

Northern Gas Networks

31 October 2011

Long Term Development Statement 2011

Northern Gas Networks

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Long Term Development Statement 2011

Foreword

The Long Term Development Statement, published annually, provides a ten-year forecast of transportation system usage and likely system developments that can be used by companies contemplating connecting to our system or entering into transport arrangements, to identify and evaluate opportunities. It is produced in accordance with Standard Condition D3 of Northern Gas Networks' Gas Transporters Licence.

The Statement explains our latest volume forecasts, system reinforcement projects and investment plans. It has been published at the end of the 2011 planning process following an appraisal of the current market conditions.

Layout

The Statement contains essential information on actual volumes and the process for planning the development of the system, including demand and supply forecasts, system reinforcement projects and associated investment. The main body of the document provides an overview of the key issues, with all details contained in the appendices.

Version and Circulation

Version Number: 6.0 (18th October 2011)

This document and any updates to this document will be circulated electronically.

Background

This document is the seventh edition to be published by Northern Gas Networks. The document sets out our assessment of the future demand and supply position for natural gas in Northern Gas Networks and outlines proposals for investment in the Local Transmission and Distribution Systems.

Northern Gas Networks manages the development, operation and maintenance of the High Pressure and below 7bar Distribution Networks. These extend from the Inlet Valves of the Pressure Regulating Installations at the National Transmission System interface, to the outlet of the consumer's Emergency Control Valve in the North East of England, northern Cumbria and West, North and East Yorkshire.

The restructuring of the gas industry during 2005 led to the formalisation of relationships between various parties, not least between the Distribution Networks and National Grid Gas (NGG). Network staff have been involved in the development of key documents, which describe this relationship and the resulting processes. In order to fulfil its Licence obligation as a Gas Transporter, Northern Gas Networks is required to confirm to NGG the quantity of gas required at a number of different demand levels. This is stated as a request for Offtake Daily Quantity (Flat Capacity) and the amount of Storage (Flexibility) at each offtake. We also indicate the Peak Hourly Flow and associated Minimum Inlet pressure required for each point in the Network where gas is offtaken from the National Transmission System. After discussion between the two parties, NGG allocates these quantities in the Offtake Capacity Statements.

The forecasts described within this document have been prepared by Northern Gas Networks (NGN). The methodology for production of the forecasts is compliant with the demand forecasting requirements of Section H of the Uniform Network Code Offtake Arrangements Document.

Chapter One - Demand

1.1 Overview

This Chapter describes the forecast for gas demand ten years ahead for each LDZ within Northern Gas Networks. It also includes discussion on how current forecasts relate to previously published forecasts. Further information is provided in Appendix 2.

Demand forecasts have been prepared as part of an exchange of information that is intended to inform respective capacity planning processes between the Independent Distribution Networks and NGG. These forecasts are compliant with the demand forecasting requirements of Section H of the UNC Offtake Arrangements document.

1.2 Demand Forecasts

This section provides an outline of our latest gas demand forecasts and the key underlying assumptions.

The demand forecasts are based on planning assumptions derived from market observations and the view of specialist consultancies.

As forecasts are made without knowledge of what weather conditions will prevail into the future they are made at seasonal normal temperatures. In order to compare actual throughput with forecast values the impact of weather needs to be removed from the figures. This is known as weather corrected demand.

Network Code requires a revision to seasonal normal values every five years and as such the basic seasonal normal temperatures were revised during 2009/10 and implemented on the 1st October for gas year 2010/11. These values reflected the generally warm weather that had been experienced over the past decade and also looked forward for the first time, using long term weather forecasts supplied by the Met Office in conjunction with the Hadley Centre for Climate Prediction and Research. Derivation of the seasonal normal values is designed to reflect the most accurate statistical relationship between demand and weather. It does not attempt to estimate any potential impact of global warming and as such the peak 1 in 20 weather assumptions have not altered.

Prior to 2005 this was done using 35 years of weather data and this was revised and implemented in 2005 using 17 years of data.

The models have again been influenced by the recent demand patterns impacted by factors such as the warm weather, financial state of the economy, improved energy conservation and continuing high fuel prices.

1.2.1 Forecast Demands

This section provides an overview of our latest gas demand forecasts through to 2021/22. A more detailed view can be found in Appendix 2, which includes our forecasts for both annual and peak demand on a year-by-year basis.

On a Network basis gas demand is forecast to decrease by 0.44% over the next 10 years, with an average yearly decline of 0.03%.

2011 is the first year that NGN has forecast a decline in overall gas demand and this is related to a less than favourable economic outlook, reductions in Seasonal Normal Demand, increases in UK gas prices, and a reduction in 1 in 20 peak day forecasts.

At LDZ level, the North East's trend suggests a decline over the whole forecast period of 0.13%. The North LDZ forecast suggests decline over the whole forecast period of 0.79%.

Peak demand is forecast to decline by 1.8% over the 10 year period within North LDZ and 3.4% in North East. This compares with a rise of 2.05% and 1.96%, respectively, for these LDZ's in the 2010 forecast.

Table A1.2.1 – Northern Gas Networks Forecast Annual Demand – By Load Category

Load Band	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
0-73 MWh	42.07	41.97	41.81	41.79	41.58	41.46	41.24	41.16	41.01	41.04	40.91
73-732 MWh	5.63	5.66	5.60	5.59	5.60	5.59	5.56	5.55	5.51	5.50	5.54
732-5860 MWh	4.78	4.80	4.74	4.72	4.70	4.71	4.67	4.66	4.63	4.63	4.60
Small User	52.47	52.43	52.15	52.10	51.88	51.76	51.47	51.38	51.16	51.17	51.06
Firm > 5860 MWh	14.57	25.87	23.57	23.33	23.26	23.37	23.15	23.12	23.02	23.04	23.18
Interruptible < 1465 GWh	7.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Large / V. Large User	22.09	25.87	23.57	23.33	23.26	23.37	23.15	23.12	23.02	23.04	23.18
LDZ Consumption	74.56	78.31	75.71	75.42	75.14	75.13	74.62	74.50	74.18	74.21	74.24
LDZ Shrinkage	0.48	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
LDZ Demand	75.04	78.78	76.19	75.90	75.61	75.60	75.09	74.97	74.65	74.68	74.71

Note

- Figures may not sum exactly due to rounding.
- All figures in TWh

1.2.1.1 Annual Flows

Annual forecasts are based on average weather conditions. Therefore, when comparing actual demand with forecasts, demand has been adjusted to take account of the difference between the actual weather and the seasonal normal weather.

The result of this calculation is the weather corrected demand.

The basis for any calculation of future demand is the accuracy of the previous forecast.

Table A.1.2.1.1 provides a comparison of actual and weather corrected throughput during the 2010 calendar year with the forecast demands presented in the 2010 Demand Statement. Annual forecast demands are presented in the format of load bands/categories, consistent with the basis of system design and operation.

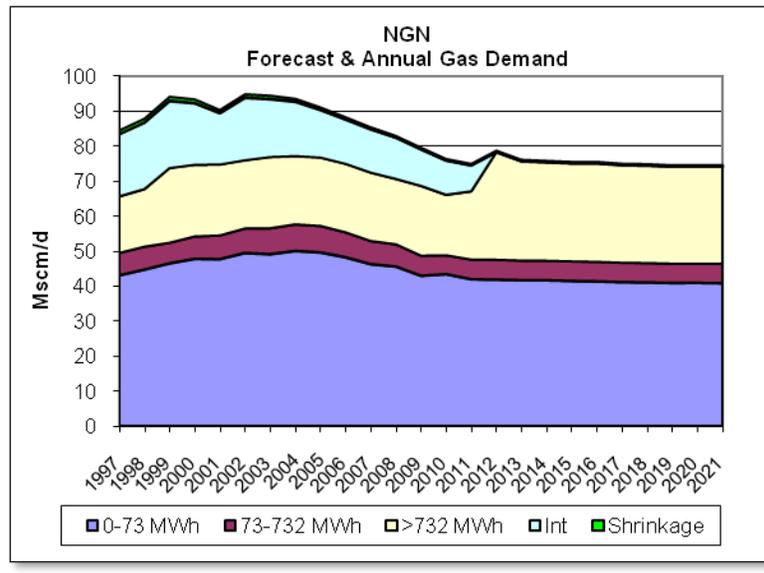
Table A1.2.1.1

Northern Gas Networks	Actual	Weather Corrected	Forecast	Corrected v Forecast (%)
0-73 MWh	46.74	42.47	42.35	0.3
73 – 732 MWh	6.07	5.49	5.66	-3.0
>732 MWh	19.86	19.28	19.25	0.2
Interruptible	10.18	10.06	10.62	-5.3
LDZ Shrinkage	0.50	0.50	0.51	-1.4
LDZ Total	83.34	77.81	78.38	-0.7

- All figures in TWh

Historical Throughput & Forecast Annual Gas Demand by Load Band.

Figure 1.2A



The chart above shows actual and forecast gas demand by load band through to 2021. The most significant change in this chart is the change in the Interruptible load in October 2011. From this date all previous interruptible loads become firm (because of UNC Mod 90) and as such are transferred into the DN Firm >5860 MWh category.

