Demand Forecasting Document 2014

October 2014

Network Capacity

SGN

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This document is intended be read in conjunction with the SGN Long Term Development Statement 2014.

Contents

Foreword

Paul Denniff – Network Director

This 2014 Demand Forecasting Document (DFD) is produced by SGN in accordance with Standard Licence Condition 25 and Standard Special Condition D3 of our Gas Transporter Licences.

We have again chosen to present the information in two documents, which can be read in conjunction. While the DFD includes the tables and graphs representing the actual year-on-year predicted load growth of annual and daily demands. In addition, it explains the background and methodology in the development of the forecasts. The Long Term Development Statement (LTDS) contains essential information on the planned major reinforcement projects and associated investment, significant completed projects and other developments in Scotland or Southern England.

I hope you will find both our 2014 DFD and LTDS informative, and if you have any enquiries you can contact me at network.capacity@sgn.co.uk, paul.denniff@sgn.co.uk or 01293 818 365.

Paul Denniff

Network Director

SGN

October 2014

1 Introduction

1.1 Context

This document provides an overview of our ten-year forecast of annual and peak day demands. Development of the SGN transportation networks is primarily demand driven

The DFD is developed to be read in conjunction with our LTDS. They have been produced in accordance with the obligations in our gas transporter licence and Section O of the Uniform Network Code (UNC); Transportation Principal Document (TPD).

The overall UK supply position and security of supply assessment is covered in detail by National Grid in its Ten Year Statement for the National Transmission System and in its various publications.

The Uniform Network Code; Offtake Arrangements Document (OAD), sets out the framework for exchanging the necessary information to assist transporters to generate long-term demand forecasts. The publication of our Demand Forecasts forms part of this process.

The timescales for the development of the Annual and Peak Demand Forecasts are included in Chapter 2.

IMAGE REDACTED
FOR SECURITY PURPOSES

Figure 1; SGN's Control Room

2 Summary and Document Scope

2.1 Summary

We are forecasting a small decrease in annual and peak day demands over the ten-year period 2014-24, albeit with a small increase in 2014-15 due to economic recovery. In the period 2016-24, demand is expected to decrease as the effect of increased efficiencies and renewable incentives take effect.

The percentage demand reductions are shown in Table 1 below.

Changes in overall demand in period 2014-2014			
	Scotia	Scotland	Southern
Annual Demand	-5.55%	-5.17%	-5.76%
Peak Day Demand	-5.81%	-2.97%	-6.99%

Table 1; Overall change in demands

2.2 Overview of the Demand Forecasting Process

The production of the Demand Forecasting Document and Long Term Development Statement are essentially the output of the planning process for the current annual cycle.

The key input to the planning process is the demand forecasts, which are produced using data procured from recognised industry sources and through consultation with our stakeholders. These demand forecasts are used by us to analyse the performance of the Local Transmission Systems (>7Barg) to predict flows, pressures, offtake capacity and in-day storage requirements. From this data appropriate investment decisions can be made.

The Uniform Network Code provides for consultation between the Distribution Networks and National Grid Transmission in the demand forecasting process within the gas year, which is shown in the timeline in Table 2 below

2.3 Structure of Document

The document has been structured such that the main body of the document, Chapters 3 to 6, provides an assessment of the previous year's forecasting performance and sets out the key drivers and uncertainties affecting demand.

- Chapter 3 shows a Local Distribution Zone (LDZ)-specific outlook for the key factors that influence demand growth.
- Chapter 4 describes the forecasting methodology used.
- Chapter 5 provides details of the annual and peak demand forecasts.

The later chapters provide details of the figures used for the forecasts, the actual flows encountered last year and general information useful for understanding the document.

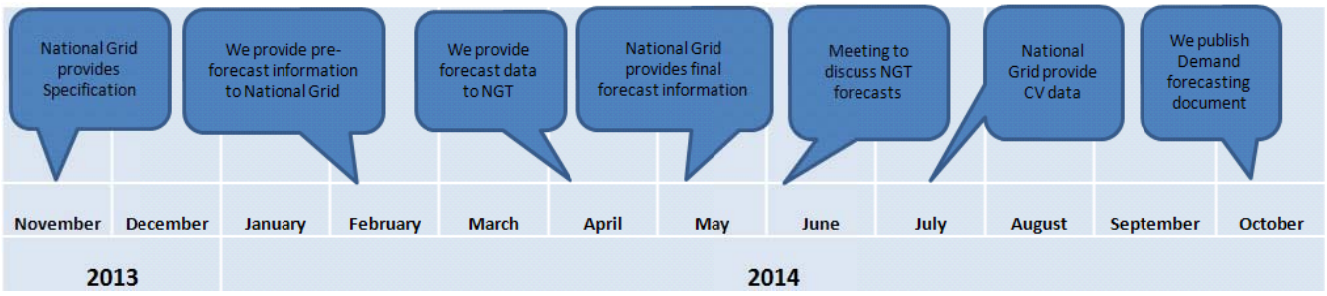


Figure 2; Overview of Timescales

3 Outlook for 2014 Demand

3.1 Medium to Long-Term LDZ Economic Outlook

This section provides a general overview of the UK economy to give some context to the regional data provided in this document. It also outlines some of the key econometric assumptions used to develop the forecasts.

3.1.1 Inflation

After a period of relative instability during the period 2009 to 2012 the Consumer Price Index (CPI) has started to stabilise in the 2 to 3% range in 2013 and has fallen below 2% at the beginning of 2014 (see below).

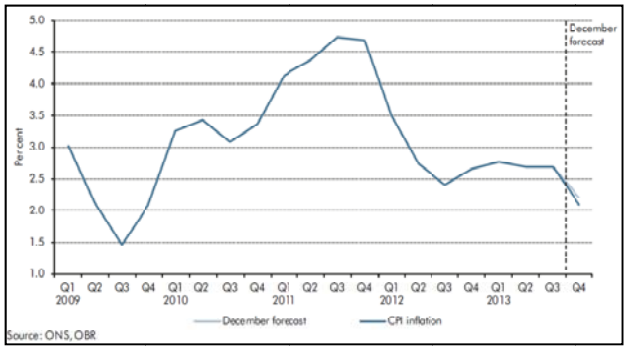


Figure 3; Consumer Price Index (CPI)

However the latest forecast for the whole of 2014 as provided by the Office of Budget Responsibility (OBR) in March 2014 is around 1.9%, and is expected to level out at 2% for 2015 to 2018.

3.1.2 UK Gross Domestic Product (GDP) and Gross Value Added (GVA)

GVA measures the contribution to the economy of each individual producer, industry or sector in the United Kingdom, and GVA is used in the estimation of Gross Domestic Product (GDP). GDP is a key indicator of the state of the whole economy and equates to GVA plus taxes on products minus subsidies on products. A significant decline in GDP occurred during 2008/9 set against a long period of growth from 1992. However there has been some small recovery in GDP since that time.

The latest economic figures included in the graph below taken from the Office of National Statistics (ONS) show a sustained, but slow, recovery in the economy during 2013 with the latest figures showing an average growth in national GDP of 0.7% across the four quarters of 2013 and a total annual growth of 1.8%.

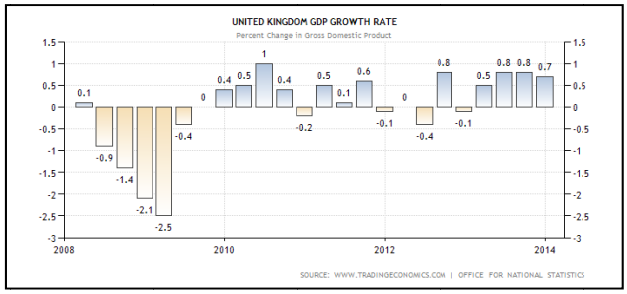


Figure 4; Change in GDP

There is still some way to go to get to pre-recession levels but on the basis of the current trend it would be expected that the economy should continue to grow in 2014 and beyond, with the reservation that an impending election in 2015 could create uncertainty and a slower expansion in growth. The OBR published their central forecast in December 2013 which is shown below. The Central forecast does look to be reasonable and does show potentially a small dip in 2015.

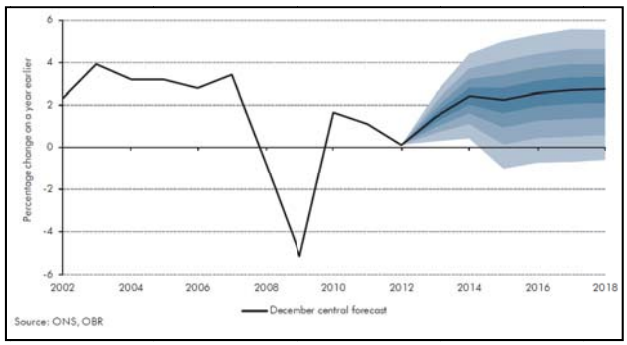


Figure 5; Predicted GDP growth

3.1.3 Gross Disposable Household Income (GDHI)

This can be used as an indicator of householders' ability to absorb rising energy prices and provides a reasonable indication of how affluent households are in a particular area. The source of this data is the National Statistics Office NUTS 1:1 table. Figures for UK are available as provisional figures up to 2011.

There were reports of a decline in GDHI in real terms. In fact the ONS did quote a national decline in 2010 of -0.2% and a forecast for 2011 of -1.4%. But this has not reflected in the published figures for those years.

3.1.4 Manufacturing Output

Manufacturing output trends provide an assessment of how this type of industry is performing. There was a significant downturn in manufacturing during 2009 but it has shown some recovery in 2010, a decline in 2011 and 2012, then a slight recovery in 2013, as the figures for the

Manufacturing Index from the ONS (see figure 4 below, where 100 is the level of manufacturing in 2000).

Figure 6; Manufacturing Index

3.1.5 Household Numbers

Household numbers are based on the Department for Communities and Local Government (DCLG) website reported data (mid-year) adjusted to year end. This data is consistent with historical data provided previously.

Initial forecasts are based on the numbers provided on the DCLG website, However we have adjusted the figures to reflect the current level of housing growth.

3.1.6 Employment

After a steady rise in employment for nearly 20 years there has been a steady decline in the number of workforce jobs between 2007 and 2009, with a small recovery in 2010 and 2011, followed by stronger recovery in 2012 and 2013. In 2013 500,000 jobs were created of which 300,000 were employee jobs as opposed to self-employed. This pattern is mirrored in the Commercial/Services sector with 400,000 jobs created. Manufacturing has seen a steady decline since 1998 after a period of small growth from 1992 to 1998. The figures for 2012 to 2013 however show a small rise of around 80,000 over the two years.

Regarding the future employment levels in the commercial, service and manufacturing sectors we are expecting that the substantial rise in the number of jobs created in 2013 will not be sustained and therefore there will be a pattern of growth that reflects the pattern that has been seen over the last 10 years.

3.1.7 Gas and Fuel Price

Prices in all markets have shown significant increases from 2002 for households and from 1999 in the non-domestic market. This has been driven by the wholesale gas price rises. There are commentators that continue to suggest that the link to oil is being decoupled as world trade in LNG expands and as the US accelerates its LNG export programme linked to the growth in shale gas production. There is still limited evidence of the decoupling at the moment. Last year gas prices did generally follow movements in the oil price and gas prices may still be expected to fall slightly during 2014 as a result of the forecast lower oil prices for 2014.

Image 2; Stakeholder engagement suggests that gas has a positive image as a safe, reliable fuel source.

3.1.8 Wholesale Price

There has been some significant fluctuation in the wholesale gas price over time as represented by the UK National Balancing Point (NBP) price but the general trend has been upwards.

