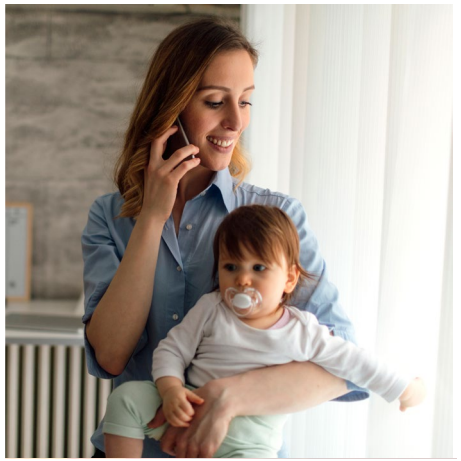
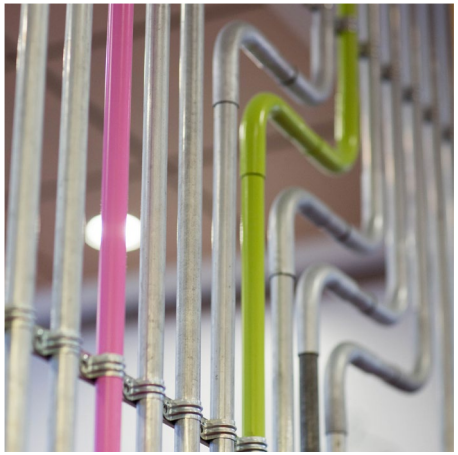
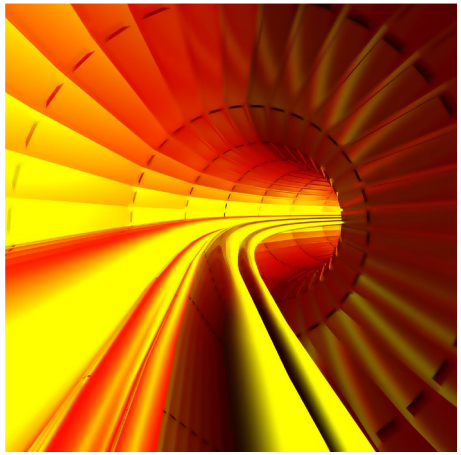
nationalgrid

End-to-end balancing guide

An overview of the commercial elements of GB gas balancing activity







National Grid November 2017

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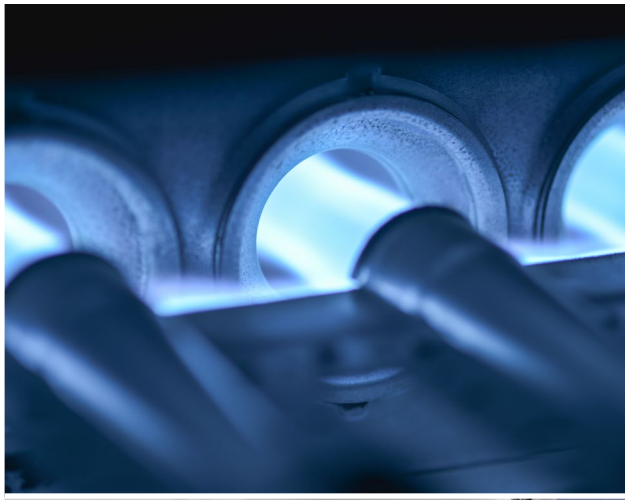
Introduction

This document outlines the commercial elements of GB gas balancing activity. We hope this guide is concise and easy to follow while giving an overview of gas transmission network balancing activity in Great Britain. We want this information to be accessible for new customers wishing to connect to the network and for customers who are more familiar with the balancing regime.

If you still have questions, or any thoughts on how we can improve this document please email us at:

Box.gas.market.devel@nationalgrid.com

All references to 'National Grid' in this document refer to National Grid Gas plc in its role as holder of the gas transporter licence in respect of the gas National Transmission System (the 'Licence').