Figure 1.2B

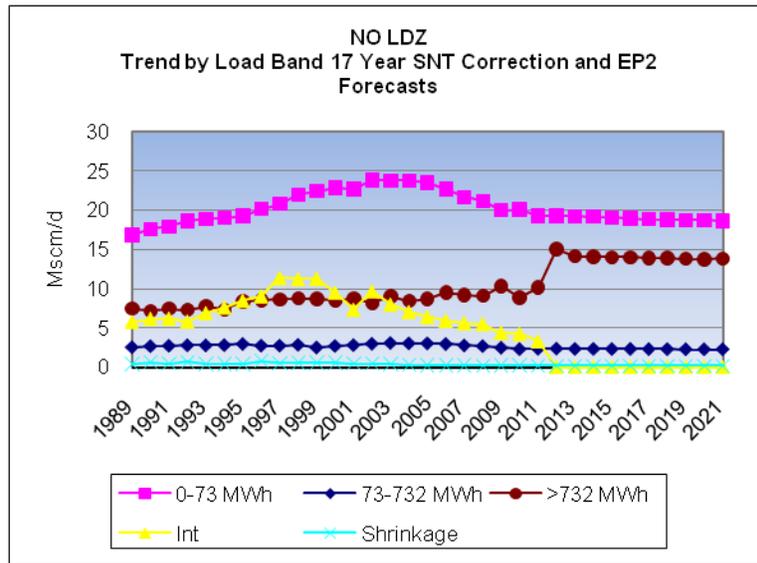
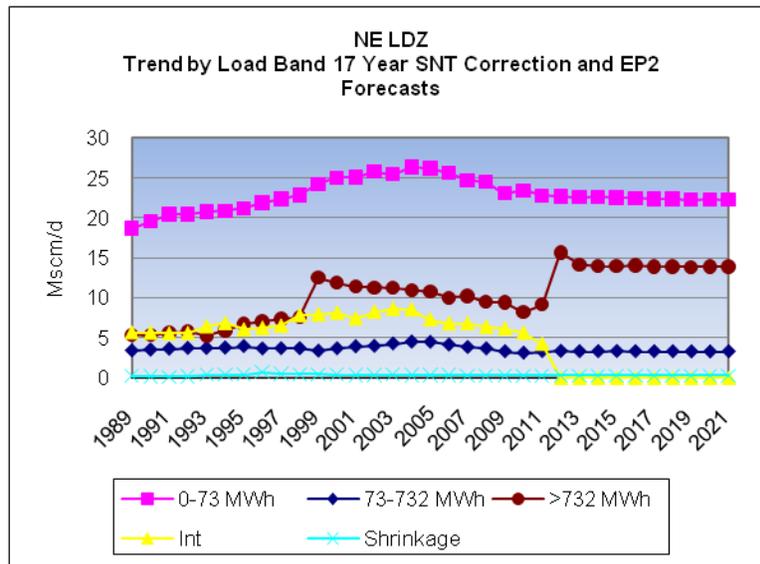


Figure 1.2C



The trend graphs above show energy by load band category for North and North East LDZ since 1989. The values from 1989 to 2010 are weather corrected throughput, and thereafter, the figures are taken from the 2011 Forecast Demand Statements.

Chapter Two - Supply and Storage

2.1 Supply

Gas is brought into the network through offtakes, above ground installations that are connected to the National Transmission System, which typically operate with inlet pressures in the range 70 – 85bar. Gas then passes through the Local Transmission System, into the Distribution System and onward to consumers.

The amount of gas NGN requires to satisfy its 1 in 20 Peak Day Firm commitment is requested from NGG on an annual basis.

Format showing latest requests for North LDZ in the 2011 Plan to NGG.

NO LDZ				Statement of Forecast Offtake Data							
DN 2011/12				i Planning CV = 40.44							
All figures in mcm/d are at the above CV.				Demand Range 1 (1:20 peak day)							
Volumetric (V) or Pressure Controlled (P)	Standard notice period & rate change (hours :%)	SOD time	EOD time	OFFTAKE		Demand mcm/d	Storage needed mcm/d (sec'dary)	Peak Rate mcm/h (primary)	SOD Pressures	EOD Pressures	
				Name	NTS Group						
V	2 : 5	6:00	22:00	BISH	NO1	4.607	0.518	0.250	41	38	
P	2 : 5	6:00	22:00	COLD	NO1	0.236	0.035	0.014	53.2	51.5	
P	2 : 5	6:00	22:00	CORG	NO1	0.007	0.001	0.000	45	38	
V	2 : 5	6:00	22:00	COWP	NO1	3.651	0.486	0.206	54.5	38	
V	2 : 5	6:00	22:00	ELTN	NO1	5.012	0.703	0.262	53.1	52.5	
P	2 : 5	6:00	22:00	GUYZ	NO1	0.171	0.035	0.010	45	38	
P	2 : 5	6:00	22:00	HUMB	NO1	0.014	0.002	0.001	45	38	
P	2 : 5	6:00	22:00	KELD	NO2	0.112	0.017	0.007	45	38	
P	2 : 5	6:00	22:00	LBUR	NO1	0.942	0.141	0.056	45	38	
P	2 : 5	6:00	22:00	MELK	NO2	0.162	0.024	0.010	45	38	
P	2 : 5	6:00	22:00	SALT	NO1	0.626	0.094	0.038	48	47.1	
V	2 : 5	6:00	22:00	SLWK	NO1	4.607	0.518	0.250	48	47.1	
P	2 : 5	6:00	22:00	THRN	NO1	0.443	0.066	0.027	51.5	49.4	
P	2 : 5	6:00	22:00	TOWL	NO2	0.051	0.010	0.003	45	38	
V	2 : 5	6:00	22:00	WETH	NO2	2.533	0.305	0.139	46.6	46.6	
				OFFTAKE TOTAL		23.173	2.956				

This process involves the Network requesting an Offtake Daily Quantity (Flat Capacity) and an amount of Storage (Flexibility) for each offtake. We also indicate the Peak Hourly Flow and associated Minimum Inlet pressure required for each offtake. After discussion between the two parties, NGG will allocate these products in the Offtake Capacity Statement (OCS) with a firm commitment until September 2015 and an indicative view for one year. The pressures quoted in the OCS are then modelled for each offtake to determine if any upgrade work is necessary.

An example of the Offtake Capacity Statement is shown below.

NO LDZ

2011/12

STATEMENT OF CAPACITY ALLOCATED

40.440 MJ/m³

All figures in mcm/d are at the above CV.

Offtake Name	Maximum Capacity Required		Assured Pressures	
	Demand	Storage	SOD	EOD
BISH	4.607	0.518	41	38
COLD	0.236	0.035	53.2	51.5
CORG	0.007	0.001	45	38
COWP	3.651	0.486	54.5	38
ELTN	5.012	0.703	50	50
GUYZ	0.171	0.035	45	38
HUMB	0.014	0.002	45	38
KELD	0.112	0.017	45	38
LBUR	0.942	0.141	45	38
MELK	0.162	0.024	45	38
SALT	0.626	0.094	48	47.1
SLWK	4.607	0.518	48	47.1
THRN	0.443	0.066	51.5	49.4
TOWL	0.051	0.010	45	38
WETH	2.533	0.305	45.7	45.7
OFFTAKE TOTAL	23.173	2.956		

Appendix Four gives more information about the Network's offtakes.

2.2 Storage in the Network

Gas is stored at various facilities within the Network, to be used on a daily basis.

Within the Northern Gas Networks supply area, there are a number of fixed storage sites, Low Pressure holders, and High Pressure storage sites. Following a review of operations over the winter period of 2010/11 and discussions with National Grid Gas a change to the storage strategy document is to be has been adopted for the winter of 2011/12. This has resulted in a reduced reliance on LP holders.

We have one operational above ground HP Bullet Storage site on the network. Clay Flatts contains four HP vessels which provide around 36,000 scm (25.7 tonnes) of usable diurnal storage.

Chapter Three - Investment in the Distribution Networks

3.1 LTS Development Plan

The LTS is designed for transmission and storage of gas on the basis of satisfying the 1 in 20 peak day firm only forecast demands. The system is developed, based on demand and supply forecasts, to ensure that this capability is maintained.

Major projects currently in the 2011 Plan are shown below: -

LDZ	Project Name	Authorised / Unauthorised	Initial Start Date	Construction Year	Total Project Cost (£m)
NO	Greatham New PRI	A	2011	2011	1.211
NO	Elton NTS offtake Upgrade	A	2011	2011	0.414
NO	Scremerston PRI upgrade	A	2011	2011	0.917
NO	Lilyhall regulators replacement	A	2011	2011	0.282
NO	Eltringham PRI upgrade	A	2011	2011	0.582
NO	North Seaton PRI upgrade	A	2011	2011	0.913
NO	Warden Law PRI upgrade	U	2013	2013	1.5
NO	Wetheral NTS offtake Upgrade	U	2013	2014	2.5
NO	Little Burdon NTS offtake upgrade	U	2016	2016	1.25
NO	Penrith PRI upgrade	U	2016	2016	0.75
NO	Melkingthorpe NTS offtake upgrade	U	2017	2017	1.25
NO	Chopwell PRI upgrade	U	2017	2017	1.5
NO	West Cumbria Reinforcement for Clay Flatts Bullet Removal	U	2017	2018	6.762
NO	Clay Flatts PRI upgrade	U	2018	2018	0.75
NO	Clay Flatts (storage) PRI upgrade	U	2018	2018	0.75
NO	Leadgate PRI upgrade	U	2020	2020	1.5

LDZ	Project Name	Authorised / Unauthorised	Initial Start Date	Construction Year	Total Project Cost (£m)
NE	Tyersal New 38-17 bar Regulator	A	2011	2012	2.712
NE	Paull NTS offtake upgrade	U	2012	2012	0.85
NE	Asselby NTS offtake upgrade	U	2013	2013	1.25
NE	Carcroft PRI upgrade	U	2013	2013	0.75
NE	Baldersby NTS offtake upgrade	U	2014	2014	1.25
NE	Pickering NTS offtake upgrade	U	2015	2015	2.5
NE	East Bierley PRI upgrade	U	2015	2015	1.5
NE	Keighley PRI upgrade	U	2016	2016	0.75
NE	Menston PRI upgrade	U	2016	2016	0.75
NE	Burley Bank NTS offtake upgrade	U	2018	2018	1.25
NE	Meadow Lane PRI upgrade	U	2018	2018	1.5
NE	Bullerthorpe Lane PRI upgrade	U	2019	2019	1.5
NE	Whitby (Guisborough Road) PRI upgrade	U	2019	2019	0.375
NE	Whitehall Rd PRI upgrade	U	2020	2020	1.5

3.2 Below 7barg Distribution System

The NGN below 7barg system is designed to operate between levels of pressure defined by statute, regulation and safe working practices.