3.1.8.1 Domestic Retail Price

There has been a steady rise in domestic gas prices since 2012. However there has been some significant fluctuation due to the result of the impact of wholesale price variation, which has an impact on a proportion of the costs incurred by energy suppliers. It has been announced by Government that around £50 per customer will be cut from the retail price as a result of absorbing the Green Levy into general taxation. This has been reflected in the 2014 retail prices. With forecast wholesale prices due to steadily rise beyond 2014. We have assumed that the major suppliers will as a minimum increase prices by the forecast rate of inflation plus a premium for the costs associated

with the smart meter rollout and supporting low carbon generation.

3.1.8.2 Non-Domestic Retail Price

There has been a steady rise in the real price of industrial gas prices for many years but with significant fluctuations in line with the fluctuation in wholesale prices. This fluctuation is particularly felt by those customers with large annual consumption as the wholesale price will be a much greater proportion of their charges from their supplier.

Ongoing current price rises are anticipated at this level in line with the trend in rising wholesale prices and a premium of 1% is added to the current price in the short term to accommodate the development of smart grids, smart metering and other green initiatives. The lower premium level is anticipated as non-domestic customers will see greater benefits from this technology compared to domestic customers and hence be early adopters or already have some form of smart metering already.

3.1.9 Efficiency Improvements

Our experience, particularly in the 0-73Mwh load band, is that there is no need to make a specific assumption about future changes in energy efficiency. There has been a steady decline in average consumption per customer, driven by the rising trend in current gas price, but there are some signs that this is slowing down.

There are occasions when gas demand drops significantly over a year, but this is not specifically linked to a physical change to the premises (loft and cavity wall insulation for example) but a change in behaviour in response to either a step change in gas price or a sudden loss of income.

It has been noted that gas demand has been declining in recent years, but it is difficult to separate the impact of efficiency improvements from the impact of variations in gas prices and the effects of variations in the number of supply points. In fact, there are signs of small growth in some sectors.

It is a fact that there has been a steady and substantial programme of gas-fired domestic boiler replacement for several years now and the high levels of efficiency achieved with these new boilers is a possible contributory factor in the decline in gas demand. However the increases in efficiency could have been used to provide higher comfort levels, especially in winter. There has also been a concerted effort by gas suppliers and other parties to encourage the use of loft and cavity wall insulation. These measures have been extensively used to reduce household consumption.

For insulation, the Department for Energy and Climate Change (DECC) published the position as of the end of 2013 as being 69% of homes with lofts have loft insulation and 71% of homes with cavities have cavity wall insulation. This is a significant increase from 2011 when the levels were 60% and 59% respectively.

However, other schemes, such as solid wall insulation requires substantial investment and disruption to install. This particular scheme does not currently provide an economic solution to those households that pay their own energy bills and could benefit from savings made. DECC statistics at the end of 2012 show that there are only 2% of homes with solid wall insulation.

3.1.10 Energy Act 2011

There is a range of provisions in the Act to encourage energy efficiency and to remove barriers to investment in energy efficiency measures. One provision in particular is the Green Deal, which is a new financing framework to enable the provision of improvements to the energy efficiency of households and non-domestic properties, funded by a charge on energy bills that avoids the need for consumers to pay upfront costs.

The Green Deal is now operating and evidence to date is that there have been many enquiries but been limited interest in using the energy saving benefits to repay the loan costs.

3.1.11 Energy Company Obligation (ECO)

This is the Government's new domestic energy efficiency programme which has replaced the existing CERT and CESP programmes, both of which came to a close at the end of 2012. ECO works alongside the Green Deal to provide additional support for packages of energy efficiency measures. The Ofgem-administered scheme also provides insulation and heating packages to low income and vulnerable households and insulation measures to low income communities.

ECO creates a legal obligation on energy suppliers to improve the energy efficiency of households through the establishment of three distinct targets:

- The Carbon Emissions Reduction Obligation (20.9 million lifetime tonnes of carbon dioxide). Focusing on hard to treat homes and, in particular, measures that cannot be fully funded through the Green Deal
- The Carbon Saving Community Obligation (6.8 million lifetime tonnes of carbon dioxide). Focusing on the provision of insulation measures and connections to district heating systems to domestic energy users that live within an area of low income
- The Home Heating Cost Reduction Obligation (£4.2bn of lifetime cost savings). Requiring energy suppliers to provide measures which improve the ability of low income and vulnerable households (the 'Affordable Warmth Group') to affordably heat their homes

In 2013 there has been a total of 530,000 efficiency related installations under the ECO. A large proportion of these were for loft and cavity wall insulation (25% and 33% respectively). Boiler replacement accounted for 32% and solid wall insulation 5%.

Further measures to improve energy efficiency include:

- Amendment of the smart meters powers in the Energy Act 2008 to allow Government to direct the approach to the roll-out of Smart Meters until 2018 and to enable the Secretary of State to make changes to transmission licences to ensure the effective introduction of the new central communications arrangements to support all Smart Meters
- Amendment of the Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2007, to enable the removal of unnecessary restrictions on access to data
- Establish powers for the Secretary of State to require energy companies to provide information on the cheapest tariff on energy bills

As high level principles the provisions cannot be seen as providing the only solution to cut carbon emissions to the target levels. Relatively low cost measures to improve efficiency like boiler replacement and cavity wall and loft insulation benefit from the Green Deal, but higher cost solutions like renewable heat or solid wall insulation would need to allow protracted payback periods (approaching 50 years or more) to be viable, unless a significant subsidy is obtained.

In summary it would appear that there are still some barriers to major investment in efficiency savings, although recent incentive developments have reduced these, but the key driver, at least in the short term, will be the price of gas when compared to the cost of installing new energy efficient appliances or means of reducing heat loss from premises.

3.1.12 Smart Meters

It was observed by Ofgem in their December 2010 report for the Energy Demand Research Project (EDRP) that smart meters can be a vehicle for effective action to reduce domestic energy demand. However there was no distinction between gas and electricity meters.

The latest news on the roll-out programme is that it has been delayed until autumn 2015, compared to the original date of summer 2014. However some suppliers are already installing meters in advance of the official roll-out. As at the end of September 2013 there were 177,000 meters installed at domestic premises and 900 at non-domestic sites, although the statistics do not break down how many of these are gas meters. The Government are still targeting 2020 for completion of the programme.

3.1.13 Carbon Neutral Housing

The Government policy on carbon neutral new housing, more commonly referred to as "zero carbon homes, has been interpreted by some as being taken literally from the headline title. In fact the actual policy makes it clear that although carbon neutral is an objective for new housing, the proposed standards published in November 2009 are aimed at reducing energy consumption as much as possible and using where possible renewable sources where appropriate. Given that this will come into force in 2016 and that gas consumption has already fallen significantly amongst the much larger existing housing market, it should not be necessary to make any specific adjustments to forecasts of household demand, but to keep this area under review for future forecasts.

It is suggested that it could be treated as a sensitivity to forecast demand by assuming that all new housing sites have zero consumption, but there may still be a peak demand to accommodate loss of renewable capability.

3.1.14 Renewable Assumptions and Impacts

In March 2011 the government announced that they would introduce a Renewable Heat Incentive Scheme (RHI)[1].

The RHI was aimed at helping to accelerate deployment of renewable heat sources by providing a financial incentive to install renewable heating in place of fossil fuels.

The non-domestic scheme was launched in November 2011 offering long-term tariff support for renewable heat installations in the non-domestic sector. This sector, which covers everything from large-scale industrial heating to small business and community heating projects, was anticipated to provide the vast majority of the renewable heat needed to meet the targets and represents the most cost-effective way of increasing the level of renewable heat.

To ensure the success of the non-domestic scheme, a cost control regime called degression was introduced in 2013, to ensure the RHI scheme stays within budget. The scheme was also expanded to support new technologies.

The domestic RHI scheme opened for applications in spring 2014. Under the scheme, there is financial support to encourage the uptake of renewable heating among domestic consumers. It is targeted at, but not limited to, off gas grid households. The impact on gas demand is likely to be small as the scheme is likely to be more attractive to households who rely on more expensive heating fuels such as oil, electricity or LPG.

UK Government is committed to providing 12% of heat from all renewable sources. The total figure quoted by them is 73TWh, a reduction of 15TWh from the original target of 88TWh.[2]

[1] DECC Renewable Heat Incentive – March 2011

[2] www.gov.uk/government/uploads/system/uploads/attachment_data/file/48041/1387-renewable-heat-incentive.pdf

3.2 Regional Economy

3.2.1 Scotland

Scotland LDZ possesses a strong commercial and services sector base, accounting for around 77% of the Scottish economy, just below the UK figure of 81%. Financial and business services growth underpinned by the presence in Edinburgh and Glasgow of many leading financial institutions is the third largest in GVA terms in the UK behind London and the South East. The recent economic downturn did have a negative effect as banks consolidated offices and functions. The Scottish Government are keen to emphasise the impact that their economy has on UK GDP as illustrated by the significant contribution that Scotland makes to the extra-regional elements of UK GDP.

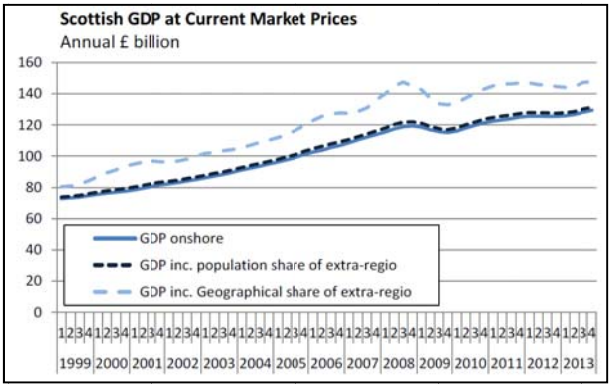


Figure 7 Scotland's GDP

The Scottish manufacturing base is also strong delivering 13% of Scotland's GVA, higher than the UK figure of 11%, but ranking eighth nationally. The sector has however performed well showing a reasonable increase in 2013 compared to a small decline in 2012 in line with the rest of the UK. Scottish international exports grew a little in 2013, after a decline in 2012 in line with the figures that relate to exports to the rest of the UK. There is good diversity, with the top five exporting industries in 2011 being food and beverages at 18%, chemicals (including refined petroleum products) at 15%, computer, electronic, optical manufacture at 6%, financial and insurance at 6% and the mechanical engineering sector at 6%. In addition, the importance of the whisky industry should not be understated as an employer outside of the central belt between Glasgow to Edinburgh.

An important point to note is that there is heavy reliance on exports to the EU (46% in 2011) which

could be affected by any sustained impacts of the ongoing economic problems in the eurozone.

The latest population projections are based on the estimate of Scotland's population at 30 June 2012[3]. These projections, based on existing trends and making no allowance for the future impact of government policies and other factors, show the total population of Scotland rising from 5.31 million in 2012 to 5.78 million in 2037. Longer term projections show the population continuing to rise.

Heavy reliance on public services (23% of employment in 2013, down from 24% in 2012) may also be problematic as the UK Government continues to cut it's spending plans in order to meet borrowing targets and reduce the budget deficit. Employment levels across the whole of Scotland have risen in the first quarter of 2014 to 73.5% the highest of all UK countries. However there have been significant drops in the public sector with a 6.2% drop in employees during 2013. This does mean that there is some steady growth in sectors outside the public sector which is counteracting the losses in the public sector, but will still leave the Scottish Economy heavily reliant on public services in the near future. Scottish Parliament reports have highlighted that the Scottish economy is probably over reliant on a small number of overseas markets and would be well advised to exploit opportunities in other emerging markets

In the medium term the Scottish economy will have development opportunities in renewable technology with the Scottish Parliament targeting a potential 16,000 to 70,000 new job opportunities in these emerging areas of employment. The UK Government states that 11,500 jobs have been created already in this sector in Scotland and studies estimate that this figure could rise to 28,000 by 2020.[4]

3.2.2 South East

In South East LDZ, the strong representation in financial and business services and transport and communications, the best-performing sectors of the national economy, are further encouraged by favourable demographics. This should be boosted by the steady economic recovery following the downturn but the trickle of recent banking industry scandals is a real threat to that industry. This will be especially significant should confidence in London as a banking stronghold be adversely affected by the various enquiries into the banking sector and changes in regulation.