Background

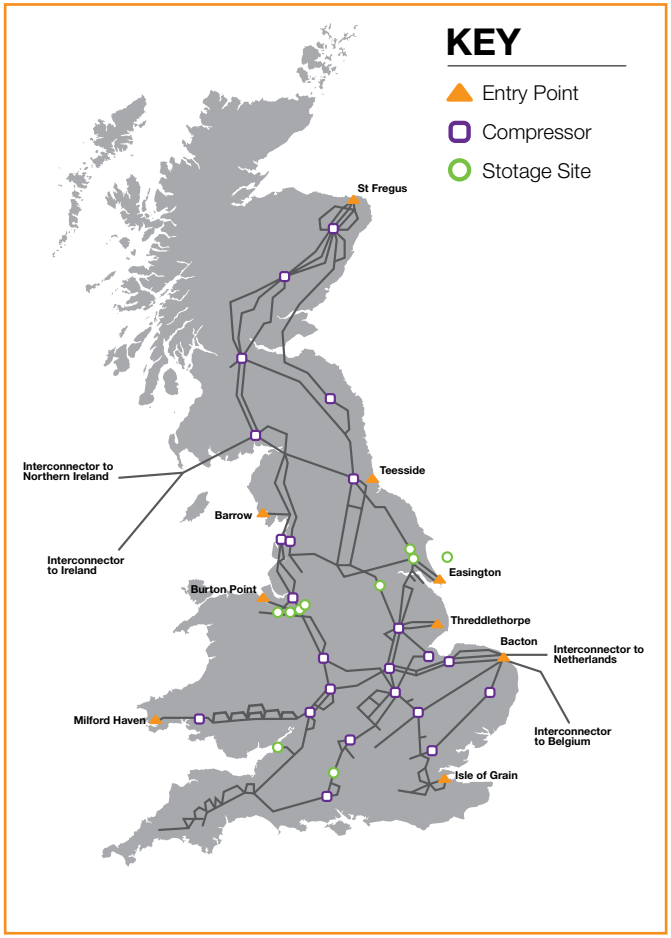
National Grid Gas plays a pivotal role in the GB gas market. We own and operate the gas National Transmission System (NTS), a high-pressure gas network that transports gas throughout England, Scotland and Wales.

The NTS network is a crucial link in the gas market supply chain; once upstream natural gas produced in offshore gas fields reaches our shores, the NTS takes it to lower-pressure distribution networks (DNs). The gas is then delivered to the businesses and homes that use it.

Natural gas arrives in GB from many sources, such as offshore gas fields in the North Sea, direct pipelines from countries such as Norway, Belgium and the Netherlands, and large liquefied natural gas (LNG) tankers.

The companies that use this gas and transport it through our pipeline network are called gas shippers – and there are many of them. Similarly there are many industries, businesses and homes that consume this gas. Shippers are incentivised so that every day they put as much gas into the system as their customers take out. This is called balancing. We can step in when the shippers are unable to keep the system in balance.

This document outlines how shippers balance the system, particularly the incentives that encourage them to balance the gas market every day. It also explains what we can do if that doesn't happen.



A map of the Gas National Transmission System (NTS)

Setting the scene

As the owner and System Operator (SO) of the NTS, our primary concern is safety. It's crucial that we make sure that NTS gas pressures stay within safe and acceptable limits. For instance, if more gas comes in than goes out, the pressure will increase. On the flip side, too little gas and the pressure will drop.

One of the challenges of our role is that gas moves slowly through the system. This means, for example, that if gas is needed in Plymouth but has been delivered in Scotland, theoretically it would take a minimum of 23 hours to reach its destination.

To meet any changes in demand we generally compress and expand gas within the pipeline system to make sure that it is always available. The amount of gas within the system at any time is known as 'linepack'. The acceptable range over which the amount of gas in the network can vary and the ability to further compress and expand this gas is generally referred to as 'linepack flexibility'. However, this flexibility has limits, so to maintain acceptable gas quantities and support its distribution there are other balancing tools we can use.

National Grid Gas is a regulated business

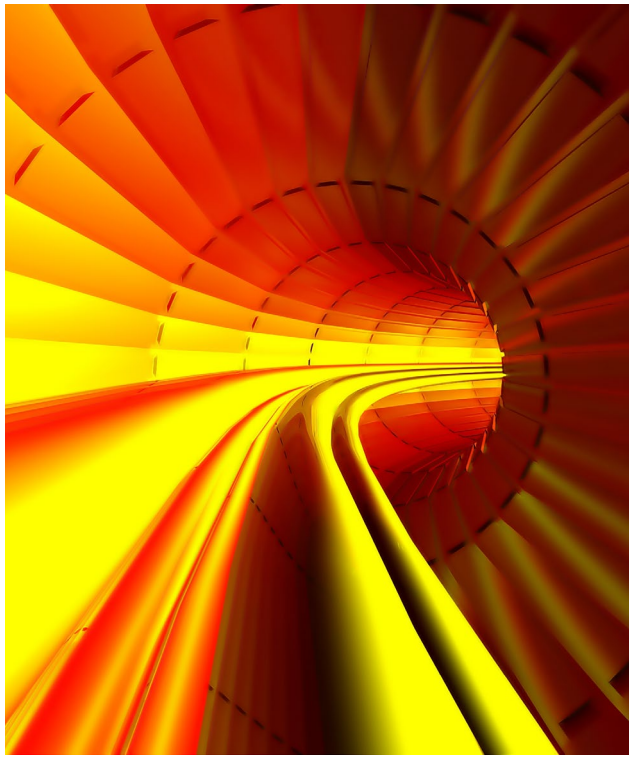
National Grid Gas is the Transmission System Operator (TSO) and we run a natural near-monopoly of the British high-pressure transmission pipeline network. We don't trade gas, other than to maintain the integrity of the system.

