaction as measured by the surveys; complaint handling; and stakeholder engagement. We have supplemented this with an additional measure, which is the number of complaints we receive.

Standards of customer service across the gas distribution networks are consistently high with customers rating performance across the three categories at an average of 7.7 out of 10. The average 'spread' between the highest and lowest scoring GDNs is typically less than one point.

Since 2008/09 (when scoring was introduced on a consistent 1 - 10 basis) we have achieved scores at or above the industry average in repair and replacement. Our performance in connections has improved significantly to achieve above average performance in 2010/11.

Historic performance

We remain committed to consistently achieving a top two level of performance in the customer surveys within the current GDPCR1 period and across the RIIO-GD1 period to 2021, in line with our corporate strategy.

Ofgem quarterly service score	2008/09	2009/10	2010/11
Replacement	7.35	7.70	7.96
Repair	8.25	8.20	8.10
Connections	6.62	7.35	7.77

Figure 6.35: Customer survey scores

Target performance

Overall, the target performance for customer satisfaction surveys reflects our strategy to improve performance across the network on an annual basis, incrementally and sustainably. To achieve this, we are refocusing the delivery of the customer service function – placing it right at the centre of the organisation and delivered directly by the Customer Operations team. This is the most visible part of our business dealing with emergency, repair, maintenance activities and connections to our network. This function is responsible for the customer interface and management, ensuring that the customer is at the heart of everything we do. Performance is tracked and reported on a weekly basis to ensure appropriate managerial input and engagement across the network.

Additionally, the network's customer service action plan includes a wide-ranging customer training programme for all operational staff. Training is carried out annually. The focus of the training will evolve as we analyse the trends of our stakeholders' feedback.

Period	GDPCR1		RIIO-GD1							
Ofgem quarterly service score/year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Planned interruptions customer satisfaction score (Replacement)	8.02	8.04	8.1	8.2	8.3	8.4	8.45	8.5	8.55	8.6
Unplanned interruptions customer satisfaction score (Repair)	7.82	8.5	8.55	8.57	8.59	8.61	8.63	8.65	8.67	8.69
Connections customer satisfaction score	7.51	7.63	7.65	7.85	8.05	8.25	8.35	8.45	8.55	8.65

Figure 6.36: Target performance customer survey scores

6.4.2 Complaints handling

The current target for resolution of a complaint is 10 days when a site visit is not required and 20 days when a site visit is needed. Should the customer be unsatisfied by the response there is an escalation procedure, first to a NGN customer service manager or director and then on to the Energy Ombudsman where objections are either rejected or upheld.

i Complaints received

We believe reducing the number of complaints is a beneficial focus as it will enable us to respond to complaints in less time on average. It is also a measure of the quality of our operational (front line) delivery and customer service.

Historic performance

We have reduced the number of complaints received by the business by more than 70% since 2007.

This has been a key focus for the business and we believe that managing the total number of complaints is a key measure of evaluating customer satisfaction and driving improvements in customer service in the future.

Year	2007/08	2008/09	2009/10	2010/11
Total number of complaints	2,591	1,371	825	776

Figure 6.37: Current complaints received

Target performance

The main initiative to continue reducing the number of complaints is the customer focus training programme. This will have an impact across NGN as it provides a focus on customer service for all our employees, including senior management, operations staff and our contract partners.

We are targeting reducing the number complaints received over the whole period by a further 50%.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Total number of complaints	730	657	591	532	492	455	421	400	380	361

Figure 6.38: Target performance complaints received

ii Percentage of complaints unresolved after one and thirty one working days (D+1 and D+31)

We view the time it takes to resolve complaints as a key measure of the quality of our customer service. We aim to reduce the number of complaints received annually and to improve the resolution time of those received.

NGN has previously worked to a target of 10 and 20 days for complaint handling so we do not have historic data for this measure.

Target performance

Target performance for the new D+1 and D+31 measures are set out below. NGN will have a target of 20% of complaints resolved within the first day and having 99% of all complaints resolved within 31 days. The forecast requires significant annual improvement in the time taken to resolve customer complaints. It is anticipated that as current areas of focus for service level improvement are managed, the improvements will become business as usual. This will allow a continuous cycle where the focus will shift from area to area pushing overall performance on to new and higher levels year on year, incrementally and sustainably.

The initiatives in place, primarily the customer training programme, will improve our scores in the Ofgem customer satisfaction surveys and also improve NGN's complaints handling performance.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Percentage of complaints unresolved at D+1 (%)	80%	80%	←			80%	→			
Percentage of complaints unresolved at D+31 (%)	1%	1%	←			1%	→			

Figure 6.39: Target performance percentage of complaints unresolved after D+1 and D+31

iii Percentage of repeat complaints

We want to have confidence that our improvement initiatives are limiting the causes of complaints to prevent reoccurrence and to demonstrate that we are listening to and acting upon what our customers tell us. The percentage of complaints that are repeats is a suitable measure for this and we can track if the complaint is a repeat by using customer addresses and postcodes. Minimising repeat complaints is also a way of reducing overall customer complaints and generally improving our customer service.

Target performance

We will keep the number of repeat complaints below 5% and reduce this to 2% in RIIO-GD1. NGN can track complaints by type (category) and so, whilst some repeat complaints will occur, we aim to ensure they are not for the same type of incident or service failure.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Number of complaints received	730	657	591	532	492	455	421	400	380	361
Percentage of repeat complaints (%)	5%	5%	5%	5%	4%	4%	4%	3%	3%	2%
Total number of repeat complaints	37	33	30	27	20	18	17	12	11	7

Figure 6.40: Target performance of repeat complaints

iv Percentage of Energy Ombudsman findings against NGN

If customers are not satisfied with NGN's response to complaints they can refer them to the Energy Ombudsman where a decision is made regarding the validity and severity of the complaint.

This is our final measure of how successfully complaints are being managed and we will measure the percentage of Ombudsman complaints which are upheld or otherwise.

Historically NGN has had very small numbers of complaints referred to the Ombudsman with a total of 14 complaints upheld in the last four years.

Historic performance

The table below shows our performance against these measures since 2008.

Ombudsman Complaints	2008	2009	2010	2011
Upheld	1	2	7	4
Rejected	3	0	2	3
Customer Dropped	1	1	0	0
Mediated Resolution	1	7	1	1
Pending	0	0	1	2

Figure 6.41: Energy Ombudsman findings against NGN

Target performance

Any complaints that remain unresolved after 31 days we are assuming will be referred to the Ombudsman. NGN is aiming to maintain performance of less than 30% of Ombudsman complaints being upheld. However, this is against a background of forecast significant reductions in complaints.

6.4.3 Stakeholder engagement

NGN will seek to demonstrate positive outcomes for customers as a direct result of our stakeholder engagement.

We will continue to meet, discuss and debate with our customers the way in which the company meets its obligations, delivers its services and analyse our customers' experiences to identify ways in which we can become more effective. We will strive to make continuous improvements in our service delivery and improvements in our customers' experience of our works.

In order to deliver this continuous improvement, we will actively source our stakeholders' views and opinions, as described in the preceding sections of this document. This data will then be fed into the business and used to identify areas of concern to our stakeholders, and used as a catalyst for change. This will be a continual process, embedded in our business, to deliver incremental and sustainable year-on-year improvement across all our activities.

6.5 Environment

Environmental outputs are made up of the following primary measures and secondary deliverables.

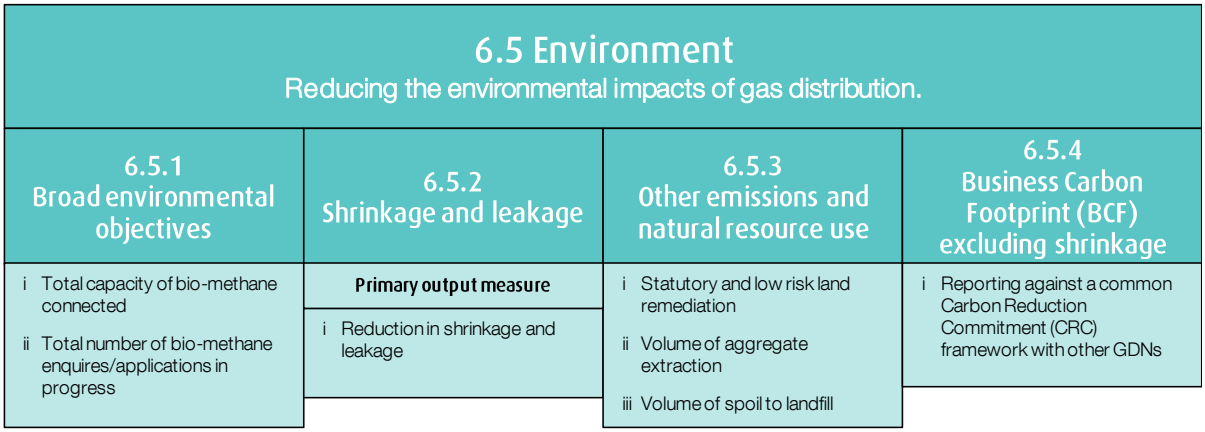


Figure 6.42: Environment outputs

The following table summarises what NGN will do in RIIO-GD1 against each of the output measures for environmental performance, measured against stakeholder expectations.

Environment improvement summary

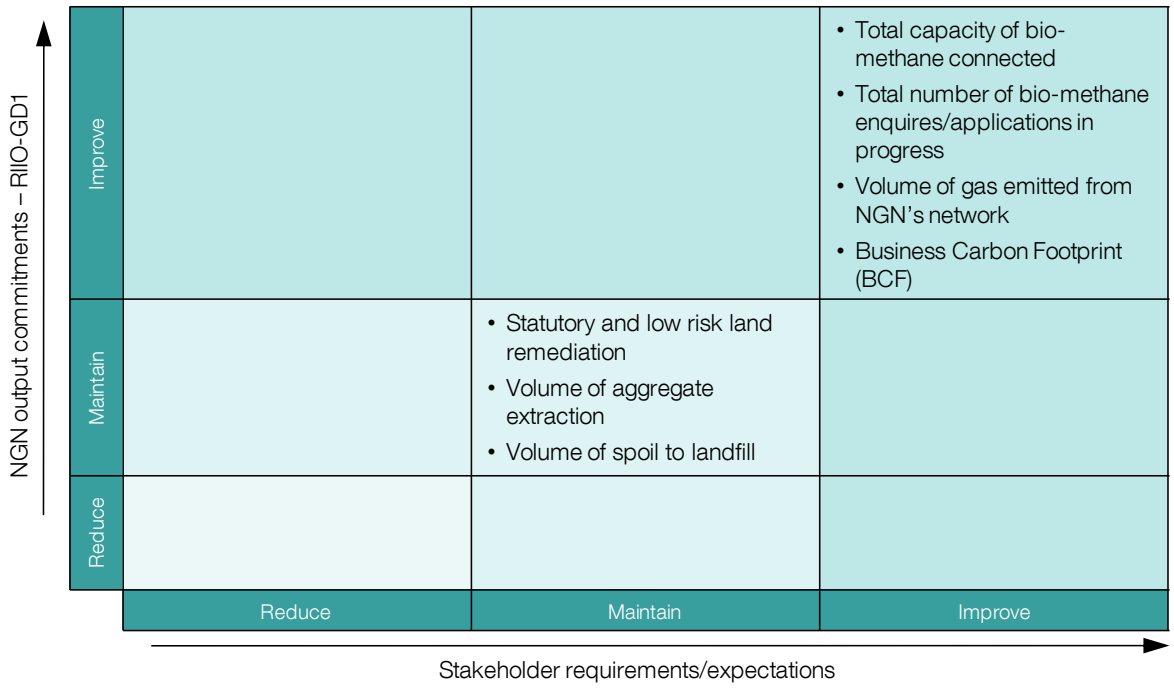


Figure 6.43: NGN environment improvements summary

6.5.1 Broad environmental objective

The Government's commitment to a long-term framework for the reduction of greenhouse gas emissions introduces significant challenges for the wider economy and energy industries, in particular in developing and implementing the policies, technologies, systems and workforce required to achieve the proposed targets by 2050.

NGN believe that the most viable scenario for the transition is one in which gas continues to play a significant role in the energy mix. However, this scenario still requires a step change in the role of the gas distribution networks and in particular involves the development and connection of a significant scale of biomethane sources into the gas distribution system. It is clear that we and the other GDNs have a significant role to play in enabling the efficient development of this technology.

i Total capacity of connected biomethane

The proposal to require GDNs to report and publish the total capacity of biomethane connected to each network is a very welcome addition to the outputs framework. It provides a quantitative focus whether we are doing enough to support the connection of biomethane.

We will measure the total capacity we are connecting to the distribution network in standard cubic metres per hour (scm/h). NGN has not yet connected a biomethane source of gas to the distribution grid but do have one scheme, of 350 scm/h capacity, progressing towards completion and potential connection in 2012.

NGN has been working with prospective biomethane producers since 2009 to better understand the role we have to play with respect to biomethane and the work required to address any prospective barriers to entry that exist. Some of the current barriers include the following.

- Access to accurate and timely information on network entry locations;
- Detailed information on network capacity and availability;
- Gas quality and safety management requirements and information;
- High network entry costs associated with the limited availability of alternative gas quality monitoring equipment; and
- Availability of low cost solutions to address entry capacity constraints at specific network entry points.

We have identified initiatives to address these, some of which we have started to implement, as described below.

Target performance

NGN has currently received enquiries or applications for biomethane injections of 9,500 scm/h. Our expectation is that we will connect, on average, one in five enquires or applications per year during RIIO-GD1.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Total capacity of schemes connected (scm/h)	0	350	←			250	→			

Figure 6.44: Target performance for capacity of biomethane connections

The likely level of connection will be dependent upon a range of factors outside our control, in particular the Renewable Heat Incentive (RHI), published in March 2011. The detail of this incentive package is currently being reviewed by producers but we expect it will act as a significant driver for the development of projects.

We have identified suitable initiatives which being to address the low volume of biomethane being connected to the GDN, and which will support our role as an enabler to the development of this technology within the wider energy market. These include the following.

A procedure that governs the process of dealing with enquiries and applications for biomethane connections.

Information published on our website giving general information, contact details and services we offer to assist prospective biomethane connections. We provide location and capacity information to biomethane producers.

Develop information relating to gas quality monitoring requirements and likely costs of connection.

A scheme expected to go live in 2012 that will create a test bed facility on a live biomethane plant. This will be used to identify and approve alternative gas quality monitoring equipment aimed at bringing down the cost of connection.

A scheme examining an innovative use of compression within the network to address capacity constraints for biomethane plant connecting at network locations with low flow conditions across the year.

We will look to bring forward schemes and initiatives aimed at addressing the issues and constraints currently experienced in this area. This will continue to be an important element of our innovation strategy throughout RIIO-GD1.

ii Total number of biomethane enquiries/applications in progress

Historic performance

The total capacity of biomethane enquiries and applications (but not yet connected) provides additional data on whether we are meeting the levels of biomethane network connection needed to meet the environmental targets. It also incentivises GDNs and relevant policymakers to address any issues that are seen to be constraining development in this area.

	Capacity (scm/h)	Comment
Total capacity of biomethane enquiries and applications received (but not yet connected)	9,500 scm/h	Made up of 22 separate schemes (Average -300 scm/h)

Figure 6.45: Total number of biomethane enquiries/applications in progress

Target performance

A forecast for the biomethane enquiries and applications received (scm/h) is based on the capacity of enquiries we have received in recent years. This averages approximately 2,500 scm/h, per year.

This target could increase as the Governments' new Renewable Heat Incentive becomes better understood and the work that GDNs are doing to address the issues described above.

6.5.2 Shrinkage and leakage

i Volume of gas emitted from NGN's network

Leakage refers to natural gas emitted from our network through pipeline joints and other assets as gas is transported through the distribution network. Leakage is approximately 0.06% of total throughput.

This is a key component of NGN's carbon footprint (more than 95% of NGN's total carbon emissions) and is measured as the volume of gas emitted in units of GWh. In 2010/11 NGN's leakage volume was equivalent to more than 576k tonnes of carbon equivalent (tCO2e).

Historic performance

Based on the latest projections for 2012/13, NGN forecasts to achieve a reduction in shrinkage and leakage of approximately 10% within GDPCR1. This is equivalent to approximately 192k tCO2e when compared to 2008/09 levels. This reduction has been primarily achieved in leakage reduction through:

- optimisation the Repex programme (within HSE parameters); and
- introducing a new pressure management system which reduces average system pressure (ASP).

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Leakage (GWh)	541	524	513	497	476	474

Figure 6.46: Current volume of gas emitted from NGN's network

Target performance

The forecasts set out below have been determined using the NGN leakage model and are consistent with the planned investment programme for Repex and for those elements of the capital investment programme directed at reducing leakage.

The delivery of this programme will reduce leakage from our network by a further 21% (520k tCO2e) when compared to the 2013/14 baseline. Going forward, we recognise that the rollout of smart meters during RIIO-GD1 could enable access to meter data. This could be used to enhance or replace the leakage model's role in measuring leakage and shrinkage. A key part of our innovation plan for 2013-21 is to trial the use and application of relevant smart meter data in the measurement of shrinkage and leakage, which will have direct environmental benefits.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Leakage (GWh)	450	448	446	432	414	397	386	376	365	354

Figure 6.47: Target performance for volume of gas emitted from NGN's network

6.5.3 Other emissions and natural resource use

NGN is committed to reducing our impact on the environment and currently holds ISO 14001 – an internationally recognised environmental management system. We will continue complying with ISO 14001 throughout RIIO-GD1, as a minimum.

The ISO 14001 environmental management standard helps NGN to:

- minimise how our work activities negatively affect the environment (e.g. they can cause adverse changes to air, water, land, flora and fauna and reduction of natural resource);
- comply with applicable laws and regulations; and
- continually improve our environmental performance by developing business targets and objectives.

i Statutory and low risk land remediation

Historic Performance

Prior to the discovery and use of natural gas, gas companies manufactured 'town gas' which was then distributed to their customers. Town gas was manufactured in gasworks sites usually located in the centre of the town or city. Gas was manufactured from coal and many by-products were produced which were potentially harmful to the environment. This resulted in the land on which the gasworks were sited becoming contaminated. NGN owns a portfolio of sites, including old gasworks, used for supporting the business in storing and delivering gas to the customer.

NGN is committed to the protection of land from future pollution and addressing the past legacy of contamination which has arisen from historical activities where this is causing unacceptable impacts on health or the environment.

NGN's contaminated land strategy is to manage the risk associated with the statutory liability of its portfolio of 114 sites with known historic contamination. The NGN land quality framework considers protection and enhancement of land quality with appropriate action to deal with historical contamination to the extent that it may affect health or the environment.

Since the formation of NGN in 2005, NGN has taken a responsible, though principally reactive, approach to managing its land portfolio. We work with regulators where a potential unacceptable impact is identified and pursue voluntary action to control and eliminate such impacts. NGN has received a number of enquiries from the regulatory authorities relating to contaminated land. To date we have been successful in removing the potential impact and avoiding the need for full scale statutory remediation at significant cost to customers.

Target Performance

The regulatory authorities are becoming progressively more active in their responsibility under the Environmental Protection Act 1990, Part IIA for identifying 'contaminated land' and ensuring significant risks are dealt with. Since 2005, all GDNs, with the exception of NGN, have been 'forced' to complete a level of statutory remediation by the regulators.

Given the regulatory actions identified above it is anticipated, during the course of the RIIO-GD1 period, the regulatory authorities will exert increased pressure on NGN for statutory remediation of sites. This is corroborated by data extracted from the Environment Agency's annual Contaminated Land Capital Programme, 2011/12. Of the 30 sites funded under the scheme, 10 were historically gasworks; another three sites were within the NGN network area. In order to manage the portfolio and minimise future statutory remediation NGN will have to move from the current reactive approach to a proactive one.

NGN are commissioning the completion of an updated risk assessment to accurately identify land with high risk to human health and environmental receptors. Locations requiring additional investigation and intervention will be documented and a programme established to manage and reduce the statutory liability of the portfolio. This is expected to be available by the end of April 2012.

To acknowledge the increased interest from regulators NGN is forecasting some statutory remediation on lower risk sites. This is for occurrences where regulators will determine sites as contaminated land if NGN fail to take appropriate action. For the RIIO-GD1 period we are therefore forecasting that we will be required to undertake statutory remediation at two of our high risk sites and a number of low risk sites identified by the regulators which we will be obligated to remediate.

ii Volume of aggregate extraction

One of the ways we ensure compliance with ISO 14001 is by controlling and, where possible, limiting the volume of aggregate we extract when carrying out work on the network. When replacement and repair work is carried out, aggregate is extracted as part of the excavation. This needs to be replaced with either virgin (new) or recycled aggregate. We have reduced the total volume of excavated spoil over the last four years, despite a variable replacement and repair workload.

Historic performance

The table below shows our performance for the last four years.

NGN's ability to use recycled aggregate is dependent on the proximity of replacement and repair work (i.e. broadly iron mains pipe at risk) to suppliers and recycling facilities. This has caused a varied volume of use of recycled and virgin aggregates use since 2007/08, which has been achieved by increasing the use of 'no dig' technologies.

Year	2007/08	2008/09	2009/10	2010/11
Use of recycled aggregate (tonnes)	97,196	102,120	77,703	67,863
Use of virgin aggregate (tonnes)	16,920	21,509	19,178	17,793
Total aggregate use (tonnes)	114,116	123,629	96,881	85,656

Figure 6.48: Current volume of aggregate extraction

Target performance

NGN will continue with the 2011/12 total use of aggregate but we will use recycled aggregate, where proximity to recycled suppliers or facilities makes it feasible. We will also continue to use 'no dig' technologies wherever feasible in order to minimise the overall volume of aggregate used.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Use of recycled aggregate (tonnes)	68,000	68,000	←	—	—	68,000	—	—	—	→
Use of virgin aggregate (tonnes)	17,000	17,000	←	—	—	17,000	—	—	—	→
Total aggregate use (tonnes)	85,000	85,000	←	—	—	85,000	—	—	—	→

Figure 6.49: Target performance for volume of aggregates

iii Volume of spoil to landfill

A separate part of our compliance with ISO 14001 is to minimise the amount of excavated spoil that is disposed to landfill. This can be affected by the proximity of suitable recycling facilities to the location of works, primarily replacement and repair jobs.

Historic performance

The table below shows our performance against these measures since 2007/08.

We have reduced the total volume of excavated spoil over the last four years, despite a variable replacement and repair workload. Whilst ISO 14001 has driven us to continually improve and has resulted in robust reporting, it has not enabled us to reduce our environmental impact through the disposal of reduced amounts of spoil to landfill.

Year	2007/08	2008/09	2009/10	2010/11
Excavated spoil recycled (tonnes)	179,056	170,364	150,987	142,188
Excavated spoil to landfill (tonnes)	4,999	9,698	12,872	13,997
Excavated spoil exempt (tonnes)	1,339	1,065	1,305	1,770
Total excavated spoil (tonnes)	185,394	181,127	165,164	157,955

Figure 6.50: Current Spoil to Landfill performance

Target performance

The forecast performance is based on a marginal improvement from 2010/11 levels and a steady state future performance. By their nature, the location of repair and replacement work is beyond the direct control of NGN. For this reason, and the issue of proximity of recycling plants in relation to these work activities, this forecasting approach has been adopted.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Excavated spoil recycled (tonnes)	143,000	143,000	←	—	—	143,000	→	—	—	—
Excavated spoil to landfill (tonnes)	13,000	13,000	←	—	—	13,000	→	—	—	—
Excavated spoil exempt (tonnes)	1,770	1,770	←	—	—	1,770	→	—	—	—
Total excavated spoil (tonnes)	157,770	157,770	←	—	—	157,770	→	—	—	—

Figure 6.51: Target Performance for Spoil to Landfill

6.5.4 Business Carbon Footprint (BCF) excluding shrinkage

i Carbon reduction commitment

Safeguarding the environment is a legal requirement as well as having a significant bearing on our reputation as a responsible company. We believe that it is our responsibility to conduct our operations in ways which have the minimum adverse impact on the environment.

NGN is committed to the protection and enhancement of the environment, always seeking new ways to minimise the environmental impacts of our past, present and future activities. In order to demonstrate this, we will report annually on our CO2 equivalent emissions, using a standard framework for reporting BCF.

Historic performance

We actively record and monitor our BCF (excluding shrinkage volumes) which includes scope one, two and three as per the World Resources Institute's protocol guidelines and invest to reduce our non-leakage carbon emissions. This equates to approximately 11,330 tCO2e in 2010/11.

We are committed to reducing the impact we have on the environment. We are examining a wide range of initiatives aimed at delivering a low carbon roadmap for the next 10 years and also reducing the non-shrinkage BCF in RIIO-GD1.

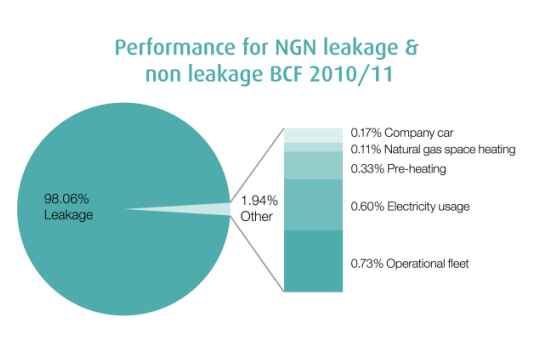


Figure 6.52: Carbon performance for NGN leakage and non leakage business carbon footprint 2010/11

Target performance

NGN is targeting a reduction of 5% in total BCF in RIIO-GD1.

Many of the initiatives we have identified for consideration are not yet developed to a stage where the business case has been proven and so they cannot be implemented prior to RIIO-GD1. Additionally we will be looking to further research and develop innovative approaches to delivering some of these projects with the aid of the innovation funding initiatives created by the RIIO framework.

NGN's targeted reductions in non-shrinkage BCF over the period are set out below.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
NGN non-shrinkage BCF (scope 1,2 and 3) – tCO2e	11,273	11,217	11,161	11,105	11,050	10,994	10,939	10,885	10,830	10,776

Figure 6.53: NGN Non-Shrinkage BCF

6.6 Social obligations

Our outputs in this area are made up of the following primary measures and secondary deliverables.

6.6 Social obligations Extending the gas network to communities who are fuel poor where it is efficient to do so (and where it is not, working with other parts of the energy industry to meet the needs of the fuel poor), and introducing measures to address incidents of carbon monoxide (CO) poisoning.	
6.6.1 Fuel poor network extension	**6.6.2 Carbon monoxide**
i Increasing the number of fuel poor customers with access to gas	i Improving public safety and awareness regarding CO ii Atmospheric testing for CO

Figure 6.54: Social obligations improvements summary

The following table summarises what NGN will do in RIIO-GD1 against each of the output measures for social obligations, measured against stakeholder expectations.

Social obligations improvement summary

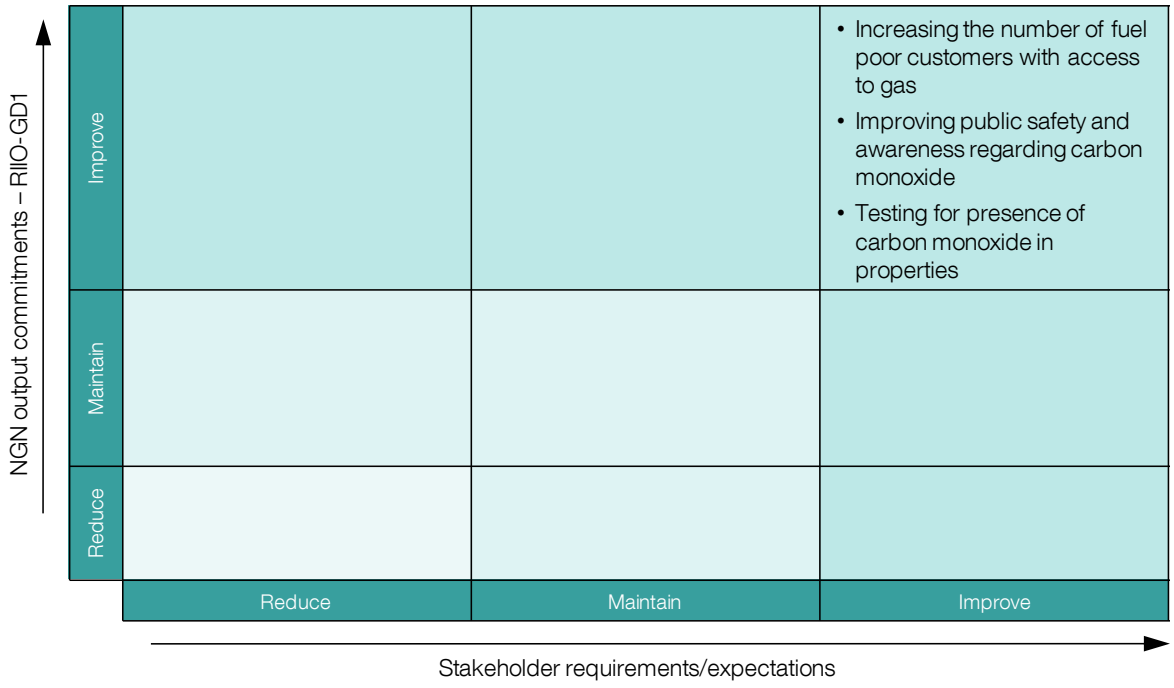


Figure 6.55: Social obligations improvements summary

6.6.1 Fuel poor connections

In 2009 arrangements were introduced which provided that customers who met the eligibility criteria for fuel poverty could receive a discount against the cost of connecting them to mains gas. This secondary deliverable measures the number of eligible fuel poor customers connected to mains gas.

i Increasing the number of fuel poor customers with access to gas

Historic performance

Since 2009 we have undertaken a variety of projects and initiatives designed to connect fuel poor customers to the gas network. Our original strategic objective when the fuel poor initiative was launched in March 2009 was to 'connect a minimum of 2,500 fuel poor customers to the network over the next four years' i.e. 2009 to 2013. At the end of September 2011, we had connected 2,245 fuel poor properties, well ahead of our original target, which has now been increased to ~5,000 to the end of GDPCR1.