We continue to develop our below 7barg Distribution system, investing in mains, services and associated plant and machinery to meet the needs of providing capacity to customers wishing to connect to our network and other Gas Transporters' requests for transportation services.

The Distribution systems are designed and reinforced to meet a peak six-minute (Pk6) demand level, which is the maximum demand level (averaged over a six minute period) that can be experienced in a network under cold winter conditions.

NGN continues to invest in capital for reinforcement and new connections consistent with the growth in peak day demand forecast in this document.

We also continue to invest in the replacement of our transportation network assets, primarily for the renewal of mains and services within Distribution systems. This includes expenditure associated with decommissioning of mains and services to a programme agreed with the Health and Safety Executive. This covers the decommissioning of all smaller-diameter iron gas pipes (≤ 8 " diameter) within 30 metres of occupied buildings before April 2032, and the progressive decommissioning of larger iron pipes based on their Risk and Condition. Ofgem has agreed funding for this programme for the period to March 2013, and NGN will shortly be submitting a proposal to cover funding for the next phase of the programme to March 2021.

Chapter Four - Commercial Developments

The major area of commercial development that is anticipated for the twelve months starting 1 October 2011 is expected to be:

- **RIO-GD1** (first gas distribution price control review under the RIO model)

The following is extracted from recent Ofgem documentation. RIO-GD1 will be the first gas distribution price control review to reflect the new regulatory framework resulting from the RPI-X@20 review. The RIO model (Revenue = Incentives+Innovation+Outputs) builds on the success of the previous RPI-X regime, but better meets the investment and innovation challenge by placing much more emphasis on incentives to drive the innovation needed to deliver a sustainable energy network at value for money to existing and future consumers.

Britain's gas and electricity industries are facing their greatest challenge since the construction of the national grid and the conversion to North Sea gas. The demands of moving to a low carbon economy and meeting our renewable targets whilst maintaining safe, secure and reliable energy supplies will lead to profound changes in the way Britain produces, uses and transports gas and electricity.

The network companies that transmit and distribute our energy have a vital role to play. They provide the physical link between energy producers and their domestic and business customers.

To play a full role, network companies need to build closer links with all of their customers from large businesses to domestic. They will need to plan for the long term, anticipating and responding to changes in current and future demand. They will have to remain flexible, keeping their options open to reflect the uncertainty they face. They will need to innovate in the way they design, build, operate and charge for their networks to deliver smarter networks and encourage customers to change their behaviour.

The scale of investment required means higher energy bills are almost certain. Network companies will have to show consumers that they are getting value for money over the longer term, setting out clearly what is being delivered and at what cost.

Given the large amount of investment required in the sector going forward, we do not want to make it difficult for companies to raise the necessary finance. Indeed, we are committed to ensuring that efficient companies are financeable and that those that demonstrably deliver for consumers are remunerated appropriately.

RIO will first be used for the next transmission (TPCR5) and gas distribution (GDPCR2) price control reviews, which are due to be implemented from **April 2013**.

More detail about the RIO process can be found on Ofgem's website:-

<http://www.ofgem.gov.uk/Networks/rpix20/ConsultDocs/Documents1/Decision%20doc.pdf>

Appendix One - Process Methodology

A1.1 Demand

The purpose of this section is to give a brief overview of the methodology that is adopted to develop forecasts of annual and peak demand. The methodology can be categorized into three main modelling areas; annual demand, demand/weather and peak demand modelling.

A1.1.1 Annual Demand Modelling

The development of annual gas demand forecasts considers a wide range of factors, from complex econometrics to an assessment of individual load enquiries. For any forecasting process a set of planning assumptions is required, which if necessary can be flexed to create alternative scenarios. In the case of the forecasts presented in this document, assumptions include economic, fuel prices, environmental and tax policies. A number of these assumptions are based on data from independent organisations.

These forecasts are also benchmarked against the work of a number of recognised external sources, such as the DTI.

A1.1.1.1 LDZ Modelling

LDZ demand is split into four market sectors according to load size and supply type (i.e. firm or interruptible). For each sector, models have been developed that make allowance for economic conditions, local demand intelligence, new large load enquiries, relative fuel prices, potential new markets and other factors, such as the Climate Change Levy, that could affect future growth in demand. By adopting this approach we are able to take account of varying economic conditions and specific large loads within different LDZs.

A1.1.1.2 Industrials

The production of forecasts within this sector is dependent on forecasts of individual new and existing loads based on recent demand trends, Transporting Britain's Energy feedback, load enquiries and commercial sources.

A1.1.2 Demand/Weather Modelling

Due to the temperature sensitivity of LDZ markets, forecasts of annual demand are based upon an assumed average weather condition to allow underlying year-on-year changes to be identified. The related demand models, developed for overall LDZ demand and a number of sub-LDZ load categories, are based on factors known as Composite Weather Variables (CWVs). The CWVs are derived from temperature and wind speed data, defined and optimised for each LDZ, and give a straight-line relationship between demand and weather.

There is an obligation to review, at least every 5 years, the definition and seasonal normal basis of all CWVs. To meet this obligation, a comprehensive review was completed in 2005 in consultation with the Network Code Demand Estimation Sub-Committee (DESC). As agreed by DESC, the CWV definition for each LDZ was revised and includes a new seasonal profile that improves the seasonal shape of the CWV for demand modelling purposes. The SNCWV for LDZ demand has also been revised using 17 gas years of weather data (1987/88 to 2003/04) to take account of the effects of climate change on average demand. The annual demand forecasts produced since 2005 have been calculated using 17 year SNCWVs.

However, in 2006, the Met Office and three leading energy companies launched a pioneering scoping study into climate change and its potential impacts on the UK energy industry. The

study was the first nationwide attempt to identify how climate change will affect energy generation; distribution and transmission, and demand. As well as initial indications on how climate change could impact the industry over the next century, it also identified areas where further research was required.

Following the scoping study an industry-funded project Energy Phase 2(EP2) was set up, involving 11 UK energy companies, focusing on the priorities identified by the earlier study. The EP2 process for weather correction not only takes into account historical weather trends but also uses long term weather forecasts to try to predict how gas demand will be influenced by environmental factors.

This basis for weather correction was again considered in 2009 and with input from the shipper community it was agreed to use a weather forecasting tool EP2 developed by the Met Office in conjunction with the Hadley Centre for Climate Prediction and Research. This basis for weather correction has been implemented for our forecasts in 2010.

The impact on annual demand is a reduction of around 3.5% when compared with the previous basis.

This change has had no impact on the 1 in 20 peak day demands or the 1 in 50 severe load duration curves which continue to be calculated, as per the relevant statutory and licence obligations, from a longer period of weather data, in this case 1928/29 to 2008/09.

A1.1.3 Peak Day Demand Modelling

Once the annual demand forecasts and daily demand/weather models have been developed, a simulation methodology is employed, using historical weather data for each LDZ, to determine the peak day (in accordance with statutory/Licence obligations) and severe winter demand estimates.

A1.2 High Pressure Tier Planning

Although the development of DN's Local Transmission Systems (LTS) is largely demand led, LTS capacity planning processes are not dissimilar to those utilised for the development of the NTS. GDNs use forecast demand to model system flow patterns and produce capacity plans that take account of anticipated changes in system load and within-day demand profiles.

The options available to relieve LTS capacity constraints include:

- Upgrading pipeline operating pressures;
- Upgrading offtakes from the NTS, regulators and control systems;
- Constructing new pipelines or storage; and
- Constructing new supplies (offtakes from the NTS), regulators and control systems.

As well as planning to ensure that LTS pipelines are designed to the correct size to meet peak flows, there is a requirement to plan to meet the variation in demand over a 24-hour period. Diurnal storage is used to satisfy these variations and may consist of gas held in linepack, low-pressure gasholders, high-pressure vessels and salt cavities.

A1.3 Lower Pressure Tier Planning (<7 barg)

The lower pressure tier system (distribution system) is designed to meet expected gas flows in any six-minute period, assuming reasonable diversity of demand. Lower tier reinforcement planning is based on LDZ peak demand forecasts, adjusted to take account of the characteristics of specific networks.

Network analysis is carried out using a suite of planning tools with the results being validated against a comprehensive set of actual pressure recordings. The planned networks are then used to assess future system performance to predict reinforcement requirements and the effects of additional loads. Reinforcement options are then identified, costed and programmed for completion before the constraint causes difficulties within the network. Reinforcement is usually carried out by installing a new main or by taking a new offtake point from a higher-pressure tier. In general, the reinforcement project is of such a size that the work can be completed and operational before the following winter.