Access to the system is provided in a way that creates an efficient, level playing field and a competitive trading market. This is because we manage and allocate all the transmission pipeline capacity within the system using an approach called 'Third Party Access' (TPA). This means that all organisations that want to use some of that capacity have an equal and fair chance of getting it.

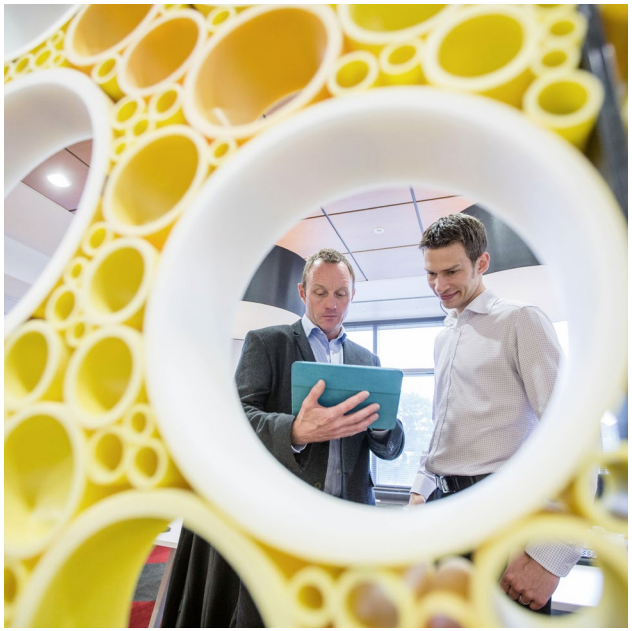
It is a regulated business; with Ofgem (the GB gas and electricity regulator) setting the amount of money we can charge the users of our pipelines.

The commercial framework

Any company wanting to trade gas, and transport this gas via the NTS, must sign up to an important legal document called the Uniform Network Code (UNC). It forms the basis of the commercial contract arrangements between gas transporters and shippers and a few other clearly defined parties. It defines the commercial rights and responsibilities of all providers and users of the gas transportation system. It also gives all parties equal access to available transportation services.



Balancing the market



Now that we've set the scene for the wider framework, we can highlight the responsibilities of the major market players and the part gas trading plays in keeping the system in balance.

What are gas shippers?

The GB gas market contains a number of players, such as producers that own and operate the offshore gas production facilities, and gas suppliers that sell the gas to businesses and domestic households.

In terms of gas market balancing, the major player is the gas shipper. Gas shippers buy gas from producers, trade gas and sell it onto gas suppliers. Importantly, they need to use the NTS to transport the gas between these two players: this means they have a critical role to play in its overall balance.

When does the gas market need to be balanced?

Shippers have incentives to balance inputs and outputs each day – what goes in should equal what comes out. Shippers are commercially exposed if their energy account is not balanced at the end of the Gas Day. We have incentives that encourage us to make sure that the whole NTS is balanced for each 'Gas Day' (5am to 5am), so that the linepack at the end of the day remains close to the level at the start of the day.

What is the residual balancer?

In addition to making sure that the system is safe, we act as the residual balancer of the GB gas market. In other words, we monitor and assess gas supply and gas demand, making sure the NTS remains within efficient operational limits so that we can deliver the level of service that we have agreed with each of our customers.

If, on any given day, we're not confident that shippers will balance the gas market, we may step in and take action to influence them, to make sure linepack levels remain within acceptable limits. The actions we can take are described in the chapter titled **'Our role as residual balancer'**.