Target performance

The forecast number of fuel poor customers we plan to connect to the gas network in RIIO-GD1 is shown in the table below.

Independent market research undertaken by the Energy Audit Company (funded by NGN) indicated that there were 120,000 householders in fuel poverty who live without gas within our region. NGN is targeting connecting 12,000 fuel poor households in RIIO-GD1 representing more than ~10% of the target population.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Community based connections	731	1024	350	350	350	350	350	350	350	350
One off connections	668	738	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
UIP/IGT connections	168	100	150	150	150	150	150	150	150	150
Total	1,567	1,862	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500

Figure 6.56: Target performance for the number of fuel poor customers without access to gas to be connected to the mains.

6.6.2 Carbon monoxide

CO is a colourless and odourless gas that is produced when carbon fuels are burnt. CO presents a serious risk to public safety because it is normally undetectable, and can cause fatalities, acute injury or chronic health problems.

i Improving public safety and awareness regarding CO

We plan to continue to play an active role in raising the awareness of the risks of CO. Our stakeholders have indicated very clearly that they believe we have a greater role to play in addressing the issue, including the distribution of information and advice and the provision of CO monitors to vulnerable customers when attending a gas emergency.

Raising the awareness of CO continues to be a key part of NGN's strategy and approach to delivering gas safety advice to our customers. Our activities include the following;

- Press releases across the year with a seasonal campaign in October and November as people start to turn their central heating back on. The seasonal campaign in 2010 generated 12 articles in newspapers across our region with a combined circulation figure of more than 164,000;
- We continue to provide funding and resources to campaigns delivered by the Kirklees Carbon Monoxide Awareness group (KCOAG). For example, we have supported additional activity to share safety messages with the student population who rent at Huddersfield University in 2010, who are typically hard to reach; and
- We continue to provide CO information leaflets to fire and rescue services in our region who distribute them as part of their public information roadshows. We have extended this activity to several housing associations, who have distributed the material to their tenants. We also distributed leaflets to all regional universities.

We recognise our role in promoting CO awareness and agree that it is a critical output for RIIO-GD1.

Target performance

We are committing to extending the CO awareness programme across the RIIO-GD1 period. This will look to build upon the work carried out during GDPCR1 and examine the opportunities for effective and innovative ways of delivering key gas safety messages to a wider audience. For example, we are planning to develop a smartphone application relating to gas safety.

We plan to report on an annual basis all awareness activities carried out over the previous year and our plans for the following year. We are also considering how best to evaluate and report on the effectiveness of the campaign in raising awareness.

ii Atmospheric testing for CO

During RIIO-GD1 we intent to introduce formal arrangements to test for the presence of CO at customers' properties. These arrangements will consist of FCOs being issued with upgraded detection equipment, based on the GASCO 6B-500R. This is an upgrade to the current equipment and has the additional capability of detecting more gases than are currently monitored, whilst providing the operative with constant detection facilities.

When an FCO attends a reported gas escape, in addition to the current procedures and tests which are carried out, tests will also be conducted for the presence of CO. The results at each property will be recorded by the FCO and held centrally on NGN systems.

Currently we are completing a gas detection equipment trial that will involve one operational area of the business within the network which has a higher than average number of CO incidents. This is a proactive approach by NGN to ensure a more customer focused solution is being applied to CO detection. The primary purpose of the trial is to identify any operational issues which would result in NGN's proposal requiring amendment or not being feasible. In the absence of any contentious issues we will work towards the full implementation of our proposals during RIIO-GD1.

We believe there are significant advantages to the proposed initiative.

- Increase the safety of our engineers when entering potentially harmful atmospheres;
- Offer customers additional confidence in our actions in their properties;
- Deliver additional confidence in our engineers' assessment that properties are free from CO;
- Increase awareness in our own engineers of CO which will be passed to customers;
- Increase the amount of accurate information available on the extent of CO in properties. This will provide the opportunity for more thorough data analysis which can be used to inform further appropriate steps to be taken by NGN and/or other agencies to address issues surrounding CO; and
- No duplication of monitoring equipment.

NGN attends around 120,000 gas emergencies each year. We plan to carry out tests for CO, as appropriate, and annually publish the results of our findings.

6.7 Connections

Connections outputs are made up of the following primary measures and secondary deliverables:

6.7 Connections Provides an efficient and effective service to customers wanting to connect to the gas network.	
6.7.1 **Exit connections for customers who want to take gas from the network**	**6.7.2** **Entry connections for customers who want to export gas onto the network**
i Issue standard connections quotes ii Issue non-standard connection quotes (below 275 kWh) iii Issue non-standard connection quotes (above 275 kWh) iv Respond to land enquiries v Provide commencement and completion dates (below 275 kWh) vi Provide commencement and completion dates (above 275 kWh) vii Substantially complete work on date agreed with customer	i Respond to initial information request ii Respond to request for capacity study iii Respond to request for indicative connection costs iv Issue entry connection quotes

Figure 6.57: Connections outputs

The following table summarises what NGN will do in RIIO-GD1 against each of the output measures for connections, measured against stakeholder expectations.

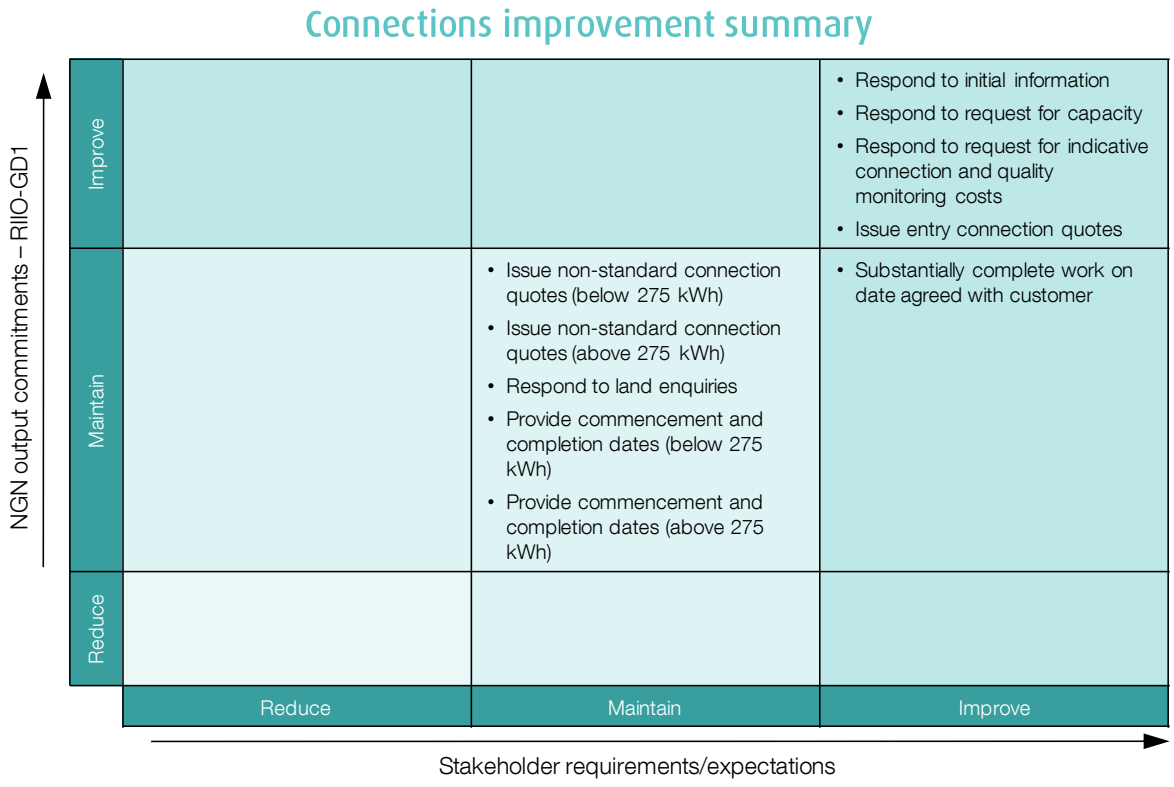


Figure 6.58: Connections improvements summary

6.7.1 Exit Connections

i Guaranteed Standards of Service (GSOS)

A range of sever service standards are in place for all stages of the exit connections process.

Historic performance

Performance since 2008 has been good, with customers receiving consistently high standards of service and timely responses to enquiries.

We have consistently outperformed the licence standards by a significant margin; in some instances 100% has been achieved, as illustrated in the table below.

Year	2008/09	2009/10	2010/11
Issue standard connection quotation within 6 working days	99.4%	99.7%	99.6%
Issue non-standard connection quotation for connection below 275 kWh within 11 working days	99.0%	98.9%	99.6%
Issue non-standard connection quotation for connection above 275 kWh within 11 working days	99.0%	99.2%	99.7%
Respond to land enquiry within 5 working days	99.6%	100.0%	99.4%
Provide connection commencement and completion dates for connections below 275 kWh within 20 working days	99.7%	99.2%	99.8%
Provide connection commencement and completion dates for connections above 275 kWh within 20 working days	97.4%	100.0%	100.0%
Substantially complete connection by date agreed	98.2%	92.2%	95.2%

Figure 6.59: Current Standards of Service (GSOS) for connections

Target performance

We believe there is a strong case for maintaining the performance targets in this area. However, in response to stakeholder feedback we will make a commitment to challenge the time taken to plan and schedule work following acceptance of quotes and to improve performance where it is efficient to do so.

We aim to maintain current levels of performance as a minimum as they are significantly higher than the target standards of 90% for each measure. The business plan is based upon achieving the levels of performance as detailed below.

Period	GDPCR1		RIIO-GD1							
Year	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Issue standard connection quotation within 6 working days	99.6%	99.6%	←	—	—	99.6%	—	—	—	→
Issue non-standard connection quotation for connection below 275 kWh within 11 working days	99.6%	99.6%	←	—	—	99.6%	—	—	—	→
Issue non-standard connection quotation for connection above 275 kWh within 11 working days	99.6%	99.6%	←	—	—	99.6%	—	—	—	→
Respond to land enquiry within 5 working days	99.6%	99.6%	←	—	—	99.6%	—	—	—	→
Provide connection commencement and completion dates for connections below 275 kWh within 20 working days	99.6%	99.6%	←	—	—	99.6%	—	—	—	→
Provide connection commencement and completion dates for connections above 275 kWh within 20 working days	100%	100%	←	—	—	100%	—	—	—	→
Substantially complete connection by date agreed	95%	95%	←	—	—	95%	—	—	—	→

Figure 6.60: Target Performance Standards of Service (GSOS) for connections

6.7.2 Entry connection

i Standards of service

The emergence of alternative sources of gas and the potential for its connection to the network has an important role in the energy mix of the future – contributing directly to the goals of energy security, sustainability and the transition to a low carbon economy.

We recognise the role we have to play in facilitating the development of these emerging customer connections and the importance of working collaboratively with these groups to connect them to the network. We agree that minimum performance standards have a key role to play in ensuring this objective is achieved and have introduced new standards of service following discussions with potential new entry connections customers.

- Respond to initial information requires within 10 working days;
- Respond to request for capacity study within 20 working days;
- Respond to request for indicative connection and quality monitoring costs with 10 working days; and
- Issue connection quotation within 21 working days.

At this stage, there is currently not enough experience in this area to accurately identify measures and standards. However, our performance against these standards will be published and reported to customers on an annual basis. NGN will continue to work with emerging customer groups, Ofgem and the other GDNs to identify the relevant voluntary standards to apply on a national basis.

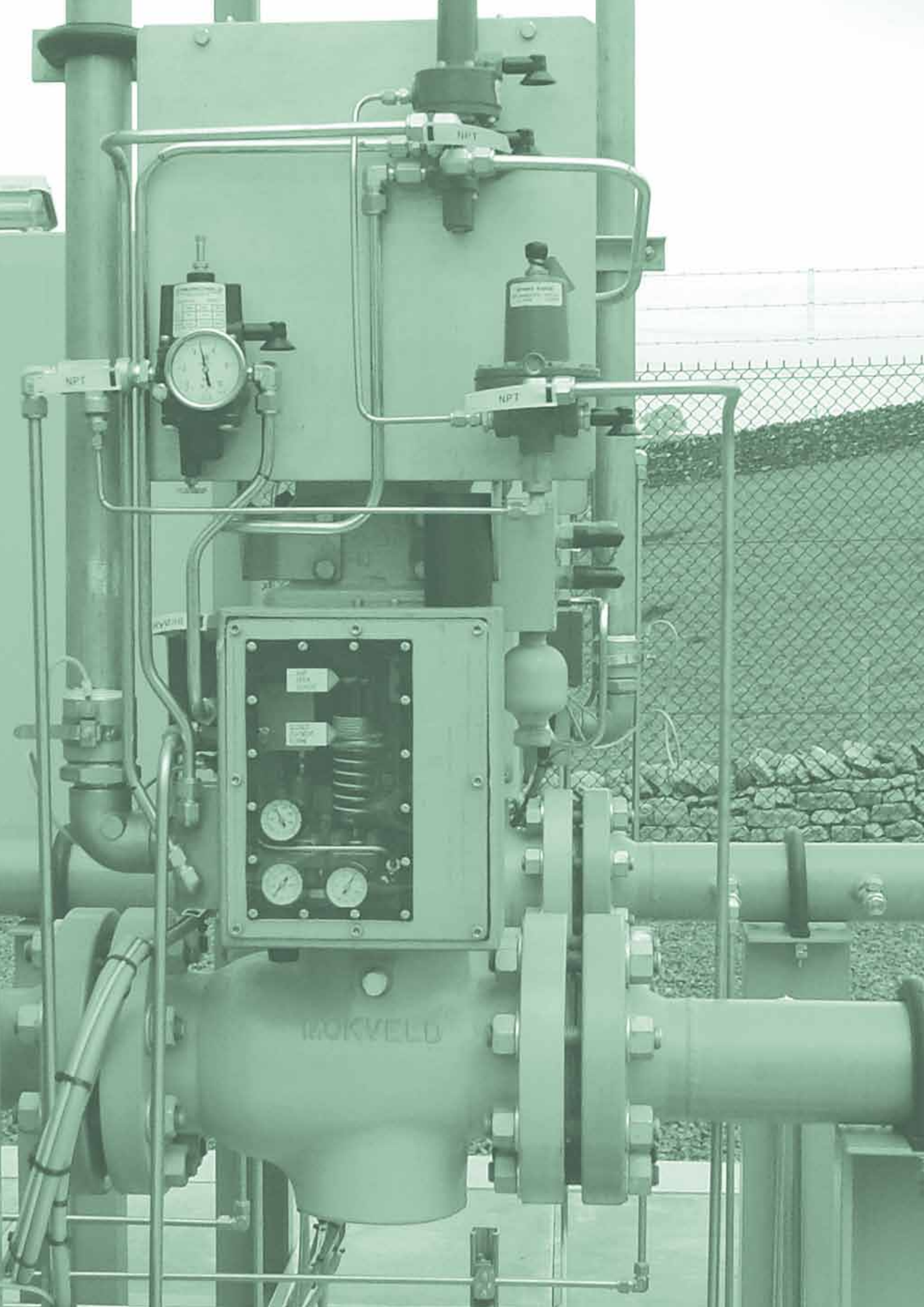
Target performance

Our target performance against the new standards is shown in the table below.

NGN has made a commitment to work with the wider industry to agree national standards of service for the issuing of quotations, the scheduling of works and the completion of works. This will be supported by a reporting framework so that performance can be monitored and compared across the industry.

Provision of relevant information on GDN entry and process	Minimum target performance
Respond to initial information request (location) within 10 working days	95%
Respond to request for capacity study within 20 working days	95%
Respond to request for indicative connection and quality monitoring costs within 10 working days	95%
Issue connection quotation within 21 working days	95%

Figure 6.61: Target performance standards of service for distributed gas customers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Expenditure forecasts

7

This sets out the key assumptions behind our forecasts and describes the new activities that we will carry out. It explains in detail the main component of our capital expenditure (Capex), replacement expenditure (Repex) and operating expenditure (Opex) plans.

Executive Summary

NGN will spend a total of £2.4 billion in RIIO-GD1, investing £1.2 billion in the network and a further £1.2 billion in continuing to operate an efficient, safe and reliable network. This will be underpinned by extensive investment in new apprentices to ensure we maintain the necessary skills in our workforce. The overall level of total expenditure is consistent with that allowed under GDPCR1.

Key elements of our cost base will increase at a greater rate than RPI due to the real price effects affecting the specialist labour and materials we use. We are responding aggressively to these pressures by improving productivity in real terms during each year of this plan.

We will spend c.£100m each year on replacing more than 580km of metallic mains and more than 55,000 metallic services. This will significantly reduce the potential safety risk from these assets and lead to year-on-year reductions in gas escapes and repairs which will in turn significantly reduce carbon emissions from the network. Our replacement programme will embrace the revised HSE rules within our Total Network Management (TNM) approach and use cost benefit methodology to determine which mains are replaced.

We will spend c.£50m each year on capital investment on the network. This will deliver measureable and demonstrable improvements in asset health. All our operational Capex is linked directly to our newly developed asset health indices. We will also invest to remove 27 of our 47 low pressure gasholders from the network during RIIO-GD1 and deliver an additional 12,000 fuel poor connections.

We will spend c.£145m each year on operating the network and delivering services to our customers. An additional 257 apprentices will be recruited to replace members of our workforce who will retire during RIIO-GD1. Our service to customers will improve and we will see reductions in our operating costs as the gasholders are removed from the network and the benefits of our targeted replacement and capital expenditure reduce gas escapes and leakage.

7.1 Background

Our expenditure forecasts directly reflect the evolving business and operating environment of NGN and the need to meet the new challenges that we will face during RIIO-GD1. Our planned expenditure contains several key features that differentiate the requirements of the period from previous price controls.

Outputs focused

The expenditure programme has been led by our commitment to the delivery of the outputs and targets set out in Section 6.2.1. These focus directly on those areas that have been identified as the greatest value to customers and other stakeholders.

Changes to the iron mains replacement programme

Our replacement programme fully reflects the changes to the arrangements described in Section 6.2.1. The programme embraces the additional flexibility that these arrangements provide to deliver additional benefits. The programme is being fully utilised to deliver additional reductions in leakage, gas escapes and repairs as well as reducing the risk of incidents. New techniques to maintain, rather than replace large diameter iron mains are incorporated in our plan.

Investment in the health of the network

The majority of our capital investment in RIIO-GD1 will be focused upon asset health improvements and will maximise the capability of the existing network and make best use of previous investment. This will be a key driver for the delivery of network reliability, which is valued highly by customers and stakeholders, and also ensure that the network maintains the capability to play its role in the future energy mix.

Removal of fixed storage assets

Our fixed storage assets are ageing (some low pressure gasholders are approaching 120 years of age) and are no longer required. They are becoming increasingly unreliable, expensive to operate and challenging to maintain to the required safety levels. The RIIO-GD1 period will see most of these assets removed from the network.

Increased investment in young people

The age profile of NGN's workforce has been steadily increasing despite the apprentice recruitment programme we have operated since 2005. The age profile of the direct labour workforce means that around 250 employees will be over the age of 60 and likely to retire during RIIO-GD1. We will extend our apprentice recruitment programme to ensure appropriate numbers of qualified engineers are employed.

Impact of smart metering and new Traffic Management Act (TMA) permit schemes

RIIO-GD1 will see the implementation programme for smart metering in the UK. This will involve the roll-out of almost 2.6m meters in our region over a five year period starting in 2014. The impact upon our emergency activity in particular could be significant with network and gas safety issues relating to the installation of the new meters being raised via our emergency helpline. In addition, RIIO-GD1 will see additional constraints with the introduction of TMA permit schemes which will increase the cost of carrying out work in the highway and impact, in some instances, the efficiency of our work.

Increase NTS offtake charges

RIIO-GD1 will see a significant increase in NTS offtake charges previously paid directly by gas shippers. Under revised industry arrangements these will now be charged to us for onward charging to shippers. There should be no impact on customer bills.

Reduced requirement for load related expenditure

As a result of reduced peak demand requirements and further forecast demand reductions, our expenditure plans contain no general reinforcement expenditure. A residual amount of reinforcement will continue to be required in response to specific, localised changes in demand on the network.

7.2 Key assumptions

The expenditure forecasts within the plan have been developed against a number of assumptions which are set out in this section. These assumptions impact across all categories of expenditure in RIIO-GD1.

Additionally, there are specific large work programmes included within the plan that have an impact across several categories of expenditure. Our forecasts also reflect the regional factors that impact NGN and are set out in Section 3 and Appendix A18.

The detail of the core assumptions and programmes are set out below to provide the necessary background to the detailed forecasts in the remainder of this section.

7.2.1 Real Price Effects (RPE)

The basket of goods and services which we procure in our normal activities are significantly different from those that make up the general measure of prices in the economy – the Retail Prices Index (RPI). These include higher proportions of specialist labour and materials.

This results in certain elements of NGN's cost base increasing at rates that are significantly higher than that implied by the RPI over the same period.

These differences have been recognised in previous regulatory settlements. However, the rate at which these prices differ from the RPI are affected by a range of factors including prevailing economic conditions and levels of market activity.

NGN, working with our independent consultant EC Harris, has carried out a detailed assessment of real price effects for RIIO-GD1. Please see Appendix A6 for details. The analysis has been prepared in line with Ofgem recommendations relating to methodology and data sources.

Our assessment of both labour and materials RPE are based on time series spanning form the mid 1970s to 2008 – covering three full business cycles.

The analysis considered RPE for direct labour, contract labour and materials across the three broad categories of expenditure.

Direct labour - The assessment analysed real average earnings data over the period 1976-2008, taking in three economic cycles. The compound annual average for the whole economy of this period is 1.64% (real).

Contract labour - Market evidence and NGN's experience shows that contractors in gas distribution, who are generally more specialised, highly mobile, are subject to higher market demand and can more easily achieve their higher wages.

Materials – The analysis examined the price index for the whole data series, 1976 – 2008, to calculate the compound annual real average price increases for both PE pipe and steel.

As set out in Appendix A19 we have adjusted the forecasts derived from the EC Harris work. The table below shows the RPE included in our plan.

Annual % impact above RPI	Opex	Capex	Repex
Direct Labour	1.0%	1.0%	1.0%
Contract Labour (construction)	1.3%	1.3%	1.3%
Materials	0.3%	0.3%	0.3%

Figure 7.1: Real Price Effects

7.2.2 Productivity

In determining the appropriate target to apply to our business plan for RIIO-GD1, three component elements of productivity have been considered.

Catch up – These are the efficiencies that a specific GDN might need to achieve in order to close the gap between its own costs and the costs incurred by the most efficient GDN in the sector. NGN has consistently benchmarked as the most efficient network in the sector so a catch-up target for RIIO-GD1 is not appropriate.

Demerger dividend – This is the additional saving that the GDNs collectively should be able to deliver to customers following network sales in 2005. At that time Ofgem identified that the injection of new owners into the sector and the consequent emergence of comparative competition could be expected to bring about significant cost savings. It estimated that the benefit to customers would eventually be equivalent to a 15% reduction in industry controllable operating expenditure. The improvements in our efficiencies since 2005 exceed the 15% reduction in Opex that Ofgem foresaw during the sale process. We therefore conclude that it is not necessary for NGN to factor any further demerger-driven productivity savings into our post-2013 business plan.

Frontier shift – This is the ongoing productivity improvements that a GDN should be capable of delivering year-on-year even when all catch-up opportunities and demerger-related savings have been exhausted. Consistent with guidance in the RIIO strategy documents, we have benchmarked the rate of frontier shift in the gas distribution sector against historical productivity growth in a range of comparator sectors. Our independent consultant (First Economics) has examined the productivity improvements achieved by the comparator industries over the period from 1990 and, recognising more reliable analysis that may come from for a longer horizon, also from 1970.

This benchmarking shows that the scope for NGN to make productivity improvement differs across the different activities we undertake. We have weighted the comparator evidence according to the composition of NGN's cost base. In the cases of Repex and Capex, the adjusted productivity growth forecasts translate into reductions in projected unit costs. In the case of Opex, and by implication, Totex, it is necessary to make an adjustment for capital substitution or the scope for companies to reduce labour costs by investing in new assets and technologies. Consistent with regulatory precedent in a wide range of sectors, we add between 0% to 0.5% for this effect.

The overall scope for annual productivity improvements which have therefore been included within this plan are as follows:

- Opex: 1.0%
- Repex: 0.5%
- Capex: 0.6%

These estimates of frontier shift are consistent with assumptions made in other periodic reviews in the UK. They are in line with the assessment of the scope for cost reduction in the electricity distribution network sector and the Competition Commission's 2010 estimate of frontier shift in the water sector.

Further details of the analysis and evidence supporting this conclusion can be found in the First Economics report attached as Appendix A7.

7.2.3 Pensions

The forecast pension costs in respect of the Northern Gas Networks Pension Scheme (NGNPS) for the RIIO-GD1 period included in this business plan reflect the initial de-risking actuarial assumptions which the trustees of the NGNPS have proposed for the 31 December 2011 actuarial valuation along with the market value of assets at this date.

The trustees of the NGNPS are seeking to implement a long term funding and de-risking strategy for the NGNPS. The reasons provided by the trustees for wishing to implement a long term funding and de-risking strategy are as follows:

- The significant increase in the maturity of the NGNPS which will occur over the next 15 to 20 years means that a plan needs to be implemented now which, over the RIIO-GD1 price control and future price controls, reduces the risk of underperformance of the assets relative to the liabilities; and
- The new pension principles that will apply to network price controls will result in a finite period of 15 years over which NGN will receive pension allowances in respect of any pre March 2013 deficit. As a result, from 2028 the trustees wish to significantly reduce the dependence of the NGNPS on NGN's covenant.

The trustees of the NGNPS have provisionally agreed a long term funding and de-risking target (i.e. the 'End Game' target) which was proposed by NGN and which, once achieved, will ensure that the NGNPS's dependence on NGN's covenant and hence on funding from customers is significantly reduced from 2028 onwards. In addition, the trustees have proposed an initial step towards achieving this long term End Game target (the 'Initial Step') which they intend to implement at the 31 December 2011 actuarial valuation of the NGNPS.

Although NGN has limited control over the funding decisions made by the trustees of the NGNPS, we believe that the approach proposed by the trustees at this actuarial valuation of the scheme represent an efficient approach for customers and is consistent with the price control pension principles under RIIO for the reasons set out in detail in Appendix A19.

In our business plan we consequently assume that the cash contributions payable by NGN towards future benefit accrual and the deficit in the pension scheme will be as follows:

- For the period to 31 March 2013, we have assumed that the cash contributions payable to the scheme will continue unchanged; and
- From 1 April 2013, onwards, we have assumed that the cash contributions payable will be based on market conditions as at 31 December 2011, and will initially total £18.6m (2009/10 prices).

This business plan is consequently based upon the following pension assumptions.

- Employer contributions towards future benefit accrual = 47.5% per year of pensionable salaries; and
- Employer contributions towards eliminating the deficit = £9.1m annually (2009/10 prices).

Further details can be found in Appendix A19.

7.2.4 Gasholder decommissioning programme

NGN currently has 47 low pressure gasholders at 35 sites on the network. All are extremely old, some were originally constructed more than 100 years ago. These holders are no longer required to operate the network under current present day operating parameters. The associated maintenance and repair costs have been steadily increasing over the years and the condition of some gasholders is likely to require significant repairs in RIIO-GD1. Many of these gasholders are located in urban areas and as such they pose a potentially increasing safety risk which NGN will have to manage.

Based on their condition, safety, environmental risk, network criticality and other criteria, we have assessed all the gasholders as high risk (RI1) in our asset health assessment. In addition to enduring Opex savings, removal of the gasholders will deliver associated gas leakage reductions, improved safety and reduced environmental risks, and improvement to security of supply.

Using cost benefit analysis (CBA) we have established that there is an overall benefit to customers in removing all the gasholders from the network in a planned programme of work over a 12 year period commencing in 2013. Using a CBA which considers only the benefits and cost in the RII0-GD1 period there is a positive net present value of £1.8m.

The costs associated with the holder demolition programme included within this plan for the RIIO-GD1 are shown in Figure 7.2, together with the associated operating cost reductions over the same period.

£m 2009/10 prices	Costs
Gasholder demolition (Opex)	11.5
Upgrade of offtakes and PRIs (Capex)	14.0
Rationalisation of mains and governors (Capex)	5.0
Total cost	**30.5**
Enduring Operating Cost Reductions	
Reduced gasholder maintenance	5.2
Reduced gasholder painting	1.1
Reduced shrinkage	0.7
Total operating cost savings	**11.5**

Figure 7.2: Summary of cost benefit analysis of the gasholder demolition programme.

It should be noted that the operating cost reductions are enduring and will increase during the RIIO-GD2 period.

The costs within our business plan for holder decommissioning do not include full land remediation of the sites as our stakeholder research indicated that customers did not consider to be value for money and it is possible to undertake demolition work without such remediation.

Further details on our decommissioning programme can be found in Appendix A19.

7.2.5 TMA costs

RIIO-GD1 will impose additional constraints on our business and operations with the introduction by Local Authorities (LAs) of the TMA permit schemes. In addition, we expect LAs to implement other sanctions available to them under the New Roads and Streetworks Act (NRSWA) notably lane rental schemes. Clearly such schemes will impose costs and restrictions on our operations, primarily mains replacement, repairs and emergency response activities. There will also be an impact on NGN's connections and mains reinforcement works.