A1.4 Investment Procedures and Project Management

All investment projects must comply with our Investment and Disposals Guidelines, which set out the broad principles that should be followed when evaluating high value investment or divestment projects.

The investment guidelines define the methodology to be followed for undertaking individual investments in a consistent and easy to understand manner. Together with the planning and budgeting methodology, they are used to ensure maximum value is obtained. For non-mandatory projects, the key investment focus in the majority of cases is to undertake only those projects that carry an economic benefit.

For mandatory projects, such as safety-related work, the focus is on minimising the net present cost whilst not undermining the project objectives or the safety or reliability of the network. The successful management of major investment projects is central to our business objectives.

Our project management strategy involves:

- Determining the level of financial commitment and appropriate method of funding for the project;
- Monitoring and controlling the progress of the project to ensure that financial and technical performance targets are achieved; and
- Post project and post investment review to ensure compliance and capture lessons learnt.

When a Transmission project is approved, a multi-discipline team prepares an Invitation to Tender in accordance with the EC Utilities Directive. For major projects, specialist consultants with experience of preparing and evaluating tender documents are used.

Tenders are received and evaluated against previously agreed technical, quality, safety, financial and programme criteria. They are compared on a cost basis with a database of capital projects. An award is then made to the most economically advantageous tender consistent with these criteria.

The successful contractor completes the project in accordance with an agreed programme of works. It remains the contractor's responsibility to manage and supervise the works. We monitor the work on a day-to-day basis and manage the funding of the project by careful cost control.

Following completion, a Post Completion Review is carried out to provide feedback to management on project performance and to improve future decision making processes.

Our project management of major investment projects is designed to ensure that they are delivered on time, to the appropriate quality standards at minimum cost. The project management process in particular makes use of professional consultants and specialist contractors, all of whom are appointed subject to competitive tender.

Appendix Two - Gas Demand Forecasts

A2.1 Demand

During the next ten years annual gas demand is forecast to decline by 0.79% in North LDZ and by 0.13% in North East.

Table A2.1A

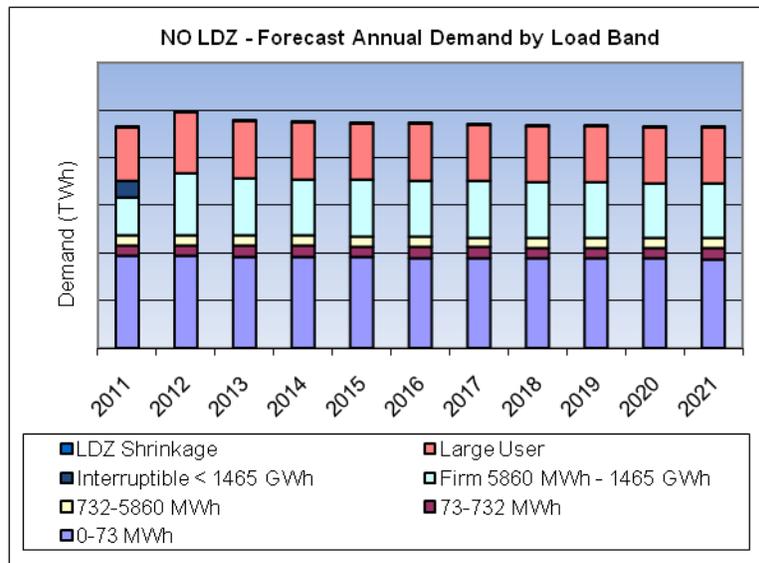
Forecast Annual Demand by Load Category by LDZ from 2010 Demand Statements (TWh)

North LDZ

Load Band	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
0-73 MWh	19.23	19.27	19.21	19.14	19.02	18.95	18.83	18.78	18.71	18.71	18.62
73-732 MWh	2.33	2.35	2.32	2.31	2.30	2.31	2.29	2.28	2.27	2.26	2.27
732-5860 MWh	2.11	2.14	2.11	2.11	2.09	2.10	2.08	2.08	2.08	2.07	2.08
Small User	23.68	23.76	23.64	23.55	23.41	23.36	23.20	23.15	23.05	23.04	22.97
Firm > 5860 MWh	8.05	12.87	12.02	11.95	11.89	11.90	11.80	11.80	11.72	11.70	11.75
Interruptible < 1465 GWh	3.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Large / V. Large User	11.33	12.87	12.02	11.95	11.89	11.90	11.80	11.80	11.72	11.70	11.75
LDZ Consumption	35.00	36.64	35.66	35.50	35.31	35.27	35.00	34.94	34.78	34.74	34.73
LDZ Shrinkage	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
LDZ Demand	35.22	36.84	35.87	35.70	35.51	35.48	35.21	35.15	34.98	34.94	34.94

Note

- Figures may not sum exactly due to rounding.

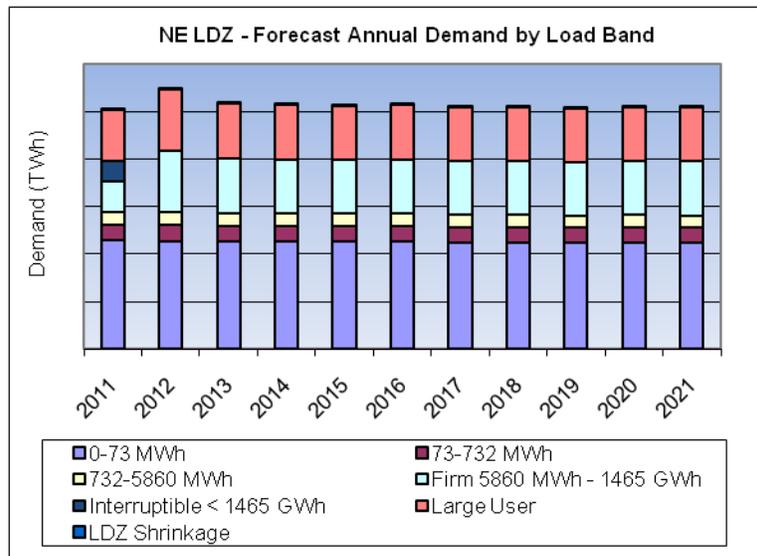


North East LDZ

Load Band	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
0-73 MWh	22.84	22.70	22.60	22.65	22.56	22.51	22.41	22.38	22.30	22.34	22.29
73-732 MWh	3.30	3.31	3.28	3.28	3.30	3.28	3.27	3.27	3.25	3.24	3.27
732-5860 MWh	2.66	2.66	2.63	2.61	2.60	2.61	2.58	2.58	2.56	2.55	2.52
Small User	28.80	28.67	28.50	28.55	28.46	28.39	28.27	28.23	28.10	28.13	28.08
Firm > 5860 MWh	6.51	13.00	11.55	11.38	11.37	11.47	11.35	11.32	11.30	11.34	11.43
Interruptible < 1465 GWh	4.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Large / V. Large User	10.76	13.00	11.55	11.38	11.37	11.47	11.35	11.32	11.30	11.34	11.43
LDZ Consumption	39.56	41.67	40.05	39.93	39.84	39.86	39.62	39.55	39.40	39.47	39.51
LDZ Shrinkage	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
LDZ Demand	39.82	41.93	40.32	40.19	40.10	40.13	39.88	39.82	39.67	39.73	39.77

Notes

- Figures may not sum exactly due to rounding.



Forecast 1 in 20 Peak Day Firm Demands by LDZ from the 2011 Demand Statements

1 in 20 Peak Day Demand (GWh)											
LDZ	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
North	245	245	244	244	243	242	241	240	239	238	237
North East	273	272	272	271	270	269	269	268	266	266	264
Total	519	517	516	515	513	512	510	509	506	505	501

Notes

- Figures may not sum exactly due to rounding.
- All figures in GWh.

World energy prices including UK gas have been trading at very high levels during 2010 and particularly 2011. UK gas prices increased in October 2010 and then again in November when the UK experienced cold weather and prices have remained relatively high since then due to indirect linkage to oil prices. The impact of these high prices has led to a further decline in gas demand.

Weather-corrected throughput in the North LDZ fell by around 1.1% in 2010 when compared with 2009, the eighth consecutive year of gas demand falling. In North East LDZ weather corrected throughput fell by 3.4%, the sixth consecutive year of falling gas demand.

Weather-corrected throughput for NGN for the first eight months of 2011 was 6.8% lower than the same period in 2010. At an LDZ level, the North weather-corrected throughput was 5.4% lower, and North East LDZ was 8% lower.

Energy prices for this winter show a seasonal increase. The expected re-coupling of oil and gas prices as the world economy recovers and current high prices has lead to forecasts of continued high energy prices over the period to 2021.

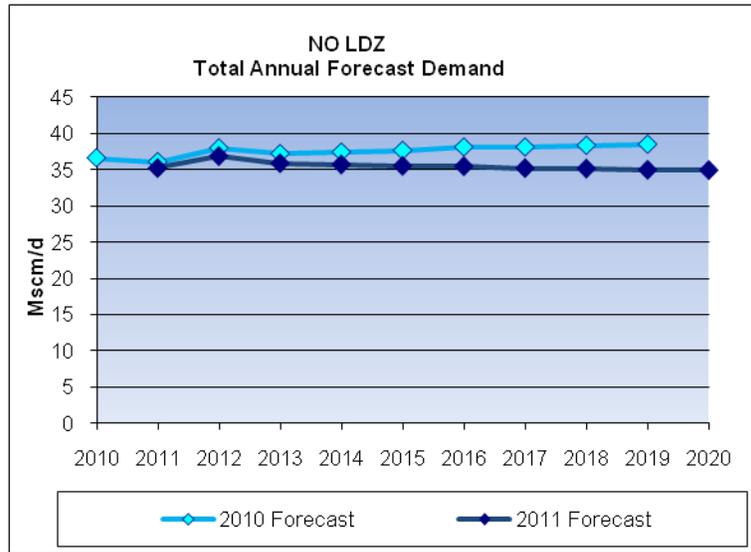
Due to a slower than expected return to global economic growth and the Government's fiscal and monetary policies in the UK, it is now expected that a return to trend economic growth will not occur for another 2/3 years to around 2015.