Ofgem monitors what we do to make sure that we're working in an efficient and cost-effective way, and minimising the effect we have on the gas market. Further details on the incentive regime and how these influence the decisions we take can be found in the section titled **'National Grid's incentives'.**

Gas trading overview

There are numerous ways in which shippers and National Grid can make sure that the NTS is balanced. For instance, shippers can sign long-term bilateral gas supply contracts with gas producers.

This summary document doesn't cover all the different ways in which market participants can balance their gas portfolios. But given the importance of gas trading – especially within a Gas Day – the following paragraphs outline how gas trading can be used to balance the gas market on any given day.

Shippers can trade between themselves on various gas markets, linked to the National Balancing Point (NBP – see below), in order to balance their portfolios. This can be over the long, medium or short term. Most of these markets must be used ahead of the Gas Day, and each of the participants can see who they are trading with.

Any trades that take place outside of the On-the-Day Commodity Market (see below) are considered as Over The Counter (OTC) trades, and must be matched on the commercial system. OTC trades are enacted through a broker or an informal agreement made directly between two parties, which is then accounted for on the commercial system.

The NBP is a virtual location originally created by the Uniform Network Code to support the balancing of the system. However, it evolved to also become a trading point. This is where shippers nominate their buys and sells, and where we carry out our daily balancing activity.

The On-the-day Commodity Market (OCM)

The balancing market, is known as the On-the-day Commodity Market (OCM), is operated by the ICE Endex exchange as appointed by National Grid. The OCM is the only market we can use for gas trading, in our role as residual balancer.

Here, day-ahead and within-day trades occur anonymously, with market participants able to post bids or offers for volumes of gas. The weighted average price traded for a specific delivery day is used to formulate a system average price (SAP).

This SAP is then used to calculate charges for shippers who do not balance their portfolio (see section titled '**Imbalance charges**'). The OCM is open until 2:35am for any Gas Day, leaving just over two hours of any given day in which no trade can occur.

There are three types of trades that market participants can make on the OCM:

- **title trade** – this is the transfer of title of gas between market participants and takes place at the NBP. This may result in a change to the physical flow rate of gas. The vast majority of OCM trades are on this market.
- **physical trade** – the bid originator will identify the location(s) at which gas will be delivered, or taken, after the trade has taken place. This is the physical transfer of gas between market participants. It will change the physical flow rate of gas.
- **locational trade** – a single entry point or exit point at which gas is bid for/offered. It will change the physical flow rate of gas.

Shrinkage provider

Shrinkage is energy used in operating the system and other energy that can't be charged to consumers or accounted for in the measurement and allocation process. We buy shrinkage in three components to compensate for these areas.

Compressor fuel usage is the energy used to run compressors to manage pressures within the gas transmission system. This can either be gas or electricity, depending on the power source for the specific compressor.

Calorific value shrinkage is gas that cannot be billed under the Gas (Calculation of Thermal Energy) Regulations 1996 (amended 1997).

Unaccounted for gas is the remaining quantity of gas that is unallocated after taking into account all measured inputs and outputs from the system.

The cost of shrinkage is recovered through the NTS commodity charge rates for shippers as published on 1 April and 1 October each year on the **website**

Data on these volumes can be found under NTS Actual and NTS Procurement on the **web page.**

[1] Except for in an emergency, when we can also use the OTC.

The flow of information

Information is crucial. Without it, National Grid and shippers cannot understand the status of the gas market, and cannot take the actions needed to balance the market. The availability of supply and demand information in close to real time is also a crucial factor for the continued success of NBP trading.

We update and publish public domain gas flow information at transmission system entry points in near to real time. This means that market participants can react quickly to any change in market conditions.

Information that we provide

We provide a suite of information to help shippers balance their inputs and outputs which assists with their commercial decision making. This information is available on our **website**. The main information items we provide are summarised below.

Demand forecasts

A large amount of the gas usage in GB depends on significant factors that affect our ability to forecast gas demand such as weather conditions, including wind speed and temperature. We need to forecast gas demand to make sure that the gas transmission system can be operated safely and reliably.

Gas demand forecasts are made for the total system and for each of the local distribution zones (LDZs) at regular times each day, but further forecasts may be made if the weather forecast or demand changes. We use the information we receive to provide shippers with an estimate of the forecasted non-daily metered (i.e. small businesses and domestic consumers) gas demand.

We have incentives from Ofgem that encourage us to provide accurate and timely forecasts (there's more on incentives in the chapter titled '**National Grid's incentives**').