The pattern of growth and development remains unbalanced, with economic hot and cold spots in the region. Manufacturing is still a significant element of the South East economy at 9%, but there was some decline in 2011, and it remains the lowest manufacturing base outside London. The impact of the level of economic recovery on this sector could still be significant assuming there is to be continued recovery, but the prospect of a general election in 2015 will be crucial to the country's economic outcome. The sector of the economy that has generally weathered the economic downturn the best appears to be the wholesale and retail sector (13% of South East GVA), which was only marginally affected by the recession In 2011 showed further growth on top of that in 2010. It is unclear how sustainable this position will be, especially if the UK, EU and global economies continue to be adversely affected by the prevailing economic uncertainty or slowdown in some countries. The impact of a possible referendum on UK membership of the EU has unknown consequences for either an in or out conclusion.

Strong expansion of tourism, both internal and international provides opportunities for the South East region, given London's attraction as a tourist centre and the ongoing positive impact from the Olympics in 2012. The specific impact of the Olympics on the UK has been assessed by the Department for Culture, Media & Sport. They have concluded in their initial assessment that in general UK terms there have been the following economic benefits.

- By 2020 the economic impact is estimated to be between £28 billion and £41 billion in Gross Value Added (GVA) and 618,000 to 893,000 man-years of employment
- So far £9.9 billion in international trade and inward investment has been won because of the Games and Games-time promotional activity – with more being announced
- 70,000 jobs for workless Londoners
- £120 million of contracts already won by UK companies from the Brazil 2014 World Cup and Rio 2016 Olympic and Paralympic Games

[3] Last updated 9 January 2014

[4] www.scotland.gov.uk/Publications/2011/09/13091128/5

- More than 60 contracts won by UK companies for the Sochi 2014 Winter Olympics and Russia 2018 World Cup
- 8% increase in international visitor numbers to the UK and 7% increase in visitor spend – in 2014, tourist spend is expected to exceed £19 billion[5].

Specific figures for the South East are not included but it is clear that the South East LDZ will see the impact of some of these economic benefits.

There are some opportunities in the agriculture industry with efforts to buy local encouraging supermarkets to source high value fruit and vegetables in the UK. Of particular note for gas demand forecasting is a number of companies, primarily brickworks, which supply the construction sector that are operating differently to minimise costs. With the construction sector now showing some slight recovery (growth in 2010 and 2011) the demand for bricks will increase with some companies having shut down for long periods now restarting, but tending to use shorter term manufacturing periods.

The Government continues to forecast that housing development will grow in the South East. A prime driver for this is the surge in population in London and the South East. There are signs of growth with the Greenwich Peninsula developments, which are part of the Thames Gateway regeneration project. In addition, a potential 15,000 homes were announced for the Garden City development in Ebbsfleet, Kent.

3.2.3 South

In South LDZ, the rail, sea and airport links provide a favourable environment for investment opportunities and employment growth. This combined with a reasonably broad mix of commerce, industry, housing and tourism should create the ideal opportunity for sustained economic growth. The south coast and rural areas of South LDZ continue to attract visitors boosting the local economies at a time when there has been some turndown in other areas. The latest figures regarding small car sales show a rise of 1.2% in 2013. The South LDZ-based plant which has to date been the major manufacturing site for this model, may see some downturn in the short term. However the parent company has stated that they will be investing £750 million across the UK sites between 2012 and 2015. It is assumed that the plant will continue to operate at full capacity in the short term.

Further changes by the Ministry of Defence will have some effect on the local economies in the vicinity of current naval and MOD facilities of which there are several in the South LDZ. This can take the form of job cuts, but can also result in increases of employment due to consolidation of bases and upgrading of living quarters. The impact of the cuts in public sector employment is not clear at this stage, but it is anticipated that it will have an impact on the South LDZ economy. Further job losses for London based public sector employees will have a knock on effect within South LDZ where people living in the Thames valley are within commuting distance of London.

Although the region has many pockets of thriving economic growth there are some threats to certain areas as a result of changes in other parts of the country. An example of this is that cruise ships are now allowed to stay in port at Liverpool docks, which has seen at least three cruise lines docking some liners at Liverpool, which will reduce the numbers that use Southampton for this purpose. Many high-tech industries could still face the threat from Silicon Valley in the US as it continues to pull itself out of recession, and the growing economies of India and China. Other factors that may constrain growth are the fact that there are many pockets within the area that are protected from development; witness the lack of onshore wind farms in the area. In addition the road infrastructure has already reached its capacity limits, particularly the M4.

As in the South East LDZ, the Government forecasts housing development to grow, which will be boosted by the fact that money raised from the Right to Buy scheme for council houses will be used to build replacement houses. It is not clear how this will impact the number of new homes given that the substantial discounts being offered to potential buyers will reduce the revenue. Also constraints on development and infrastructure could further dilute the growth in new housing.

[5] http://www.ons.gov.uk/ons/dcp171778_373655.pdf

4 Forecasting Methodology

4.1 Annual Demand; General Assumptions

The starting point for production of the full set of demand forecasts is the annual average demand. The following general assumptions were used to assist in the development of the annual forecasts;

- All forecasts are seasonal normal demands calculated using the latest Seasonal Normal Composite Weather Variable basis [known as EP2]
- Historic annual demand data is provided on the same basis and daily demand data is available broken down by load band
- SIU demand and Borders are not incorporated into the Scotland LDZ numbers
- Shrinkage was forecast on a fixed daily basis irrespective of demand levels to be consistent with UNC
- Retail gas price forecasts that are used as part of the demand modelling process
- Load band 0-73 MWh is assumed to consist predominantly of households and that the behaviour patterns are linked to household behaviour
- Load band 73 to 732 MWh is considered to be predominantly small commercial/retail premises with some small industrial.
- The load bands >732 MWh and Interruptibles will be predominantly industrial and commercial premises and therefore exhibit behaviour related to these types of load

4.2 General Methodology

We have refined the forecasting models for the different load bands over a number of years. The underlying principle is that the models make specific linkages between the load bands and traditional market categories like households and industrial and commercial customers. These models are tailored specifically to each LDZ although the underlying approach is the same across the whole of our networks.

An important factor affecting recent demand levels has been the variation in the price of gas over the last two years creating some uncertainty in energy costs for some customers. More recently there has been a steady loss of non-domestic customer numbers resulting in reduced demand, although there are some areas where growth is being seen. This may be partially a result of the fluctuations in the economy and gas prices. These fluctuations have been a fairly recent event and when combined with the effects of large scale public sector cutbacks we may see more fluctuations in the economy as the private sector attempts to fill the gaps left by the cutbacks, although there has now been a sustained level of economic growth in the short term.

The latest economic figures included in the graph below taken from ONS show a sustained, but slow recovery in the economy during 2013 with the latest figures showing an average growth in national GDP of 0.7% across the four quarters of 2013 and a total annual growth of 1.8%.

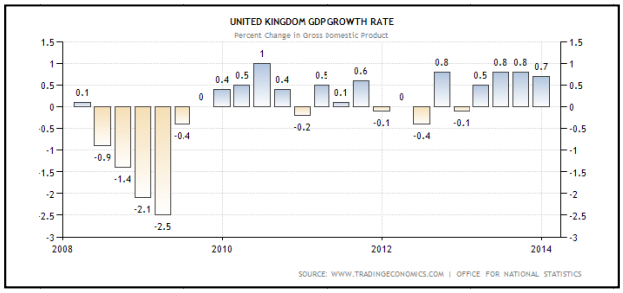


Figure 8 Change in UK GDP growth rate

There is still a little way to go to get to pre-recession levels but on the basis of the current trend it would be expected that the economy should continue to grow in 2014 and beyond, with the reservation that an impending election in 2015 could create uncertainty and a slower expansion in growth.

4.2.1 0 to 73MWh Annual Demand

The primary driver in this sector is still believed to be the behaviour of households. Annual demand growth has traditionally been driven by the number of houses that are being built and completed, the number that subsequently on completion are occupied and of that population how many of these occupied properties will be using gas.

Data was collected on all aspects of the housing market and regression analysis was carried out to establish if there is any need to amend the models from last year.

Average consumer gas bills have risen in 2013 and are expected to rise again in 2014.

To ensure that the methodology from last year is still appropriate the models were re-examined to test the validity of the current model.

It was concluded that the same model can be used as last year.

These models were refined for each LDZ, as customer behaviour proved to be materially different in each LDZ. We have developed a current retail gas price forecast specifically for the purposes of this process each year as an input.

4.2.2 73 to 732MWh Annual Demand

It has been assumed that this sector is generally influenced by energy prices and economic drivers. As a result of detailed evaluation of alternative econometric models, the best fit was achieved. We repeated the analysis this year with data from 2013. The following drivers were re-examined as part of this year's analysis.

- Current and real retail gas prices for this type and size of load
- Average non-domestic retail gas price
- GDP indices, actual GDP (seasonally adjusted) and GDP growth, regional GVA
- Manufacturing Output
- Consumption per unit of GDP
- Efficiency improvements
- Impact of renewables

4.2.3 >732MWh Annual Demand

This sector can be significantly affected by the behaviour at a small number of large loads and therefore the forecasts continue to be split into two elements. The Large Loads are forecast individually and separately from the rest of the market sector. The remaining demand is forecast as a whole.

4.3 Peak Demand Forecasts; General Assumptions

The traditional primary basis for calculating the peak day demand in any market is the relationship between average daily demand and peak day demand, typically known as the load factor, where

Peak Day Demand = Average Daily Demand divided by Load Factor.

The following assumptions were made when producing the 1 in 20 peak day demand;

- It is assumed that the modelling method results in no additional requirements for demand diversity analysis
- The use of 1 in 20 CWVs, provided by Xoserve to calculate the 1 in 20 peak day meets the requirements of the licence and UNC with respect to the specified methodology for determining 1 in 20 peak day demand
- No demand reduction will be allowed associated with demand management products offered by Shippers
- No allowance will be made to take account of any capacity buy-back contracts that may have been negotiated between SGN and its customers

4.3.1 LDZ Specific Assumptions

All the general assumptions are applied across all the LDZs and there were no specific assumptions that relate to the individual LDZs that were used in this analysis, unless the weather demand analysis suggests that this should be considered.

4.3.2 Methodology

Forecast base case peak day demands were calculated from projections of annual demands by using the following relationship:

Peak demand = (Annual demand/365)/load factor

The relationship was applied in each of a number of different market sectors, for which the load factor may be assumed to be constant over the forecast period. The following market sectors have been used as the starting point for the production of the base case peak day forecasts:

- NDM Firm 0 to 73.2MWh
- NDM Firm 73.2 to 732MWh
- NDM Firm >732MWh
- DM Firm Consumption

Load factors for each market sector were estimated from historical daily demand and other data sources.

5 Forecasts

5.1 Forecast Demands

This section provides an overview of our latest annual and peak gas demand forecasts through to 2023/24. A more detailed view can be found in Appendix 2, which includes the forecasts for both annual and peak demand on a year-by-year and LDZ basis. These forecasts have been developed around the Uniform Network Code load band categories and relate only to gas that is transported through SGN systems.