Over the next few years it is expected that the high fuel prices will drive demand reductions as consumers take advantage of improvements in energy efficiency, particularly in relation to government schemes such as CERT, Warm Front and the Green Deal. Loft and cavity wall insulation and the replacement of boilers in existing houses are also expected to contribute to energy efficiency savings, whilst new houses are expected to be designed far more efficiently than the existing stock. High fuel prices and improvements in energy efficiency are anticipated to affect the non-domestic sector too.

2.2 Forecast Comparisons

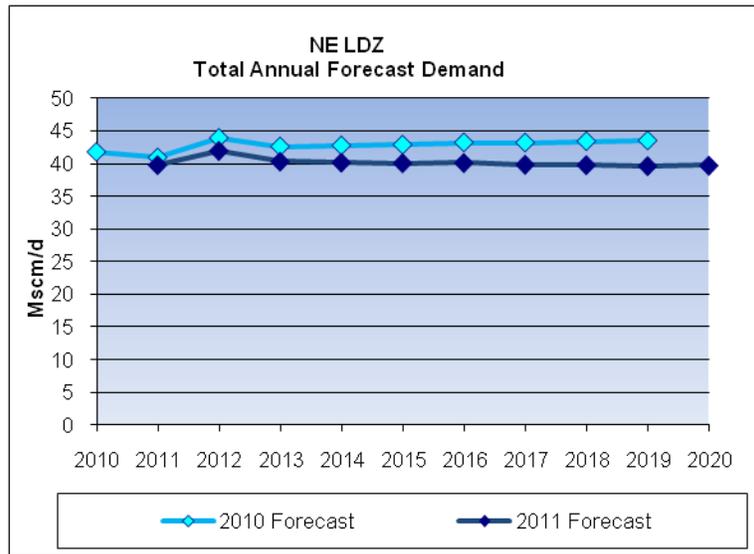
The following charts provide a comparison of the current forecasts with those published in the 2010 Demand Statements.

Figure 2.4A – North LDZ Total Annual Forecast Demand



Year	Forecast		% Difference
	2010	2011	
2011	36.08	35.22	-2
2012	38.01	36.84	-3
2013	37.22	35.87	-4
2014	37.43	35.7	-5
2015	37.67	35.51	-6
2016	38.14	35.48	-7
2017	38.14	35.21	-8
2018	38.38	35.15	-8
2019	38.53	34.98	-9

Figure 2.4B – North East LDZ Total Annual Forecast Demand



Year	Forecast		% Difference
	2010	2011	
2011	40.91	39.82	-3
2012	43.88	41.93	-4
2013	42.59	40.32	-5
2014	42.74	40.19	-6
2015	42.85	40.1	-6
2016	43.2	40.13	-7
2017	43.18	39.88	-8
2018	43.38	39.82	-8
2019	43.49	39.67	-9

Appendix Three - Actual Flows 2010

A3.1 Annual Flows

Annual forecasts are based on average weather conditions. Therefore, when comparing actual throughput with forecasts, throughput has been adjusted to take account of the difference between the actual weather and the seasonal normal weather.

The result of this calculation is the weather corrected throughput.

The weather corrected throughput and forecast demands are shown assuming a weather condition based on weather data from 17 years.

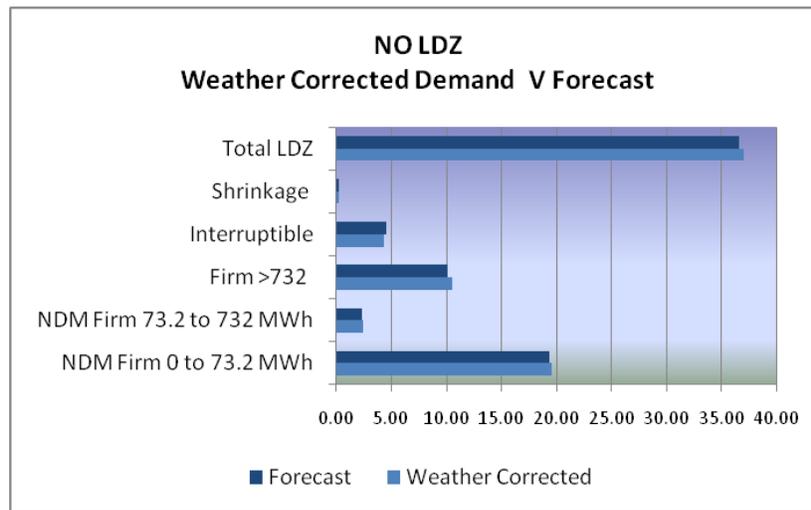
Actual throughputs have incorporated a reallocation between load bands based on reconciliation processed.

The basis for any calculation of forecast demand is the accuracy of the previous forecast.

Tables A3.1.1 and A3.1.2 provide a comparison of actual and weather corrected throughputs during the 2010 calendar year with the forecast demands presented in the 2010 Demand Statements. Annual demands are presented in the format of LDZ and NTS load bands/categories, consistent with the basis of system design and operation.

Table A3.1.1 North LDZ Throughput

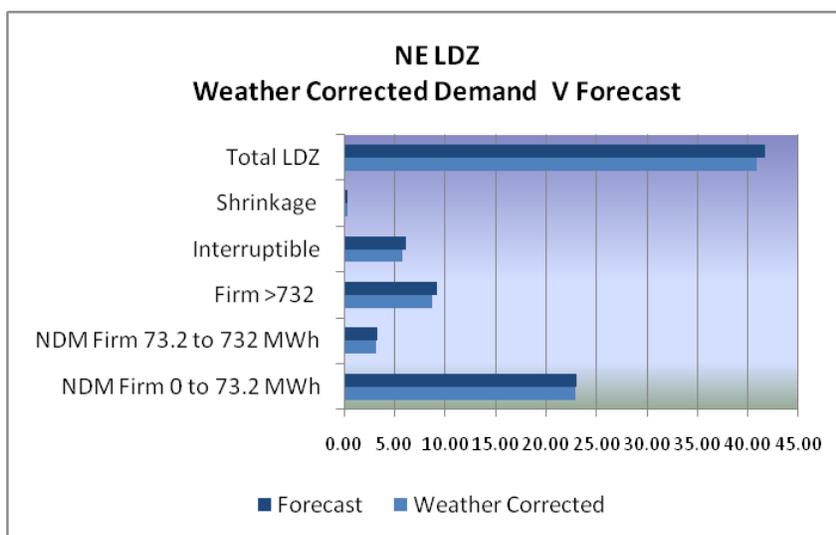
NORTH 2010	Actual	Weather Corrected	Forecast	Corrected v Forecast (%)
0-73 MWh	21.39	19.51	19.39	0.6
73 – 732 MWh	2.61	2.39	2.35	1.8
>732 MWh	10.80	10.52	10.09	4.2
Interruptible	4.37	4.33	4.57	-5.1
LDZ Shrinkage	0.22	0.22	0.22	-1.2
LDZ Total	39.39	36.98	36.62	1.0



Looking at the North throughput in comparison with the forecast we can see that in the majority of load bands, the forecasts were understated. The interruptible and shrinkage forecasts were overstated, but overall the total forecast LDZ demand was only 1% lower than actual weather corrected demand.

Table A3.1.2 North East LDZ Throughput

N.EAST 2010	Actual	Weather Corrected	Forecast	Corrected v Forecast (%)
0-73 MWh	25.35	22.96	22.96	0.0
73 – 732 MWh	3.46	3.10	3.31	-6.4
>732 MWh	9.07	8.77	9.16	-4.3
Interruptible	5.81	5.72	6.05	-5.4
LDZ Shrinkage	0.28	0.28	0.28	-1.6
LDZ Total	43.96	40.83	41.76	-2.2



The North East LDZ was overstated in most load bands, although the forecast and actual demand for 0-73MWh was an exact match. Actual LDZ demand was 2.2% higher than forecast. Compared to the 2009 forecast, the 2010 forecast proved to be more accurate in all load bands and categories.

A3.2 Peak Flows

Record total throughput in North LDZ is 21.08mscm on 30th January, 2003, and in North East LDZ the record stands at 24.42mscm on 28th January, 2004.

The day of highest total throughput in the Network was 21st December 2011. In the North East LDZ demand levels were 23.47 mscm, 10% higher than the winter of 2009/10. In the North LDZ demand levels were 19.18 mscm, this was 4% higher than the previous winter.

The total throughput on 21st December equated to 102% of peak day firm only forecast demand for North East LDZ. In the North LDZ firm only forecast demand was 91% of peak day demand.

Over the next ten years, annual peak forecast demand is expected to decline by 1.80% in North and 3.37% in North East. This is a significant reduction in forecast compared to last year where increases of 2.05% and 1.96% respectively, were expected.