System and imbalance information

The individual shipper's projected end-of-day balance position is available electronically to them throughout the Gas Day. This information is based on the shipper's gas flow nominations (more information below) and notified trades. We also provide, on our website, system status information, which includes the opening linepack, projected closing linepack (PCLP) and predicted NTS demand. This report is published hourly on the **website**

We also publish on our website instantaneous flows delivered to the NTS within the Gas Day. This information is updated every 12 minutes (with data steps at two-minute intervals) on the **website**.

Information coming to us

To manage the entire pipeline network, all shippers need to regularly tell us what they expect to supply or consume on a given Gas Day. In this way, we can forecast whether supply will cover demand and whether further action needs to be taken. Shippers provide this information through a nomination process.

Nominations

A shipper must tell us through a gas flow nomination of how much gas it intends to either input or offtake at each separate entry or exit point on the system. A shipper can record its initial gas flow nominations up to 30 days in advance and can also change them at any time up to 3am[2] on the Gas Day (i.e. two hours before the end of the Gas Day).

Shippers cannot withdraw the nomination, although they can change them to any value (including zero), subject to the implied flow rate rule[3].

We can reject a nomination for a few reasons, mainly related to the format rather than the quantity contained in the nomination. We don't carry out any type of confirmation or matching process for the majority of gas flow nominations and an accepted nomination will take immediate effect unless it is rejected. The exception is at interconnection points where nominations are subject to a matching process prior to becoming definitive. In all cases we cannot change a shipper's gas flow nomination unless we're asked to do so by the relevant shipper.

[2] 2am at Interconnection Points

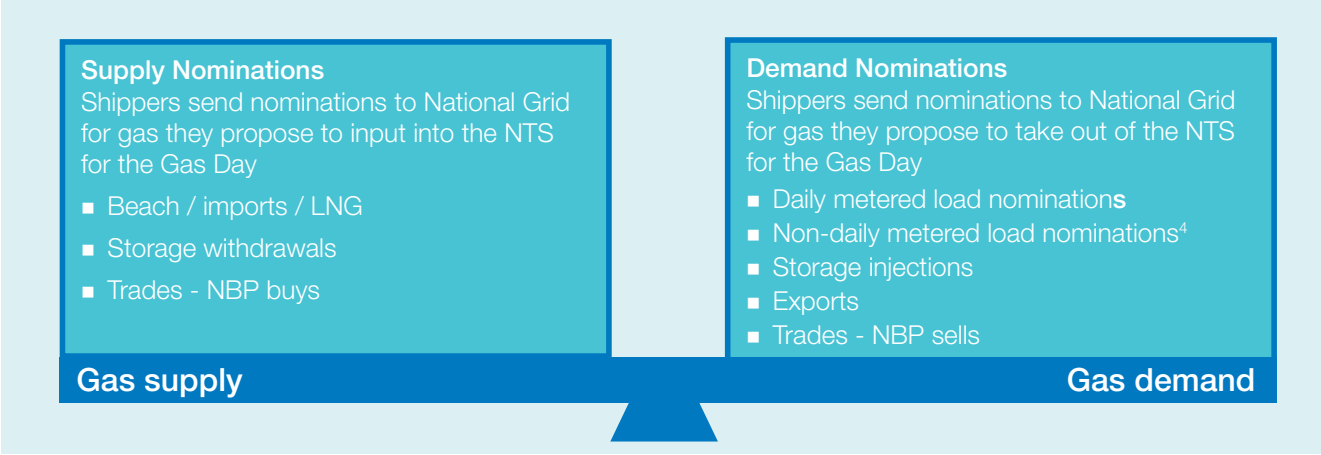
[3] The implied nomination flow rate rule gives an expectation that the gas will be delivered into the system on a flat basis (1/24th). This rule makes sure that a shipper cannot re-nominate to a level less than what would be expected to have already entered the system.

In addition to nomination data, we receive information on expected flows from entry terminals, storage facilities, interconnection points and large end consumers, such as gas-fired power stations. For sites that directly offtake gas from the NTS (NTS offtakes), such as large industrial sites and distribution network offtakes, we need an hourly breakdown of the daily gas demand so we can make sure that any changes we make to linepack flexibility deliver customers' requirements and don't have an impact on safety.