5.1.2 Growth in Annual Gas Demand Forecast (2014–23)

	SGN	Scotland	Southern
Demand Growth	-5.55%	-5.17%	-5.76%

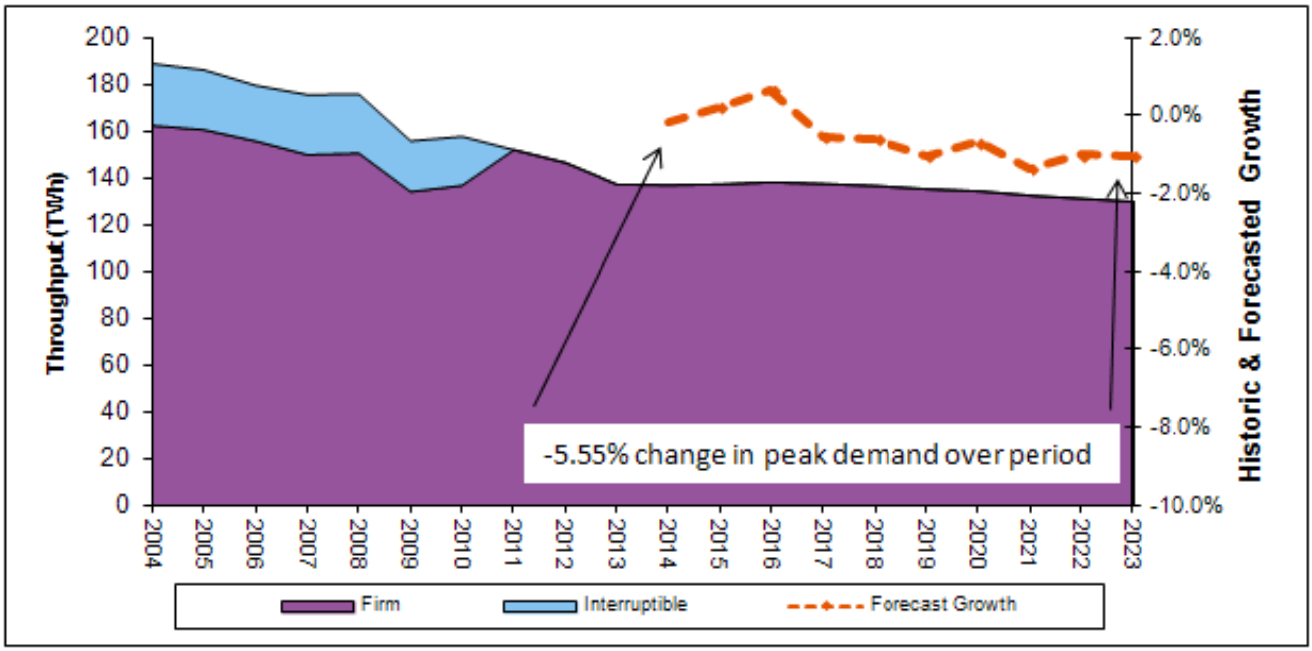
Table 3; Change in Annual Demand over period

5.1.3 Annual Demand

The graph below shows historical gas demand growth and the forecast going forward. Note specifically the sudden demand reduction in historical demand in 2009 followed by a minor recovery in 2010 and then further declines in 2011, 2012 and 2013. There are two sets of information on the same graph with the throughput on the left axis and the growth on the right axis.

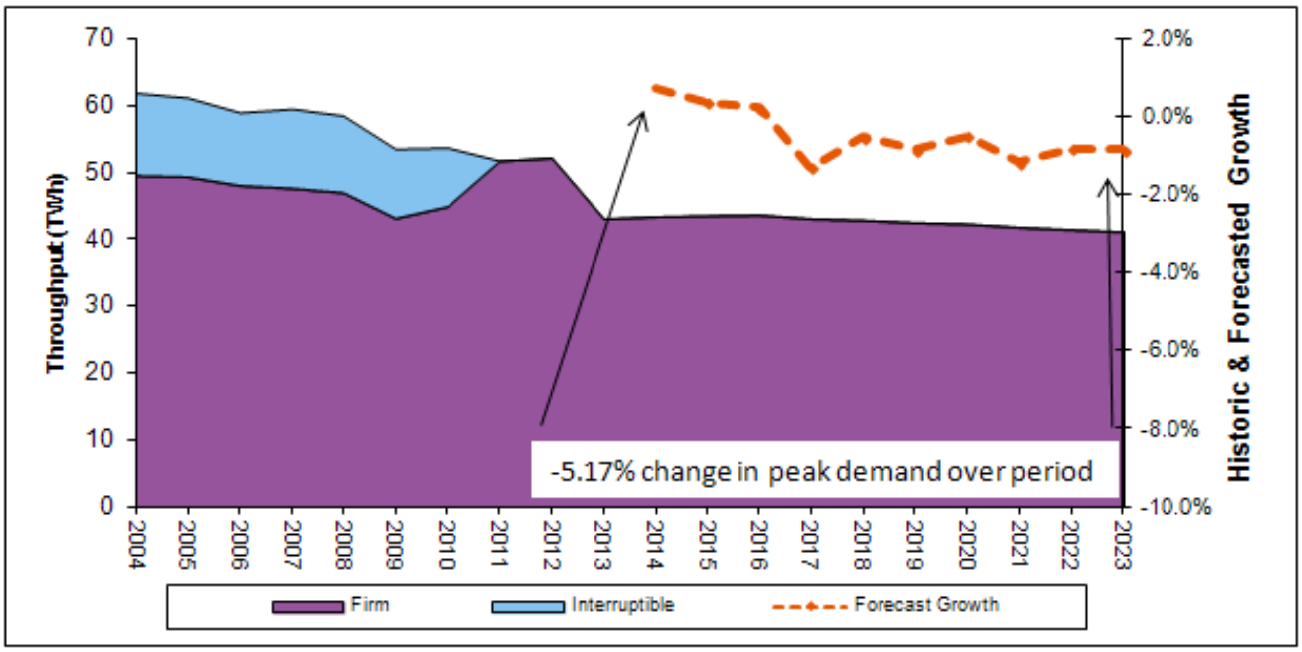
It is important to realise that while we forecast an overall decrease of during the period, this does not infer a year on year decrease of the same magnitude. Specifically we actually forecast small increases in demand in 2016-17 driven by economic recovery. This is then followed by a period of annual demand decreasing driven by efficiency measures, renewable technology and UK Government policy.

FIGURE 5.1.3A – Historic Demand and Forecast Growth of Annual Gas Demand for SGN



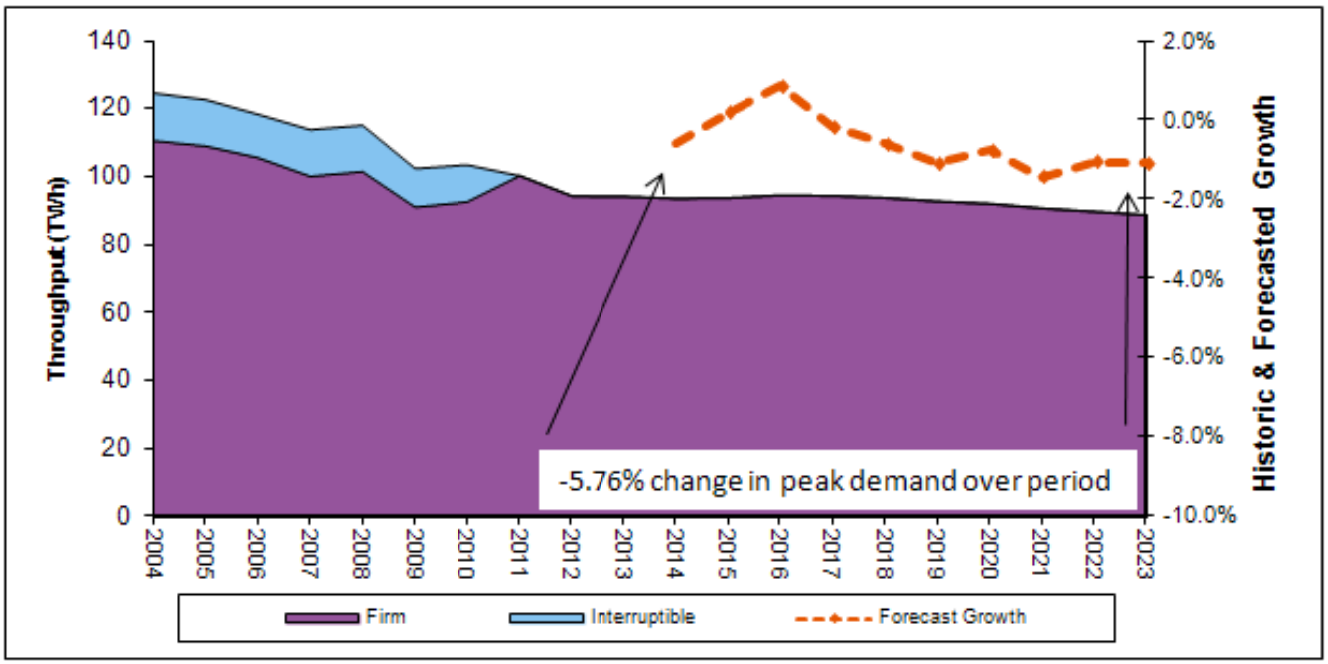
- Shaded areas are measured on the left hand side and represent throughput
- Forecast growth is measured on the right hand side as a line
- It is assumed that in the period 2016-17 there is a small increase in demands associated with economic recovery as shown in the forecast growth
- It is assumed that the UK Government will meet its 2020 carbon target hence from the period 2016-22 there is a decrease in demands associated with increased energy efficiency measures and the uptake of renewable technology

FIGURE 5.1.3B – Historic Demand and Forecast Growth of Annual Gas Demand for Scotland Gas Networks



- See graph above for commentary

FIGURE 5.1.3C – Historic Demand and Forecast Growth of Annual Gas Demand for Southern Gas Network



- See graph above for comments

5.2 Growth in Peak Demand Forecast (2013-14 to 2023-24)

	SGN	Scotland	Southern
Peak Demand Growth	-5.81%	-2.97%	-6.99%

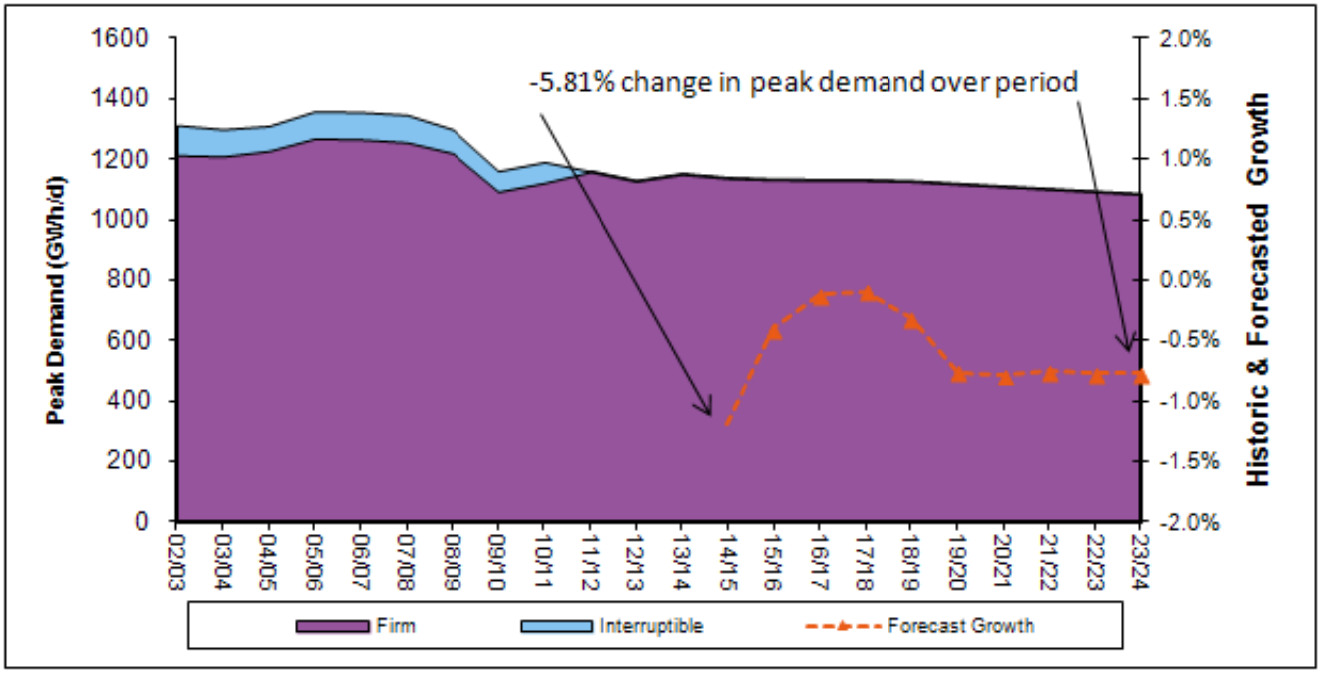
Table 4; Change in Peak demand

5.2.1 Peak Demand

The following graphs show the equivalent view for peak demand, the key driver for investment in SGN. Note specifically the decline in 2009 followed by a minor recovery in 2010 and then further declines in 2011, 2012 and 2013.