We recognise that despite these constraints, customers require us to minimise the overall cost impact and manage these costs as efficiently as possible. We can draw on our achievements in GDPCR1, successfully reducing costs associated with existing schemes, notably fixed penalty notices (FPNs) and overstay fines.

In addition, NGN is presently developing a strategy and approach to mitigating other streetworks costs. The key focus of this is the Yorkshire Common Permit Scheme (YCPS), which will commence with three LAs in 2012 and four in 2013. NGN will be subject to TMA permit costs with the introduction of the YCPS.

The forecast for the impact of YCPS on our costs are set out below.

The forecast to 2020/21 is based on:

- the YCPS operating in seven LAs;
- FPNs levied by the present 11 LAs;
- current levels of overstay fine activity; and
- recruitment of an additional 4.5 FTEs to deal with the rollout of the YCPS.

These forecasts reflect our intention to mitigate as far as possible the impact of the YCPS on our operations. The key aspects are detailed below.

1) NGN will ensure wherever possible that planned works have minimal impact on permit roads (there are just over 2,000 in the YCPS), this will include:

- utilising flexibility of the HSE's new three tier framework to re-schedule some pipes to minimise intrusion on permit roads;
- re-despatching repair jobs to ensure permit terms are complied with; and
- factoring TMA costs into the cost benefit assessment undertaken under our TNM approach.

2) All permit roads are being incorporated into NGN's IS system so they are available in our planning and schedule applications.

3) We have initiated a number of actions to ensure that our field operations incur the minimal level of permit related costs:

- NGN's direct labour workforce and contractors are undergoing training and awareness programmes to ensure they understand the implications of the YCPS and how they are expected to minimise costs;
- ensuring NGN's key contractor partners are sufficiently incentivised to reduce such costs, and as far as possible the contractors absorb them in existing rates;
- proactive engagement with the relevant LAs by our NRSWA team and operational staff in the field; and
- utilising existing IS applications for use in minimising streetworks e.g. digital photography and time stamps to demonstrate compliance with permits.

£m 2009/10 prices	Forecast cost YCPS only							
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Opex	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
Repex	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4
Capex	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Total	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.5**	**2.5**

Figure 7.3: YCPS cost forecast 2013 to 2021

We are confident that we will be able to demonstrate we will only incur an efficient level of costs under the YCPS. NGN will use experience gained from recent NRSWA changes and YCPS to deal with any additional permit schemes and new lane rental arrangements in an effective and efficient manner.

In summary, our business plan includes c.£2.5m per year for the initial impact of the new YCPS TMA permit scheme only. At this stage we are not aware of any definitive plans by other LAs so are currently unable to provide reasonable estimates of additional costs outside YCPS within our business plan.

7.2.6 Impacts of the smart metering roll out

NGN recognises the importance of smart metering in the UK utilities sector and it being a powerful tool in achieving Governmental targets on carbon reduction. We also recognise that this is a supplier-led programme. However, the replacement of all 22m gas meters in this country wide programme will have a major impact on the GDNs.

The start date for implementation has been announced as 2014. We are working with other GDNs and suppliers in an attempt to mitigate any issues related to the implementation programme. It is hoped that we will be able in some way to coordinate the rollout phasing plans of each supplier in a way that will minimise the impact on the supplier, on NGN, and most importantly on customers.

As a member of ENA, we have been involved in the creation of a "Hierarchy of Gas" issues. This is a list of all the potential situations that may occur during the installation of a smart meter, along with the associated party responsible for the resolution of these issues. NGN has commissioned a programme of site surveys in an attempt to identify the estimated frequency rates of such issues occurring.

Using this data we have forecast the following two impacts into our business plan.

i. Emergency service

The increased emergency workloads we estimate will cost c.£2m annually. This is based on:

- an extra 4,500 one-hour response calls annually, amounting to an additional 4% of the average annual workload; and
- an extra 19,200 other work type calls, amounting to over 100% of the average annual workload.

These workloads assume the implementation of smart meters is uniformly spread over 4.5 years and that the Hierarchy of Gas Issues will be used to mitigate and reduce the frequency rate of issues by informing the training of smart metering installers as the programme matures.

ii. Replacement programme

Meter re-fixing and meter repositioning as a result of mains/service replacement will become more complicated and may involve increased costs. The programme will identify services that will require replacement as a result of a range of factors including non-standard fittings, non-standard material types and steel services. This will be an acceleration of work that would otherwise need to be carried out as part of the replacement programme. In addition to this, suppliers will charge NGN to 'reboot' the communications array of the smart meter installation, after the meter has been disconnected and reconnected as part of a service relay. We estimate this combined cost will be c.£1m annually.

There are a number of potential impacts which have not been costed into our plan. These are as follows.

Training - There could be a need to provide additional training to FCOs and engineering teams for working on smart meters as part of both the emergency service and the replacement programme. Any training requirements are currently unknown but we believe some form of training may be required.

Provision of Emergency Metering Services (PEMS) - NGN may be required to source and stock smart meters. FCOs would also have to carry both smart and standard meters to meet the PEMS obligations; there would be the associated increase in held stock costs. NGN therefore believes suppliers should now provide a full 24 hour, seven day emergency meter service and there should not be an obligation on GDNs to provide PEMS.

Increased resources - There may be the need to increase the number of resources to cover the additional workload. This would include both industrial and office-based support staff. The number of resources, and the type (contractor/direct labour) will depend greatly on the decisions of the suppliers as to the role of the GDN in supporting the smart metering implementation, (e.g. will the supplier have 'in-house' capability to carry out meter relocations). Also the training of the smart metering installer (as detailed in the emergency services impacts) will also influence the number of resources required. We are therefore unable to estimate the potential cost impact at this time.

Stranded meters - NGN currently has a meter supplier of last resort licence obligation which obliges NGN to provide and install meters on request. Since 2005 NGN has installed more than 28,000 meters under this regulatory requirement. As a result of the smart meter implementation these meters will become stranded by being replaced earlier than their normal working life. It is imperative that the lost income stream associated with this should be compensated to NGN.

In summary, our business plan therefore includes a c.£2m per year impact on our Operating costs for the duration of the smart meter implementation programme and c.£1m per year on our Repex costs, based on our current understanding of the impact of the rollout programme.

7.3 Investment plans

In September 2010 we submitted our forecast expenditure for 2013/14 to 2018/19 based on our initial view of the likely requirements for the next price control period. These forecasts included a proposal to invest c.£180m/year over the period and formed the basis of our discussions with stakeholders.

Since that time we have significantly developed our new TNM approach and consulted widely with our stakeholders. Consequently, we now have a much clearer picture of what we should be aiming to deliver, balanced against the overall impact on customers. We have reviewed and challenged these forecasts, and refined our business plan to reflect customers' views.

During RIIO-GD1 we now plan to invest c.£145m/year in the gas distribution network a significant reduction from our previous forecast. The high level breakdown of this investment is shown below.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Mains replacement	63.2	60.8	60.5	61.8	62.5	62.3	63.6	63.6	498.3
Non-mains replacement	33.8	34.9	35.0	35.1	35.2	35.2	34.3	34.3	277.7
Total net replacement expenditure	**96.9**	**95.6**	**95.5**	**96.9**	**97.7**	**97.6**	**97.9**	**97.9**	**776.0**
LTS and storage	10.8	11.5	18.6	17.0	13.0	13.3	10.4	10.8	105.4
Mains and governors	5.4	5.3	5.2	5.2	5.0	4.8	4.7	4.5	40.1
Governors (replacement)	1.8	1.7	1.7	1.7	1.7	1.8	1.7	1.7	13.8
Connections	6.0	5.9	6.1	6.2	6.2	6.4	6.7	7.0	50.6
Other Capex	24.6	29.3	24.4	24.3	14.3	14.2	16.8	16.9	164.7
Total net Capex	**48.5**	**53.8**	**56.0**	**54.3**	**40.3**	**40.5**	**40.4**	**40.9**	**374.6**
Total net investment	**145.4**	**149.4**	**151.4**	**151.3**	**138.0**	**138.1**	**138.2**	**138.8**	**1150.6**

Figure 7.4: Total RIIO-GD1 investment forecasts

7.4 Replacement expenditure (Repex)

Since 2005 we have consistently been the most cost efficient GDN in delivering the iron mains replacement programme, whilst consistently meeting the HSE abandonment targets.

7.4.1 Overall forecast

We intend to remain as one of the frontier performers by embracing the revised three tier strategy for iron mains replacement within our TNM approach. We will use innovative tools and techniques, some developed under the existing price control period, others to be established, to deliver the required outputs, targeting the aspirations of our stakeholders. Our overall Repex forecast for RIIO-GD1 is summarised Figure 7.5.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
HSE programme	46.2	46.4	46.0	47.2	47.9	47.5	48.6	48.5	378.3
Other policy and condition	9.9	8.8	8.8	8.9	8.9	9.0	9.1	9.1	72.5
Non-rechargeable diversions	6.3	4.8	4.9	4.9	5.0	5.0	5.1	5.1	41.1
Total incentivised mains	**62.4**	**60.0**	**59.7**	**61.0**	**61.7**	**61.5**	**62.8**	**62.8**	**491.9**
Rechargeable diversions	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	6.4
Total mains Repex	**63.2**	**60.8**	**60.5**	**61.8**	**62.5**	**62.3**	**63.6**	**63.6**	**498.3**
Replacement services-domestic	32.7	33.1	33.2	33.2	33.3	33.4	32.4	32.5	263.8
Replacement services non - domestic	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1
Total multiple occupancy buildings (risers >20 metre length)	0.8	1.5	1.5	1.6	1.6	1.6	1.6	1.6	11.8
Total services Repex	**33.8**	**34.9**	**35.0**	**35.1**	**35.2**	**35.2**	**34.3**	**34.3**	**277.7**
Total Repex (Net)	**96.9**	**95.6**	**95.5**	**96.9**	**97.7**	**97.6**	**97.9**	**97.9**	**776.0**

Figure 7.5: Total RIIO-GD1 Repex

The table below shows our Repex during GDPCR1.

	Actuals			Forecast		
£m 2009/10 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
HSE programme	50.2	51.7	48.6	48.8	49.5	248.8
Other policy and condition	2.0	3.7	3.0	4.0	4.1	16.8
Non-rechargeable diversions	1.1	0.7	0.8	2.3	3.3	8.2
Total incentivised mains	**53.3**	**56.1**	**52.4**	**55.1**	**56.9**	**273.8**
Rechargeable diversions	0.7	0.5	0.8	0.8	0.8	3.6
Total mains Repex	**54.0**	**56.6**	**54.6**	**55.9**	**57.7**	**278.8**
LTS pipelines and installations	**0.2**	**0.3**	**1.3**	**0.0**	**1.2**	**3.0**
Replacement services-domestic	26.8	29.0	29.2	30.2	31.5	146.7
Replacement services non -domestic	0.3	0.7	0.3	0.3	0.3	1.9
Total multiple occupancy buildings (risers >20 metre length)	0.0	0.0	0.0	0.3	0.5	0.8
Total services Repex	**27.1**	**29.7**	**29.5**	**30.8**	**32.3**	**149.4**
Total Repex (net)	**81.1**	**86.3**	**84.1**	**86.7**	**90.0**	**428.2**

Figure 7.6: GDPCR1 Repex

As can be seen the average level of Repex will increase by c.13% in RIIO-GD1 reflecting an increase in condition based replacement and non rechargeable diversions, the transfer of more Repex work into the southern part of our network and RPEs.

7.4.2 Application of Total Network Management to the Repex programme

Section 4 outlines how we have developed our organisation to deliver a TNM approach to investment decisions. The recent changes to the iron mains replacement programme will enable NGN to apply this new approach to the major area of investment on the gas distribution network.

Our approach is driven by fully utilising the additional flexibility to innovate and improve mains replacement. This has enabled us to develop a Repex programme that delivers significant additional benefit to customers. The key features are summarised below:

- Mandated volumes in tier one will be delivered at lower unit cost, despite the cost pressures we face. This is due to greater flexibility in the delivery of projects and the potential to exploit greater economies of scale by more mains being replaced in an area under a single scheme.
- Our approach to the setting of 'seed' thresholds in tier one, together with our process used for identifying other iron pipes for replacement on the basis of their requirement, efficiency, condition and performance, will ensure that year-on-year we will continue to deliver full compliance with the HSE's requirements whilst minimising our overall tier one iron workload.
- We have worked with the other GDNs and the HSE to develop a risk threshold for tier two iron pipes which we believe delivers an appropriate balance between workload and risk exposures.
- We have driven down our forecast volume of below-threshold pipes to include only those which will provide an overall net benefit. As a result, our total mandated and non-mandated workload volume in tiers two and three has been reduced from almost 80km/year (based on a straight line profile of replacement of remaining live iron pipe out to 2032) to 35km/year – a reduction of nearly 60%.
- A targeted replacement strategy which uses a cost benefit methodology to determine which mains will be replaced.
- A reduced requirement for replacing large diameter iron mains pipes where it is accepted by HSE that a programme of monitoring, maintenance and remediation developed by NGN can manage risk within acceptable levels.

Taken together, these are the key drivers of our RIIO-GD1 replacement programme and they will deliver additional and broader benefits to customers.

7.4.3 Targeted replacement strategy and cost benefit methodology

Many of the additional benefits which will be delivered by our replacement expenditure will derive directly from the specific targeting of mains replacement as part of our approach to TNM. At the heart of this strategy is a cost benefit methodology to assessing where the replacement programme will deliver maximum overall benefit when assessed against a wide range of criteria.

The methodology considers the characteristics of the network at each of 215 individual Network Analysis Polygons (NAPs) which make up our network. For each NAP within the network we can analyse financial and non-financial data for a range of criteria:

- System pressure;
- Pipe material;
- Risk profile;
- Leakage history;
- Pipe diameters;
- MEG concentration levels;
- Impact on customer (interruptions); and
- Impact on local community (e.g. road closures).

This process and detailed localised analysis allows us to identify those NAPs, and individual pipes within those NAPs, which contain the worst performing assets. We can then identify solutions to most efficiently deliver sustainable improvements on performance of the assets. This can then be assessed by considering a range and mix of alternative options including the following:

- Replacement (including the ability to develop efficient projects);
- Mains and governor reinforcement;
- Pressure management;
- MEG application; and
- Repair.

Specifically for replacement expenditure, those NAPs with the highest likelihood of leakage and mains repair with the consequent highest associated operating expenditure will be used to identify the required size and shape of the programme. This will allow the specific geographic targeting of the mandated elements of the programme to those higher priority areas and the identification of specific mains replacements projects that can be justified on a true cost-benefit analysis.

As an example, we show below the application of this cost benefit approach on two of our highest priority NAPs, in Leeds and Huddersfield. The analysis in Section 4 shows these areas have some of our worst performing assets. Individual pipes can be categorised as high, medium or low priority against a range of criteria including associated payback periods.

Route	Material	Size	Length (meters)	Total escapes	Average annual cost of escapes	Replacement Cost	Payback period based on escapes in last 12mths payback period (last year)	Payback period based on average escapes over last 5yrs payback period (average)
Leeds 1	CI	10"	41	31	£10,150	£138k	13.2	13.7
Leeds 2	CI	24"	248	12	£16,800	£102k	6.1	6.1
Leeds 3	SI	14"	171	7	£4,200	£35k	4.0	8.5
Leeds 4	SI/ST	14-24"	802	15	£11,800	£338k	6.0	28.7
Hudd 1	CI	3"	556	6	£750	£24k	6.4	31.8
Hudd 2	CI	14-24"	5312	166	£251,000	£2029k	3.1	8.1
Hudd 3	DI	12"	139	9	£3,600	£45.5k	11.4	12.6

Figure 7.7: Sample analysis Leeds and Huddersfield NAPs 2011

Figure 7.7 above shows a cost benefit analysis (less than 10 years payback) in replacing pipes shaded in green. There is no cost benefit in replacing pipes shaded in red. Pipes shaded in amber would be kept under review as these pipes have demonstrated significant deterioration in the previous 12 months.

This analysis and its key principles have been used in directly developing our replacement and wider investment and operating plans. Detailed forecasts on a scheme by scheme basis cannot be derived for all pipes within all NAPs. However, it can and has been used to accurately identify the required scale of the programme for non-mandatory tier two and three pipes.

The methodology will continue to be developed and employed directly as part of our investment strategy for the prioritisation and scheduling of tier one pipes for incorporation into efficient and effective projects. It will also be used for the identification of non-mandatory tier two and tier three pipes where their replacement would be justified on a net-benefit business case approach.

7.4.4 Mains replacement

Using this approach the total investment we plan to make on replacing iron mains is c.£62m/year, as shown in Figure 7.7.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
HSE programme	46.2	46.4	46.0	47.2	47.9	47.5	48.6	48.5	378.3
Other policy and condition	9.9	8.8	8.8	8.9	8.9	9.0	9.1	9.1	72.5
Non-rechargeable diversions	6.3	4.8	4.9	4.9	5.0	5.0	5.1	5.1	41.1
Total incentivised mains	**62.4**	**60.0**	**59.7**	**61.0**	**61.7**	**61.5**	**62.8**	**62.8**	**491.9**
Rechargeable diversions	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	6.4
Total mains Repex	**63.2**	**60.8**	**60.5**	**61.8**	**62.5**	**62.3**	**63.6**	**63.6**	**498.3**

Figure 7.8: RIIO-GD1 mains Repex

The following sections provide additional detail regarding the forecast investment in each tier of mains, and the underlying cost and workload drivers.

i. Tier one – iron pipes 8" in diameter and below

Tier one is the largest element of the Repex programme with c.95% of the total iron mains replacement workload and c.90% of the total cost of mains replacement.

The HSE minimum requirement is that iron pipes of 8" and below should continue to be abandoned at a rate that will deliver completion of this part of the Repex programme by 2032. We have set our workload target in this category to achieve this requirement.

A minimum of 20% of the highest scoring tier one pipes under the risk model must be replaced. This will deliver the required primary output of risk removal, with the remaining 80% being utilised to develop efficient projects using criteria other than the risk score model for mains replacement.

Our forecast costs and workload are shown in the Figure 7.9.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
HSE programme	44.0	44.2	44.1	45.4	46.0	45.5	46.9	46.8	362.8
Other policy and condition	5.2	4.0	4.0	4.1	4.1	4.1	4.2	4.2	33.9
Non-rechargeable diversions	6.3	4.8	4.9	4.9	5.0	5.0	5.1	5.1	41.1
Total incentivised mains	**55.4**	**53.0**	**53.0**	**54.4**	**55.1**	**54.7**	**56.1**	**56.1**	**437.8**
Rechargeable diversions	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	5.9
Total mains Repex	**56.1**	**53.7**	**53.7**	**55.1**	**55.9**	**55.4**	**56.9**	**56.9**	**443.7**
Workload (kms abandoned)									
HSE programme	502	502	502	502	502	502	502	502	4,016
Other policy and condition	41	31	31	31	31	31	31	31	258.0
Non-rechargeable diversions	26	16	16	16	16	16	16	16	138
Total incentivised mains	**569**	**549**	**549**	**549**	**549**	**549**	**549**	**549**	**4,412**
Rechargeable diversions	15	15	15	15	15	15	15	15	120
Total tier one mains Repex	**584**	**564**	**564**	**564**	**564**	**564**	**564**	**564**	**4,532**

Figure 7.9: RIIO-GD1 Tier one mains replacement expenditure and workload volumes

Workload drivers

The tier one iron mains abandoned during RIIO-GD1 will be c.550 km per year. This workload has been determined by the requirement to completely replace all tier one iron mains by 31 March 2032, and consists of three elements:

- Strategically planned projects –This includes all seed pipes (the highest scoring pipes, which make up 20% of the required workload), with the remainder being utilised to develop efficient projects and deliver the required outputs associated with pipes in this category. Development of this workload will be delivered using data from multiple sources. This will be a resource-intensive activity, with the designers utilising existing and developing new expertise, tools and techniques to optimise the selected mix of projects to deliver the best balance of desired outputs and making full use of the additional flexibility available to them.
- Conditional iron – These volumes are based on historic rates of mains abandoned in this category, and are pipes which were identified as requiring replacement after completion of the strategic planning workload development.
- Non-rechargeable diversions – These are based on historic rates of diversions since 2005. As with condition iron, these are pipes that are identified as requiring replacement outside the strategic planning cycle and which cannot be deferred to the next cycle.

By ensuring that seed thresholds are set based on the full HSE target length, and that all of these pipes are included within the strategically planned workload, we will be able to ensure that iron pipes abandoned on the basis of condition or non-chargeable diversions can be included as counting toward s the overall HSE target. In this way, we have been able to minimise our forecast workload whilst remaining fully compliant with our HSE requirements.

The RIIO-GD1 programme shows a significant shift in the geographical dispersion of workload between the North and Yorkshire LDZs when compared to GDPCR1. This is as a direct result of the targeted replacement programme and the methodology employed to identify appropriate projects using a TNM approach. Figure 7.10 compares the split of repair-related operating costs with the percentage of iron mains in that area. The majority of these costs are triggered by repairs to iron mains rather than PE mains.

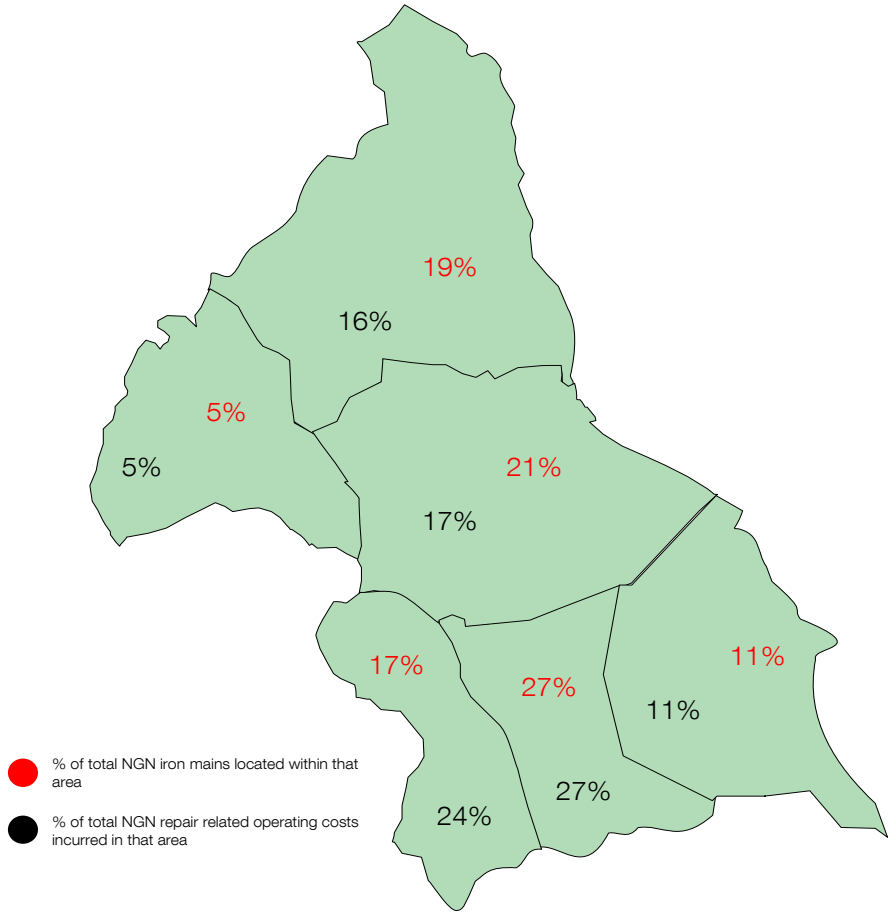

Figure 7.10: Iron mains population and associated operating costs by geographic area

This analysis demonstrates the Yorkshire region has a significantly higher percentage of escapes, repairs and leakage on iron mains than the North. We have undertaken detailed cost benefit analysis which shows clear economic benefit to customers in switching Repex investment into our Yorkshire region.

In Appendix A19 we set out the results of this analysis and show the optimum split between the two regions. Consequently, we will focus 80% of our Repex investment on the poorest performing assets, which are in the Yorkshire region. Figure 7.12 shows the typical annual workload split for RIIO-GD1.

As a consequence, associated steel abandonment will increase to a rate of 37km/year as Yorkshire has a significantly higher proportion of associated small diameter steel mains than the North. These pipes form part of the planned workload and are an integral element in delivering efficient projects.

Following our TNM approach we have also used cost benefit analysis to identify that there is customer benefit in undertaking a condition based replacement programme for small diameter (>2") steel mains. Therefore we plan to replace 15km per year of condition steel of diameter >2" across the network. For example, we have identified that several estates in Leeds which are served by all-steel infrastructures and are experiencing increasing levels of corrosion failures leading to continual supply disruption. This would be most effectively addressed by a programme of planned replacement rather than continuing with the current repair/replace on failure strategy. This is clearly shown from the example below.

Figure 7.11 shows escape repairs (red dots) since 2006 plotted on mains pipes which have been colour-coded by material – grey being plastic, green is iron and orange is steel. It can clearly be seen that there have been significantly more repairs required on the steel pipes than the neighbouring PE or iron pipes.

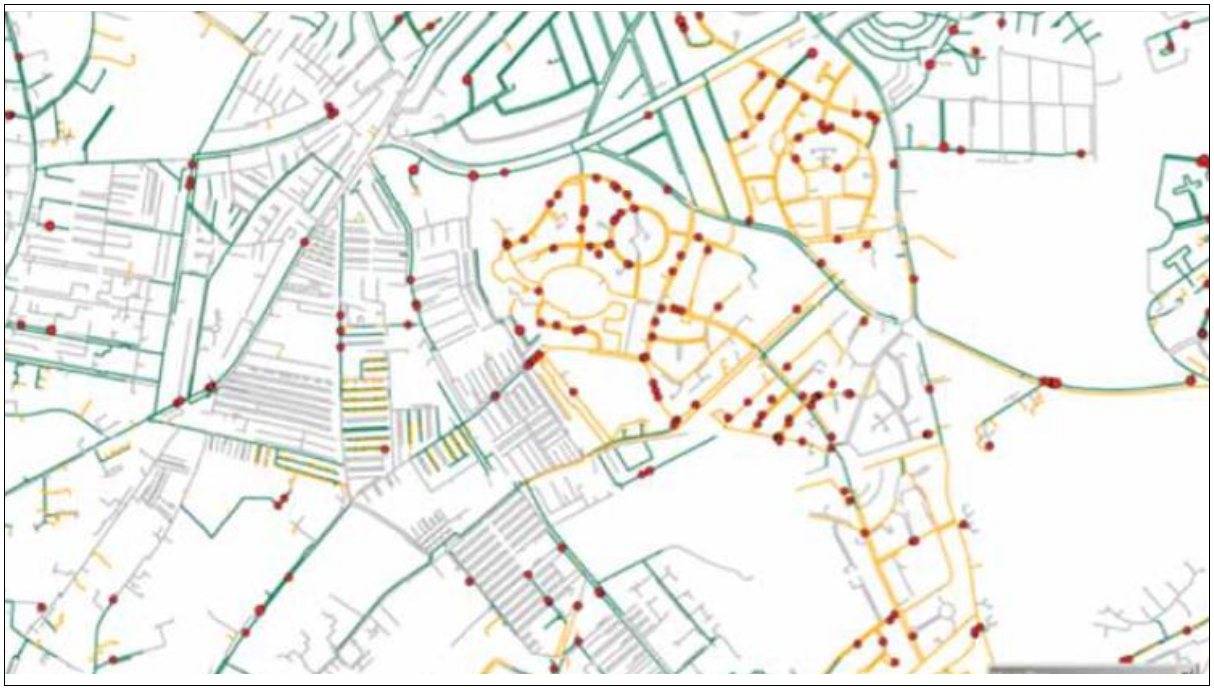

Figure 7.11: Repair history in specific Leeds NAP

The majority of these were failures of the pipe barrel through corrosion. This indicates that these pipes are deteriorating to the end of their useful life and as time progresses the frequency of failure has increased Opex spend. There is an increased likelihood of disruption/disturbance for local residents, environmental impact of leakage and of supply failure due to water ingress.

The overall benefits of replacing these pipes with PE in a well-managed, planned and efficient manner outweigh the costs of carrying out the repair work, and our detailed cost benefit analysis demonstrates this.

Other potential areas for proactive replacement will be assessed and prioritised using the targeted replacement methodology set out above.

Figure 7.12 shows the split of annual Tier 1 workload by geographic area and work types for RIIO-GD1.

kms	Total	Yorkshire	North
Total iron mains abandoned	496	398	98
Strategically planned projects	464	382	82
Condition	16	8	8
Non rechargeable diversions	16	8	8
Associated steel	37	33	4
Condition (steel)	15	10	5
Total incentivised mains	549	442	107

Figure 7.12: Tier one iron mains abandonment workload

Cost drivers

Minimising the amount of PE pipe laid to replace iron pipe is a significant cost driver. The less pipe laid generally the lower the cost. NGN has been able to maintain high abandonment to lay ratios during GDPCR1.

For RIIO-GD1 we forecast that iron mains lay to abandonment ratios will decrease gradually when compared to GDPCR1. This is a result of the reduced availability of high-ratio projects that have been successfully targeted through GDPCR1. The forecast lay to abandonment ratios are set out in Figure 7.13.

Lay to abandonment ratios	2013/14	2020/21
Iron	1:1.05	1:1.025
Associated steel		
North	1:1.18	1:1.18
Yorkshire	1:1.39	1:1.39
Condition (steel)	1:1	1:1
Condition (iron)	1:1	1:1
Non-rechargeable diversions	1:1	1:1

Figure 7.13: RIIO-GD1 lay to abandonment ratios

For associated steel pipes we have recorded very high lay to abandonment ratios, particularly in Yorkshire. This is because a significant number of these are back garden steel rails which are addressed by cutting off the steel pipe and relaying the services to the parent main at the front of the property. We are forecasting this practice will continue, and this efficiency has been included in our plan.