Figure 3.2a – Historical Throughput & Forecast Peak Day Firm Demand for North LDZ

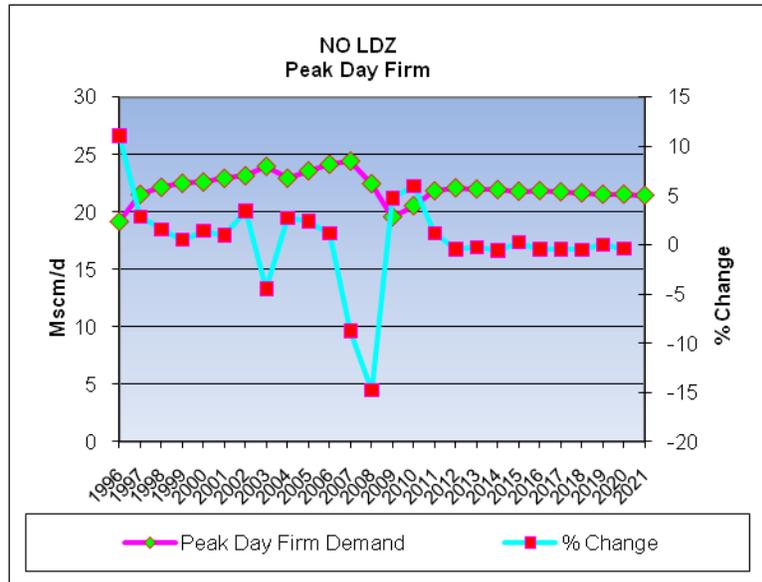
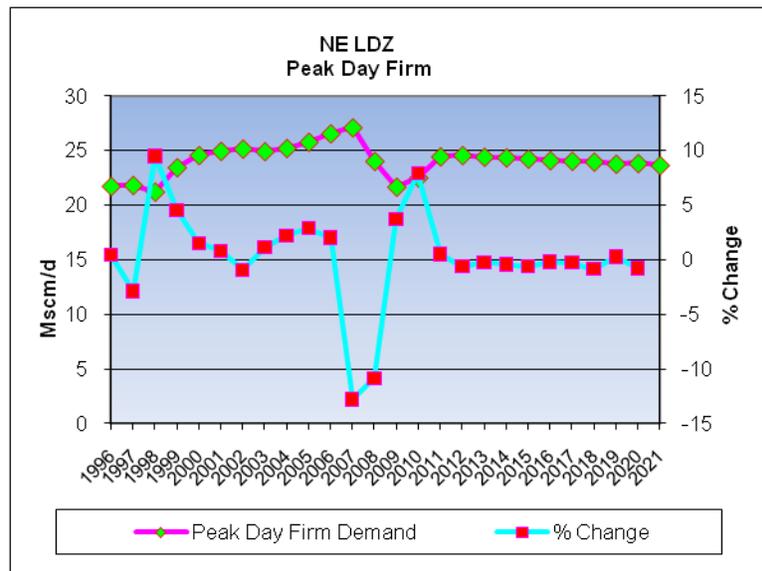


Figure 3.2b – Historical Throughput & Forecast Peak Day Firm Demand for North East LDZ



Appendix Four - Offtakes

As an indication of available capacity at the Network's offtakes, the 2012 requested Peak Flow from NTS has been plotted against the Maximum Offtake Capacity in 2011.

Figure 4.0a – NO Small Offtakes 2012 Flow Vs Maximum

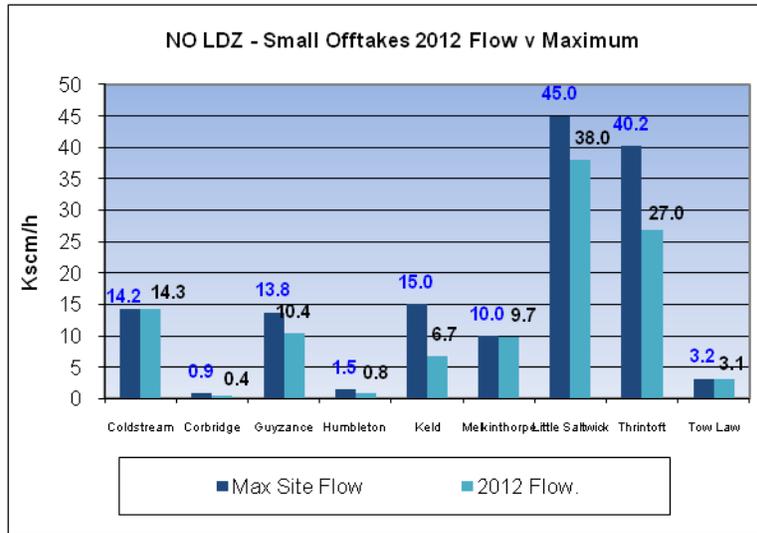
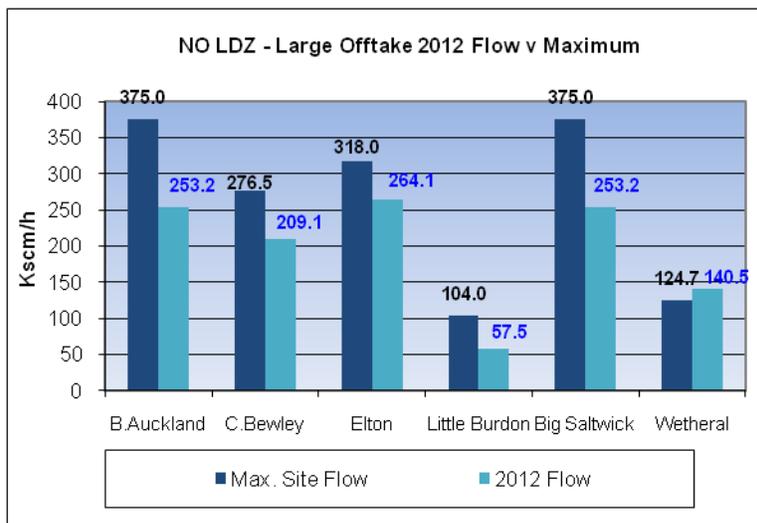


Figure 4.0b – NO Large Offtakes 2012 Flow Vs Maximum



The illustration above shows Wetheral offtake as below the capacity required for the planned peak flow for 2012. If demand on the Transpennine Network gets near to peak demand we have purchased some interruptible capacity that will be used to reduce demand and hence reduce flows. However, there is still a need to upgrade Wetheral offtake in the near future as National Grid have made NGN aware of the need to reduce NTS pressures down the western side of the country to help with the flows around the national pipeline system.

Figure 4.0c – NE Small Offtakes 2012 Flow Vs Maximum

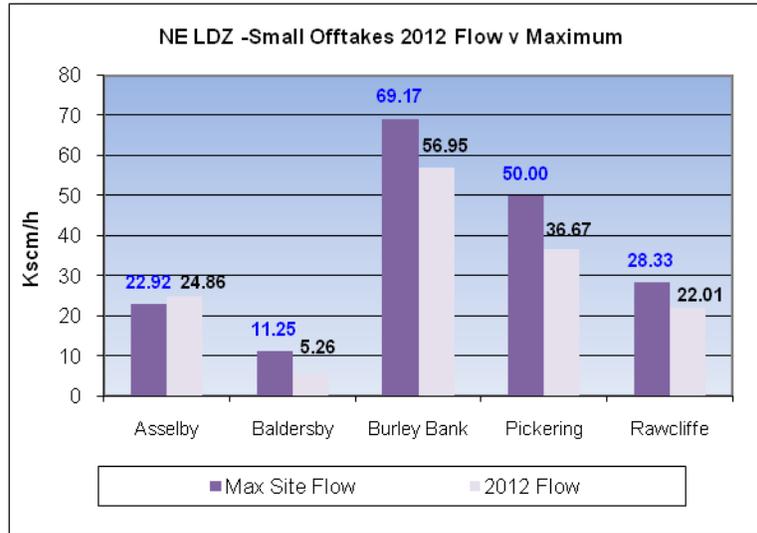
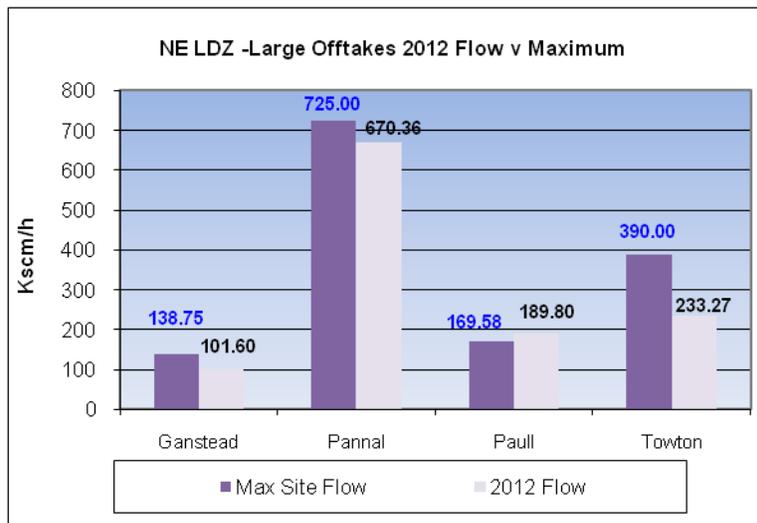