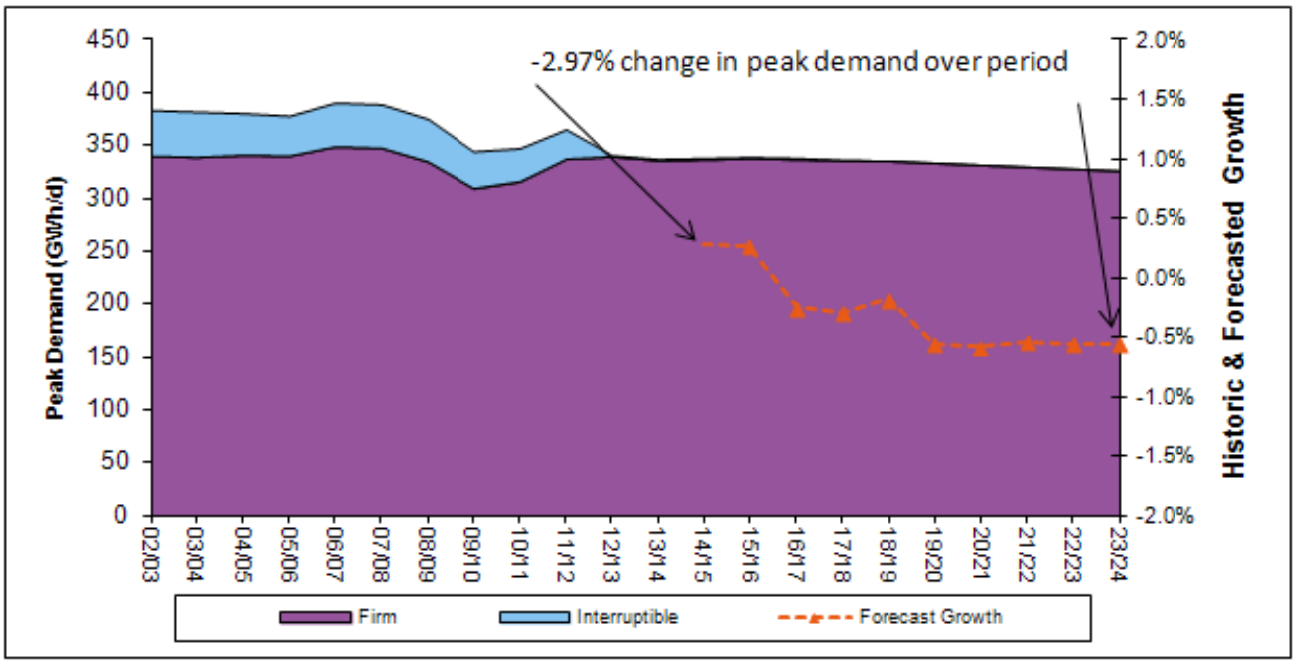
There are two sets of information on the same graph with the throughput on the left axis and the growth on the right axis. As pointed out in the previous section it is important to highlight there is a distinction between the decrease during the ten year period and the year-on-year values depicted in the graphs below. Specifically we assume again a small increase in 2016-17 driven by economic recovery followed by a decrease driven by energy efficiency measures and renewable technology.

FIGURE 5.2.1A – Historic Demand and Forecast Growth of Peak Gas Demand for SGN



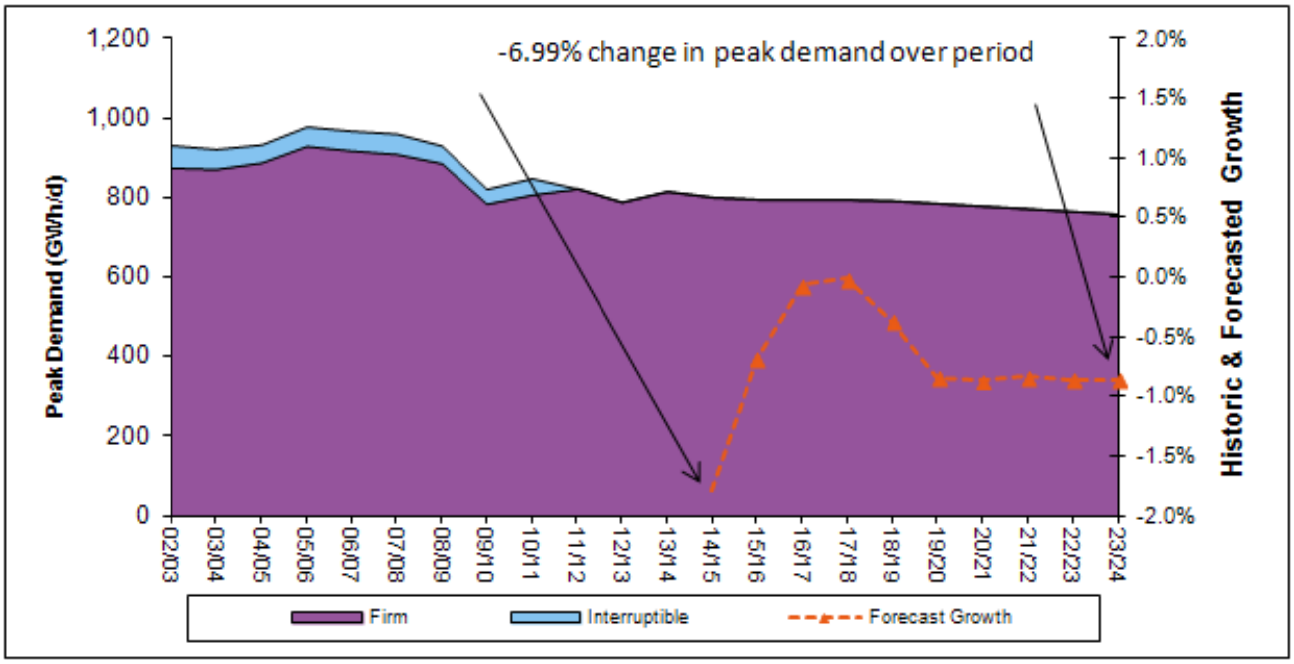
- Shaded areas are measured on the left hand side and represent throughput
- Forecast growth is measured on the right hand side
- It is assumed that in 2016-17 there is a small increase in demands associated with economic recovery
- It is assumed that the UK Government will meet its 2020 renewable target hence from the period 2017-24 there is a decrease in demands associated with increased energy efficiency measures and the uptake of renewable technology

FIGURE 5.2.1B – Historic Demand and Forecast Growth of Peak Gas Demand for Scotland Gas Network



See previous graph for commentary

FIGURE 5.2.1C – Historic Demand and Forecast Growth of Peak Gas Demand for Southern Gas Network



- See previous graph for commentary

5.3 Forecast Comparisons

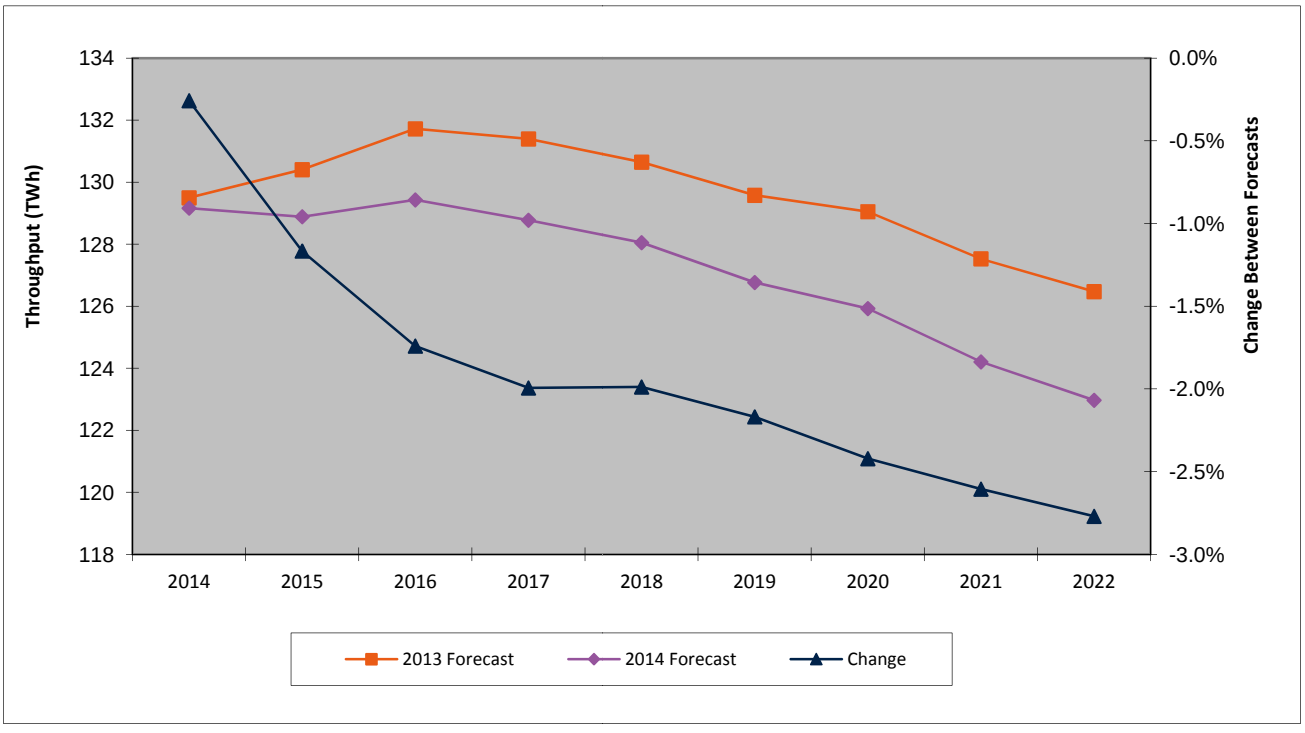
The following charts provide a comparison of the current forecasts with those that were produced in 2013.The latest annual demand forecasts are lower over the period of the plan than last year's.

There is a reduction in certain sectors as a result of higher gas price forecasts, countered partially by marginally better economic recovery than expected and slightly higher levels of housing growth. There is forecast a modest decline in demands throughout the forthcoming forecast period.

Greater consumer awareness on environmental issues and their 'carbon footprint' also has an effect on the annual gas demands during the forecast period. Typical measures for domestic consumers include double glazing, loft insulation, cavity wall insulation and energy efficient boilers. Sustained higher levels of fuel price despite the reduction in the environmental levy and lower wholesale prices will affect all markets along with national and local government initiatives. Also the effect of UK and EU renewable energy targets such as "20 - 20 - 20 Targets" is important. This European Directive is to reduce the European Union's greenhouse gas emission by 20% below 1990 levels, ensure 20% of energy is generated from renewable sources and reduce primary energy use 20% by improving energy efficiency. These initiatives should have an impact on non-domestic and domestic demand as gas is used more efficiently and have a positive impact as new types of business are created to cope with emerging industrial opportunities. Indeed at the time of publication, October 2014, EU leaders have agreed in principle further reductions beyond 2020.