All expenditure forecasts have been set with reference to the latest unit cost rates that already represent the frontier for efficiency across the industry. This level of performance is driven by a range of initiatives and processes within NGN. These include:

- strong commercial arrangements with contractors;
- advanced systems and processes that allow the development of very efficient schemes that make up the whole programme; and
- procedures that employ efficient delivery techniques that minimise the cost of delivery such as pipe insertion.

We currently use insertion techniques in more than 90% of all iron mains abandoned. As such, and when combined with ongoing productivity improvements included in this plan, these unit costs represent a continuation of this industry-leading performance.

£/metre 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
HSE programme	94.2	93.3	91.9	93.2	93.1	90.9	92.2	90.8
Other policy and condition	130.4	134.0	134.9	137.2	139.9	140.5	143.2	144.9
Non-rechargeable diversions	314.4	319.9	323.4	328.0	332.7	335.2	340.0	344.9
Rechargeable diversions	316.2	319.3	323.7	327.5	331.7	336.5	339.9	344.3

Figure 7.14: Tier one – unit rates

However, the geographic shift in the workload to Yorkshire has an impact on the unit costs of delivering the programme. Contractor rates in Yorkshire attract a premium over those in the North reflecting a range of factors including more difficult ground and working conditions and the availability/mobility of contract labour.

ii. Tier two – mains greater than 8″ and less than 18″

For this tier, the programme is based upon a forecast of the volumes of mains that will exceed the agreed risk threshold, plus those pipes below the risk threshold that will deliver positive value for customers based on a cost benefit analysis of targeted replacement.

Our proposed tier two programme forms only a small percentage of our overall programme – 4% of workload and 9% of total replacement expenditure.

The three tier approach and the additional flexibility it provides along with our holistic targeted approach, has produced significant savings for tier two when compared to the previous framework.

Our forecast costs and workload are show in Figure 7.15.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
HSE programme	2.3	2.2	1.9	1.8	1.9	2.0	1.7	1.7	15.5
Other policy and condition	3.3	3.4	3.4	3.4	3.4	3.5	3.5	3.5	27.5
Rechargeable diversion	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5
Total tier two mains Repex	**5.7**	**5.6**	**5.4**	**5.3**	**5.3**	**5.5**	**5.3**	**5.3**	**43.5**
Workload (kms abandoned)									
HSE programme	10	10	10	10	10	10	10	10	80
Other policy and condition	20	20	20	20	20	20	20	20	160
Rechargeable diversion	1	1	1	1	1	1	1	1	8
Total tier two mains Repex	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**248.0**

Figure 7.15: RIIO-GD1 tier two mains Repex and workload volumes

Workload drivers

The RIIO-GD1 workload consists of 10km of mandatory abandonment and 20km of non-mandatory abandonment.

The mandatory workload has been derived from our assessment of the minimum length of iron pipe that will need to be abandoned in order to achieve a risk threshold of 93*10-6 incidents/ km/year, with the annual workload volume set to achieve abandonment of these pipes by the end of RIIO-GD1. Details of the process adopted and the analysis employed to derive this threshold are included as Appendix A10. This threshold and the associated workload require agreement with HSE – any changes required to the risk threshold will change the volumes of work to be carried out in this category.

The non-mandatory workload has been derived from two factors:

- our assessment of the volume of tier two work that will be necessary to form part of an efficient overall package of work, given the mandated workload volumes in both tier one and tier two; and
- the volume of additional tier two work that can be fully justified using cost benefit analysis.

This results in a forecast 20km per annum of non-mandatory tier two replacement being included in our business plan.

Details of this analysis and derivation of the forecast non-mandatory work volume can be found in Appendix A19.

Cost drivers

Lay to abandonment ratios for tier two pipes are consistent with those for tier one and as set out in Figure 7.13.

Expenditure forecasts have been set based on modest overall volumes leading to short project lengths. This is driven by a desire to deliver our mandatory pipe requirement in tier two at the lowest total cost to the customer, and to only schedule non-mandatory pipes for abandonment where there is an overall justifiable benefit.

Although this may have a negative impact on unit rates, it delivers the lowest overall spend and is consistent with our goal to minimise our total cost of operation.

As with tier one, we are forecasting a geographic shift in workload towards Yorkshire which will also have an adverse impact on costs. Despite these effects, we have held our forecast unit rates for tier two pipes close to our current costs.

£/metre 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
HSE programme	187.9	188.7	183.8	183.8	186.4	192.1	188.4	190.1

Figure 7.16: Tier two - unit rates

iii. Tier three – mains equal to and greater than 18″

Our proposed tier three programme represents the smallest element of our overall programme with 1% of workload and 2% of total mains replacement expenditure.

This tier of iron mains contains no mandated workloads. Iron mains within this tier have been included where they deliver positive value for customers and the most cost effective way of delivering the outputs set out within the plan.

Our forecast costs and workload are shown in Figure 7.17.

£/metre 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Other policy and condition	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	11.1
Total tier three mains Repex	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**11.1**
Workload (kms abandoned)									
Other policy and condition	5	5	5	5	5	5	5	5	40
Total tier three mains Repex	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**40**

Figure 7.17: RIIO-GD1 tier three mains replacement expenditure and workload volumes

Workload drivers

As with our non-mandatory tier two workload forecasts our tier three forecasts have been derived from two factors:

- our assessment of the volume of tier three work that will be necessary to form part of an efficient overall package of work, given the mandated workload volumes in both tier one and tier two; and
- the volume of additional tier three work that can be fully justified using cost benefit analysis.

This results in a forecast 5km per annum of tier three replacements being included in our business plan. Details of this analysis and derivation of the forecast volume can be found in Appendix A19.

Workload (km)	Total	Yorkshire	North
Total	5.0	3.0	2.0
18"	3.4	2.0	1.4
24"	1.6	1.0	0.6

Figure 7.18: RIIO-GD1 tier three workload split

Cost drivers

All expenditure forecasts have been set with reference to the latest unit cost rates that already represent the benchmark for efficiency across the industry.

These rates fully reflect both the diameter band split and the geographical allocation of these projects across the period.

£/metre 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Tier three mains	298.3	301.9	305.6	309.3	313.1	317.0	320.9	324.8

Figure 7.19: Tier three – unit rates

7.4.5 Services replacement

Whenever NGN is replacing an iron main, attends a gas escape, or undertakes a service alteration, if we discover a steel service at a property then we must replace it.

Services replacement expenditure is forecast to total c.£35m per year. This is broadly in line with expenditure during GDPCR1 excluding RPEs.

Our forecast cost and workload for service replacement is shown in Figure 7.20.

£/metre 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Replacement services-domestic	32.7	33.1	33.2	33.2	33.3	33.4	32.4	32.5	263.8
Replacement services non – domestic	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1
Total multiple occupancy buildings (risers >20m length) – planned Replacement	0.5	1.0	1.0	1.0	1.1	1.1	1.1	1.1	7.9
Total multiple occupancy buildings (risers >20m length) – Replacement on failure	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	3.9
Total services Repex	**33.8**	**34.9**	**35.0**	**35.1**	**35.2**	**35.2**	**34.3**	**34.3**	**277.7**
Workload (numbers)									
Replacement services-domestic	58,577	59,097	59,097	59,097	59,097	59,097	56,990	56,990	468,043
Replacement services non-domestic	118	114	114	114	114	114	114	114	915

Figure 7.20: RIIO-GD1 replacement services expenditure and workloads

i. Domestic services

We forecast that the volume of domestic service replacement will remain at c.58,000 throughout RIIO-GD1 reflecting broadly similar levels of mains replacement being carried out in RIIO-GD1.

RIIO-GD1 workloads are derived from those experienced during GDPCR1. There is no evidence to suggest that these workload rates and core assumptions will differ during the period up to 2020/21.

£/metre 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Replacement services-domestic	58,577	59,097	59,097	59,097	59,097	59,097	56,990	56,990	468,043

Figure 7.21: Domestic services workload

Workload drivers

This forecast workload is derived from the following core assumptions:

	Assumption	Explanation
Services rate	1 per 12.6 meters of main replaced	Historically, we encounter one domestic service for every 12.6 meters of metallic main replaced.
Relays : transfers	59% Relays : 41% transfers	During mains replacement works, where an existing service is found to be steel it must be replaced in PE; however an existing PE service attached to the metallic main being replaced can be tested and transferred to the new PE main without being replaced. During mains replacement activities, 59% of the services encountered are steel and must be replaced.
Relays after escape	7,700 per year	Following a gas escape call, if the source of the escape is found to be a leaking steel service it must be fully replaced in PE from the main to the ECV.
Other services	4,100 per year including an additional 2,100 per year for 5 years commencing 2014/15 driven by the smart meter programme	Services which are replaced for other purposes, for example when associated with altered meter positions or services alterations.

Figure 7.22: RIIO-GD1 domestic service assumptions

Cost drivers

Expenditure forecasts have been derived using latest unit cost information. These rates have been extended over the whole period with the core assumptions of real productivity improvements and RPE incorporated.

£/service 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Relay	573	578	583	588	593	598	603	608
Transfer	326	329	332	335	337	340	343	346
Relay after escapes	1,122	1,132	1,141	1,150	1,160	1,170	1,180	1,190
Other	492	496	500	504	508	512	517	521

Figure 7.23: Domestic service unit rates

ii. Non-domestic services

Workload drivers

We forecast that the volume of non-domestic service replacement will continue at the rate experienced in GDPCR1 at c.115 per year.

Workload (number)	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Replacement services - non-domestic	118	114	114	114	114	114	114	114	915

Figure 7.24: Non-domestic service unit rates

Cost drivers

Non-domestic service replacement unit costs have been derived using the latest cost information.

£/service 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Replacement non-domestic services	2,253	2,275	2,297	2,320	2,344	2,368	2,392	2,412

Figure 7.25: Non-domestic workload

iii. Risers and laterals replacement

The RIIO-GD1 period includes a programme of work to replace a number of risers and laterals in high rise buildings at a cost of c.£12m during RIIO-GD1.

£/service 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Total multiple occupancy buildings (risers >20m length) – planned replacement	0.5	1.0	1.0	1.1	1.1	1.1	1.1	1.1	8.1
Total multiple occupancy buildings (risers >20m length) – replacement on failure	0.3	0.5	0.5	0.5	0.5	0.6	0.6	0.6	4.0

Figure 7.26: RIO-GD1 riser costs

Workload drivers

A significant amount of survey work has been completed in GDPCR1 to collect and analyse data relating to the condition of risers and laterals on our network.

We have identified 12,764 supply points on the network that can be classified as risers and they have been sub-categorised as set out in Figure 7.27.

This survey work has identified that a number of these risers will require replacement in RIIO-GD1. The forecast for replacement of laterals and risers is driven by the outputs of a bespoke risk model being developed for these specific assets, together with outputs from the asset health and criticality assessments underpinning our asset management strategy.

	Number of supply points
Meter points connected to risers <20m	3,824
Meter points connected to risers 20m-40m	4,043
Meter points connected to risers >=40m	4,897
Total multiple occupancy building supply points	12,764

Figure 7.27: NGN riser population

Workload (number)	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Buildings	3	6	6	6	6	6	6	6	45
Supply Points	31	65	65	65	65	65	65	65	486

Figure 7.28: RIO-GD1 risers and lateral replacement workload

Cost driver

NGN has limited internal data on the costs associated with replacing risers and laterals in high rise buildings.

We have undertaken high level benchmarking and market testing to derive the unit cost forecasts shown below.

£k 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Risers replacement cost	242	235	239	243	247	252	256	261

Figure 7.29: RIIO-GD1 risers and laterals replacement unit rate.

7.5 Capital expenditure (Capex)

7.5.1 Overall summary

We plan to invest c.£375m of Capex during RIIO-GD1.

We have linked all our operational network capital expenditure in RIIO-GD1 to asset health measures, showing the status in 2013 and impacts with, and without investment in 2017 and 2021. Appendix A19 provides more detail of our investment plan and shows the linkage to the asset health indices.

We have been through an extensive process with the Gas Transmission Operator to ensure our business plans (particularly our Capex plan) are co-ordinated and deliver the most economic solution for customers. Neither company is planning investments or initiatives that could be done more efficiently on the other company's network. More details of this process can be found in Appendix A12.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
LTS and storage	10.8	11.5	18.6	17.0	13.0	13.3	10.4	10.8	105.4
Reinforcement (Mains and Governors)	5.4	5.3	5.2	5.2	5.0	4.8	4.7	4.5	40.1
Governors (Replacement)	1.8	1.7	1.7	1.7	1.7	1.8	1.7	1.7	13.8
Connections	6.0	5.9	6.1	6.2	6.2	6.4	6.7	7.0	50.6
Total Other Capex	**24.6**	**29.3**	**24.4**	**24.3**	**14.3**	**14.2**	**16.8**	**16.9**	**164.7**
Other Capex	13.9	18.7	11.7	11.7	8.5	7.7	7.9	7.9	87.9
Vehicles	3.3	2.7	5.5	0.1	0.3	2.2	2.9	2.3	19.4
IS and telecoms	7.0	6.4	5.4	10.9	5.1	4.1	5.5	6.1	50.6
Xoserve	0.4	1.5	1.7	1.6	0.4	0.1	0.5	0.7	6.9
Total net Capex	**48.4**	**53.8**	**56.0**	**54.4**	**40.3**	**40.5**	**40.4**	**40.9**	**374.8**

Figure 7.30: GDPCR1 total capital investment

This programme directly reflects the key business drivers we are facing and the changing focus of Capex in RIIO-GD1. The move away from meeting growth in demand to focusing on asset health to maintain safety and reliability outputs is reflected in the size and profile of the proposed programme.

The current capital expenditure during GDPCR1 is shown in Figure 7.31.

£m 2009/10 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
LTS and storage	2.9	3.8	6.7	6.5	8.5	28.4
Mains and Governors	4.0	6.9	4.8	4.9	8.5	29.1
Other Capex	12.0	10.4	12.6	7.4	12.2	54.6
Vehicles	2.5	4.9	0.0	0.4	2.8	10.6
Connections	6.3	7.2	5.9	6.2	6.5	32.1
IS and telecoms	3.5	8.3	1.8	8.0	6.3	27.9
Xoserve	1.4	0.3	0.6	0.9	0.1	3.3
Total net Capex	**32.6**	**41.8**	**32.4**	**34.4**	**44.9**	**186.1**

Figure 7.31: RIIO-GD1 total capital investment

Overall levels of capital investment are forecast to increase in RIIO-GD1 primarily due to a number of one-off investments we plan to make in RIIO-GD1. These include investments in: PRIs; governors and mains to support the removal of the low pressure gasholders; security upgrade of sites recommended by the Centre for the Protection of National Infrastructure (CPNI) and monitoring and removal of high pressure storage vessels from the network. Figure 7.32 shows that when the impact of these one-off investments are removed, then investment levels are consistent with those in GDPCR1.

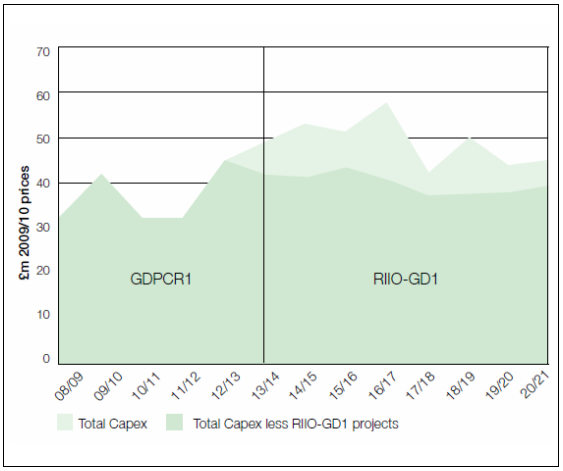

Figure 7.32: RIIO-GD1 total capital investment

7.5.2 Local Transmission System (LTS) and storage investment

The table below sets out our overall forecasts for LTS and storage investment and shows how the investment is broken down between the various types of expenditure. Given the range of different drivers and requirements we have only included a high level summary in this plan, further details can be found Appendix A11 and Appendix A19.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
PRI/Offtake upgrades	3.5	3.7	3.9	3.4	3.4	4.1	1.8	2.8	26.7
Replacement and upgrades of pre heating	2.1	2.1	2.4	3.1	3.0	2.9	2.3	2.0	20.1
E&I site upgrades	1.1	1.4	1.3	1.2	1.3	1.1	1.1	1.1	9.6
Pipeline re-life	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.7	5.1
Offtake meter upgrades	0.1	0.3	0.3	0.3	0.7	0.7	1.1	1.1	4.6
Offtake gas calorimeters replacement	0.0	0.1	0.1	0.1	0.4	0.4	0.4	0.4	1.9
Upgrade offtake site metering low flow	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	1.4
PRI condition upgrades	0.1	0.2	0.9	0.7	1.1	0.9	0.6	0.1	4.6
E&I odorant system upgrade	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.7
High pressure storage strategy	0.0	0.2	6.0	0.1	0.0	0.0	0.0	0.0	6.4
Install pig traps facilities on 6" high pressure pipelines	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.2
River bank erosion	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.3
Compensation	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	8.2
Sleeves	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.9
LTS Pipeline Replacement	0.8	0.8	0.9	5.3	0.8	0.8	0.8	0.8	10.9
Total	**10.8**	**11.5**	**18.6**	**17.0**	**13.0**	**13.3**	**10.4**	**10.8**	**105.4**

Figure 7.33: RIIO-GD1 LTS and storage capital expenditure

RIIO-GD1 requires a total investment of c.£106m in LTS and storage assets. This investment is driven by the requirement to replace assets which pose a risk to network integrity and security of supply due to age, condition or obsolescence.

The asset health assessments which we have completed confirm that the proposed programme will deliver a significant improvement in the integrity of the assets.

A brief outline of each area of expenditure is set out in the remainder of this section.

i. PRI/offtake upgrades

This comprises two major programmes of work. The first is work required to PRI's and offtakes to facilitate removal of low pressure gasholders, described in Section 7.2.4. The second is a programme of upgrades to maintain asset integrity, set out below.

We plan to minimally upgrade the capacity of 22 installations in line with output measures set out in Section 6. This proposal will ensure the respective plant is utilised appropriately and that the level of investment is balanced with meeting the licence obligations. We have considered alternatives to the proposed minimal upgrade of the sites identified. The alternative option would be to undertake full upgrading rebuilds of each of the 22 sites. This would provide an over-engineered solution and would unnecessarily increase costs by c.£13m in RIIO-GD1. Consideration was also given to building Local Distribution Zone storage capacity within the NGN local transmission system rather than securing and utilising NTS flex capacity. This option was discarded as it would cost more than double the chosen solution.

ii. Replacement and upgrades of preheating units

A large number of preheating units on sites are now approaching the end of their useful life, having been installed over the past 30 years. The units are generally of the Water Bath Heater (WBH) type, and are fairly crude in design, with no provision to suit the modern requirements of efficiency and environmental performance. Replacement of these WBH units will normally be by the use of a package boiler and heat exchanger, rather than a like for like replacement. This will give better performance and efficiency savings, by utilising modern burner management systems and controls.

In addition to the replacement of obsolete WBH units, we plan to upgrade a number of existing modular unit housings to modern standards. The expected life of a modular unit is about 15 years, and a number of our early sites have now reached this age and require upgrading/ replacing.

iii. Electrical and Instrumentation (E&I) site upgrades

The E&I equipment on these LTS sites varies in complexity but the basic electrical distribution and instrumentation hardware was installed more than 30 years ago and is now obsolete or has reached the end of its useful life. Sites are now beginning to degrade to a point where there are potential safety risks and security of supply implications if power was lost at the site.

iv. Pipeline re-life

A range of pipeline works is required, covering IGEM/TD1 infringements (buildovers), cathodic protection, ground beds and transformer rectifiers. The drivers for this work are either statutory requirements or the need to maintain the effectiveness of equipment.

v. Offtake meter upgrades

Gas shippers have indicated that more security and greater accuracy is required on offtake meter measurement, as any errors on such meters can have a significant impact on their business. We therefore plan to install new ultrasonic meters on 13 of our major offtake sites.

vi. Offtake gas calorimeters

The current gas calorimeters on our offtakes are reaching the end of their life and cannot be guaranteed to maintain the level of accuracy required and need to be replaced.

vii. Upgrade offtake site metering for low flow

In future with biomethane connections it is important to understand and have accurate minimum flow data. The current metering does not provide low flow data and will be upgraded.

viii. PRI condition upgrades

This will be upgrade work following compliance inspections and the replacement of some obsolete equipment.

ix. E&I odorant system upgrade

The current odorisation equipment is reaching the end of its operational life at various sites and requires replacing.

x. High pressure storage strategy

Our High Pressure (HP) storage facility at Clay Flats in Cumbria supports the network at a point of geographic extremity and is a strategic part of the network. The vessels were constructed in the 1960s and are at the end of their natural life. By removing these ageing assets our customers will benefit from the proposed scheme to replace the fixed storage with linepack. This has been balanced with the offtake upgrades to maximise total investment benefits. The storage will be facilitated by offtake/PRI upgrades, with the remainder provided by linepack storage, providing a more reliable system and improving security of supply for customers at the extremity of the network.

xi. Install Pig traps facilities on 6″ high pressure pipelines

We plan to install new facilities to inspect 6" pipelines by using the latest advances in PIG technology. This will give us greater accuracy in measuring the integrity of 6" pipes with the ability to fully optimise the use of these pipes, further ensuring security of supply to our customers.

xii. River bank erosion

Many pipelines cross a watercourse on their route. Rather than building an over-crossing, they are submerged beneath the river. Changes in climatic conditions are affecting these crossings more regularly. These conditions are exposing our pipelines, increasing the risk of damage and interruption to the supply our customers. We therefore need to invest to counteract the impact of erosion.

xiii. Compensation

NGN is experiencing increased exposure to the loss of mineral extraction and development compensation claims particularly due to the development of wind farms close to our high pressure pipelines. Our IGE/TD1 policy sets out proximity guidance for such development that can initiate compensation claims from developers and land owners. As the Government is establishing a greener energy portfolio we estimate the number of compensation applications will rise significantly.

Treatment of these costs is in line with current regulatory policy and their treatment within the 'quarry and loss' arrangements for the NTS.

Mitigation options must also be considered as part of the overall scheme, including additional block valves and impact protection. Our assessment forecasts we will make compensation payments during RIIO-GD1 for about 10 sites.

xiv. Sleeves

To ensure LTS pipeline integrity, particularly at vulnerable points (e.g. road crossings) we have an ongoing plan to upgrade the integrity of these sleeves.

xv. LTS pipeline and installations replacement

The programme includes a requirement for a small amount of replacement of LTS pipelines and installations. An annual baseline volume of 0.8km reflects the workload patterns and volumes we have seen in GDPCR1.

Within the programme, as well as the relatively short year-on-year non-chargeable diversions driven typically by mineral extraction, we have also included one major non-chargeable diversion towards the middle of the period. We believe that there is a high probability of significant construction in our main conurbation area of West Yorkshire which will require us to carry out a long-length diversion at our cost.

7.5.3 Reinforcement (mains and governors)

Figure 7.34 sets out our forecast reinforcement mains and governor investment.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Reinforcement mains and governors	5.4	5.3	5.2	5.2	5.0	4.8	4.7	4.5	40.1

Figure 7.34: RIIO-GD1 reinforcement mains and governors

Reductions in annual and peak demand in GDPCR1 have not led to significant reductions in the requirement for local network reinforcement to ensure security of supply during 1 in 20 winter levels of demand. We are currently carrying out 66 reinforcement projects a year of this nature. We continue to evaluate the most effective solution between increasing pressures and system reinforcement.

However, as many parts of our network are operating at or close to the maximum operating pressure, RIIO-GD1 will require ongoing reinforcement of the network to meet localised load growth even within an overall profile of falling demand. We forecast to invest c.£40m during the period on localised reinforcement projects including a number of governors, which will ensure we meet our capacity obligations during 1 in 20 winter demand conditions.

7.5.4 Replacement governors

Figure 7.35 sets out NGN's overall forecasts for replacement governors investment in RIIO-GD1.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Replacement governors	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	14.0

Figure 7.35: RIIO-GD1 replacement governors

A significant number of existing governors are deteriorating due to age profile and are becoming obsolete. On the basis of our asset health assessment, the RIIO-GD1 work programme will upgrade or replace critical units in the following volumes:

- District governors – 22 per year.
- Industrial or commercial governors – 3 per year.
- Domestic service governors – 150 per year.

7.5.5 Connections

We forecast a modest recovery in the number of new connections during RIIO-GD1 as the national and regional economy recovers from recession and returns to trend levels of growth.

Additionally, the number of Fuel Poor connections is forecast to continue at the levels of activity seen during the later years of GDPCR1.

NGN's forecast connections net capital expenditure is shown in Figure 7.36 below.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Connections (net)	4.3	4.2	4.4	4.5	4.5	4.6	4.8	5.1	36.4
Fuel Poor connections	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	14.2
Total	**6.0**	**5.9**	**6.1**	**6.2**	**6.2**	**6.4**	**6.7**	**7.0**	**50.6**

Figure 7.36: RIIO-GD1 net connections expenditure

i. Connections

Over recent years there has been a decline in the number of new gas connections due to factors such as increased competition for new housing connections, general decline in housing market and poor economic conditions. Against this background, RIIO-GD1 volumes reflect a gradual increase in connection volumes. Following a period of forecast consolidation as the economy improves, employment levels increase and household income improves.

Income recovery rates are forecast to improve steadily and reach 67% by the end of the period. Consequently, income is forecast to improve as a proportion of total cost. As a result, net expenditure remains relatively stable throughout the price control period due to the improved recovery rates effectively counter balancing the increased gross costs generated via higher volumes.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Gross Expenditure	12.9	13.3	13.8	14.1	14.5	14.9	15.5	16.2	115.2
Workload	8,966	9,173	9,462	9,656	9,911	10,189	10,576	10,990	78,923
Recovery rate	54.3%	56.4%	56.5%	57.2%	58.6%	59.1%	59.4%	59.9%	57.8%
Income	7.0	7.5	7.8	8.1	8.5	8.8	9.2	9.7	66.6
Net Expenditure	**5.9**	**5.8**	**6.0**	**6.0**	**6.0**	**6.1**	**6.3**	**6.5**	**48.6**

Figure 7.37: RIIO-GD1 connections expenditure and workload

ii. Fuel Poor connections

Over the GDPCR1 period, the number of Fuel Poor connections completed by NGN has increased significantly as the various schemes and portfolio of services has been expanded. Independent market research undertaken by the Energy Audit Company 2010 and funded by NGN indicated that there are c.120,000 householders in fuel poverty who are currently off the gas grid.

Given the economic position of the region and increasing fuel costs the levels of fuel poverty are likely to have increased since this research was completed.

Connecting to mains gas and installing modern efficient gas heating systems remains an effective way of reducing fuel poverty. We plan to invest c.£2m per annum to connect 12,000 fuel poor customers over RIIO-GD1.

7.5.6 Other capital expenditure

Figure 7.38 below gives our forecasts for other capital expenditure during RIIO-GD1. Given the range of different drivers and requirements we have only included high summary evidence in this plan. Further details can be found in Appendix A11 and Appendix A19.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Aggregated expenditure other (projects <£0.5m)	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.1	1.6
Rationalise mains and governors to support storage strategy	0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.8	4.9
Gascoseeker replacement with CO detection capability	1.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	2.4
Over crossings	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.3
Remote pressure monitoring and control	0.7	2.6	2.5	2.5	0.0	0.0	0.0	0.0	8.3
Replace network loggers	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	2.2
Replace ancillary obsolete equipment	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	9.7
Buildings/civils rebuild and refurbishments	1.9	2.4	1.9	2.3	1.9	1.7	1.5	1.5	15.1
Gas treatment	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8
NDM dataloggers	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.5	1.3
Site security	2.0	5.0	0.9	0.9	0.9	0.9	0.9	0.9	12.6
System control - offtake reform/alarm and demand management	2.2	1.9	0.2	0.4	0.2	0.0	0.0	0.0	4.9
Telemetry hilltop/satellite system	0.0	0.0	0.5	0.5	0.1	0.1	0.0	0.0	1.4
Furniture and fittings	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8
Plant and equipment	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	4.7
Auxiliary equipment	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.1
Environmental land remediation	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	12.5
Total	**13.9**	**18.7**	**11.7**	**11.7**	**8.0**	**7.7**	**7.9**	**7.9**	**87.4**

Figure 7.38: RIIO-GD1 total other capital expenditure

The RIIO-GD1 period requires a total investment of c.£87m in Other Capex. This category includes a very wide range of schemes with differing drivers and associated outputs, providing significant benefits in environment, safety, reliability and security of supply to our customers.

A brief outline of each area of expenditure is set out below.

i. Buildings/Civils

A large number of network sites were constructed in the 1960s, 1970s and 1980s and now require substantial civil works to maintain them in a fit for purpose condition. In some cases the site infrastructure has deteriorated and will require replacement during RIIO-GD1; 195 of which are PRS and offtake sites with higher levels of equipment and additional buildings, such as electric, telemetry and odorant housings. In addition, many of the structures also contain asbestos which requires removal and disposal by specialist contractors.

ii. Installation and upgrading of network site security systems

The network has a substantial number of sites in a large geographical area including both urban and rural locations. This spread results in varying levels of threat from illegal activities. If people succeed in breaching security measures they are not only at risk of injuring themselves, but also pose a risk to the public at large and a very real threat to the supply and control of the gas distribution system. The increased value of metals has resulted in random and opportune break-ins increasing across all industries. To deter this, the business will invest in ways to prevent such attacks on our assets.

Our Pannal and Bishop Auckland NTS offtakes have been listed and recognised as category three locations by the Centre for the Protection of National Infrastructure (CPNI). As such they fall under the remit of the Department for Energy and Climate Change (DECC), programme for increasing security and deterrents to possible terrorist attack. These sites need significant upgrades, to meet new security requirements. This will include the installation of passive detection devices and surveillance equipment.