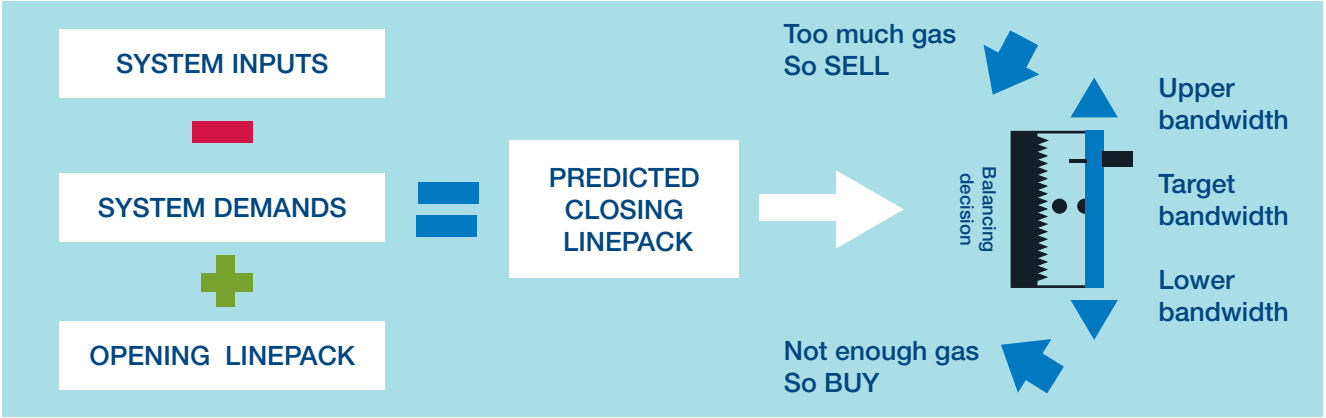
Predicted closing linepack

By assessing the predicted inputs and offtakes we can determine whether the system is likely to be within the acceptable operational range of 'balance' throughout the Gas Day. We publish a predicted closing linepack (PCLP) at regular intervals during a Gas Day based on the information we receive from industry parties.

By providing nomination data to the entire market (in anonymous form) and by publishing our own demand forecasts, all those trading at the NBP have the tools necessary to maintain Britain's security of supply.



This diagram highlights the type of information that shippers send to us.



The diagram above demonstrates how we forecast and use PCLP.

[4] Non-daily metered nominations are submitted by National Grid NTS on behalf of shippers..

Encouraging gas shippers to balance

This chapter explains the financial incentives that shippers have to balance the system.

How are gas shippers encouraged to balance the gas market?

The UNC sets out the framework to make sure that shippers have commercial incentives to flow gas on and off the NTS in a predictable and reliable way. This is important because it reduces the need for us to step in as residual balancer. When we do this, it can have a further financial impact on the market.

Shippers face two charges for incorrectly telling us when they're flowing gas into the NTS which are the costs we incur to balance the system:

- **imbalance/cash-out charges** – encouraging shippers to balance their inputs with their outputs
- **scheduling charges** – encouraging shippers to accurately nominate the amount of gas that they flow on and off the system.

Imbalance charges

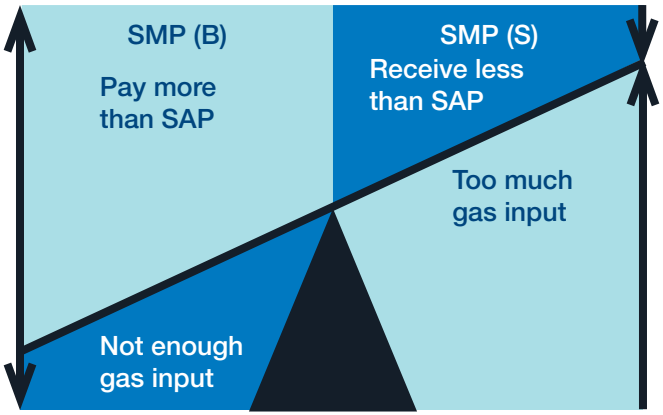
'Long' shippers – over delivery of gas

When shippers over deliver i.e. put too much gas into the NTS, they will receive a payment for each unit of their excess gas. Shippers have incentives that encourage them to balance because the unit charge will be less than the average daily price of gas. This means they're earning less than if they had sold it for themselves. The price shippers receive for each unit of over-delivered gas is the System Marginal Price Sell (SMPs) price.

'Short' shippers – too little gas

Where shippers under deliver i.e. put too little gas into the NTS, they will have to pay for each unit of under delivery. Shippers have incentives that encourage them to balance because this unit charge will be higher than the average daily price of gas. This means they're paying more than if they had bought it for themselves. The price shippers are charged for each unit of under-delivered gas is the System Marginal Price Buy (SMPb) price.