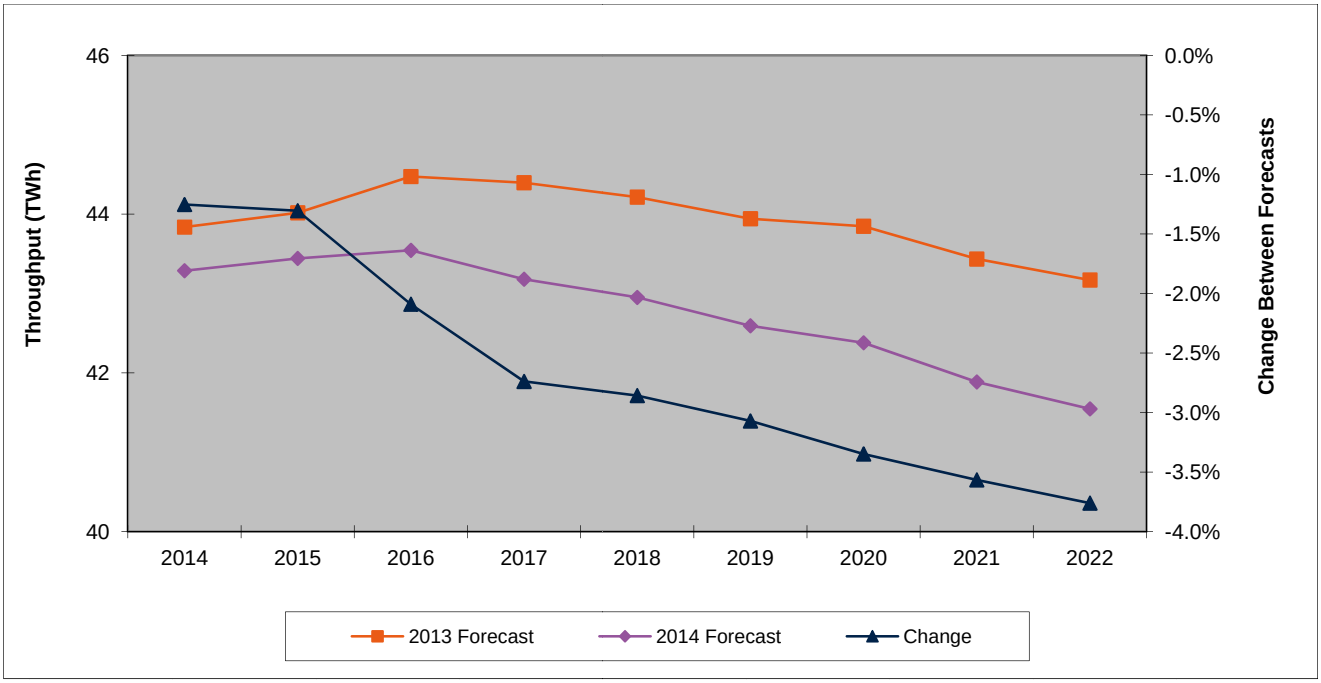
This could have a substantial impact on consumption year to year or may not materialise in the near or possibly even mid-term future.

FIGURE 5.3A – Comparison of Total Firm and Interruptible Annual Demand Forecasts – SGN



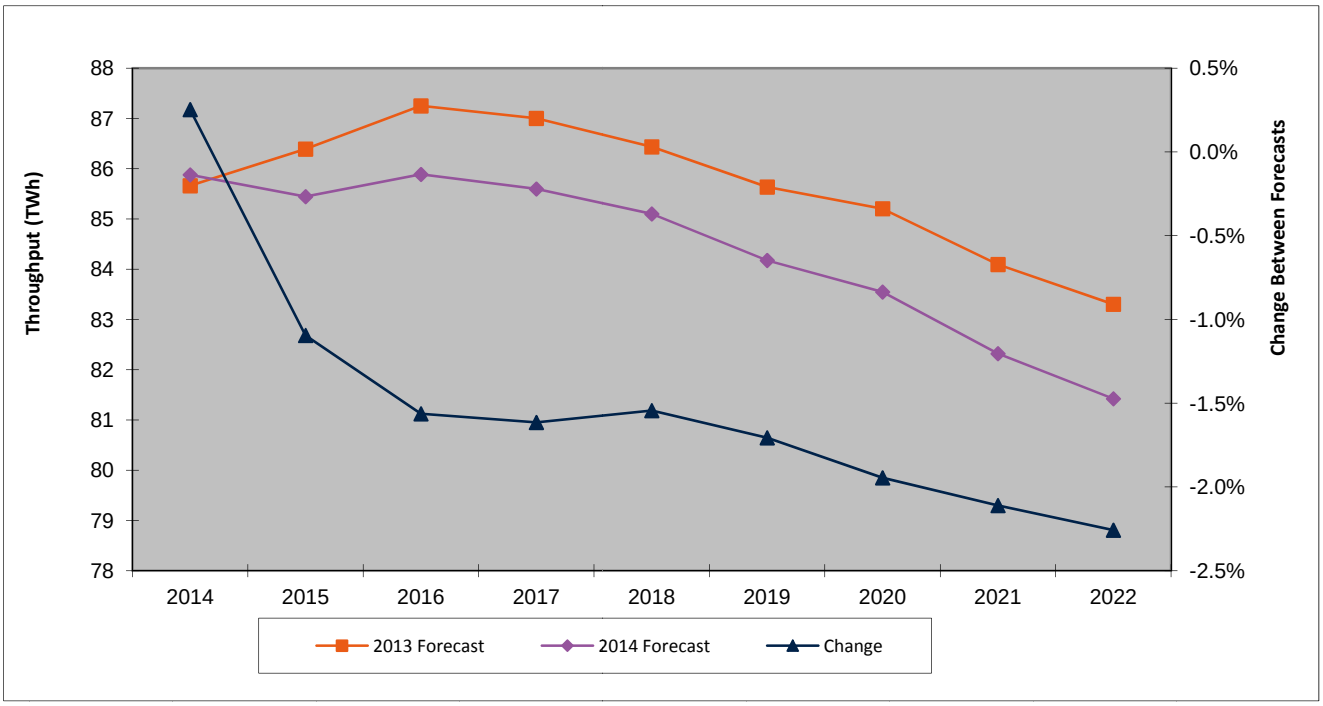
- 2013 and 2014 forecasts are measured on the left hand side
- The change between years' forecast demands are measured on the right hand side so on the above example a decrease in demand in 2022 from 126TWh to 123TWh is a decrease of 2.8%

FIGURE 5.3A1 – Comparison of Firm and Interruptible Annual Demand Forecasts – Scotland Gas Network



- 2013 and 2014 forecasts are measured on the left hand side
- The percentage change between years' forecasts is measured on the right hand side

FIGURE 5.3A2 – Comparison of Firm & Interruptible Annual Demand Forecasts – Southern Gas Network



- 2013 and 2014 forecasts are measured on the left hand side
- The percentage change between years' forecasts is measured on the right hand side

6 Annual Demand

TABLE 6.1 – Forecast Annual Demand – SGN Load Categories (TWh)

Calendar Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
0 - 73.2 MWh	90.1	89.3	88.3	88.3	87.8	87.6	86.9	86.5	85.3	84.5	83.7
73.2 - 732 MWh	12.5	12.3	12.1	12.1	11.8	11.6	11.4	11.2	11.0	10.8	10.6
732 - 2196 MWh	6.7	6.6	6.6	6.7	6.6	6.5	6.4	6.4	6.3	6.2	6.2
2196 - 5860 MWh	4.5	4.5	4.5	4.5	4.5	4.4	4.4	4.4	4.3	4.3	4.2
Total Small User	113.8	112.7	111.6	111.6	110.7	110.2	109.1	108.4	106.9	105.8	104.7
Firm >5860 MWh	7.3	7.3	7.3	7.3	7.2	7.1	7.0	7.0	6.9	6.8	6.8
DM Firm Consumption	23.4	24.0	25.3	26.3	26.8	26.6	26.3	26.0	25.7	25.5	25.2
DM Interruptible	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Large User	30.9	31.5	32.8	33.8	34.0	33.7	33.3	33.0	32.6	32.3	32.0
Total LDZ	144.7	144.2	144.4	145.4	144.8	143.9	142.4	141.4	139.5	138.1	136.7
Firm Shrinkage	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Shrinkage	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Throughput	145.6	145.0	145.2	146.2	145.6	144.7	143.2	142.2	140.3	138.9	137.5
Gas Supply Year	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
Total Throughput	145.1	145.3	146.1	145.7	145.0	143.7	142.7	140.7	139.3	137.9	137.1
Total Firm Demand	145.4	144.8	145.0	146.0	145.6	144.7	143.2	142.2	140.3	138.9	137.5
Total Interruptible Demand	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 6.2 – Forecast Annual Demand – Scotland Gas Networks Load Categories (TWh)

Calendar Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
0 - 73.2 MWh	28.9	29.4	29.6	29.6	29.4	29.3	29.1	29.0	28.7	28.5	28.3
73.2 - 732 MWh	4.3	4.3	4.2	4.3	4.2	4.2	4.1	4.1	4.0	4.0	3.9
732 - 2196 MWh	2.6	2.5	2.5	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.4
2196 - 5860 MWh	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7
Total Small User	37.6	38.0	38.2	38.3	37.9	37.8	37.5	37.3	36.9	36.6	36.3
Firm >5860 MWh	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.2	3.2	3.2
DM Firm Consumption	9.5	9.1	9.0	9.1	9.2	9.1	9.0	8.9	8.8	8.7	8.6
DM Interruptible	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Large User	13.1	12.7	12.6	12.7	12.6	12.4	12.3	12.2	12.0	11.9	11.8
Total LDZ	50.7	50.7	50.8	50.9	50.5	50.2	49.8	49.5	48.9	48.5	48.1
Firm Shrinkage	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Shrinkage	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Throughput	51.0	50.9	51.0	51.2	50.8	50.4	50.0	49.7	49.1	48.7	48.3
Gas Supply Year	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
Total Throughput	51.0	51.0	51.2	50.8	50.5	50.1	49.9	49.3	48.9	48.4	48.2
Total Firm Demand	50.8	50.7	50.8	51.0	50.8	50.4	50.0	49.7	49.1	48.7	48.3
Total Interruptible Demand	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 6.3a – Forecast Annual Demand – South Eastern LDZ Load Categories (TWh)

Calendar Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
0 - 73.2 MWh	37.6	36.8	36.1	36.0	35.8	35.7	35.4	35.2	34.7	34.3	34.0
73.2 - 732 MWh	4.8	4.7	4.6	4.6	4.5	4.4	4.3	4.2	4.0	3.9	3.8
732 - 2196 MWh	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1
2196 - 5860 MWh	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4
Total Small User	46.2	45.2	44.4	44.4	44.0	43.7	43.3	42.9	42.3	41.8	41.3
Firm >5860 MWh	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6
DM Firm Consumption	7.5	8.4	9.8	10.7	11.2	11.1	11.0	10.9	10.7	10.6	10.5
DM Interruptible	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Large User	9.2	10.1	11.5	12.4	12.8	12.8	12.6	12.5	12.4	12.2	12.1
Total LDZ	55.4	55.3	56.0	56.8	56.8	56.5	55.9	55.4	54.6	54.0	53.4
Firm Shrinkage	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Shrinkage	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Throughput	55.8	55.6	56.3	57.1	57.2	56.8	56.2	55.8	55.0	54.4	53.8
Gas Supply Year	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
Total Throughput	55.5	56.3	57.0	57.2	57.0	56.4	56.0	55.2	54.6	54.0	53.6
Total Firm Demand	55.8	55.6	56.3	57.1	57.2	56.8	56.2	55.8	55.0	54.4	53.8
Total Interruptible Demand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 6.3b – Forecast Annual Demand – South LDZ Load Categories (TWh)