This will also lead to increased costs for monitoring and maintenance. Only the Pannal site has been included in this plan as the Bishop Auckland site is within an NTS site operated by National Grid.

iii. Rationalise mains and governors to support gasholder strategy

As part of the work to remove low pressure gasholders we will carry out work to relocate mains and governors associated with such sites.

iv. Remote pressure monitoring and control

NGN's low and medium pressure regulator sites and network modelling points are controlled by a series of systems which control the low pressure distribution network, provide alarm monitoring for pressure excursions, capture pressure recording and provide vital data for monitoring the network.

During GDPCR1 we have installed a new system that centralises data from all pressure control and monitoring locations without the need for personnel to return to a depot. This new pressure monitoring system provides NGN with an opportunity to adopt a new pressure management and control strategy. This strategy moves from the control being undertaken on site by an operative to one of controlling pressure settings remotely by a centralised team. This will result in a more dynamic and proactive response to matching supply needs based on short term forecasting projections.

Currently pressures are controlled via a fixed telephone line to around 300 low pressure regulator stations. More than 1,600 sites require pressure to be adjusted by an operative visiting site. Fixed telephone lines are expensive to install and maintain, mobile technology offers a more cost effective solution to controlling regulators. During RIIO-GD1 we plan to invest in this technology so that all district governors are remotely monitored and controlled using mobile technology.

v. Replace ancillary obsolete equipment

We have a number of plans to replace and upgrade equipment, including preheating pilots and regulator control cabinets.

vi. Offtake reform/alarm management/demand management

Investment will be required in RIIO-GD1 in operational support systems to enable more accurate reporting of alarm activity, manage any potential risks associated with offtake capacity overrun charges, manage the effective use of interruption, and update the existing Time to Fail programme which forecasts when there would be insufficient gas to meet demand on any given day.

vii. Plant and equipment

This includes expenditure on mobile assets and tools used to support operational activities, including water pumps and metering gauges.

viii. Gascoseeker replacement

The existing gascoseekers used by our emergency workforce are due for replacement early in the RIIO-GD1 period. As set out in Section 6, we plan to replace them with equipment which incorporates the capability to undertake CO detection alongside natural gas. There was strong feedback from our stakeholders that our emergency staff should have this capability. We have completed an initial trial which shows the equipment operates effectively and allows the capture of much better data on CO detection.

ix. Overcrossings

This covers upgrading of support structures of pipelines and mains to ensure security of supply (e.g. bridge supports).

x. Replace network loggers

We currently use network validation loggers, which are moved from site to site to deliver the requirements of the validation process. We plan to purchase additional loggers to provide equipment at all sites, to reduce costs and also improve compliance and integrity.

xi. Telemetry/hilltop/satellite system

NGN owns five hilltop satellite sites which require upgrades to ensure we maintain secure communications across network assets.

xii. Non-daily metered (NDM) dataloggers

All NDM dataloggers are anticipated to be obsolete by the end of RIIO-GD1 and will be replaced.

xiii. Gas treatment

This investment is for an additional series of condition treatments designed to reduce leakage from gas mains.

xiv. Furniture and fittings

A small amount of investment is made every year to replace furniture and fittings at a range of operational and non-operational sites.

xv. Auxiliary equipment

This is the upgrading of auxiliary equipment to ensure integrity of site assets and prevent deterioration from corrosion.

xvi. High rise building valves

We plan to install live safety valves in high rise buildings where these are currently not installed.

xvii. Sleeves (mains)

This will ensure the integrity of distribution mains particularly at vulnerable points (e.g. road crossings). We have an ongoing programme to upgrade the integrity of these sleeves.

xviii. Environment land remediation

We are committed to the protection and enhancement of the environment, the protection of land from future pollution and addressing the past legacy of contamination which has arisen from historical activities where this is causing unacceptable impacts on health or the environment.

Our contaminated land strategy is to manage the risk associated with the statutory liability of the portfolio of 114 sites with known historic contamination. Since the formation of NGN in 2005, we have taken a responsible, though principally reactive, approach to managing the land portfolio. We work with regulators where a potential unacceptable impact on human health or the environment is identified and pursue voluntary action to control and eliminate such impacts. This has resulted in relatively low levels of expenditure in GDPCR1.

However, recent developments indicate increasing levels of statutory action being taken by environmental regulators. We have therefore taken a pragmatic approach to the level of required expenditure in RIIO-GD1 to manage the contaminated land portfolio and only forecasting to undertake statutory remediation as outlined in Section 6.

Expenditure identified for RIIO-GD1 is c.£12.5m:

- c.£8.5m for the statutory remediation of high and medium/high risk environmentally sensitive sites;
- c.£2m for statutory remediation of any lower risk sites identified and required by regulators;
- c.£1m for monitoring; and
- c.£1m for decommissioning/ re-commissioning of plant associated with remediation projects.

7.5.7 Vehicles

Figure 7.39 below sets out capital expenditure on vehicles. We are planning to invest c.£20m in renewing our operational fleet, based on age related requirements, and take into account trade-offs relating to maintenance or replacement.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Operational vehicles	3.3	2.7	5.5	0.1	0.3	2.2	2.9	2.3	19.4

Figure 7.39: RIIO-GD1 Vehicle Capex

NGN operates more than 500 vehicles and this level will be maintained across the period. Operational efficiencies will be delivered by this programme with targeted improvements in fuel efficiency and reduced carbon emissions, which also lower vehicle licensing rates. We also plan to increase the level of vehicles with 4x4 capability within the fleet in light of recent severe winters.

7.5.8 Information Systems (IS) and telecoms

The table below sets our IS and telecoms capital expenditure for RIIO-GD1. We are planning to invest c.£50m in our IS and telecoms infrastructure and systems.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
IS and telecoms	7.0	6.4	5.4	10.9	5.1	4.1	5.5	6.1	50.6

Figure 7.40: IS and telecoms expenditure

Since 2005 we have developed a series of solutions to address commercial issues driven by external priorities (e.g. to exit from National Grid systems in a timely manner). This has resulted in tactical solutions not be delivered in all cases the most effective and enduring benefit. Recognising this, a strategy was developed and agreed in 2010, in effect a blueprint for consolidation and virtualisation of our IS assets.

This provides a more holistic approach to infrastructure, applications and support, which will bring improve business continuity and service management. It will also support more efficient processes through greater understanding of business and customer needs, mapped on to improved technology platforms to drive efficiency and innovation. The IS investment programme reflects the necessary expenditure to maintain and upgrade this critical element of NGN's infrastructure, in line with best practice around upgrades of desktop, infrastructure and applications.

In general, desktop and server based infrastructure warranty periods are three and five years respectively. Whilst NGN evaluates the cost of maintaining and extending warranties on hardware and associated support and maintenance (S&M) contracts versus the productivity and cost free operation of new equipment, we largely look to operate hardware to its optimum level in line with manufacturers' warranties. Further, Microsoft confirms the optimum desktop refresh cycle as three years whilst server based infrastructure optimum levels are set between five and six years.

RIIO-GD1 will see the evolution of our IS strategy which will play a significant supporting and enabling role in NGN being better able to address the key challenges it will face over the period and beyond. The planned investment programme is focussed on delivering eight key objectives:

- Consolidation of services – applications and data centres;
- Improved support model – simplification of helpdesks;
- Hardware upgrades – a structured approach to the replacement of assets;
- Innovation – support the NGN innovation strategy and the initiatives developed;
- Application upgrades – a more proactive approach to regular upgrade of applications;
- Security – meet increased requirements for systems and data security;
- Green IT – processes and hardware are in place to minimise environmental impact; and
- Smart networks – ensure we can effectively utilise increased data in operating and managing our network.

The investment programme will focus on three key areas as discussed below.

i. Assets

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
IS asset	3.0	1.0	2.6	3.3	1.3	0.7	1.0	1.3	14.2

Figure 7.41: RIIO-GD1 IS asset investment

This element of the programme will implement best practice across hardware refresh cycles and maintain our infrastructure capabilities. Best value will be ensured via a competitive procurement process with five established framework partners. Assurance will be provided via external validation of changes and upgrades through our independent technical architects TSG. Key schemes within the programme include the following:

- Whilst the norm for laptop replacement would be three years, given the nature and use of field devices we will replace Tough Books every five years. This provides better value for customers and avoids problems with equipment moving out of manufacturers' support;
- Desktop hardware will be refreshed on a three year cycle to ensure capability is maintained. The exception will be equipment that is in use 24/7, which will be replaced or rolled out more frequently; and
- Refresh infrastructure on a five year cycle for all aspects of the business including system operations, corporate and connections.

ii. Applications and data

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Applications and data	1.6	3.6	4.4	4.1	4.5	2.0	2.3	3.0	25.5

Figure 7.42: RIIO-GD1 applications and data

This element of the programme will ensure maximum efficiency is maintained from key applications with upgrades generally developed to bring enhanced capability and process improvement. Key schemes within the programme include the following:

- A phased approach to upgrading front office, back office and system control applications. This will minimise business change, bring improved service and provides a greater continuity of service;
- Process improvements to deliver operational and environmental improvements;
- Ongoing and sustained review of integrity of our systems; and
- Regular review and validation of data harvesting, retention and usage to ensure compliance.

iii. Systems and application development

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Systems and application development	0.2	0.6	0.6	0.7	0.3	0.9	0.3	1.1	4.7

Figure 7.43: RIIO-GD1 systems and application development

NGN is aware of the progress and advances in technology that will bring significant benefit. In order to maximise advantages, we will monitor and track emerging trends. This element of the programme will address NGN's capability to both respond to, and take advantage of, developments in the wider marketplace, as listed below:

- Trends and market developments through external benchmarking;
- Vulnerabilities and threats managed through CPNI;
- Industry movement through existing relationships with other GDNs;
- Extending relationships via networking both locally and nationally, via our framework partners;
- Best practice associated with service management via ITIL;
- Specific development will address matters in the following areas during the period;
- Systems development to accommodate increases in data associated with smart metering, including systems operations, leakage measurement and demand modelling. Technology watch, to consider benefits of emerging trends both within and outside utilities;
- Enhance systems to accommodate the NGN network management strategy, and asset health data and analysis tools; and
- Systems upgrades to accommodate implementation of traffic management arrangements.

These form an investment programme which delivers the infrastructure, systems and applications that underpin the delivery of the key objectives of this plan. They will also see the development of a framework that can accommodate and facilitate the changes that will impact the network during RIIO-GD1 and beyond.

7.5.9 Xoserve

Our business plan assumes continuation of the current ownership and funding structure for Xoserve. NGN's share of funding Xoserve capital expenditure is £6.9m during RIIO-GD1.

During RIIO-GD1 it is expected that the existing, ageing UK Link systems which underpin the central supply point register will need replacement. The UK Link suite of systems consists of data bases which have developed over the extended period since metering competition in 2004. In addition to the central supply point register, UK Link contains the IT systems which carry out the invoicing of transportation and energy balancing. The ageing nature of these systems was raised as a risk and during 2008 a technology refresh was undertaken to support the systems until such time that the future requirements were established.

Xoserve has undertaken a fully inclusive approach towards collating the aspirations of the shipper community in gathering requirements for a future system through Project Nexus. These aspirations are used to set a baseline for a UK Link replacement activity which will take place during RIIO-GD1. Shippers have requested changes to allocation, settlement and invoicing which they believe will result in a more flexible and reflective settlement regime. The inclusion of rolling AQ and more frequent reconciliation for all market participants are combined with the ongoing GT requirements for a robust and efficient invoicing activity. The timing of the investment programme required to carry this out has been included early in the price control period in the Xoserve forecast, but this remains subject to the necessary regulatory governance taking place together with the interaction with the Government's smart metering programme being better understood.

This plan includes Xoserve's estimated costs of delivery of the initial requirements for smart metering. It is widely accepted that the Data Communications Company (DCC) will not hold extensive databases and that the access control that will be required to ensure data accuracy and privacy will be achieved by interacting with the existing supply point registers for both electricity and gas. The exact scope and timing of this is currently unknown and Xoserve has engaged with the DECC programme to ensure they are ready to undertake a capital programme to facilitate DCC access to data. The costs of this (£17.6m across all GDNs) is consistent with the Xoserve response to the DECC information requests.

Other investment activity that NGN will contribute to in the Xoserve plan relates to the refresh of non UK Link systems over the period in line with the policy of planning for technology refreshes to take place every five years and the costs of infrastructure upgrades that will be required to support the wider IS estate.

Further details can be found in the Xoserve business plan submission.

7.6 Operating expenditure (Opex)

NGN has consistently been a frontier performer on the benchmarked operating costs across the GDNs.

NGN will seek to maintain this frontier level of performance throughout RIIO-GD1. We recognise this will involve seeking further efficiencies and introducing innovative ways of delivering the outputs and service levels that our customers and stakeholders expect.

Nevertheless the RIIO-GD1 period will be impacted by a number of factors that will increase the overall level of operating expenditure. Our forecast Opex costs for the RIIO-GD1 period are shown in Figure 7.44 below.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Controllable Opex									
Work management	16.5	16.6	16.7	16.7	16.7	16.7	16.6	16.5	132.9
Emergency	9.9	12.0	11.7	11.4	11.2	11.2	9.2	9.3	85.8
Repairs	17.9	17.9	17.8	17.5	17.2	17.1	16.9	16.6	139.1
Maintenance	9.7	9.8	9.6	9.1	8.9	8.8	8.6	8.5	73.1
Other direct activities (including Xoserve)	10.0	11.5	12.2	13.4	12.3	12.5	13.2	13.6	98.7
Total direct activities	**64.1**	**67.7**	**68.0**	**68.2**	**66.4**	**66.2**	**64.6**	**64.5**	**529.6**
Business Support	16.0	17.2	18.2	18.5	18.3	18.0	17.6	17.0	140.9
IT and Telecoms	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	48.0
Property management	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	14.1
Total indirect activities	23.8	25.0	25.9	26.3	26.1	25.8	25.4	24.8	203.0
Total controllable Opex	**87.9**	**92.7**	**93.9**	**94.4**	**92.5**	**92.0**	**89.9**	**89.3**	**732.6**
Non-controllable Opex									
Shrinkage	9.0	8.6	8.3	8.0	7.8	7.6	7.4	7.2	63.9
Network rates	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	240.5
Pensions deficit	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	72.4
NTS pensions	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	34.1
Offtake	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	81.6
PPF levy	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.0
Ofgem licence and Joint Office	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	8.8
Total non-controllable Opex	**64.2**	**63.8**	**63.5**	**63.2**	**63.0**	**62.8**	**62.6**	**62.4**	**505.9**
Total Opex	**152.1**	**156.5**	**157.5**	**157.7**	**155.5**	**154.8**	**152.6**	**151.7**	**1,238.5**

Figure 7.44: RIIO-GD1 Opex forecast requirements

Our actual and forecast Opex costs during GDPCR1 are shown in Figure 7.45 below.

£m 2009/10 prices	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Controllable Opex						
Work management	18.3	16.6	15.9	15.9	15.8	82.5
Emergency	9.2	8.9	8.7	9.1	9.5	45.4
Repair	15.2	15.1	15.8	16.7	17.8	80.6
Maintenance	9.1	8.0	7.8	8.6	9.1	42.6
Other direct	5.4	5.2	5.0	5.6	7.2	28.4
Total Direct	**57.3**	**53.7**	**53.2**	**55.9**	**59.4**	**279.5**
Business support	10.0	10.5	11.0	11.6	13.0	56.1
IS and telecoms	6.3	5.7	5.1	5.4	6.0	28.5
Property	1.8	1.6	1.6	1.7	1.8	8.5
Total indirect	**18.2**	**17.8**	**17.7**	**18.7**	**20.8**	**93.2**
Total controllable Opex	**75.5**	**71.5**	**70.9**	**74.6**	**80.2**	**372.7**
Non-controllable Opex						
Shrinkage	9.0	4.9	7.6	9.0	8.9	39.4
Network rates	33.2	34.7	31.4	30.4	30.1	159.8
Pensions deficit	3.8	4.6	4.6	5.0	5.0	23
NTS pensions	3.1	3.1	3.0	3.0	4.3	16.5
Offtake	0.0	0.0	0.0	0.0	5.0	5.0
PPF levy	0.0	0.0	0.5	0.5	0.5	1.5
Ofgem licence and Joint Office	1.4	1.1	1.0	1.1	1.1	5.7
Total non controllable Opex	**50.5**	**48.4**	**48.0**	**49.0**	**54.9**	**250.9**
Total Opex	**126.0**	**120.0**	**118.9**	**123.6**	**135.1**	**623.6**

Figure 7.45: Current GDPCR1 Opex costs

Opex costs are forecast to increase toward the end of the GDPCR1 period due to a number of factors:

- Additional winter costs following the severe weather events experienced in 2009/10 and 2010/11;
- Increased contributions to Xoserve running costs;
- Increase in ongoing pension contribution rates for employees in NGNPS from 34.6% to 47.5%;
- Work to investigate all potential anomalies in data records following an incident in Gateshead in 2010 and the introduction of new, more accurate geographic data from enhanced ordnance surveys;
- Offtake and interruption costs following industry changes;
- Increasing level of insurance claims and the associated premiums;
- Increased spend on innovation projects; and
- New maintenance practices for tier two and three iron mains.

As we enter RIIO-GD1 our apprentice costs will further increase in the early years, but overall labour costs decline in later years as these apprentices replace current employees as they retire from the business. In addition, the costs associated with gasholder demolition (treated as Opex) and the impact of the rollout of smart metering will increase costs during the early and middle years and then decline as these programmes complete.

The graph below illustrates the impact of these additional expenditure items over the RIIO-GD1 period compared with GDPCR and our base operating expenditure over the period.

When the impact of these new factors are taken into consideration our total Opex costs remain broadly in line with those in GDPCR1.

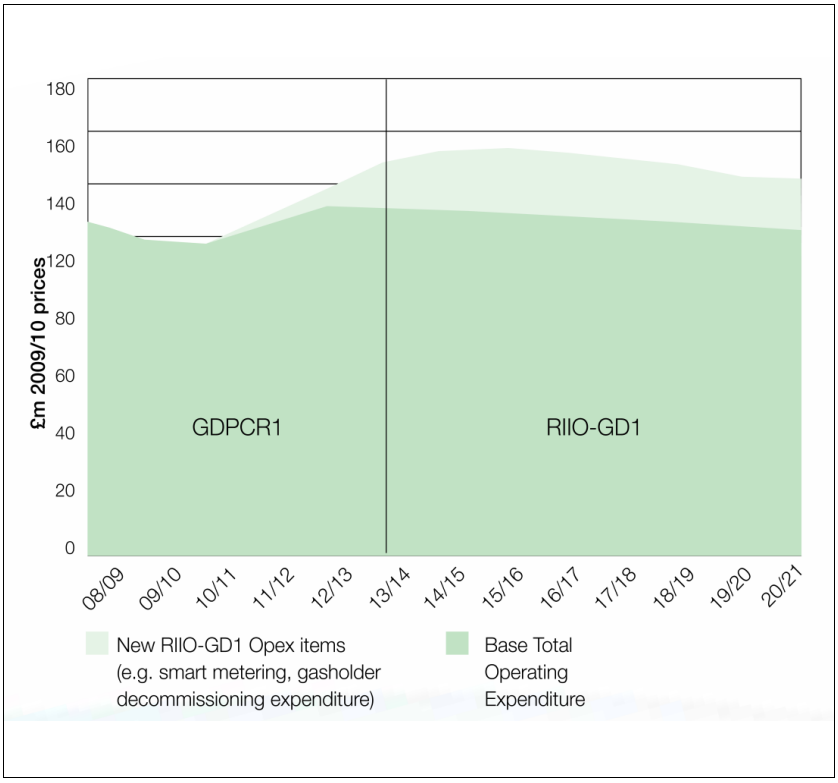

Figure 7.46: Comparison of GDPCR1 and RIIO-GD1.

7.6.1 Controllable Opex

Figure 7.47 below shows the detailed breakdown of our controllable Opex forecasts.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Controllable Opex									
Work management	16.5	16.6	16.7	16.7	16.7	16.7	16.6	16.5	132.9
Emergency	9.9	12.0	11.7	11.4	11.2	11.2	9.2	9.3	85.8
Repairs	17.9	17.9	17.8	17.5	17.2	17.1	16.9	16.6	139.1
Maintenance	9.7	9.8	9.6	9.1	8.9	8.8	8.6	8.5	73.1
Other direct activities (including Xoserve)	10.0	11.5	12.2	13.4	12.3	12.5	13.2	13.6	98.7
Total direct activities	**64.1**	**67.7**	**68.0**	**68.2**	**66.4**	**66.2**	**64.6**	**64.5**	**529.6**
R&D	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	24.0
IT and telecoms	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	48.0
Property management	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	14.1
Training and apprentices	2.5	3.6	4.4	4.9	4.7	4.5	4.2	3.6	32.5
Insurance	3.9	4.1	4.3	4.2	4.2	4.1	4.1	4.1	32.9
HR	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.3
Finance, audit and regulation	2.7	2.7	2.5	2.5	2.5	2.5	2.5	2.5	20.5
Procurement	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.7
CEO	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1	25.1
Total Indirect activities	**23.8**	**25.0**	**25.9**	**26.3**	**26.1**	**25.8**	**25.4**	**24.8**	**203.0**
Total controllable Opex	**87.9**	**92.7**	**93.9**	**94.4**	**92.5**	**92.0**	**89.9**	**89.3**	**732.6**

Figure 7.47: RIIO-GD1 controllable Opex

i. Direct Opex activities

Direct Opex increases marginally over RIIO-GD1. Figure 7.48 below shows the breakdown of our direct Opex forecasts.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Asset Management (including network policy)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	15.0
Operations management (including contract management)	8.8	8.7	8.7	8.7	8.6	8.6	8.5	8.4	69.0
Customer management (including customer call centre) and network support (including system mapping)	3.6	3.6	3.7	3.8	3.8	3.9	3.9	3.9	30.1
System control	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	18.7
Total work management	**16.5**	**16.6**	**16.7**	**16.7**	**16.7**	**16.7**	**16.6**	**16.5**	**132.9**
Emergency	9.9	12.0	11.7	11.4	11.2	11.2	9.2	9.3	85.8
Repairs	17.9	17.9	17.8	17.5	17.2	17.1	16.9	16.6	139.1
Maintenance	9.7	9.8	9.6	9.1	8.9	8.8	8.6	8.5	73.1
Other direct activities (including Xoserve)	10.0	11.5	12.2	13.4	12.3	12.5	13.2	13.6	98.7
Total direct activities	**64.1**	**67.7**	**68.0**	**68.2**	**66.4**	**66.2**	**64.6**	**64.5**	**529.6**

Figure 7.48: RIIO-GD1 direct Opex activities

The impact of the smart metering rollout programme over the four year period between 2014/15 and 2017/18 can be seen in the increased costs of delivering the emergency activity. However, underlying that we can see real term reductions in all the key elements of direct Opex as NGN continues to extend the efficiency frontier and to deliver real value for customers.

Each of the key elements of our direct Opex costs forecasts are set out below in more detail.

ii. Work management

Work management includes all strategic asset management activities within our Asset Risk Management function including the system control centre. Our forecast work management costs are detailed below in Figure 7.49.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Asset Management (including network policy)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	15.0
Operations management (including contract management)	8.8	8.7	8.7	8.7	8.6	8.6	8.5	8.4	69.0
Customer management (including customer call centre) and network support (including system mapping)	3.6	3.6	3.7	3.8	3.8	3.9	3.9	3.9	30.1
System control	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	18.7
Total work management	**16.5**	**16.6**	**16.7**	**16.7**	**16.7**	**16.7**	**16.6**	**16.5**	**132.9**

Figure 7.49: RIIO-GD1 work management forecast

Our Asset Risk Management function is a central focus for delivery of our Total Network Management approach. We do not forecast any significant changes to the cost of this activity over RIIO-GD1.

iii. Emergency

The emergency function handles our first line response to any reports of gas escapes or loss of gas supply. Our forecast emergency costs and workload are shown below. Details of our smart metering cost forecast can be found in Section 7.2.6.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Baseline costs	9.9	10.0	9.7	9.4	9.2	9.2	9.2	9.3	75.8
Smart Metering costs	0.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	10.0
Total emergency costs	9.9	12.0	11.7	11.4	11.2	11.2	9.2	9.3	85.8
Publicly reported gas escape (000s)	120	119	118	116	115	114	113	112	927

Figure 7.50: RIIO-GD1 emergency cost and workload forecasts

The emergency workload is forecast overall to reduce by approximately 1% per year as our investment expenditure targets those areas of high escapes and leakage. However, we anticipate that increased awareness of gas safety and in particular heightened awareness of CO will partly offset the reductions from our investment expenditure leading to increased volumes of work.

Our emergency staff will be equipped with new 'gascoseekers' to detect CO as well as natural gas when undertaking emergency work. This will increase the amount of work carried out but we have not increased our cost forecasts as we will manage this impact through productivity savings.

NGN has experienced two harsh winters, in 2009/10 and 2010/11, which significantly impacted the peak emergency daily workloads and consequently our performance against the emergency response standards. In 2010/11, a very severe winter, NGN spent more than £2.5m in additional emergency and repair costs compared to 2009/10. We had to deal with a record peak of emergency calls which coincided with the worst weather conditions experienced in parts of the region for over 100 years.

We have not based our future forecast emergency and repair costs on this exceptional event experienced in 2010/11, but on the costs experienced in 2009/10 with some additional targeted contingencies. These include additional contractor emergency and repair staff and hire of additional 4x4 vehicles.

The commercial fleet replacement programme identified in our investment plans will deliver additional cost savings over the period. Running and operating costs will reduce, along with more efficient fuel consumption levels.

iv. Repair

The repair activity carries out all work to permanently fix any gas escapes from our network. Our forecast costs and workload are shown in Figure 7.51 below.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Total repair costs	17.9	17.9	17.8	17.5	17.2	17.1	16.9	16.6	139.1
Mains repairs	12,353	12,106	11,864	11,626	11,394	11,166	10,943	10,724	92,174
Total number of repairs	30,577	29,965	29,366	28,779	28,203	27,639	27,086	26,544	228,159

Figure 7.51: RIIO-GD1 repair cost and workload forecasts

The number of repairs is forecast to fall by around 2% per year in RIIO-GD1 as the Repex programme and our TNM approach targets those areas of high levels of escapes.

Current repair team numbers are maintained throughout the plan. However, through recruitment the opportunity will be taken to better match workload with available resources i.e. to make sure we have the right people in the right place at the right time. The analysis set out earlier demonstrates the need for more resources in the southern part of our region.

The repair costs forecast associated with winter have been derived on the same basis as the emergency costs described above.

As with emergency, the replacement of the commercial fleet will provide reduced running and operating costs within the repair activity as reduced levels of maintenance and servicing along with more efficient fuel consumption levels are attained.

v. Maintenance

The maintenance activity includes all the activities associated with ensuring that all our assets operate efficiently. Our forecast costs are detailed in Figure 7.52 below.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Total maintenance cost	9.7	9.8	9.6	9.1	8.9	8.8	8.6	8.5	73.1

Figure 7.52: Forecast maintenance costs

Our TNM approach, with targeted investment, will generally reduce maintenance requirements associated operating costs during RIIO-GD1. For example, as we remove the low pressure gasholders from the network there will no longer be a need to maintain those assets.

However, under the revised Repex programme NGN will use maintenance measures to gather data on the condition of non-mandated tier two and tier three iron mains and manage the overall safety risks from such pipes. For tier two pipes this will include the following:

- Response to public reports of 'smell of gas', repair of escapes where found and replacement of pipes found to be in poor condition;
- MRPS survey of all iron pipes to determine their calculated risk score;
- Winter and trigger surveys of iron pipes (of any diameter) scoring above the appropriate thresholds, plus repair of escapes where found and replacement of pipes in poor condition; and
- Local surveys following ductile iron barrel or bolt corrosion failures, repair of escapes where found and replacement of pipes found to be in poor condition.

For tier three pipes this will include the following:

- All iron pipes to have a leakage survey every 12 months, with repair of escapes where found and replacement of pipes found to be in poor condition;
- All ductile iron pipes to have an interim six-monthly leakage survey, with repair of escapes where found and replacement of pipes found to be in poor condition;
- A report to be produced for all pipe barrel failures and/or failures due to corrosion detailing, where appropriate, if the failure was due to a specific local circumstance;
- Consideration being given to soil/backfill analysis in the immediate/surrounding area where a failure is considered to be due to corrosion; and
- Consideration being given to internally spraying or linking the pipe in the immediate/ surrounding area of pipes suffering failures to barrel or joints.

All survey, failure and maintenance information will be captured and will inform the decision making process when assessing a pipe for replacement.

We forecast the cost of these additional maintenance measures will be c.£0.6m per year but will offset the requirement for potential annual investment of c.£30m annually to replace these pipes.

vi. Other Direct Opex

This activity covers a wide variety of other operating activities including odorant costs, wayleaves and easements and replacement tools and equipment. The majority of costs, however, relate to our contribution to the operating costs of Xoserve, interruption costs and gasholder decommissioning.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Baseline costs	6.9	6.5	7.3	8.0	6.9	7.1	7.3	7.2	57.2
Interruption cost	2.4	3.8	3.8	3.8	3.8	3.8	3.8	3.8	29.0
Gasholder decommissioning cost	0.7	1.2	1.1	1.6	1.6	1.6	2.1	2.6	12.5
Total other direct cost	**10.0**	**11.5**	**12.2**	**13.4**	**12.3**	**12.5**	**13.2**	**13.6**	**98.7**

Figure 7.53: RIIO-GD1 other direct Opex

We are not forecasting any increase in baseline other direct costs over the period. Xoserve costs are in line with the Xoserve business plan.