The diagram below provides an overview of the prices paid for shipper imbalance.



Scheduling charges

In addition to imbalance charges, the UNC sets an additional financial incentive for gas shippers to make sure that they accurately forecast, through their nominations to us, how much gas they will flow on and off the NTS. It is calculated by taking the difference between the nominated values and the actual flows.

What happens to the balancing charges?

The 'balancing neutrality' mechanism makes sure that we, as Transmission System Operator (TSO), don't make or lose any money through carrying out our role as the system residual balancer, or through settling shippers' imbalance charges.

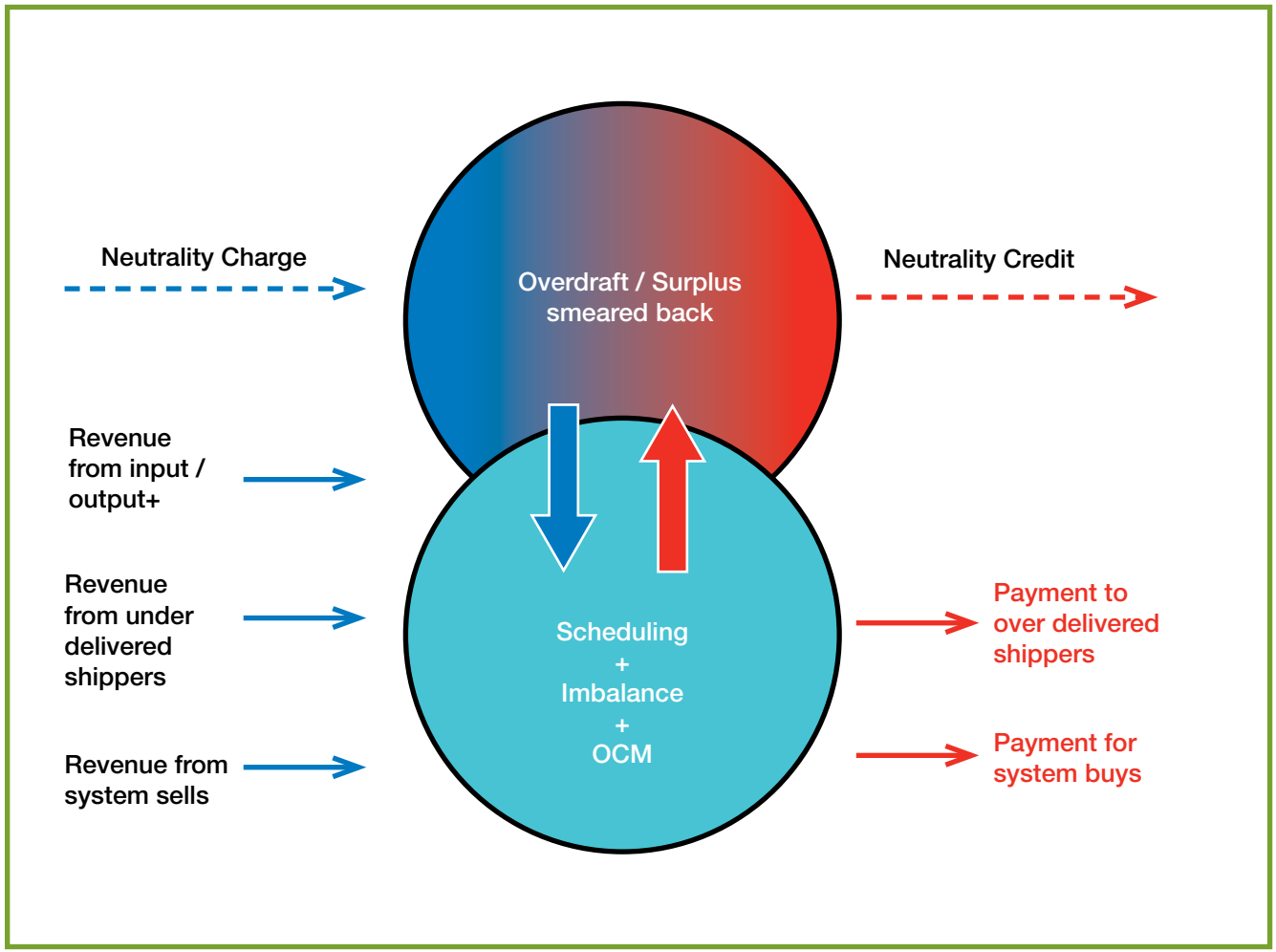
All the money that changes hands during the imbalance settlement process, and any TSO market-balancing actions costs, feeds into a 'neutrality pot'. Other charges, such as scheduling charge payments, may also be added. The balance, whether positive or negative, is redistributed back to shippers based on their usage of the system.