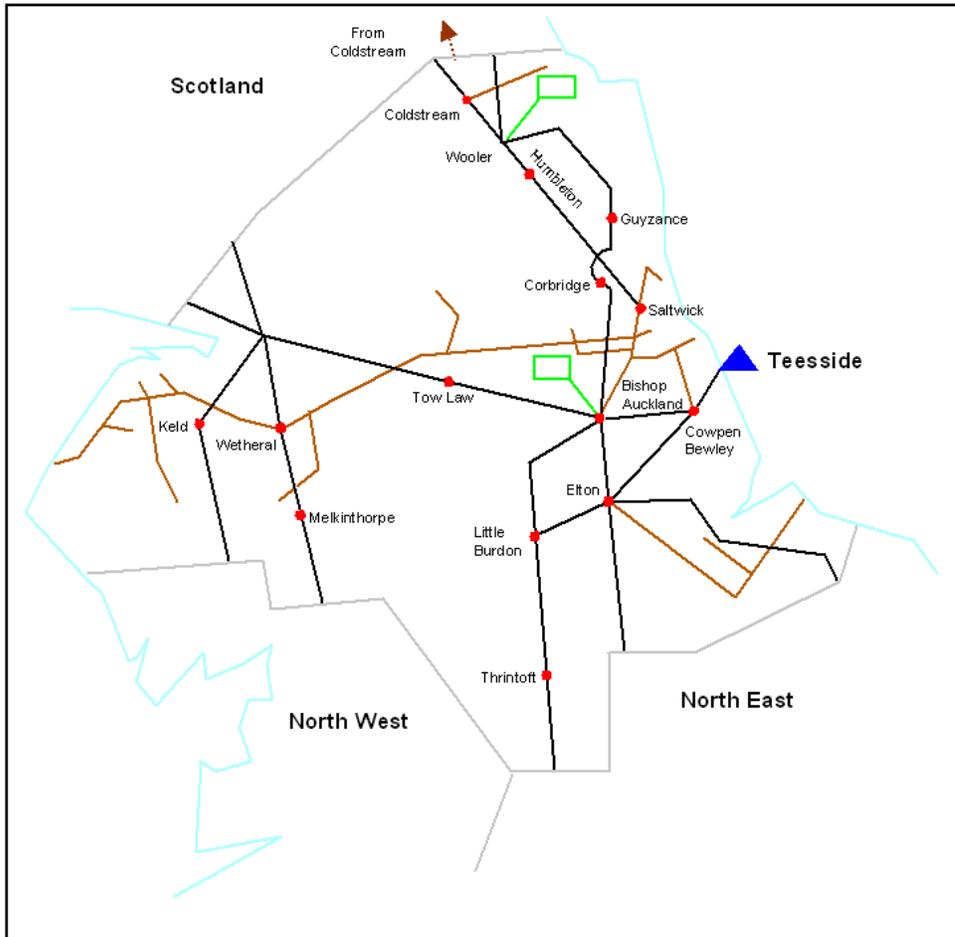
Figure 4.0d – NE Large Offtakes 2012 Flow Vs Maximum



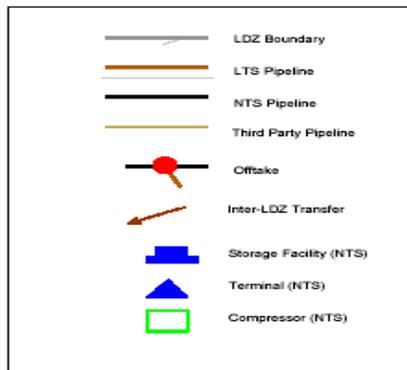
Paull offtake is part of a multi junction complex and parts of the site are owned by NGG and NGN. We are in discussion with NGG to determine the best solution to the issues we have.

Appendix Five - The Gas Transportation System

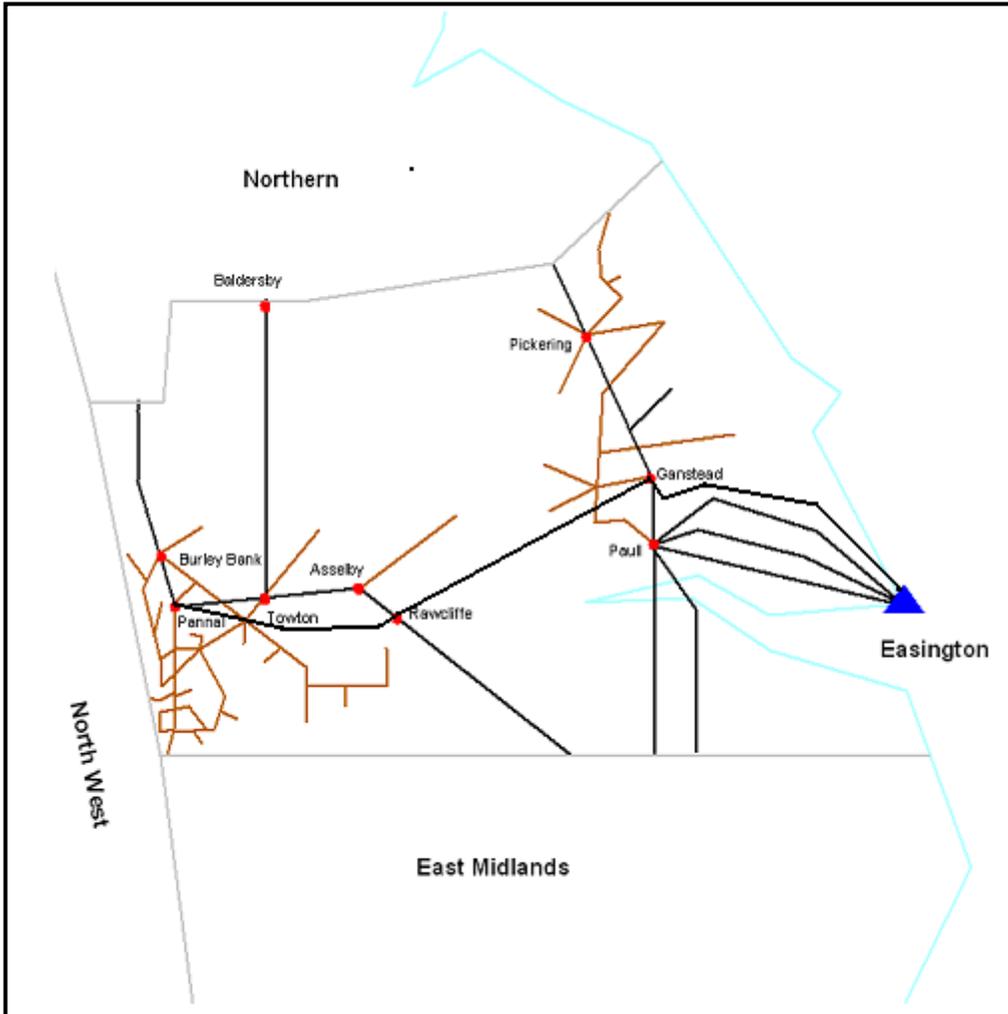
North LDZ



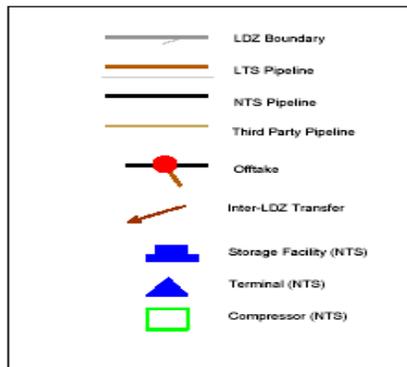
Key - Network Code LDZ Map



North East LDZ



Key - Network Code LDZ Map



Appendix Six - Connections to our System

A6.1 Introduction

Within the space of a few years, the gas industry in Britain has evolved from a situation where one company provided all new connections, to one where many alternative connection services are now available on a competitive basis.

Indeed, whilst Northern Gas Networks continues to offer connection services in line with our Gas Act obligations, customers and developers have the option to choose other parties to build their facilities, have the connection vested in or adopted by the host gas transporter (depending upon circumstances), pass assets to a chosen system operator, transporter, or retain ownership of them.

The following are the generic classes of connection.

- **Entry Connections:** connections to delivery facilities processing gas from gas producing fields or, potentially in the future, LNG vaporisation (i.e. importation) facilities, for the purpose of delivering gas into the NGN system.
- **Exit Connections:** connections that allow gas to be offtaken from our system to premises (a 'Supply Point') or to Connected System Exit Points' (CSEPs). There are several types of connected system including:
 - A pipeline system operated by another gas transporter;
 - Any other non-NGN pipeline transporting gas to premises consuming more than 2,196MWh per annum; and
 - **Storage Connections:** connections to storage facilities for the purpose of temporarily offtaking gas from our system and delivering it back at a later date.
 - **Biomethane:** Biomethane is a fully renewable source of energy and NGN is fully committed to maximising the entry of biomethane into our gas network

Please note that storage may both deliver gas to the system and offtake gas from the system and therefore specific arrangements pertaining to both Entry and Exit Connections will apply. In addition to new pipes being termed connections, any requirement to increase the quantity of gas delivered or offtaken is also treated as a new connection.

NGN is working with producers, Ofgem, DECC, HSE, equipment suppliers and other GDN's to ensure technical and commercial barriers to entry are speedily removed.

We have received a number of enquiries to enter biomethane into our pipeline system and anticipate that several of these facilities will be connected during the 10 year planning period.

These sites use a variety of feedstocks for this process such as crops, sewage, livestock and supermarket wastes and range in entry capacity from 250 – 1,200 cubic metres per hour.