Interruption is the cost of procuring interruption services from certain large customers. This avoids having to undertake very expensive pipeline upgrades to provide them with a firm supply. In putting together the forecast of interruption costs we have adhered to the methodology set out in the March 2011 Strategy document.

- Interruption costs based on the annualised cost of potential reinforcements.
- To reflect greater uncertainty regarding future gas demand the 40 year asset life used to discount reinforcement costs has been shortened to 20 years.

NGN is basing forecasts on existing requirements at West Cumbria and Vale of York. In addition we have included 50% of the costs of a scheme at Elton on the basis it may not retain NTS flexibility capacity during RIIO-GD1. This is realistic given the indications from the NTS in its RIIO-TD plan that flex is becoming increasingly scarce. The NTS previously rejected NGN's application for flex at our Elton offtake.

The forecasts for RIIO-GD1 will start with costs for 2013/14 having already been determined through the 2010 auctions. These are largely interruption contracts supporting West Cumbria. We have recently become aware that our major customer necessitating network reinforcement may reduce its registered capacity. Further discussion on the treatment of this development may therefore be necessary.

For the avoidance of doubt, our Capex forecasts do not include any reinforcement costs associated with removing interruption constraints. This plan assumes we will be fully able to acquire the necessary interruption contracts and all such costs are contained in our operating cost forecasts.

7.6.2 Indirect Opex activities

Indirect Opex costs are forecast to increase predominantly due to the increased apprentice recruitment programme.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Research and development (innovation)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	24.0
IT and telecoms	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	48.0
Property management	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	14.1
Training and apprentices	2.5	3.6	4.4	4.9	4.7	4.5	4.2	3.6	32.5
Insurance	3.9	4.1	4.3	4.2	4.2	4.1	4.1	4.1	32.9
HR	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.3
Finance, audit and regulation	2.7	2.7	2.5	2.5	2.5	2.5	2.5	2.5	20.5
Procurement	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.7
Store and logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CEO	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1	25.1
Total indirect activities	**23.8**	**25.0**	**25.9**	**26.3**	**26.1**	**25.8**	**25.4**	**24.8**	**203.0**

Figure 7.54: RIIO-GD1 indirect Opex

Each of the key elements of our indirect operating cost forecast is set out in more details below.

i. Research and development (innovation)

RIIO-GD1 requires a much greater level of innovation from network companies. Section 4 sets out our approach to innovation and the basis of our forecast expenditure. Further detail can also be found in Appendix A19.

ii. IT and telecoms

The costs of the provision of IT and telecoms support services are forecast to increase compared to GDPCR1 and remain constant during RIIO-GD1.

The full go-live of the DNCS system in 2011 and the withdrawal from the direct link with the legacy National Grid systems requires arrangements for the continuing support of the new systems. This represents a significant increase in workload when compared to current arrangements and increases our costs by c.£0.8m per year. In addition the in-sourcing of all operational activities previously contracted out under the Asset Services Agreement leads to increased costs to support the operational business. Future costs have been market tested through competitive tender and are driven by revised terms, service levels, and reflect the relative value and size of the services required.

A key part of our IS strategy is market testing:

- All material projects and upgrades are put out to tender to NGN's established framework suppliers;
- NGN obtains rate cards for all tendered projects which allow NGN to pick individual unit costs from different suppliers and use them to reduce unit costs for other projects; and
- NGN uses external market data to check that its internal unit costs and those of framework suppliers remain efficient compared to what is available on the wider market.

We use consolidated CKI group buying where such opportunities arise.

To facilitate this NGN uses Gartner, one of the world's leading IT advisors. Gartner has an extensive database of unit costs from most listed companies around the world. Gartner regularly produces reports of key metrics against which NGN is able to check its unit costs. The charts below show key metrics from Gartner's Utilities database. For each metric the chart shows the minimum and maximum value sand NGN's position within this range. The results show NGN having an efficient level of IS cost.

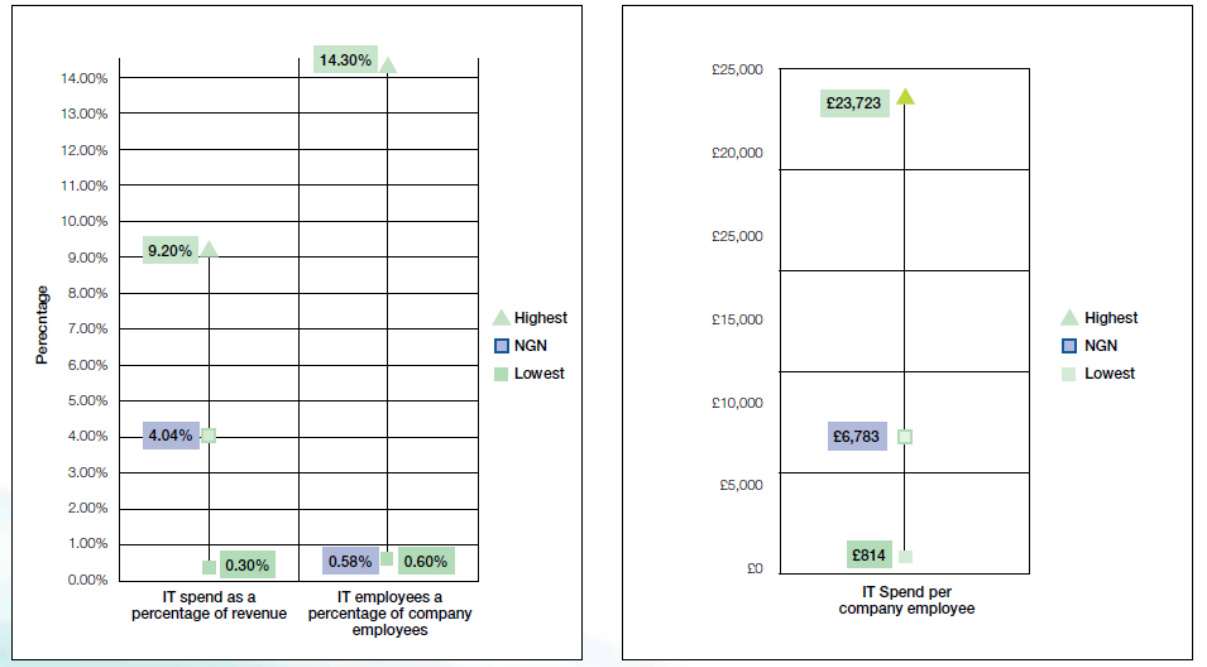

Figure 7.55: IS expenditure benchmarking

iii. Property Management

We do not forecast any significant change in our property portfolio in RIIO-GD1 with all operational sites, depots and offices remaining fully utilised. Benchmarking has identified NGN as having an efficient level of property costs. We have considered the Driver Jonas review of DNOs in DPCR5. This showed an efficient range of 9m^2 – 11m^2 per FTE and NGN operates comfortably lower than 9m^2 per FTE. Overall NGN was comparable to CE Electric and WPD who were benchmarked as best DNOs in that review.

Our property management costs are forecast to remain constant in real terms over the period.

iv. Apprentices and training

The cost of the planned recruitment of c.260 additional apprentices is contained within business support until they have graduated (after three years).

This represents average expenditure of c.£4m per year throughout RIIO-GD1. It is necessary to make this investment because NGN has an ageing industrial workforce with an average age now approaching 50. Since 2005, NGN has been investing in young people through our apprentice recruitment programme. Despite this the average age has increased and there is a need to increase the level of apprentice recruitment during RIIO-GD1.

The age profile of NGN's existing workforce is shown in the graph below.

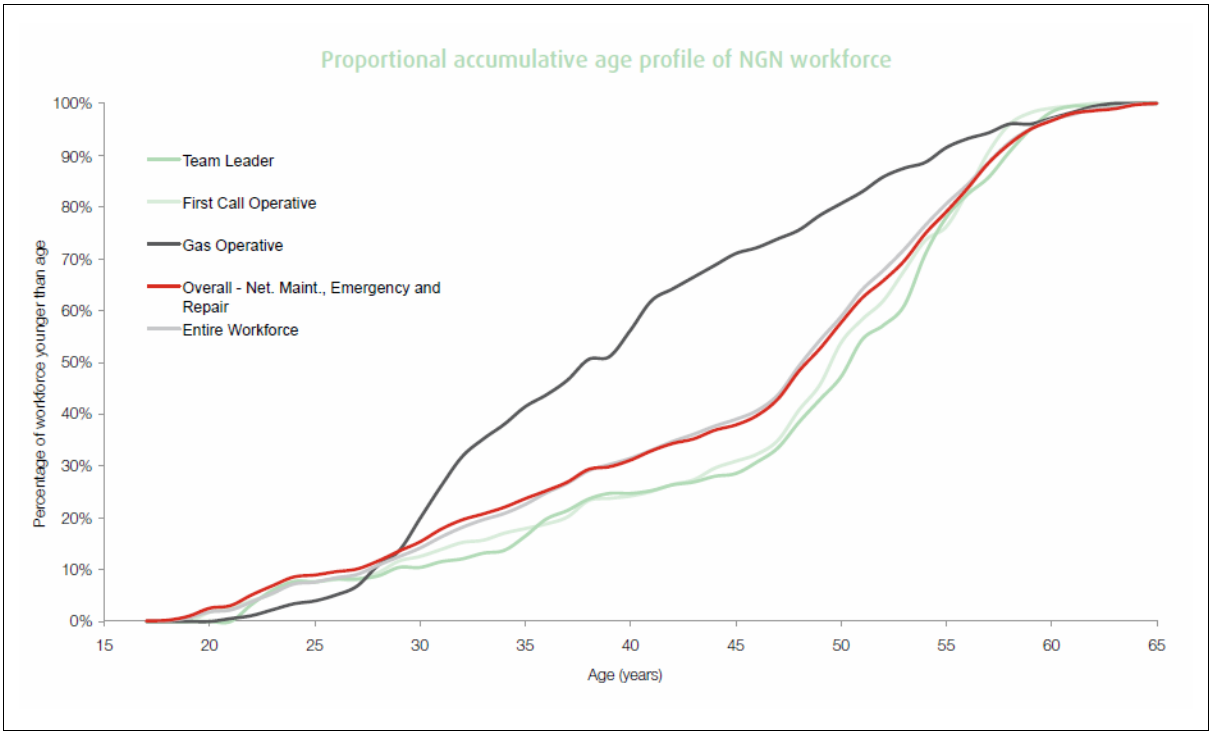

Figure 7.56: Number of NGN employees expected to retire over RIIO-GD1.

As the graph demonstrates, more than 60% of current team leaders and FCOs are 50 years of age or older within the workforce only 25% are below 40 years of age.

To address this issue we are planning to recruit c.260 apprentices throughout RIIO-GD1 to ensure that we have the capability and skills to ensure we maintain a safe and reliable gas network and continue to meet customer requirements. The table below shows the profile of recruitment compared to the number of employees expected to retire. The analysis does not include employees who leave for other reasons. The apparent year-on-year mismatches will be managed consistently with the different patterns of winter and summer workload.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Apprentices recruited	40	40	40	36	30	30	26	16	258
Apprentices graduated	0	16	16	40	40	40	40	36	228
Staff over 60 years of age forecast to leave the business	30	25	33	34	27	21	32	32	234

Figure 7.57: RIIO-GD1 planned apprentice recruitment

v. Insurance

Insurance cost and claims have been on an upward trend throughout GDPCR1. There has been a general increase in market premiums. To attempt to offset this we regularly market test the cost of insurance premiums via a range of insurance brokers to ensure costs are minimised rather than using a captive insurance vehicle. Market evidence is showing that the premiums have increased significantly in recent times and this is likely to endure for the period up to 2020/21.

We have also increased the levels of cover following in-sourcing of the operational activities in 2011. This has resulted in increased premiums when compared to previous years. However, this higher level of cover will reduce the level of claims funded directly by NGN over the period.

vi. Other indirect activities

The remaining indirect activities cover a range of functions including HR, CEO, Finance and Procurement etc. We are not forecasting any significant changes to these activities over the planned period, though there will be some increase in our legal costs.

Currently NGN's legal workload is managed by a team of two supported by external professional legal support where required. The increased legal support required by in-sourced operational activity coupled with significant industry change arising from programmes such as smart metering will require an additional lawyer directly employed by NGN. This is more cost effective for customers than using external legal practices.

In addition in line with RIIO principles we will be further increasing our activities associated with stakeholder engagement.

7.6.3 Non-controllable Opex

Our non-controllable Opex in RIIO-GD1 is forecast to total c.£500m as shown in the table below.

£m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Shrinkage	9.0	8.6	8.3	8.0	7.8	7.6	7.4	7.2	63.9
Network rates	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	240.8
Pensions deficit	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	72.4
NTS pension	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	34.4
NTS offtake	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	81.6
PPF levy	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.0
Ofgem license	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	8.8
Total cost	**64.2**	**63.8**	**63.5**	**63.2**	**63.0**	**62.8**	**62.6**	**62.4**	**505.9**

Figure 7.58: Non-controllable Opex

i. Shrinkage gas

Shrinkage gas is the amount of gas that escapes due to leakage or theft and that which is used to operate the network itself. Our shrinkage forecasts therefore is based on the forecast volume of shrinkage gas and an assumed wholesale price of gas.

We are forecasting significant reductions (14%) in shrinkage gas volumes when compared to 2011/12 estimates. Our TNM approach to deliver wider benefits, including leakage reduction, and specific investment to allow more effective network pressure management, will be the key driver of this reduction.

The price of the gas used is the average wholesale price in 2010/11. The actual costs will vary in line with movements in wholesale prices.

ii. Network business rates

We have been successful in achieving a reduction in network business rates for 2013/14 when compared to GDPCR1. The reduction in cost follows a rates revaluation in 2010 where higher rateable values were compensated by lower valuations for rate in the pound. The forecast is held constant at c.£30m for the whole period.

iii. Pensions deficit

Please see Section 7.2.3 of this plan for further details.

iv. NTS pension

Our plan contains the latest forecast of these costs from National Grid of c.£4m per year.

v. NTS offtake

From 1 October, 2012, we will begin to pay the NTS exit costs for flat and flex offtake capacity to National Grid (NG). Previously these charges were paid directly by shippers.

These charges are set by NG, and NGN's forecast costs are based on indicative charges contained within the NG offtake pricing statements, which currently forecast out to 2014/15. Costs from this point are forecast to remain constant.

vi. PPF pension levy

NGN actively manage and control our D&B failure scores to maintain the PPF levy incurred by the business, associated with the defined benefit scheme, to an absolute minimum.

The PPF has published a policy statement on the 2012/13 levy, part of which details how the average D&B failure score over the previous 12 months will be used to place employers into one of 10 risk bands. NGNOL would be placed in band two, which is expected to produce a risk based level which is approximately 50% higher than the current 2011/12 level, leading to the total PPF level for 2012/13 increasing c.£0.5m per year. This has been reflected throughout RIIO-GD1 under the new framework.

vii. Ofgem licence and joint office costs

Current cost levels of £1.1m are forecast to remain constant throughout.

Revenue and Financial Forecasts

8

This section sets out the revenues NGN will need in order to deliver this business plan. It shows how these revenues have been calculated and the underlying assumptions behind these calculations. It demonstrates how we balance the requirements of customers with those of investors.

Executive Summary

NGN's proposed financial package represents an appropriate balance between the short and long term requirements of customers and providers of finance. The level of revenues we require is broadly in line with those in GDPCR1 at c.£342m per year when the impact of moving to IFRS accounting is excluded. This level of revenue will allow NGN to invest more than £1.2bn in our network by continuing to attract the necessary funding from shareholders and other providers of finance. It represents an increase in domestic gas bills of considerably less than a penny a day on a like-for-like basis.

Our business plan is compliant with the RIIO financial principles and works within the guidance provided by the March 2011 Strategy document. Our revised cost of equity requirement is 7.0% (previously 7.2% in our November 2011 business plan) based on a 62.5% notional gearing, indexed cost of debt and transitional arrangement of a c.8.5% p.a. adjustment to the Fast:Slow Money ratio.

Without transition, this plan is not financeable. The transition arrangement will allow NGN to maintain our strong investment grade credit ratings, raise the necessary finance to fund required investment, reduce the volatility of customer bills between regulatory periods and deliver this within an overall lower cost of capital than we have in GDPCR1. We believe this plan delivers the most efficient all round financial package with an equitable balance of risk and reward.

As a frontier company we should have the opportunity to earn higher returns through a reward consistent with previous regulatory precedents.

8.1 Revenue and financial forecasts

Ensuring that efficient companies are able to finance their activities is a key principle under both the GDPCR1 and RIIO regulatory frameworks. This is essential in order to enable the delivery of the large amounts of investment required in the UK's energy infrastructure to facilitate a move to a low carbon economy.

Adequate revenue streams have to be key components to this, enabling companies to deliver business plans that pass the key credit and equity metrics used to assess financeability and attract continued investment. However, NGN recognises that financeability should not be the only criterion when assessing revenue streams and financial forecasts. In deriving our financial proposals we have assessed the impact on four key criteria, incorporating the short and longer term impact upon customers, investors and providers of finance as set out below.

- **Impact on customer bills**
  The proposals must consider the impact upon customer bills in the short and long term. In an environment of potentially lower future gas demand, deferring revenues would lead to significant increases in future customer bills.
- **Long term market confidence to attract investment**
  A stable regulatory framework with a well understood risk profile is essential to continuing to attract the significant investment required in UK energy networks over the longer term. Extending cash flows significantly into the future will increase the perceived risk of the regulatory framework and increase the returns required by investors.
- **Ability to finance RIIO-GD1 investment**
  The financial strategy must ensure that the key credit and equity metrics are satisfied and that the RIIO-GD1 investment requirements can be financed efficiently. It must also recognise the potential impact upon the perception of the relative risk of the regulatory framework and the longer term cost of debt and equity finance.
- **Appropriate balance of risk and reward between customers and shareholders**
  Shareholders continue to share the burden of risk with customers over the RIIO-GD1 period and take responsibility for those risks that the company is best placed to manage. This should be achieved with reference to the overall impact on the required cost of capital.

Our financial strategy represents an appropriate balance between the short and long term impacts on investors, providers of finance and customers. This should reduce the overall costs of financing, by maintaining the confidence in the UK's stable regulatory framework and consequently supporting the ability to attract the significant levels of investment required in the longer term.

Our financial proposals are fully compliant with the key parameters set out in the March 2011 Strategy document, including cost of equity, cost of debt, capitalisation policy, asset lives and regulatory depreciation.

8.2 Financial Outcomes

This business plan is based upon the following assumptions.

- Vanilla WACC of 4.37% (average over RIIO-GD1 period), underpinned by:
  - Acceptance of a real post tax cost of equity of 7.0%; (previously 7.2% in November 2011 business plan);
  - A modelled cost of debt of 2.81% (average) based on our internal forecasts of the iBoxx GBP Non-Financials Indices; and
  - Maintaining Notional Gearing of 62.5%.
- Transitional arrangements that address the cash flow impact of the full capitalisation of Repex and result in a capitalisation rate of 52.6% on average in RIIO-GD1; including a 'notional' equity injection of £93m (2009/10 prices) at the start of RIIO-GD1 to reduce our actual capital structure level of gearing to a notional level of 62.5%;
- Delivering equity and credit metrics that are required to maintain our existing strong investment grade credit ratings; and
- Assumed adoption of IFRS accounting from UKGAAP in 2015/16.

Using Ofgem's financial model, the overall revenues, key financial outcomes and credit/equity metrics of NGN's business plan are shown in Figure 8.1.

£m 2009/10 prices	12/13	13/14	14/15	IFRS 15/16	16/17	17/18	18/19	19/20	20/21	Total
Closing RAV value	**1,598**	**1,647**	**1,692**	**1,734**	**1,773**	**1,800**	**1,824**	**1,844**	**1,861**	
Return on RAV		70	72	73	75	77	78	78	77	**600**
Depreciation		79	83	87	91	94	97	100	103	**734**
Fast Pot		110	115	116	116	109	109	108	108	**892**
Other		83	73	72	85	92	92	89	87	**672**
Revenue	**339**	**343**	**342**	**348**	**367**	**372**	**376**	**375**	**375**	**2,897**
Costs		(240)	(243)	(148)	(149)	(146)	(146)	(143)	(143)	**(1,358)**
EBITDA		**103**	**99**	**200**	**218**	**226**	**230**	**231**	**232**	**1,539**
interest paid		(61)	(58)	(57)	(57)	(59)	(59)	(58)	(58)	**(466)**
Capex & Repex paid		(48)	(54)	(152)	(151)	(138)	(138)	(138)	(139)	**(958)**
Other		(13)	(10)	(21)	(33)	(35)	(35)	(35)	(35)	**(217)**
Net Operating Cash Flow		**(19)**	**(22)**	**(29)**	**(23)**	**(6)**	**(3)**	**(1)**	**0**	**(102)**
Debt movement		50	54	62	56	39	37	35	35	**368**
Notional equity injection	93									
Dividend		**(31)**	**(32)**	**(33)**	**(33)**	**(34)**	**(34)**	**(35)**	**(35)**	**(266)**
Fast Money %		**47.4%**	**47.4%**	**47.4%**	**47.4%**	**47.4%**	**47.4%**	**47.4%**	**47.4%**	**47.4%**
Slow Money %		**52.6%**	**52.6%**	**52.6%**	**52.6%**	**52.6%**	**52.6%**	**52.6%**	**52.6%**	**52.6%**
FFO/Interest (x)		3.1	3.2	3.2	3.2	3.3	3.3	3.4	3.4	**3.2**
Adjusted FFO/Interest (x)		1.8	1.8	1.6	1.7	1.7	1.6	1.6	1.6	**1.7**
RCF/Total Capex (x)		**2.0**	**1.8**	**0.6**	**0.6**	**0.7**	**0.7**	**0.7**	**0.8**	**1.0**
RCF/Net Debt		**9.4%**	**9.2%**	**8.4%**	**8.6%**	**8.8%**	**9.0%**	**9.1%**	**9.1%**	**8.9%**
FFO/Net Debt		12.4%	12.2%	11.4%	11.6%	11.9%	12.0%	12.1%	12.2%	**12.0%**
Net Debt:RAV		61.7%	61.6%	62.1%	62.3%	62.0%	61.7%	61.5%	61.3%	**61.8%**
TWDV/RAV		**14.0%**	**14.8%**	**21.0%**	**26.7%**	**31.4%**	**36.0%**	**40.5%**	**44.8%**	**28.6%**
Tax Charge/PBT		**30.7%**	**22.2%**	**21.3%**	**21.2%**	**21.3%**	**21.3%**	**21.3%**	**21.3%**	**22.6%**
PMICR using RAV depreciation		1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	**1.8**
Regulatory Equity/Regulatory Earnings		**96.8**	**115.6**	**7.6**	**6.9**	**6.8**	**6.8**	**6.9**	**7.0**	**31.8**
Regulatory Equity/EBITDA		**5.9**	**6.3**	**3.2**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.8**

Figure 8.1: Key financial outcomes of NGN's business plan

Overall, we believe the financial package underpinning our business plan represents an appropriate balance between the short and long term impact upon customers and providers of finance. The following sections set out how we have determined our financial package and the evidence to support why this represents the correct balance.

8.3 Key financial modelling assumptions

The forecast allowed revenues required to deliver this business plan during RIIO-GD1 are based on a range of key financial assumptions set out below.

8.3.1 Cost of equity

It is essential that the cost of equity is set at the right level, taking account of the risks faced by equity holders under the new RIIO framework. Setting a cost of equity too low relative to this risk profile will deter investors and we will not be able to deliver our business plan.

The cost of equity relies upon a range of factors and may vary between sectors and even individual companies within a sector. However, there is a clear case that proposals contained within the RIIO framework materially increase the returns that will be required by equity investors in regulated energy networks in the UK going forward.

The RIIO framework introduces a greater role for equity, not only in securing the short term financeability of investment plans, but also in delivering the significant levels of investment required in UK energy infrastructure in the future. This obviously places the discussion of the appropriate returns for equity investors at the heart of the regulatory framework.

To determine the correct cost of equity for our business plan we have considered a range of issues which are set out below.

i Evidence from the Capital Asset Pricing Model (CAPM)

NGN, along with other members of the Energy Networks Association (ENA), commissioned an independent report from Oxera into the cost of equity for gas transmission and distribution networks in RIIO-GD1, which is attached as Appendix A13.

The traditional assessment of the appropriate cost of equity using the Capital Asset Pricing Model (CAPM) identified an upper range of 7.5% for the cost of equity as shown in Figure 8.2below.

	Low	High
Real risk free rate	1.5%	2.0%
Equity risk premium	4.5%	5.5%
Equity beta	0.8%	1.0%
Real cost of equity	5.2%	7.5%

Figure 8.2: Appropriate cost of equity for gas transmission and distribution networks in RIIO-GD1

The report identified that estimates at the top of this range were relevant for the RIIO-GD1 period due to the following:

- There is no evidence to suggest that the risks faced by the gas distribution companies have fallen significantly since GDPCR1; and
- The analysis included strong market evidence of recent history which was adversely affected by unprecedented market conditions. In particular this affected the low end of the range shown in Figure 8.2. It was concluded that it was therefore more appropriate to consider a period of time of five years or more within the analysis, which is broadly consistent with the estimates at the top of this range.

The impact of the recent significant economic downturn and the volatility experienced in world financial markets have been reflected in the analysis underpinning Figure 8.2. To the extent that utilities have represented a more attractive investment during these periods (which is undoubtedly the case) equity betas would have reduced below longer term averages. Analysis of longer term equity returns is included in Appendix A16. This further supports the argument that the top end of this range is a more appropriate indicator of the cost of equity for RIIO-GD1.

ii Duration of cash flows

The RIIO proposals introduce a range of changes to the regulatory framework which imply an increase in the risk profile faced specifically by gas distribution companies. In particular, the increase in the duration of cash flows implied by a change to the policy of full capitalisation of Repex.

Analysis prepared by Oxera (Appendix A14) examined in detail the theoretical and empirical evidence to support the assumption that required equity returns would increase as a result of an increase in cash flow duration. This includes analysis using the Brennan and Xia framework (2006), the results of their analysis of US market data, as well as specific empirical analysis of cash flow betas for UK utilities.

The analysis shows a positive relationship between cash flow duration and required returns, and clearly reinforces the point that the increase of cash flow durations implied by the RIIO framework would be expected to materially increase the cost of equity for regulated energy networks in the UK.

iii Indexation of debt

Historically, the allowed cost of debt has included a premium to deal with uncertainty in actual costs of debt over the period. The implied assumption within RIIO-GD1 of a move to allowances based on an indexed cost of debt is that companies will be able to hedge perfectly the debt index and hence there will be no residual exposure to risk from changes to market cost of debt.

Our own experience, supported by analysis carried out by Oxera, (Appendix A15) shows that if this core assumption does not hold, then the companies will be exposed to significant residual risk, and this residual risk under an indexed debt model accrues directly to equity.

In addition to this residual risk, the proposed debt indexation methodology also exposes all companies to additional debt costs arising from the inflation mismatch. Ofgem's methodology for setting the cost of debt index is, in simple terms, to deflate nominal debt costs by an inflation rate derived from inflation breakevens (the difference between nominal and index-linked gilt yields). In calculating the company's allowed return Ofgem then reflates this allowance using actual RPI inflation. To the extent that implied breakeven inflation and outturn RPI differ (which is the case in reality) this then creates a mismatch where nominal debt costs are not accurately compensated for by nominal revenues.

This is a particular major issue as opportunities to issue index-linked debt (other than 'tap' issues) are currently, and will remain for the foreseeable future, very limited, so most new debt issued by companies is likely to be issued at a nominal rate. Historic evidence shows that inflation breakevens are invariably higher than actual RPI inflation so the mismatch is expected to be adverse from NGN's point of view. Since breakevens theoretically incorporate an inflation risk premium to incentivise investors to buy nominal rather than index-linked gilts, it is reasonable to assume that breakevens will continue to outpace actual RPI rates.

iv Risk and uncertainty

The appropriate cost of equity has been assessed against the risk profile we face in RIIO-GD1. Our assessment of the key risks and our analysis of whether it is appropriate for these risks to be borne by NGN or customers are set out in Appendix A18.

Based on this analysis, we are not proposing any additional uncertainty mechanisms above those set out in the March 2011 Strategy document. NGN will therefore manage the impact of any risk outside these mechanisms.

Our risk analysis indicates that the appropriate cost of equity lies towards the top end of the Oxera identified range.

Taken together, our plan therefore includes a revised cost of equity of 7.0% (previously 7.2% in our November 2011 business plan) which lays within the range of the March 2011 Strategy document but below the current cost of equity in GDPCR1.

8.3.2 Cost of debt

In the March 2011 Strategy document it was stated that the cost of debt allowance in the WACC for RIIO-GD1 would be based on a 10-year simple trailing average index to be updated annually during the price control. It is proposed that the cost of debt allowance will be calculated as an average of the iBoxx GBP Non-Financials Indices of 10+ years maturity, with credit ratings of broad 'A' and broad 'BBB' issuers, deflated by 10-year breakeven inflation data published by the Bank of England.

Figure 8.3 details our forecast for the value of this trailing average index for each year of RIIO-GD1. This profile has been used throughout our financial analysis.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Cost of debt (iBoxx)	2.91%	2.85%	2.83%	2.83%	2.87%	2.86%	2.73%	2.60%

Figure 8.3: RIIO-GD1 iBoxx cost of debt forecast

These forecasts have been calculated using a methodology described below.

Historic data has been derived from a combination of Ofgem's indexation model, the Bank of England's website and Bloomberg. Forward swap rates have been derived from internal models maintained by one of our key UK relationship banks and are based on observable market swap rates.