Calendar Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
0 - 73.2 MWh	23.6	23.1	22.7	22.6	22.6	22.6	22.4	22.2	21.9	21.7	21.5
73.2 - 732 MWh	3.4	3.3	3.2	3.2	3.2	3.1	3.0	3.0	2.9	2.9	2.8
732 - 2196 MWh	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.7	1.7
2196 - 5860 MWh	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1
Total Small User	30.1	29.5	29.0	28.9	28.8	28.7	28.4	28.2	27.7	27.4	27.1
Firm >5860 MWh	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0
DM Firm Consumption	6.4	6.5	6.5	6.5	6.5	6.4	6.3	6.3	6.2	6.1	6.1
DM Interruptible	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Large User	8.5	8.7	8.7	8.7	8.6	8.5	8.4	8.3	8.2	8.1	8.1
Total LDZ	38.6	38.2	37.7	37.6	37.4	37.2	36.8	36.5	36.0	35.6	35.2
Firm Shrinkage	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Shrinkage	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Throughput	38.9	38.4	37.9	37.9	37.6	37.4	37.0	36.7	36.2	35.8	35.4
Gas Supply Year	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
Total Throughput	38.6	38.1	37.9	37.7	37.5	37.1	36.9	36.3	35.9	35.5	35.3
Total Firm Demand	38.9	38.4	37.9	37.9	37.6	37.4	37.0	36.7	36.2	35.8	35.4
Total Interruptible Demand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7 Peak Demand

TABLE 7.1 – Forecast 1 in 20 Peak Day Firm Demand (GWh per day)

LDZ	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
Scotland	337	337	338	337	337	336	334	332	330	328	327
South East	471	462	459	461	460	458	454	450	446	442	438
South	346	340	337	335	336	335	332	330	327	324	322
SGN	**1,153**	**1,139**	**1,135**	**1,133**	**1,132**	**1,129**	**1,120**	**1,111**	**1,103**	**1,095**	**1,086**

TABLE 7.2 – Forecast 1 in 20 Peak Day Firm Demand SGN (GWh/day)

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
0 - 73.2 MWh	807.9	797.3	792.0	789.0	789.4	788.8	783.2	777.4	771.6	765.7	759.8
73.2 - 732 MWh	105.7	103.9	103	1-2.3	101.3	99.9	98.5	97.2	95.9	94.6	93.3
732 - 2196 MWh	53.6	53.6	53.6	53.5	53.3	52.9	52.6	52.2	51.9	51.6	51.4
2196 - 5860 MWh	32.5	32.5	32.4	32.4	32.3	32.1	31.8	31.6	31.5	31.3	31.1
> 5860 MWh	42.5	42.5	42.4	42.4	42.2	42.0	41.7	41.4	41.2	41.0	40.7
Total NDM Consumption	1042.3	1029.7	1023.3	1019.6	1018.4	1015.6	1007.8	999.8	992.1	984.1	976.3
DM Firm Consumption	107.8	106.7	108.5	110.8	111.7	111.0	110.2	109.5	108.9	108.2	107.6
Total Firm Consumption	1150.1	1136.4	1131.8	1130.4	1130.2	1126.6	1118.0	1109.3	1100.9	1092.4	1083.9
Firm Shrinkage	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Total Firm Demand	1152.3	1138.6	1134.0	1132.6	1132.4	1128.8	1120.3	1111.5	1103.2	1094.6	1086.1
DM Interruptible Consumption	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	26.9
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Interruptible Demand	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	26.9
Total DM Consumption	108.7	107.5	109.3	111.6	111.7	111.0	110.2	109.5	108.9	108.2	134.5
Total Shrinkage	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Total LDZ Demand	1153.2	1139.4	1134.8	1133.5	1132.4	1128.8	1120.3	1111.5	1103.2	1094.6	1086.1

TABLE 7.3 – Forecast 1 in 20 Peak Day Firm Demand Scotland Gas Networks (GWh/day)

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
0 - 73.2 MWh	221.5	223.4	224.1	223.2	222.7	222.8	221.6	220.4	219.2	217.9	216.7
73.2 - 732 MWh	31.8	31.6	31.6	31.6	31.4	31.2	31.0	30.7	30.5	30.3	30.1
732 - 2196 MWh	18.5	18.5	18.4	18.4	18.4	18.2	18.1	18.0	17.9	17.8	17.8
2196 - 5860 MWh	12.2	12.2	12.2	12.2	12.1	12.1	12.0	11.9	11.8	11.8	11.7
> 5860 MWh	17.6	17.6	17.6	17.6	17.5	17.4	17.3	17.2	17.1	17.0	17.0
Total NDM Consumption	301.6	303.3	303.9	303.0	302.1	301.7	300.0	298.3	296.7	295.0	293.3
DM Firm Consumption	33.5	32.7	32.9	33.0	33.7	33.5	33.3	33.1	33.0	32.8	32.6
Total Firm Consumption	335.1	336.0	336.9	336.0	335.9	335.3	333.4	331.4	329.6	327.8	325.9
Firm Shrinkage	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Firm Demand	335.7	336.6	337.5	336.7	336.5	335.9	334.0	332.1	330.3	328.4	326.5
DM Interruptible Consumption	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	26.9
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Interruptible Demand	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	26.9
Total DM Consumption	34.3	33.5	33.8	33.9	33.7	33.5	33.3	33.1	33.0	32.8	59.6
Total Shrinkage	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total LDZ Demand	336.5	337.4	338.3	337.5	336.5	335.9	334.0	332.1	330.3	328.4	326.5

TABLE 7.4a – Forecast 1 in 20 Peak Day Firm Demand South East LDZ (GWh/day)

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
0 - 73.2 MWh	346.2	338.6	334.9	334.3	333.8	333.3	330.6	327.9	325.2	322.4	319.7
73.2 - 732 MWh	42.4	41.5	41.0	40.6	40.0	39.3	38.6	37.9	37.2	36.5	35.9
732 - 2196 MWh	18.0	18.0	18.0	18.0	17.9	17.8	17.7	17.5	17.4	17.3	17.2
2196 - 5860 MWh	10.4	10.4	10.4	10.4	10.3	10.3	10.2	10.1	10.0	10.0	9.9
> 5860 MWh	9.8	9.8	9.8	9.8	9.8	9.7	9.6	9.6	9.5	9.4	9.4
Total NDM Consumption	426.9	418.4	414.1	413.0	411.9	410.3	406.7	403.0	399.4	395.7	392.1
DM Firm Consumption	43.2	42.7	44.3	46.5	46.9	46.6	46.2	45.9	45.6	45.3	45.0
Total Firm Consumption	470.1	461.0	458.4	459.6	458.8	456.9	452.9	448.8	445.0	441.0	437.1
Firm Shrinkage	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total Firm Demand	471.0	462.0	459.3	460.5	459.7	457.8	453.8	449.8	445.9	442.0	438.0
DM Interruptible Consumption	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Interruptible Demand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total DM Consumption	43.2	42.7	44.3	46.5	46.9	46.6	46.2	45.9	45.6	45.3	45.0
Total Shrinkage	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total LDZ Demand	471.0	462.0	459.3	460.5	459.7	457.8	453.8	449.8	445.9	442.0	438.0

TABLE 7.4b – Forecast 1 in 20 Peak Day Firm Demand South LDZ (GWh/day)

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
0 - 73.2 MWh	807.9	797.3	792.0	789.0	789.4	788.8	783.2	777.4	771.6	765.7	759.8
73.2 - 732 MWh	105.7	103.9	103.0	102.3	101.3	99.9	98.5	97.2	95.9	94.6	93.3
732 - 2196 MWh	53.6	53.6	53.6	53.5	53.3	52.9	52.6	52.2	51.9	51.6	51.4
2196 - 5860 MWh	32.5	32.5	32.4	32.4	32.3	32.1	31.8	31.6	31.5	31.3	31.1
> 5860 MWh	42.5	42.5	42.4	42.4	42.2	42.0	41.7	41.4	41.2	41.0	40.7
Total NDM Consumption	1042.3	1029.7	1023.3	1019.6	1018.4	1015.6	1007.8	999.8	992.1	984.1	976.3
DM Firm Consumption	107.8	106.7	108.5	110.8	111.7	111.0	110.2	109.5	108.9	108.2	107.6
Total Firm Consumption	1150.1	1136.4	1131.8	1130.4	1130.2	1126.6	1118.0	1109.3	1100.9	1092.4	1083.9
Firm Shrinkage	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Total Firm Demand	1152.3	1138.6	1134.0	1132.6	1132.4	1128.8	1120.3	1111.5	1103.2	1094.6	1086.1
DM Interruptible Consumption	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	26.9
Interruptible Shrinkage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Interruptible Demand	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	26.9
Total DM Consumption	108.7	107.5	109.3	111.6	111.7	111.0	110.2	109.5	108.9	108.2	134.5
Total Shrinkage	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Total LDZ Demand	1153.2	1139.4	1134.8	1133.5	1132.4	1128.8	1120.3	1111.5	1103.2	1094.6	1086.1

8 Actual Flows

This appendix describes annual and peak flows during the calendar year 2013

8.1 Annual Flows

Forecasts of annual demand are based on average weather conditions. Therefore, when comparing actual demand with forecasts, demand must be adjusted to take account of the difference between actual weather conditions and seasonal normal weather. The result of this adjustment is the weather corrected demand.

Recent winters have included some of the warmest of any in the weather data history employed for demand modelling, dating back to 1928-29. Consequently the basis of the average weather condition used for demand forecasting purposes has been adjusted to better reflect these conditions. Anecdotal evidence to the contrary is based on specific days or weeks and not the entire winter period. As a result of this, the 2013 weather corrected annual demands and forecasts are based on the industry's current view based on research in cooperation with the Hadley Centre, which is part of the Met Office.

Tables 8.1A to 8.1D provides a comparison of actual and weather corrected demands during the 2013 calendar year with the forecasts presented in the 2013 LTDS. Annual demands are presented in the format of LDZ load bands/categories, consistent with the basis of system design and operation.

TABLE 8.1A – Annual Demand for 2013 (TWh) – SGN

	Actual Demand	Weather Corrected Demand	2013 LTDS Forecast Demand
0 - 73.2MWh	98.9	90.0	90.1
73 - 5860MWh	25.6	23.7	47.3
>5860MWh Firm	31.5	31.0	7.3
Total LDZs	156.0	144.8	144.7
Shrinkage	0.8	0.8	0.8
Total Throughput	156.8	145.6	145.7

Notes: Figures may not sum exactly due to rounding.

TABLE 8.1B – Annual Demand for 2013 (TWh) – Scotland LDZ

	Actual Demand	Weather Corrected Demand	2013 LTDS Forecast Demand
0 - 73.2MWh	31.2	29.1	28.9
73 - 5860MWh	9.3	8.7	18.4
>5860MWh Firm	13.2	13.2	3.4
Total LDZs	53.7	51.0	50.7
Shrinkage	0.2	0.2	0.2
Total Throughput	53.9	51.2	51

Notes: Figures may not sum exactly due to rounding.

TABLE 8.1C – Annual Demand for 2013 (TWh) – South East LDZ

	Actual Demand	Weather Corrected Demand	2013 LTDS Forecast Demand
0 - 73.2MWh	41.5	37.5	37.6
73 - 5860MWh	9.3	8.5	16
>5860MWh Firm	9.4	9.3	1.7
Total LDZs	60.2	55.3	55.3
Shrinkage	0.4	0.4	0.4
Total Throughput	60.6	55.7	55.8

Notes: Figures may not sum exactly due to rounding.