It should be noted that any person wishing to connect to our system, or requiring increased flow, should contact us as early as possible to ensure that requirements can be met on time, particularly if system reinforcement is required as outlined in A6.7.

A6.2 Additional Information Specific to System Entry and Storage Connections

We require a Network Entry Agreement or Storage Connection Agreement as appropriate, with the respective operator of all delivery and storage facilities to establish, among other things, the gas quality specification, the physical location of the delivery point and the standards to be used for both gas quality and the measurement of flow.

A6.2.1 Network Entry Quality Specification

For any new entry connection to our system, the connecting party should notify us as soon as possible as to the likely gas composition. We will then determine whether the gas can be accepted, taking into account our existing statutory and contractual obligations.

The ability of Northern Gas Networks to accept gas supplies into the system is affected by, among other things, the composition of the new gas, the location of the system entry point, volumes entered and the quality and volumes of gas already being transported within the system.

In assessing the acceptability of any proposed new gas supply, we will take account of the following.

- a) Our ability to continue to meet statutory obligations (including, but not limited to, the Gas Safety (Management) Regulations 1996 (GS(M)R)).
- b) The implications of the proposed gas composition on system running costs.
- c) Our ability to continue to meet our contractual obligations.

For indicative purposes, the specification set out below is usually acceptable for most locations and encompasses, but is not limited to, the statutory requirements set out in the GS(M)R.

1. Hydrogen Sulphide
 - Not more than 5mg/m³
2. Total Sulphur
 - Not more than 50mg/m³
3. Hydrogen
 - Not more than 0.1% (molar)
4. Oxygen
 - Not more than 0.001% (molar)
5. Hydrocarbon Dewpoint
 - Not more than -2°C at any pressure up to 85barg
6. Water Dewpoint
 - Not more than -10°C at 85barg
7. Wobbe Number (real gross dry)
 - The Wobbe Number shall be in the range 47.20 to 51.41MJ/m³
8. Incomplete Combustion Factor (ICF)
 - Not more than 0.48
9. Soot Index (SI)
 - Not more than 0.60
10. Gross Calorific Value (real gross dry)
 - The Gross Calorific Value (real gross dry) shall be in the range 36.9 to 42.3MJ/m³, in compliance with the Wobbe Number, ICF and SI limits described above. Subject to gas entry location and volumes, we may set a target for the Calorific Value within this range.
11. Inerts
 - Not more than 7.0% (molar) subject to Carbon Dioxide: not more than 2.0% (molar)
12. Contaminants

- The gas shall not contain solid, liquid or gaseous material that may interfere with the integrity or operation of pipes or any gas appliance within the meaning of regulation 2(1) of the Gas Safety (Installation and Use) Regulations 1998 that a consumer could reasonably be expected to operate.
13. Organo Halides
- Not more than 1.5 mg/m³
14. Radioactivity
- Not more than 5 Becquerel/g
15. Odour
- Gas delivered shall have no odour that might contravene the statutory obligation not to transmit or distribute any gas at a pressure below 7 barg, which does not possess a distinctive and characteristic odour.
16. Pressure
- The delivery pressure shall be the pressure required to deliver natural gas at the Delivery Point into our Entry Facility at any time, taking into account the back pressure of our System at the Delivery Point as the same shall vary from time to time.
 - The entry pressure shall not exceed the Maximum Operating Pressure at the Delivery Point.
17. Delivery Temperature
- Between 1°C and 38°C

Note that the Incomplete Combustion Factor (ICF) and Soot Index (SI) have the meanings assigned to them in Schedule 3 of the GS(M)R. In addition, where limits on gas quality parameters are equal to those stated in GS(M)R (Hydrogen Sulphur, Total Sulphur, Hydrogen, Wobbe Number, Soot Index and Incomplete Combustion Factor), we may require an operational tolerance to be included within an agreement to ensure compliance with the GS(M)R.

Due to continuous changes being made to the system, any undertaking made by us on gas quality prior to signing an agreement will normally only be indicative. We are working with the Government and Ofgem in assessing the compatibility of existing specifications (both statutory and contractual) with the longer term needs of the UK in respect of additional gas supplies, and the European Association for the Streamlining of Energy Exchange (EASEE-gas) in the development of a Gas Quality harmonisation Common Business Practice. The outcomes of these projects could ultimately result in changes to our network entry quality specifications in the future.

[A6.3 Additional Information Specific to System Exit Connections](#)

Any person can contact us to request a connection, whether a shipper, operator, developer or consumer. However, gas can only be offtaken where the Supply Point so created has been confirmed by a shipper, in accordance with the Network Code.

[A6.4 National Transmission System \(NTS\) Connections](#)

The Applicable Offtake Pressure for the NTS, as referred to in UNC Section J2.1 is normally 25barg. Although system pressure is typically higher, it will be subject to variation over time and location on the network. We currently plan normal NTS operations with start of day pressures no lower than 33barg, but such pressure cannot be guaranteed as pressure management is a fundamental aspect of operation of an economic and efficient system.

NTS offtake pressures at any location will vary due to the following.

- Gas demand
- Gas supply pressures at entry points
- Compressor operation
- Pipeline sizes and maximum operating pressures
- Special operations such as maintenance and system development works

Offtake pressure also varies within day, from day to day, season to season and year to year. As a general rule, NTS offtake pressures tend to be higher at pressure sources such as entry points and outlets of operating compressors, and lower at the system extremities and inlets to operating compressors.

A6.5 Distribution Network Connections

Gas will normally be made available for offtake to consumers at a pressure that is compatible with a regulated metering pressure of 21mbarg. Information on the design and operating pressures of distribution pipes can be obtained by contacting the appropriate office.

A6.6 Self Lay Pipes or Systems

In accordance with Section 10(6) of the Gas Act, and subject to the principles set out in the published Licence Condition 4B Statement and the terms and conditions of the contract between us and the customer in respect of the proposed connection, where a party wishes to lay their own service pipe to premises expected to consume 2,196MWh per annum or less, ownership of the pipe will vest in us once the connection to the our system has been made.

Where the connection is for a pipe laid to premises expected to consume more than 2,196MWh per annum or the connection is to a pipe in our system which is not a relevant main, self laid pipes do not automatically vest in us. However, subject to the principles set out in the published Licence Condition 4B Statement and the relevant contractual terms and conditions, we may take ownership of pipes to such premises.

Parties considering laying a pipe that will either vest in us or is intended to come into our ownership should refer to the published Licence Condition 4B Statement and make contact with the appropriate office prior to the planning phase of any project.

A6.7 Reasonable Demands for Capacity

Operating under the Gas Act 1986 (as amended 1995), we have an obligation to develop and maintain an efficient and economical pipeline system and, subject to that, to comply with any reasonable request to connect premises, provided that it is economic to do so.

However, in many instances, specific system reinforcement may be required to maintain system pressures for the winter period after connecting a new supply or demand. Details of how we charge for reinforcement and the basis on which contributions may be required can be found in the published Licence Condition 4B Statement. Please note that dependent on scale, reinforcement projects may have significant planning, resource and construction lead-times and that as much notice as possible should be given. In particular, we will typically require three to four years' notice of any project requiring the construction of high pressure pipelines or plant, although in certain circumstances, project lead-times may exceed this period.

Glossary

[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.

[Composite Weather Variable \(CWV\)](#)

A single measure of weather for each LDZ, incorporating the effects of both temperature and wind speed. A separate composite weather variable is defined for each LDZ.

[Distribution Network \(DN\)](#)

An administrative unit responsible for the operation and maintenance of the local transmission system (LTS) and <7barg distribution networks within a defined geographical boundary.

[Diurnal Storage](#)

Gas stored for the purpose of meeting, among other things, 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.

[Formula Year](#)

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

[Gas Transporter \(GT\)](#)

Formerly Public Gas Transporter (PGT), GTs, such as Northern Gas Networks, 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 1st October, also referred to as a Gas Year.

[Interruptible Service](#)

A service that offers financial incentives to customers but under which we can interrupt the flow of gas to the supply point.

[Kilowatt hour \(kWh\)](#)

A unit of energy used by the gas industry. Approximately equal to 0.0341 therms. One megawatt hour (mWh) equals 10³ kWh, one gigawatt hour (gWh) equals 10⁶ kWh, and one terawatt hour (tWh) equals 10⁹ kWh.

[Linepack](#)

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

[Load Duration Curve \(1 in 50 Severe\)](#)

The 1 in 50, or severe, load duration curve is that curve which, in a long series of years, with connected load held at the levels appropriate to the year in question, would be such that the volume of demand above any given demand threshold (represented by the area under the curve and above the threshold) would be exceeded in one out of fifty years.

[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 offtakes. Consists of LTS and distribution system pipelines.

[Local Transmission System \(LTS\)](#)

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

[National Transmission System \(NTS\)](#)

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

[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.

[Odourisation](#)

The process by which the distinctive odour is added to gas supplies to make it easier to detect leaks. We provide odourisation at our offtakes.

[Own Use Gas \(OUG\)](#)

Gas used by us to operate the transportation system. Includes gas used for compressor fuel, heating and venting.

[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.

[Seasonal Normal Composite Weather Variable \(SNCWV\)](#)

The seasonal normal value of the CWV for a LDZ on a day is the smoothed average of the values of the applicable CWV for that day in a significant number of previous years.

[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.

[Therm](#)

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

[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](#)

The document that defines the contractual relationship between System Users. The Uniform Network Code has replaced the Network Code and, as well as existing arrangements, cover the arrangements between all gas transporters.