- The average maturity of the two indices is:
  - iBoxx 'BBB' index – currently approximately 17 years; and
  - iBoxx 'A' index – currently approximately 21 years.
- For modelling purposes, forecast future underlying interest rates are based on a single maturity swap, (namely 20 years). Swap market rates are used to imply forward 20-year swap rates at the beginning and end of each calendar year. The average for the year is taken as a simple average of the two valuations.
- A credit spread is added to the average swap rate to derive a forecast average iBoxx index yield for each calendar year. In 2010 the average of the iBoxx 'A' index was 1.37% above the 20-year swap rate. In 2010 the average of the iBoxx 'BBB' index was 1.70% above the 20-year swap rate. This implies an average credit spread over swaps of 1.54%.
- Using the Fisher Equation, the nominal forecast average iBoxx yield is deflated by the forecast breakeven inflation for the corresponding year to derive a projected real index value for the year. The differential between historic 10-year breakevens (difference between 10-year nominal gilts and 10-year real gilts) and 10-year zero coupon inflation swaps averaged 0.22% over the period January 2005 to March 2011. Projected breakevens are therefore derived by implying forward inflation swap rates from swap markets and adjusting downwards for the assumed 0.22% differential. A simple average of opening and closing rates for each year is used as the deflating rate.

This approach gives a projected real cost of debt value for each year of RIIO-GD1 as shown in Figure 8.3. A 10-year trailing average of actual and projected rates is then calculated to derive a real cost of debt index for each year.

The key assumptions underpinning this modelling are detailed below:

- Future credit spreads are assumed to remain in line with observed spreads in 2010;
- The future differential between 10-year gilt breakevens and 10-year zero coupon inflation swaps is assumed to be consistent with observed data from 2005 to 2011;
- The average maturity of bonds across the two relevant iBoxx indices is assumed to remain close to 20 years. The move to a 10-year trailing average index in reality is likely to push debt issuance by network operators towards shorter tenors; and
- Average future swap rates (both 20-year nominal and 10-year inflation) are based on a simple average of opening and closing rates in each calendar year. Forecasting daily, weekly or monthly rates was considered too onerous for this exercise.

Whilst we have based our financial proposals upon the cost of debt index methodology, we still consider there are some significant issues with this approach, as set out below.

i Debt costs not funded by the cost of debt index

The forecasts set out in Figure 8.3 for the suggested future level of the indexed cost of debt allowance assume that no adjustment is made to compensate companies for additional costs of carrying and issuing debt not captured by the index itself. The March 2011 Strategy document stated that such costs are implicitly allowed for by the fact that UK utilities have historically been able to raise debt at rates lower than general corporates (the proposed iBoxx indices being a general corporate index). It is not necessarily the case that this position will continue to the same degree and we believe that it is essential that some form of mechanism should exist to cater for this given the falling cost of debt allowance evidenced above.

For the avoidance of doubt the additional costs are expected to include:

- Costs associated with maintaining adequate liquidity (loan facility commitment fees and/or cost of carry where debt issuance proceeds are held as cash deposits, attracting associated rates of interest materially lower than the cost of the corresponding debt);
- Direct costs arising from issuing bonds, arranging loan facilities or otherwise sourcing new debt (e.g. arrangement fees and legal fees); and
- Ongoing costs necessary to maintain funding arrangements (e.g. rating agency and other agents' fees).

Furthermore, new debt issues generally require issuers to pay a new issue premium which in the current market amounts to c.30bps above secondary spreads captured by the index. There were numerous market deals in 2011 which pointed to 30bps not being a generous level and this premium could be higher at the time of issue.

ii Constituents of the iBoxx indices

Markit, the provider of iBoxx indices, announced during September 2011, that from 31 December 2011 it would reclassify Whole Business Securitisation (WBS) bonds issued by utilities and infrastructure providers. The WBS bonds would thenceforth be classified as 'corporate bonds'. As a consequence, ten 'A' band and two 'BBB' band rated bonds were added to the iBoxx indices used to calculate the indexed cost of debt allowance under RIIO-GD1. Historically the yields on WBS bonds have been lower than those on 'vanilla' corporate bonds in the same ratings bands. In our November 2011 business plan submission we estimated that the reclassification of the WBS bonds would result in an immediate and ongoing reduction in the iBoxx indices of c.10 bps.

In the event, the effect of the change in the constituents of the indices was much smaller than this, and we are no longer seeking an additional allowance for this.

Substantial falls in gilt yields from mid-2011, particularly at the shorter end of the yield curve, have led to a significant proportion of recent corporate bond issues in sterling markets being clustered around a maturity of 10 years. If this trend continues, this will likely skew the average

maturity of the pertinent iBoxx indices downwards from the current averages of c.17-21 years as set out in Section 8.3.2. This would lead to a consequential lowering of the index yields to the detriment of the GDNs whose natural preference has been to finance long term assets with long term debt.

iii Other limitations of the proposed methodology

As already detailed in discussing the cost of equity, there is a mismatch between the rate of inflation used to derive a real cost of debt allowance and the actual RPI inflation rates that will be used to calculate allowed revenue. The mismatch will be disadvantageous to the GDNs in that it will result in nominal debt costs not being adequately reflected in nominal revenue allowances.

This business plan is compliant with the March 2011 Strategy document on the use of the iBoxx index for determining the actual cost of debt allowance. However, outstanding issues with the ability of companies to hedge the index effectively means there is a significant transfer of risk to equity under these proposals.

We estimate that the additional funding costs not captured by the current indexation approach total at least 75bps, as set out below.

	Impact on cost of debt
Maintenance of liquidity	20bps
Issuance costs and ongoing costs of maintaining funding arrangements	10bps
Inflation risk premium mismatch	30bps
New issue premia	15bps
Total	75bps

Figure 8.4: Additional debt funding costs

The cost of equity of 7.0% set out in Section 8.3.1 is not wholly consistent with this additional risk implied by the approach to setting the allowed cost of debt. We believe that supplementary allowances should be added to the cost of debt index to reflect additional funding costs not captured by the index itself and remove the upward pressure this is placing on the cost of equity to move outside of the range in the March 2011 Strategy document.

iv Possible weighting to be applied to the index

In the light of the RIIO-T1 initial proposals for the transmission price control for Scottish Hydro Electric Transmission Ltd (SHETL) we believe that there is an argument for a weighting to be applied to the index used to calculate NGN's cost of debt.

Whereas the use of a weighting in the case of SHETL is justified on the basis of SHETL's "very high Capex:RAV ratio", for NGN the issue is one of a modest Capex and Repex programme naturally leading to infrequent new debt issuance. The common feature is that debt issuance over the price control will not display a smooth profile.

NGN is exposed to the risk that the actual cost of debt issued at a time when all-in rates are relatively high will not be adequately compensated for by the index given the impact of index averaging. Given the benefits of issuing bonds in "benchmark" sizes we do not expect to issue new debt more than twice during RIIO-GD1. Without the natural averaging effect of frequent issuance NGN is therefore exposed to timing risks which we believe should be mitigated through a weighting being applied to NGN's cost of debt index to take account of the timing of actual (or expected, subject to subsequent adjustment) new issuance.

v Possible mechanism to cater for embedded debt

Another consequence of NGN's modest requirement for additional funding over RIIO-GD1 is that a high proportion of actual debt cost will relate to embedded debt and, to the extent that this is fixed rate debt, this cost will not fluctuate over time as the cost of debt index moves. There is therefore a risk that the cost of debt allowance will fall materially below NGN's actual cost of debt and our current projections suggest that the allowance will decline steadily over the course of the price control.

We therefore deem it appropriate to consider introducing a collar mechanism to the cost of debt allowance in respect of embedded debt consisting of a floor set at a level to protect against the allowance falling below the rate on NGN's embedded debt and a cap to ensure that NGN does not benefit excessively from a mismatch between allowed costs and embedded debt costs to the detriment of customers.

8.3.3 Notional gearing

We recognise that we should set our notional gearing level on the basis of our level of exposure to cash flow risk. Our assumption within this business plan maintains notional gearing at the current level of 62.5%. Whilst this remains unchanged from GDPCR1, we feel the reasons for increasing gearing are offset by the increased risks we face in the future. Factors that would indicate a potentially higher level of notional gearing are detailed below.

- Our capital structure results in actual gearing higher than notional. Last year our debt:RAV ratio was c.66% and we achieved a strong investment grade credit rating of BBB+ with S&P and Baa1 with Moody's, both with stable outlook. NGN has an internal target to maintain debt:RAV at or below 70% in order to maintain current credit metrics and these strong investment grade ratings; and
- We note notional gearing levels in electricity have increased to 65% and evidence shows that companies have maintained their credit ratings at this higher level of gearing.

However, during RIIO-GD1 there are very different market and regulatory conditions than those encountered in GDPCR1. The factors that would indicate a potentially lower gearing are detailed below.

- Weaknesses of highly geared companies were highlighted during the financial crisis;
- A sufficient equity buffer is needed to manage short term financeability issues, in particular during times of market instability, where the costs of raising debt could be prohibitive; and
- Regulatory methodology changes (primarily the Repex capitalisation) result in longer duration of cash flows and therefore increase risk, as well as the potential inflexibility of what is now also a significantly longer price control.

In line with RIIO principles, we analysed the impact of notional gearing on the equity returns by evaluating its impact on Return on Regulatory Equity (RORE) and the cash flow risks presented by the RIIO framework and the incentive proposals for the RIIO-GD1 price control.

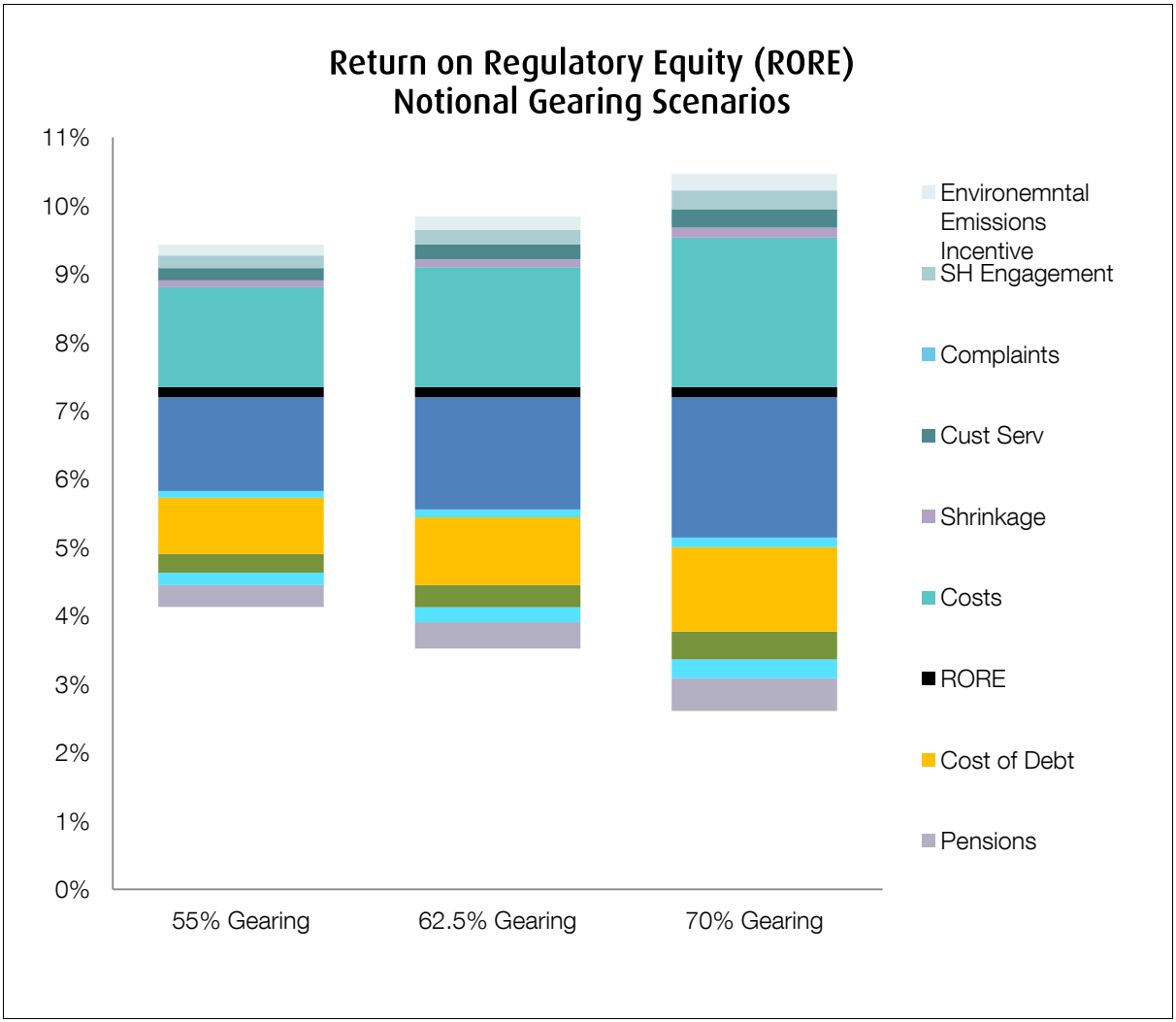

Figure 8.5: RIO-GD1 Return on Regulatory Equity-notional gearing scenarios

A notional gearing level of 62.5% gives a corresponding RORE range (based on a 7.0% cost of equity) of 3.3-9.8%. Reducing notional gearing below the current level of 62.5% would increase the equity wedge of RAV and impact on RORE.

With a notional gearing of 55.0%, the relevant RORE range narrows to 3.9-9.6%. We believe this represents too narrow a range of potential returns and penalties which may undermine the perception of the stability of the regulatory framework. This is in part due to the fact it is outside of regulatory precedent that allows the best performing companies to earn double digit returns.

Additionally, reducing notional gearing in turn increases the WACC, which increases allowed revenues within the regulatory period without any compensating reduction in future years. This would increase the burden on customers in the longer term.

Increasing notional gearing to 70% would increase the relevant RORE range to 2.4-10.1%. This represents an unacceptable RORE range particularly as it skews the return profile towards downward risk extending this significantly.

Having taken all factors into account, our business plan assumption is that notional gearing should remain at the current level of 62.5%.

8.3.4 Capitalisation policy

Based on the RIIO principles of equalising incentives and the rate of capitalisation being closely aligned to the actual split between operating and investment expenditure, this plan has fully considered the following Fast:Slow Money splits which are a product of the March 2011 Strategy document. The impact of this change on capitalisation ratios is shown in the table below.

	RIIO-GD1 Average p.a.
Controllable Opex and Non-Operational Capex (£m)	91.6
Capex (£m)	46.9
Repex (£m)	97.0
Total Definition	235.5
50% Capitalisation of Repex Fast : Slow Money split consistent with GDPCR1 treatment	
Fast %	59.5%
Slow%	40.5%
100% Capitalisation of Repex Fast : Slow Money split as now proposed by the RIIO proposals	
Ofgem proposed base Fast %	38.9%
Ofgem proposed base Slow %	61.1%

Figure 8.6: Fast:Slow Money split as a result of the March 2011 Strategy document

The starting point for our consideration of the necessity for transitional arrangements has therefore been to being with a Fast:Slow Money split of 40.5%:59.5% averaged across RIIO-GD1, consistent with the March 2011 Strategy document, and consideration of the associated impact on our cash flows and resultant credit/equity metrics.

8.3.5 Asset lives and depreciation

The assumed asset lives and depreciation treatments in our plan are fully consistent with the March 2011 Strategy document and the Ofgem financial model.

Asset Category	Depreciation profile
Pre 2002	56 years sum of digits
2002-2013	45 years sum of digits
(Accelerated depreciation)	8 year straight line
2013-2021	45 years sum of digits

Figure 8.7: Asset depreciation profile as a result of the March 2011 Strategy document

The position on the treatment of accelerated depreciation relating to the change to a front-loaded depreciation profile for existing post 2002 assets is consistent with the methodology set out within the Ofgem financial model.

However, we believe the above approach is inconsistent with Ofgem's statement in the March 2011 Strategy document where it stated that: "Our expectation is that network operators will propose in their well justified business plan whether they would intend to release this additional amount or retain it in RAV".

We believe that the most efficient way to release these additional sums would be to apply a front loaded profile based on an eight-year sum of digits approach.

This approach would significantly reduce the requirement for transitional arrangements, particularly in the early years of RIIO-GD1. We suggest that the sum of digits methodology is applied to catch up depreciation though our plan is not calculated on this basis. However, we have not made this change within this business plan or the Ofgem financial model.

Catch up' profile during RIIO-GD1 £m 2009/10 prices	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Straight line (current Ofgem approach)	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	71.5
Alternative eight-year sum of digits (NGN's preferred approach)	15.9	13.9	11.9	9.9	7.9	6.0	4.0	2.0	71.5
Difference	7.0	5.0	3.0	1.0	(1.0)	(3.0)	(5.0)	(7.0)	-

Figure 8.8: Contrasting 'catch up' depreciation profiles during RIIO-GD1

8.3.6 Return on equity RAV

Across all of our financial proposals we have used an assumption of a notional 5% of equity RAV dividend distribution level. This is consistent with the modelling assumptions set out within both the Ofgem financial model and the financial modelling for the DPCR5 final determination.

There are several key drivers underpinning this modelling assumption.

- A 5% notional distribution level is well below the assumed cost of equity (7.0%), and therefore in effect acts as a type of additional shareholder equity financing injection which equates to c.£106m in RIIO-GD1.
- The proposed growth in equity RAV in RIIO-GD1 is at a level broadly consistent with GDPCR1at only c.2.0% per year and is therefore consistent with a distribution level of above 5.0%.
- In this context, a lower distribution level would represent a significant further increase in the notional equity injection and would further increase the duration of cash flows experienced by equity investors. This would in turn need to be reflected in an increase in the cost of equity and therefore reflected in higher required risk premium.

8.3.7 Acceptable key credit metrics to be financeable

All the key credit metrics, shown in Figure 8.9 opposite are adversely affected by the March 2011 Strategy document proposals as they are all 'cash' metrics. From the extensive modelling we have undertaken, interest cover ratios, primarily Post Maintenance Interest Coverage Ratio (PMICR) is the 'limiting' factor in assessing financeability. This is clearly evident from the financial outcomes presented in Figure 8.10. and clearly shows the need for transition arrangements. In NGN's case, PMICR and net debt to RAV are also the two main financial covenants embedded within our liquidity facilities within our bank lending group. Our analysis below shows the PMICR is the primary 'limiting' ratio under the RIIO-GD1 proposals for NGN before any transitional arrangements are incorporated and if not addressed clearly leads to financeability issues as well as removing any headroom against key financial covenants.

NGN therefore targets credit metric ratios post transitional arrangements that will ensure we retain our strong investment grade credit ratings.

	Moody's		Standard and Poor's	
	Baa	A	BBB	A
PMICR	1.4 - 2.0x	2.0 - 4.0x		
Net debt : RAV	60 - 75%	45 - 60%	> 70%	<70%
FFO net debt	8 - 12%	12 - 20%	8 - 12%	>12%
RCF/Capex	1.0 - 1.5x	1.5 - 2.5x		
FFO Interest Cover			2.0x to 3.0x *	3.0x to 5.0x

Figure 8.9: Moody's and Standard & Poor's (S&P) indicative ranges for investment grade credit ratings

8.4 Requirements for transitional arrangements

The key financial assumptions detailed in the sections above, along with the expenditure forecasts set out in Section 7, have been analysed using the Ofgem financial model. The results of this analysis are shown in the following table. The table shows the key financial outcomes by: an abbreviated income statement; net operating cash flow position; and the impact on the key financial, credit and equity metrics used to assess financeability.

£m 2009/10 Prices	12/13	13/14	14/15	15/16 IFRS	16/17	17/18	18/19	19/20	20/21	Total
Closing RAV Value	**1,598**	**1,670**	**1,735**	**1,798**	**1,856**	**1,896**	**1,933**	**1,966**	**1,996**	
Return on RAV		71	73	76	78	81	82	83	83	626
Depreciation		79	84	89	93	98	101	105	109	758
Fast Pot		88	93	94	94	92	92	90	89	733
Other		65	65	70	87	88	88	88	89	640
Revenue	**339**	**303**	**314**	**329**	**353**	**359**	**364**	**366**	**369**	**2,756**
Costs		(240)	(243)	(148)	(149)	(146)	(146)	(143)	(143)	(1,358)
EBITDA		**63**	**71**	**180**	**205**	**212**	**218**	**222**	**226**	**1,398**
Interest Paid		(61)	(60)	(60)	(62)	(63)	(65)	(64)	(64)	(498)
Capex & Repex Paid		(48)	(54)	(152)	(151)	(138)	(138)	(138)	(139)	(958)
Other		(9)	(9)	(11)	(22)	(31)	(31)	(32)	(32)	(178)
Net Operating Cash Flow		**(55)**	**(51)**	**(43)**	**(30)**	**(20)**	**(16)**	**(12)**	**(9)**	**(235)**
Debt Movement		86	84	76	65	55	52	49	46	514
Notional Equity Injection	93									
Dividend		**(31)**	**(33)**	**(34)**	**(35)**	**(36)**	**(36)**	**(37)**	**(37)**	**(278)**
Fast Money %		**37.7%**	**38.3%**	**38.3%**	**38.4%**	**40.1%**	**40.0%**	**39.4%**	**39.1%**	**38.9%**
Slow Money %		**62.3%**	**61.7%**	**61.7%**	**61.6%**	**59.9%**	**60.0%**	**60.6%**	**60.9%**	**61.1%**
FFO/Interest (x)		2.5	2.7	2.8	3.0	2.9	2.9	3.0	3.0	2.8
Adjusted FFO/Interest (x)		1.2	1.2	1.3	1.4	1.3	1.3	1.3	1.3	1.3
RCF/Total Capex (x)		**1.2**	**1.2**	**0.5**	**0.6**	**0.6**	**0.6**	**0.6**	**0.7**	**0.8**
RCF/Net Debt		**5.6%**	**5.9%**	**6.5%**	**7.2%**	**6.8%**	**6.9%**	**7.1%**	**7.3%**	**6.7%**
FFO/Net Debt		8.6%	8.9%	9.4%	10.2%	9.7%	9.9%	10.0%	10.2%	9.6%
Net Debt/Closing RAV		63.1%	63.8%	64.2%	64.1%	64.1%	64.0%	63.9%	63.7%	63.9%
TWDV/RAV		**13.8%**	**14.4%**	**20.2%**	**25.5%**	**29.8%**	**34.0%**	**37.9%**	**41.7%**	**27.2%**
Tax Charge/PBT		**0.0%**	**0.0%**	**5.4%**	**21.0%**	**21.2%**	**21.2%**	**21.2%**	**21.2%**	**13.9%**
PMICR using RAV depreciation		1.3	1.4	1.5	1.6	1.5	1.5	1.5	1.5	1.5
Regulatory Equity/Regulatory Earnings		**(19.1)**	**(27.0)**	**8.4**	**8.4**	**8.3**	**8.3**	**8.3**	**8.2**	**0.5**
Regulatory Equity/EBITDA		**9.7**	**8.9**	**3.7**	**3.3**	**3.3**	**3.3**	**3.3**	**3.3**	**4.9**

Figure 8.10: Key financial and credit outcomes based on forecast RAV and allowed revenue with no transition

The most significant impact is the material reduction (by over 10%) in allowed revenue, falling from c.£340m in 2012/13 to c.£303m in 2013/14. The key drivers of this downward movement are:

- the 100% capitalisation of Repex, resulting in all Repex costs being funded over 45 years, rather than funded 50% in year;
- reduced WACC, based on lower assumed cost of equity and debt, which reduces the associated return on RAV; and
- rebasing the price control cost allowances.

This reduction in allowed revenue is partially offset by the proposed change to the depreciation of all assets from 2002/03 to a sum of digits basis, rather than on a straight line basis. This brings forward the recovery of some of the asset investment cost, and increases the depreciation allowance in the year. Linked to the above, associated 'catch up' depreciation will also be recovered, for the difference in the depreciation charge already received on a straight line basis for assets added to RAV between 2002/03 to 2012/13 and that amount that would have been received if they had been depreciated on a sum of digits basis over this period.

The reduction in NGN's allowed revenue, coupled with the increase in operating costs, reduces EBITDA by c.£51m in 2013/14 to c.£63m from c.£114m (in 2012/13) under UK GAAP. This in turn generates significant negative net operating cash flow activities of c.£55m in 2013/14, and operating cash flow remains negative in all other years of the price control.

Such a base outcome would create significant financing issues as explained below.

8.4.1 Financeability assessment

As set out in Figure 8.9 net operating cash flow is a key dynamic of the majority of credit metrics. The generation of cash is key to being able to invest in Capex, service debt finance and pay returns to shareholders.

Constant negative net operating cash flow, such as that delivered by the RIIO base proposals prior to any transitional arrangements, materially impacts the financeability of the proposals. In this situation, debt must increase year on year simply to cover the negative operating cash position and to maintain the status quo. Any return to the equity holders must be fully funded from debt. This is clearly not a sustainable long term operating model or a base outcome which shareholders could accept.

This is reflected in the assessment of this scenario against our key financeability criteria analysed below which shows the importance of the PMICR measure.

8.4.2 Assessment of key credit rating and equity metrics

Metric	Outcomes post IFRS adoption	Comment
PMICR	1.5	This ratio measures the ability to pay interest from operating cash flows, and shows an unacceptable position of 1.3x over RIIO-GD1, driven by the reduced net operating cash flows as a result of the proposals without transition arrangements. This is at the bottom end of potential outcomes and provides no headroom to accommodate cost shocks and would not be a financeable position. In turn this compares with levels of PMICR of c.1.8x delivered in GPCR1 by NGN.
Adjusted FFO / Interest	1.3	
Notional net debt to RAV	64%	Notional net debt to RAV increases year on year in RIIO-GD1, from c.63.1% to c.63.9% reflecting the need to borrow increasing amounts to fund the negative net operating cash flow position year- on-year. This is within the overall target of actual net debt to RAV of c.70% but after c.£93m of notional equity injection.
FFO interest cover	c.2.8x	This ratio measures the ability to pay interest from operating cash flows, and shows an average position in RIIO-GD1 of c.2.8x under the proposals without transition. This is within the acceptable range.
FFO to net debt	c.9.6x	This ratio measures the ability to pay interest from net operating cash flows, and shows an average position during RIIO-GD1 of c.9.6x. This represents an acceptable position.
RCF to Capex	c.0.8x	This ratio measures the ability to fund investment plans from net operating cash flows, and shows a worsening position in RIIO-GD1 from greater than 1.0x to 0.8x without transition arrangements. This does not represent an acceptable position.
Regulated equity over EBITDA	c.4.9x	Regulated equity over EBITDA falls in RIIO-GD1 and is not an acceptable position without transition arrangements.

Figure 8.11: Key credit and equity metrics without transition arrangements

Overall, under the base RIIO-GD1 proposals, without transitional arrangements the key equity and credit metrics show a materially worsening position from those currently maintained in GDPCR1. In particular huge strain is placed on interest cover ratios as evidenced by PMICR, which has a very high weighting when assessing financeability by our external credit rating agencies, our lenders and by our shareholders.

Such outcomes would severely limit NGN's ability to obtain finance from the banks, debt capital markets and equity holders. Therefore, under the base RIIO-GD1 proposals, without transitional arrangements NGN could potentially breach key financial covenants in our loan facility provisions, as a result of the removal of all financial headroom and could suffer an associated downgrade of our strong corporate credit ratings.

This base case of RIIO-GD1 proposals without transition arrangements consequently does not represent a financeable position for NGN and would not support the delivery of this business plan.

8.4.3 Longer term impact

The diagram below shows RAV growth and return on RAV over three price control periods, assuming 50% Repex capitalisation (as per GDPCR1 methodology) and 100% Repex capitalisation with no transition (as per the base RIIO-GD1 proposals). This highlights that RAV will grow at a quicker rate under the RIIO-GD1 proposals than under the current GDPCR1 methodology. This further highlights the potential for sunk costs, as well as the increasing returns that will need to be funded by future customers on an increasing asset base. Indeed, at the end of the third price control, RAV would be c.£250m higher and customers will have paid out an extra c.£200m in financing costs (both in 2009/10 prices) if not addressed now through adoption of transitional arrangements.

Given this overall position, we believe that an onerous and unfair burden should not be placed on future generations of customers to pay back the capital investment and higher returns on a higher asset base. This is particularly relevant when the long-term uncertainties of future gas demand are considered.

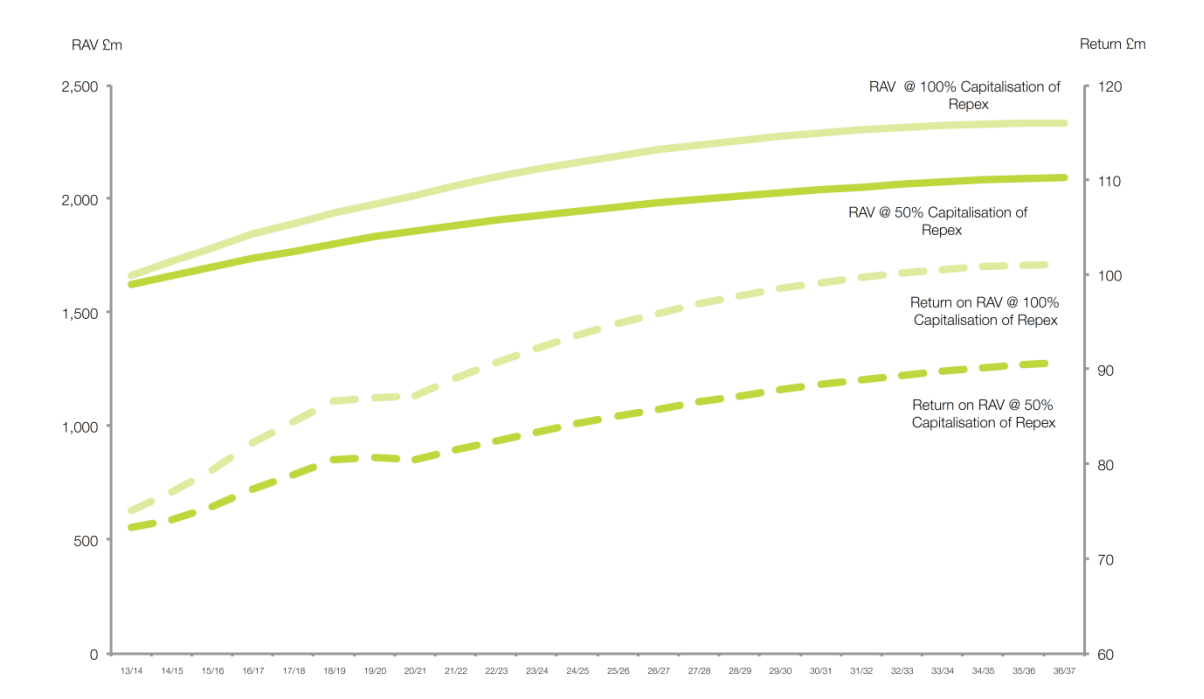

Figure 8.12: RAV return on capitalisation

8.4.4 Impact of IFRS

A key assumption of this plan is that IFRS will be implemented in full from the start of the 2015/16 regulatory year. Recent comment from the main UK accountancy firms has stated that the likely adoption date will be on or after 1 January 2015, (in effect the 31 December 2015 statutory financial year end for NGN).