TABLE 8.1D – Annual Demand for 2013 (TWh) – South LDZ

	Actual Demand	Weather Corrected Demand	2013 LTDS Forecast Demand
0 - 73.2MWh	26.1	23.5	23.6
73 - 5860MWh	7.0	6.5	12.9
>5860MWh Firm	8.8	8.6	2.2
Total LDZs	42.0	38.5	38.7
Shrinkage	0.2	0.2	0.2
Total Throughput	42.2	38.7	38.9

Notes: Figures may not sum exactly due to rounding.

8.2 LDZ Winter Severity Statistics

TABLE 8.2 - SGN 6 month Winter Severities per LDZ

LDZ	1 in N
Scotland	1 in 12, warm
South East	1 in 26, warm
South	1 in 35, warm
National	1 in 34, warm

Notes: Sourced from the May 2014 National Grid report on winter severity statistics 2013/2014. Despite periods of high rainfall this was the fifth warmest winter on record since 1928/29.

8.3 Peak & Minimum Flows

8.3.1 Maximum and Peak Day Flows

Table 8.3 below shows actual flows for each individual LDZ on the maximum demand day for gas year 2013/14 compared to the forecast peak flows.

TABLE 8.3A – Actual Flows on the Maximum Demand Day of Gas Year 2013/14

LDZ	Maximum Day 2013/2014	1 in 20 Forecast Peak for 2013/14 (% of peak)
Scotland	21.90mscmd (12th February 2014)	32.23mscmd (67.9%)
South East	25.97mscmd (20th November 2013)	42.25mscmd (61.5%)
South	18.27mscmd (30th January 2014)	31.65mscmd (57.7%)

8.3.2 Minimum Day Flows

TABLE 8.3B – Actual Flows on the Minimum Demand Day of Gas Year 2013/14

LDZ	Minimum Day 2013/14
Scotland	3.92mscmd (26th July 2014)
South East	4.25mscmd (23rd July 2014)
South	2.91mscmd (30th July 2014)

9 Gas Transportation System

Appendix 4 consists of diagrams of the general arrangement of the major pipelines and associated assets we operate. Please note that there is not a specific scale in use due to the differences in size between the areas covered by the differing LDZ. However the names of towns and cities are included as a means of reference. In addition we have published larger, more legible versions of the same schematics on our website which are intended to be printed at A3 size.

Should you require further information on the location of our assets please contact our plant control department at plant.location@sgn.co.uk

9.1 Scotland LDZ Schematic

IMAGE REDACTED - PLEASE REFER TO
https://www.linesearchbeforeudig.co.uk
FOR ANY PLANT LOCATION INFORMATION

9.2 South East LDZ Schematic

IMAGE REDACTED - PLEASE REFER TO
https://www.linesearchbeforeudig.co.uk
FOR ANY PLANT LOCATION INFORMATION

9.3 South LDZ Schematic

IMAGE REDACTED - PLEASE REFER TO
https://www.linesearchbeforeudig.co.uk
FOR ANY PLANT LOCATION INFORMATION

10 Glossary

Annual Quantity (AQ)

The AQ of a supply point is its annual consumption over a 365 or 366-day year, under conditions of average weather.

Bar

The unit of pressure that is approximately equal to atmospheric pressure (0.987 standard atmospheres). Where bar is suffixed with the letter g, such as in barg or mbarg, the pressure being referred to is gauge pressure, i.e. relative to atmospheric pressure. One-millibar (mbarg) equals 0.001 bar.

Biomethane

Biogas that has been cleaned in order to meet GSMR requirements.

Bioplant

Plant that will process biogas or gas produced by any alternative methods in biomethane. This can involve removal of sulphur content, reduction in oxygen or any other content which will otherwise make the gas unsuitable for injection into the gas networks owned by us.

BRIC

Brazil, Russia, India and China. Generic term for major emerging economies especially these four countries.

Calorific Value (CV)

The ratio of energy to volume measured in Mega joules per cubic meter (MJ/m3), which for a gas is measured and expressed under standard conditions of temperature and pressure.

Climate Change Levy (CCL)

Government tax on the use of energy within industry, commerce and the public sector in order to encourage energy efficient schemes and use of renewable energy sources. CCL is part of the UK Government's Climate Change Programme (CCP).

Connected System Exit Point (CSEP)

A connection to a more complex facility than a single supply point. For example a connection to a pipeline system operated by another Gas Transporter.

Cubic Metre (m3)

The unit of volume, expressed under standard conditions of temperature and pressure, approximately equal to 35.37 cubic feet. One million cubic metres (mcm) are equal to 10^6 cubic metres, one billion cubic metres (bcm) equals 10^9 cubic metres.

Daily Metered Supply Point

A supply point fitted with equipment, for example a data-logger, which enables meter readings to be taken on a daily basis. These are further classified as SDMC, DMA, DMC or VLDMC according to annual consumption. Of these the most relevant is VLDMC which is defined further on.

Distribution Network (DN)

An administrative unit responsible for the operation and maintenance of the local transmission system (LTS) and <7barg distribution network's within a defined geographical boundary, supported by a National Emergency Services organisation.

Distribution System

A network of mains operating at three pressure tiers: intermediate (7 to 2barg), medium (2barg to 75mbarg) and low (less than 75mbarg).

Diurnal Storage

Gas stored for the purpose of meeting within day variations in demand. Gas can be stored in special

installations, such as gasholders, or in the form of linepack within transmission, i.e. >7barg pipeline systems.

DECC

Department of Energy and Climate Change

Embedded Entry Points

Entry point which is not an offtake from NTS. Can be a biomethane or other unconventional source of gas.

Exit Zone

A geographical area within an LDZ, that consists of a group of supply points, that on a peak day, receive gas from the same NTS Offtake.

Formula Year

A twelve-month period commencing 1 April predominantly used for regulatory and financial purposes.

Future Energy Scenarios (FES)

National Grid's annual industry-wide consultation process encompassing the Ten Year Statement, targeted questionnaires, individual company and industry meetings, feedback on responses and investment scenarios. Previously called Transporting Britain's Energy.

Gas Transporter (GT)

Formerly Public Gas Transporter (PGT). GTs such as SGN, are licensed by the Gas and Electricity Markets Authority to transport gas to consumers.

Gasholder

A vessel used to store gas for the purposes of providing diurnal storage.

Gas Supply Year

A twelve-month period commencing 1 October also referred to as a Gas Year.

Gemini

A computer system which supports Uniform Network Code operations, including energy balancing.

Interconnector

This is a pipeline transporting gas from or to another country.

Interruptible Supply Point

A supply point that offers lower transportation charges where SGN can interrupt the flow of gas to the supply point and that is prepared to be interrupted if the Transporter needs it to.

Kilowatt hour (kWh)

A unit of energy used by the gas industry. Approximately equal to 0.0341 therms. One Megawatt hour (MWh) equals 10^3 kWh, one Gigawatt hour (GWh) equals 10^6 kWh and one Terawatt hour (TWh) equals 10^9 kWh.

Linepack

The usable volume of compressed gas within the National or Local Transmission System at any time.

Liquefied Natural Gas (LNG)

Gas stored in liquid form. Can be firm or constrained (CLNG). Shippers who book a constrained service agree to allow us to use some of their gas to balance the system.

Load Duration Curve (Average)

The average load duration curve is that curve which, in a long series of winters, with connected load held at the levels appropriate to the year in question, the average volume of demand above any given threshold, is represented by the area under the curve and above the threshold.

Local Distribution Zone (LDZ)

A geographic area supplied by one or more NTS

offtakes. Consists of High Pressure (>7 barg) and lower pressure distribution system pipelines.

Local Transmission System (LTS)

A pipeline system operating at >7barg, that transports gas from NTS offtakes to distribution systems. Some large users may take their gas direct from the LTS.

National Balancing Point (NBP)

An imaginary point on the UK gas supply system through which all gas passes for accounting and balancing purposes

National Transmission System (NTS)

A high-pressure system consisting of terminals, compressor stations, pipeline systems and offtakes. Designed to operate at pressures up to 85barg. NTS pipelines transport gas from terminals to NTS offtakes.

National Transmission System Offtake

An installation defining the boundary between NTS and LTS or a very large consumer. The offtake installation includes equipment for metering, pressure regulation, etc.

Non-Daily Metered (NDM)

A meter that is read monthly or at longer intervals. For the purposes of daily balancing, the consumption is apportioned using an agreed formula, and for supply points consuming more than 73.2MWh pa reconciled individually when the meter is read.

Odorisation

The process by which the distinctive odour is added to gas supplies to make it easier to detect leaks. Odorisation is provided at all Network Entry points.

Office of Gas and Electricity Markets (Ofgem)

The regulatory agency responsible for regulating the UK's gas and electricity markets.

Offtake

An installation defining the boundary between NTS and LTS or a very large consumer. The offtake installation includes equipment for metering, pressure regulation, etc.

ONS

Office for National Statistics

Operating Margins

Gas used to maintain system pressures under certain circumstances, including periods immediately after a supply loss or demand forecast change, before other measures become effective and in the event of plant failure, such as pipe breaks and compressor trips.

OPN

Offtake Profile Notice. Method of notifying National Grid of the next day or future demand for gas at offtakes.

Peak Day Demand (1 in 20 Peak Demand)

The 1 in 20 peak day demand is the level of demand that, in a long series of winters, with connected load held at the levels appropriate to the winter in question, would be exceeded in one out of 20 winters, with each winter counted only once.

Price Control Review

Ofgem's periodic review of Transporter allowed returns The current period has been called RIIO and will cover April 2013 to March 2021.

PRI

Pressure Regulating Installation. The replacement term for PRS, district governor and all other local terms (such as STRS or TRS) when IGEM standard TD13 was introduced.

PRS

Pressure Regulating Station. an installation which reduces the supply pressure as gas passes either between different pressure rated tiers of the LTS or from the LTS to the below 7barg network or between different pressure tiers of the <7barg network.

Seasonal Normal Temperature (SNT)

Seasonal Normal Temperature is the average temperature that might be expected on any particular day, based on historical data.

Shipper or Network Code Registered User (System User)

A company with a Shipper Licence that is able to buy gas from a producer, sell it to a supplier and employ a GT to transport gas to consumers.

Shrinkage

Gas that is input to the system but is not delivered to consumers or injected into storage. It is either Own Use Gas or Unaccounted for Gas.

Supplier

A company with a Supplier's Licence contracts with a shipper to buy gas, which is then sold to consumers. A supplier may also be licensed as a shipper.

Supply Hourly Quantity (SHQ)

The maximum hourly consumption at a supply point.

Supply Offtake Quantity (SOQ)

The maximum daily consumption at a supply point.

Supply Point

A group of one or more meters at a site.

Therm

An imperial unit of energy. Largely replaced by the metric equivalent: the kilowatt hour (kWh). 1 therm equals 29.3071 kWh.

Transporting Britain's Energy (TBE)

National Grid's annual industry-wide consultation process encompassing the Ten Year Statement, targeted questionnaires, individual company and industry meetings, feedback on responses and investment scenarios. In 2013 rebranded as Future Energy Scenarios

Unaccounted for Gas (UAG)

Gas lost during transportation. Includes leakage, theft and losses due to the method of calculating the Calorific Value.

Uniform Network Code (UNC)

The Uniform Network Code covers the arrangements between National Grid, shippers and the DNs following the selling off of four of the Networks.

UKCS

United Kingdom Continental Shelf.

UK-Link

A suite of computer systems that supports Uniform Network Code operations. Includes Supply Point Administration; Invoicing, and the Sites and Meters database.

VLDMC

Very Large Daily Metered Site. A site which uses greater than 50,000,000 therms per annum.