The primary impact from the adoption of IFRS is that Repex would become a capitalised item from a statutory accounting perspective. In addition, connections customer contributions become revenue in the IFRS income statement in the year received under the guidance provided by IFRIC 18. Previously under the UK GAAP accounting rules these contributions were taken to the balance sheet and released over the appropriate asset life. This has a material impact on revenue and EBITDA in the income statement, but importantly not on the net operating cash flow line.

Under IFRS, revenue increases from c.£314m to c.£328m from 2014/15 to 2015/16. The primary drivers for this are:

- An increase in the tax allowance as the full costs of Repex are no longer treated as an operating expense and no longer act as a tax shield. This equates to an increase of c.£24m in 2015/16. However, this is offset by increased tax paid and so gives no benefit to NGN; and
- Connections customer contributions crediting revenue in year, which equates to a further c£9m increase.

The balance of the increase is driven primarily by increased return as the RAV grows, and movements in Fast:Slow Money split.

Following assumed adoption of IFRS for 2015/16, EBITDA significantly increases. This is primarily driven by Repex no longer being an operating expenditure item. However, the Repex costs still act as an 'in year' cash expense when considering net operating cash flow. Together with the increased tax paid, net operating cash flow still remains negative in 2015/16 and throughout RIIO-GD1, which is clearly an unacceptable position, and highlights the need for 'transitional' arrangements.

Revenue/(Transition requirements) have been modelled in accordance with IFRIC18 with customer contributions being added to revenue post IFRS adoption.

If this is not the case then further transition would be required as currently this is subsidising the level of transition we have asked for.

8.4.5 Conclusions

Without transitional arrangements there are several significant implications.

- Deferment of revenues which effectively 'mortgage' future customers bills;
- Deterioration of credit ratings, reducing NGN's ability to raise finance;
- Erosion of any financial headroom in the business which will also reduce our ability to raise finance; and
- Investors in UK energy networks will look for greater returns to compensate for the additional risk of delayed cash flows.

The case for transition is therefore very clear. Our proposals to address this issue are set out in more detail below.

8.5 Proposed transitional arrangements

It is important to recognise that the financeability issues are driven by a methodology change for Repex which is outside the control of the GDNs. The March 2011 Strategy document recognised this as a key issue, and looked to partially rectify this position by changing the depreciation methodology from straight line to sum of digits. In effect this forward weights the recovery of the initial asset costs by recovering proportionally more of the costs earlier in the assets' life.

Previously, when spending c.£85m on Repex in any given year, NGN recovered 50% of the cost in the year, and the other 50% by addition to the RAV. Moving to 100% capitalisation, with no other changes, would immediately decrease NGN's revenue in year 1 by c.£42.5m. This would partially be offset due the impact of the increasing RAV, generating additional revenue. However, by the end of RIIO-GD1 this offsetting income would only total c.£22m per year compared to the annual c.£42.5m reduction. The impact of this change would be largely offset by 2022/23. This also means that transition arrangements should be required for no more than one and a half price control periods, and the need for transitional arrangements reduces each year on a sliding scale. Consequently the need for transitional arrangements could be reassessed at the end of RIIO-GD1.

There is a clear requirement for transitional arrangements to ensure financeability criteria continue to be met. We believe that as a minimum these arrangements should fully compensate for the Repex capitalisation impact highlighted above, but should also be used to ensure that appropriate financing and credit metrics are maintained consistently across the period.

The revenue impact of RIIO-GD1 proposals in effect creates a short term dip in allowed revenue that will be more than compensated for in the future. At a time when there is increasing uncertainty over the use of the gas networks, where gas usage is expected to fall, this will put an increasing burden on future generations to fund the sunk costs if not addressed now within RIIO-GD1.

8.5.1 Options for transition

There are a range of options which could deliver the required transitional arrangements. However, each option will deliver these improvements via different mechanisms and directly impact the balance between providers of finance, equity investors and our customers. A summary assessment of several alternative options is set out below.

Adjustment mechanism	Assessment
Decrease in asset lives	NGN agree with the work completed by Ofgem in evaluating the appropriate economic lives in gas distribution and that 45 years remains the appropriate basis for depreciating these assets. Shortening these asset lives and increasing depreciation represents a permanent pull forward of allowed revenue from future periods at the expense of current customers and is not an appropriate mechanism for addressing the transitory financeability effects of Repex capitalisation. It may also impact investor perception about the long term future of gas distribution networks.
Increase in weighted average	An increase in the weighted average cost of capital would provide the necessary increase in allowed cost of capital (WACC) revenues to address the negative operating cash flow position presented. However this simply represents a transfer of funds directly from customers to shareholders without any compensating reduction in future customer bills. As such it does not represent an equitable mechanism for addressing our short term financeability requirements.
Decrease in notional gearing	Reductions in notional gearing, for a given cost of equity, will increase the WACC and provide additional allowed revenue to address financeability issues. This change does however provide an increased role for equity providers in financing the investment programme but must be assessed against the ability of providers of equity to achieve appropriate returns.
Change in capitalisation rate (increasing the Fast:Slow Money split)	Adopting a capitalisation rate that increases the percentage of Fast money (consequently reducing the amount allocated to RAV) represents a pull forward of money from future periods to within RIIO-GD1. Importantly this will be compensated by lower allowed revenue and customer bills in future periods ensuring that the longer term benefit for customers is maximised. These arrangements can be implemented on a short term basis to reflect the relatively short time to accommodate the period of transition required to address the impact of the capitalisation of Repex.

Figure 8.13: Options for transition arrangements

8.5.2 Capitalisation rate and notional gearing

Based on this analysis we consider that the best options for transition would be either through changes to notional gearing and/or capitalisation ratios. The matrix below summarises our analysis to determine the potential mix of Fast:Slow Money and notional gearing that could deliver an acceptable PMICR ratio of 1.7x (highlighted in orange), which is one of the key requirements in determining the financeability of our business plan.

Notional Gearing	62.50%		60.00%		57.50%		55.00%	
	PMICR	Debt:RAV	PMICR	Debt:RAV	PMICR	Debt:RAV	PMICR	Debt:RAV
Fast Money %								
37%	1.2	63.8%	1.3	60.9%	1.4	58.0%	1.5	55.1%
39%	1.3	63.5%	1.4	60.5%	1.5	57.6%	1.7	54.7%
41%	1.4	63.1%	1.5	60.1%	1.6	57.2%	1.8	54.2%
43%	1.5	62.7%	1.6	59.7%	1.7	56.8%	1.9	53.8%
45%	1.6	62.4%	1.7	59.3%	1.8	56.3%	2	53.3%
47%	1.7	62.1%	1.8	58.9%	1.9	55.9%	2.1	53.0%
49%	1.8	61.6%	1.9	58.5%	2.0	55.6%	2.2	52.5%

Figure 8.14: Capitalisation rate and notional gearing

Figure 8.14 clearly demonstrates that either changing notional gearing or capitalisation rates, or a combination of the two, could be used to manage transition. The exact mix clearly depends on whether one option has fundamental advantages over the other when considering the impact on all stakeholders, and these options are discussed below.

i Change in notional gearing

In order to mitigate the cash flow and financeability issues highlighted in Section 8.3, notional gearing would need to decrease from the current 62.5%. The table below summarises what happens when notional gearing is decreased by 2.5% in incremental steps down to 55.0%, based on a cost of equity of 7.0%.

Notional gearing %	62.5%	60.0%	57.5%	55.0%
WACC	4.37%	4.47%	4.58%	4.68%
Return on RAV	75	76	78	80
Tax allowance	21	22	23	24
Allowed revenue	362	365	368	371
Equity injection	93	133	173	213
5% return on equity RAV	33	35	38	40
PMICR	2.0x	2.1x	2.2x	2.3x
Adjusted FFO/Interest	1.8x	1.9x	2.0x	2.1x

Figure 8.15: Notional gearing transition

As can be seen, successive reductions in notional gearing have a positive impact on PMICR. This is driven by the following factors:

- The WACC increases, which drives a c.£2m p.a. increase in return on RAV;
- Notional interest payments reduce which increases the tax allowance by a further c.£1m per year; and
- Equity RAV increases, which increases potential returns on equity RAV by c.£2m per year and partially offsets the points above.

When calculating PMICR, the increase in returns does not impact the ratio in year, as it does not affect net operating cash flow. It will, however, have some impact in subsequent years as it will lead to higher debt and therefore increased interest costs in the PMICR ratio. Therefore the overall impact is to provide an extra c.£3m of allowed revenue annually which drives the improving PMICR position shown in the table above.

However, the drawbacks of this approach are significant. The transfer of money from customers to shareholders without any compensating reduction in charges in future years is in our view clearly inequitable. Furthermore, we have already identified that reducing notional gearing beyond 62.5% will drive reducing returns on regulatory equity to levels that are unacceptable to equity investors. This is in turn likely to increase the perception of risk within the regulatory framework and place upward pressure on the long term cost of equity for the sector.

ii Change in capitalisation rate

Increasing the relative Fast Money split would increase allowed revenue and return more cash to the company, improving the net cash flow from operating activities and in turn improve the PMICR ratio.

The key advantages to using Fast Money as the primary mechanism of transition include the following:

- It reduces the amount of expenditure going into the RAV, reducing any burden on future generations of customers to pay back sunk costs, and reducing the perceived risk in the eyes of investors;
- It also reduces the return on RAV due to this lower RAV, reducing the long term financing costs funded by customer bills; and
- It does not decrease the tax shield from interest payments in the tax allowance.

Using notional gearing for transition has none of these positives. Importantly, from a customer perspective, reducing notional gearing simply increases the WACC and increases the real cost to the customer, whereas increasing relative Fast:Slow Money split returns capital earlier to the investors, which importantly reduces the real cost to the customer.

Therefore we consider using the Fast:Slow Money split as the most appropriate mechanism to deliver transitional arrangements within this business plan.

8.5.3 Transitional arrangements in this business plan

Based upon the analysis in Section 8.5.2, our financial proposals include a requirement for transition which is achieved through an adjustment to the Fast:Slow Money split. The proposed adjustments are set out below.

				IFRS						
	RIIO-GD1 Base	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	RIIO Avg
Fast Money calculated by year	38.9%	54.5%	51.1%	41.4%	45.1%	47.7%	47.5%	46.4%	45.4%	**47.4%**
£m Revenue profile adjustment needed when using average of 47.4% across every year of RIIO-GD1		+£16.4	+7.4	-16.5	-6.3	+0.5	0	-2.6	-4.6	

Figure 8.16: RIIO-GD1 Fast:Slow Money split and Revenue Profile adjustment needed when using an average fast money of 47.4% every year

Our business plan shows an increase in the Fast Money rate from 38.9% to an average of 47.4% over the full RIIO-GD1 period.

November transition arrangements were on the basis of an individual year by year calculation, which as shown in Figure 8.16 highlights the big variations across RIIOGD1 – and in particular the much higher level of transition needed in the earlier years, due to:

- The gap caused by Repex capitalisation being at its highest; and Transition requirements drop with IFRS implementation, due to IFRIC18 classifying customer contributions as revenue.

We have taken into account feedback received from the November plan submission and have now moved to an average fast / slow position across every year of 47.4% fast / 52.6% slow. However this standard approach causes significant revenue movements and financeability issues in the first half of RIIOGD1. We have therefore added a revenue profiling adjustment to address this issue, shown in Figure 8.16.

Overall this ensures strong interest coverage within PMICR of c.1.7x in each year (consistent with the level delivered in GDPCR1) to ensure this business plan is fully financeable. This is driven by the improved EBITDA and stronger net operating cash flow. However, both of these measures still show reductions from those achieved at the end of GDPCR1.

Even with our proposed transition arrangements, net operating cash flow despite the improved EBITDA constantly remains negative, moving NGN from a position of being a cash generator, to consistently having a net cash outflow. This implies that debt must increase year-on-year to maintain the status quo, and that any return to the equity holders must be fully funding from debt.

Compared to the base RIIO-GD1 proposals without transition, there is improvement in all credit ratios due to the increase in cash generated by the marginal increase in allowed revenue.

Metric	Outcome - Ofgem base	Outcome NGN proposals
PMICR	1.5x	1.8x
Adjusted FFO / Interest	1.3x	1.7x
Notional net debt to RAV	69.9%	61.8%
FFO interest cover	c.2.8x	c 3.3x
FFO to net debt	c.9.6x	c 12.x
RCF to Capex	c.0.8x	c 1.0x
Regulated equity over EBITDA	c.4.9x	c 3.8x

Figure 8.17: Equity and credit metrics

8.5.4 Summary

Overall, under this scenario all of NGN's key equity and credit metrics should deliver the minimum required to maintain our existing strong investment grade ratings. NGN would continue to comply with the critical terms of its current loan provisions, and achieve ratios commensurate with its current credit ratings, but with limited headroom.

In summary therefore, the transitional arrangements in this business plan will allow NGN to:

- maintain our current investment grade credit ratings;
- raise the necessary additional finance to deliver planned investment during RIIO-GD1;
- reduce the volatility in customers' bills between regulatory periods; and
- deliver this within an overall lower cost of capital.

The outcome of our transitional arrangements on the financial outcomes of our business plan are set out in Section 8.2.

8.6 Rewards for frontier

One of the key strengths of the UK regulatory framework is the strong efficiency incentives that it provides companies both within regulatory periods and also importantly across regulatory periods. NGN has consistently achieved frontier levels of performance in Opex, Repex and Totex expenditure since 2005. This continual extension of the efficiency frontier has created significant value for customers within NGN's area and across the UK.

Ofgem has recognised this explicitly in previous regulatory decisions where it has provided for the most efficient companies to earn a base rate of return in excess of the industry average cost of equity. This provides very clear incentives for companies to continue to drive cost efficiencies over the whole of the price control period.

There are a number of ways in which the overall value of the customer benefit delivered by NGN's frontier performance can be quantified.

- Apply the same rewards in RORE terms as for the frontier companies during the last electricity distribution network price control (DPCR5);
- Quantify the cost reductions NGN has driven from all GDNs since GDPCR1 by operating at the efficiency frontier rather than as an average performer; and
- What additional allowances NGN would receive using an upper quartile benchmarking approach.

As an example, Figure 8.18 below uses the second of these techniques and shows the aggregate annual industry cost savings (using 2008/09 and 2009/10 industry costs) that NGN has driven through operating as the most efficient GDN rather than an average GDN.

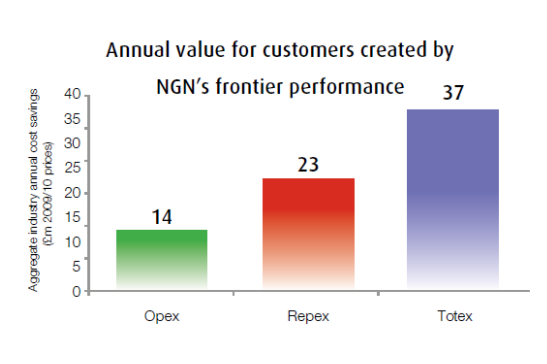

Figure 8.18: Value created by NGN frontier performance

This analysis shows NGN has created c.£40m per year of value across the gas industry through extending the efficiency frontier, (i.e. c.£200-300m across RIIO-GD1). This is delivered to customers through lower regulated revenues which have been determined by moving all companies towards the benchmarked levels of efficiency set by NGN.

When applying the alternative methodologies and comparing them to previous regulatory precedents we obtain similar results. We believe this approach must be maintained under the RIIO-GD1 framework and rewards should be set to reflect the value that NGN as the frontier company has created. Similar to the approach taken by Ofgem at DPCR5, allowances that mean NGN can earn base returns in excess of the determined cost of equity must be considered for RIIO-GD1. This would equate to a c.1.5% increase in base returns on regulatory equity or c.£10-15m per year during the period.

8.7 Proposed Information Quality Incentive (IQI)

The role of the IQI is to set the strength of the upfront efficiency incentives, and to encourage companies to submit more accurate forecasts. As part of this business plan NGN is proposing an IQI with rewards for forecasts matching Ofgem's assessment and an increased ongoing efficiency rate. Details of the proposed IQI can be found in Appendix A21.

The 7.0% cost of equity assumed in this plan is conditional upon acceptance of this IQI proposal.

The RORE graph below in Figure 8.19 illustrates the position of a frontier company, such as NGN, with the proposed IQI in place. The RORE range increases from 3.1-9.8% to 3.1-10.4%. We believe this represents a more appropriate RORE range and risk-reward framework which provides potential double digit returns for frontier performers and returns in line with cost of debt for poor performers.

This approach is wholly consistent with Ofgem's regulatory precedent and the core incentive principles of RIIO and a frontier reward should be reflected in NGN's final allowances.

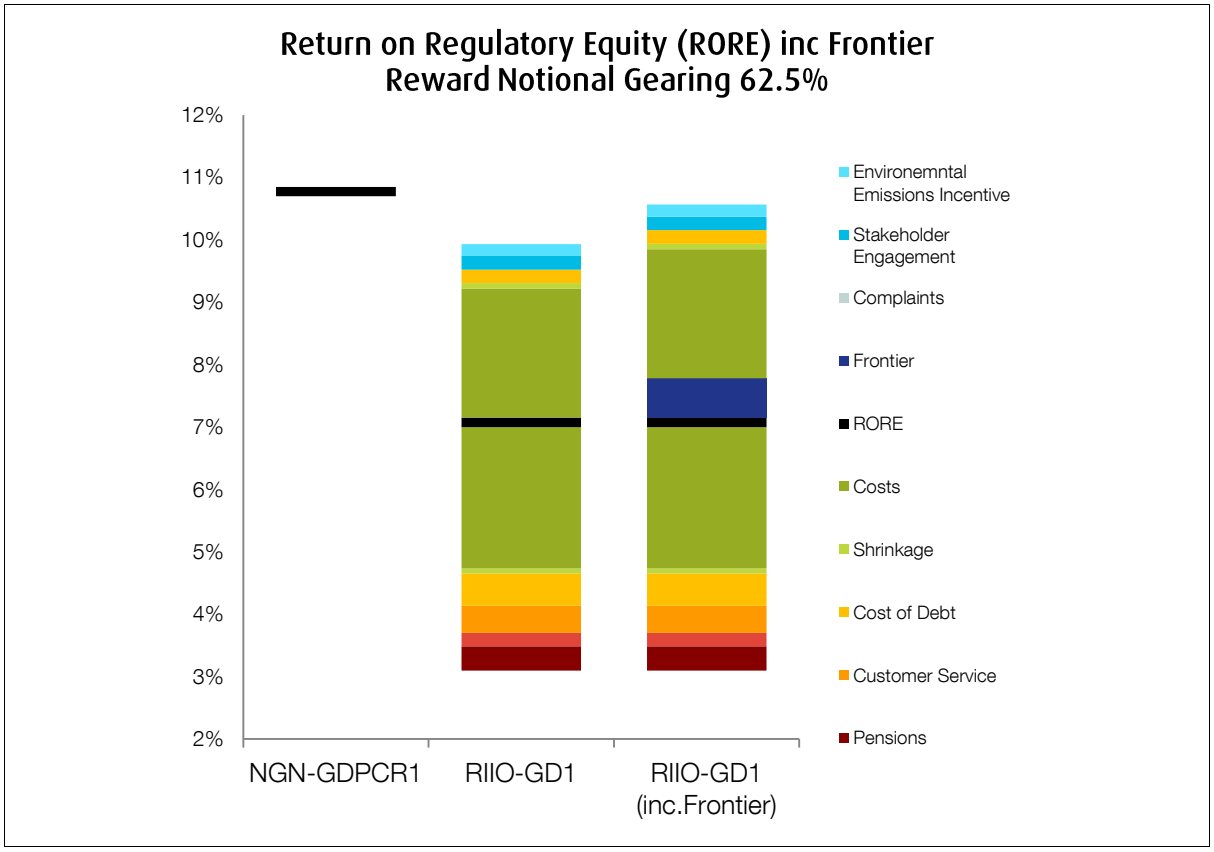

Figure 8.19: Return On Regulatory Equity (RORE)


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Impact on customer bills

9

NGN's business plan is based upon the principle of continuing to deliver value for money for the network's customers whilst maintaining high standards of safety, customer service and environmental responsibility. The financial impact of this business plan on customers' bills is detailed in this section.

Executive summary

Our stakeholders have told us we must continue to deliver value for money, achieving high performance at minimal cost. This has been the key challenge throughout the development of this business plan.

We have committed to achieve 56 business output measures, improving performance in 35 and maintaining current performance levels in the remaining 21. Our commitment to safety, reliability, environmental sustainability and customer service underpins our objective to meet our customers' demands and to remain the most cost-efficient GDN. This is predicated upon the need for financial stability, giving the correct balance of risk and reward between customers and investors.

We believe our new Total Network Management approach will provide the focus and direction for the successful delivery of this business plan, providing a gas distribution network which continues to deliver energy, safely and securely, to 2.6m homes and businesses across the North of England. We will continue to provide significant levels of value for our customers by extending the efficiency frontier which we have set for the past six years.

This business plan represents the most efficient way of meeting our customers' needs and can be delivered for an increase in bills of one penny a day.

9.1 Background

As we have demonstrated throughout this plan, we are acutely aware of the impact that our operations have upon customers in terms of the level of service provided, the safety and reliability of our system and particularly the cost of providing our services has upon customers' overall energy bills.

The impact on customer bills and the overall value for money of this business plan were highlighted very clearly during our stakeholder engagement for RIIO-GD1. We have ensured that expenditure is directly linked to the outputs we are proposing to deliver and that customers can clearly identify that they are receiving a value for money service.

This section sets out the impact of our proposals on customers' energy bills, highlighting the increased service levels that will be delivered in RIIO-GD1. In particular we set out analysis of:

- RIIO-GD1 revenue compared to GDPCR1 revenue; and
- Average impact upon annual domestic gas bills.

We also discuss proposals to try and address a major concern from one of our key stakeholder groups (gas shippers) in relation to charging volatility.

9.2 RIIO-GD1 revenue

NGN's regulated revenues are forecast to average c.£369m per year (2009/10 prices) post IFRS during RIIO-GD1, which represents an increase of 8.8% on average when compared to the final year of allowed revenue of GDPCR1 (2012/13).

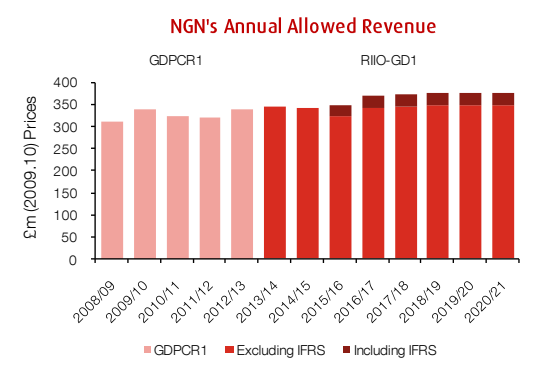

Figure 9.1: NGN's forecast allowed revenue

The single largest driver of this increase is the change to the implementation of IFRS accounting principles which is now due to take place in 2015/16. The largest impact upon NGN's revenues derives from the accounting treatment of Repex which moves to being treated as Capex. This leads to NGN receiving a significantly higher tax liability, and a corresponding revenue allowance to match the liability.

Also the accounting treatment of customer contributions will change, and be treated as revenue under the IFRIC18 accounting guidelines, which in turn reduces the level of transition adjustments required also post 2015/16.

Our regulated revenue funds an efficient level of the tax liability and requires an increase of c.£26m annually throughout RIIO-GD1.

None of these items will generate any benefit to NGN, and both are outside our direct control. Consequently, when evaluating the impact on customer bills and value for money over RIIO-GD1, account must be taken of these changes and adjusted so a valid comparison can be made. If we exclude the impact of IFRS, average annual revenue reduces from c.£369m to c.£341m, a level which is consistent with that earned under GDPCR1.

9.3 Customer bills

When the impact of IFRS is removed then the underlying increase in customer bills is less than one penny a day increase by the end of RIIO-GD1 as illustrated below.

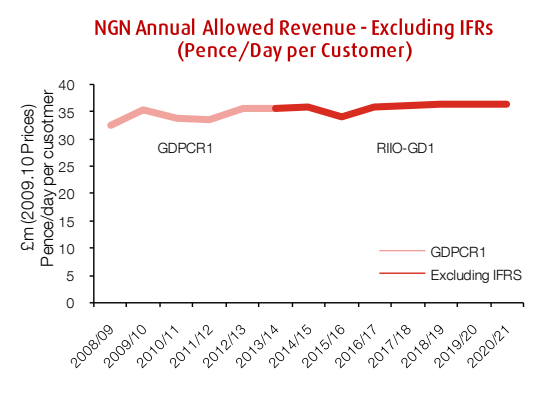

Figure 9.2: NGN annual allowed revenue excluding IFRS (pence/day per customer)

This analysis is based upon the following assumptions.

- The energy component of annual customer bills stays constant over the period at around £625.
- Customer SOQs (reflecting the capacity element of transportation charges) fall in line with NGN's forecast of reduction in demand.

Overall, when including the impact of IFRS, customer bills will increase by an average of £9 per year, or 2p/day. The size of these overall changes in customer bills directly highlights the reasons we have sought throughout this plan to consider and limit the impact of our proposals on gas customers.

These small increases in revenue must be viewed against the levels of expenditure and commitments made in the rest of this plan which aim to deliver enhanced outputs and levels of service throughout RIIO-GD1.

This commitment will deliver a gas distribution network with significantly higher standards of safety, improved network integrity and security of supply, and considerable reductions in emissions into the environment.

NGN has continually challenged the level of forecast costs that will apply for RIIO-GD1 and is committing to a 1% annual real productivity improvement for the whole timeframe. This represents a commitment to continual improvement and the maintenance of industry leading performance which are consistent with our corporate strategy.

9.4 Charging volatility and predictability

Charging volatility is a key issue for GDNs and shippers, with both parties seeking stable and predictable pricing structures. NGN is inherently aware of this industry-wide concern and has fully acknowledged recent concerns raised from shippers. NGN has worked hard in the current price control period to provide stable and predictable prices, identifying key drivers of charging volatility and focusing specific attention on these areas. As a result NGN has provided some of the most stable and consistent price changes amongst the GDNs throughout GDPCR1. Throughout RIIO-GD1 we will continue to work to mitigate any issues creating charging volatility.

NGN welcomes the decision, published in July 2011, on RPI indexation of allowed revenue, under which RPI forecasts published by HM Treasury are to be used with a two year lagged true-up adjustment to the actual outturn RPI for that year. Uncertainty regarding inflation during the economic downturn in the current price control period has had a significant impact on forecasting allowed revenues and this approach will mitigate any such impact in RIIO-GD1.

NGN also welcomes the Ofgem consultation published in April 2012 on mitigating network charging volatility. We will consider all items within the consultation and provide a detailed response by the June 2012 deadline. Fundamentally, however, NGN is supportive of the suggestion of increased focus on improving current forecast revenue reporting and delaying the impact of certain revenue adjustments to ensure actual rather than forecasted figures are used when calculating price changes. NGN is also supportive of restricting intra-year price changes, provided there are appropriate changes to the current penalties for over and under recovering revenue.

In addition to the suggested changes above, NGN is keen to consult on a number of other issues pertaining to charging volatility, which include the following:

- Consideration on the timing and implementation date of SOQ changes on network capacity, established as part of the AQ Review carried out each formula year. Around 97% of transportation charges are based on the capacity of the network and any SOQ changes, which have historically been very difficult to forecast, can potentially have a significant impact on charges as any reduction to the network requires an increase in transportation charges to ensure GDNs receive their allowed revenues. NGN believes that dissociating the requirements of SOQs for planning purposes from those involved in the pricing process could be a credible solution.
- Increased collaboration and engagement with the NTS in price setting, particularly following Exit Reform in October 2012.

We believe that debating these issues offers the most suitable and practical approach to ensuring charging volatility is reduced throughout RIIO-GD1. However, this is an ongoing process and there needs to be flexibility, particularly given the unknown impacts of initiatives, such as smart metering and bio-methane entry, on charging volatility.

Other proposals which have been discussed recently, either as part of the charging volatility consultation or through charging methodology fora, include placing cap/ collars on allowed revenues and the smoothing of any under or over recovery in each formula year. NGN has modelled scenarios based on these different approaches and determined that they only add to uncertainty and volatility rather than providing the required stable and predictable charges.

We are, consequently, opposed to both these suggestions. However, NGN remains fully committed to working with and assisting shippers on this difficult issue in appropriate charging consultations and other groups.