The balancing neutrality charge to be recovered from or credited to shippers is the difference between the amounts received and the amounts payable by National Grid in relation to all the applicable balancing charges.

For each balancing period (Gas Day) we work out:

- a net neutrality amount, which is all balancing payments made by us, minus all receipts due to us as part of the system-clearing process (this can be a positive or negative value)
- a neutrality unit price, which is the net neutrality amount divided by the sum of the total physical gas throughput (all system inputs and outputs) for all shippers
- a shipper's proportion of the neutrality costs (or revenues) is calculated by multiplying the neutrality unit price by the shipper's total physical gas throughput (system inputs and outputs) in the balancing period

We don't directly gain or lose from the costs of our balancing actions, but we can gain or lose through our incentive schemes (see more in the chapter titled '**National Grid's incentives**'). These costs or revenues aren't part of the neutrality mechanism.



The diagram provides an illustration of that mechanism

Our role as residual balancer

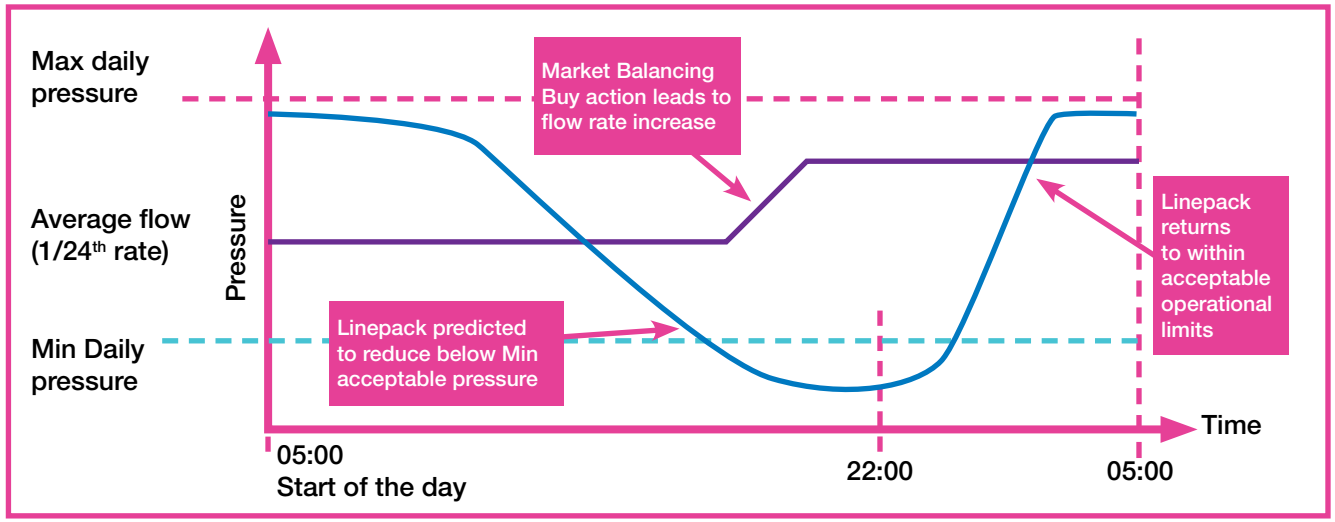
This chapter gives an overview of the actions we can take to keep the NTS operating safely.

Market-balancing actions

In our role as residual balancer, we can carry out a market-balancing action if we think the system is likely to move outside of the acceptable range of balance, either during the day or by the end of the day.

This means we can trade on the On the Day Commodity Market (OCM) to buy gas to cover an overall negative imbalance (also referred to as a short system), or sell gas to try to reduce a positive imbalance (a long system). When we carry out a market-balancing action, we're attempting to change the physical flows of gas into or from the system through market trades.

There are other tools we can use as well. For example, in order to manage the location-specific constraints of the system, we can buy back the right to flow gas or carry out location-specific gas trades. We can also agree contracts for flexibility gas in order to provide a short-term solution to system problems normally experienced at the extremities of the system. These flexibility contracts are known as 'operating margins' (OM).



Operating margins

OM gas can be called upon at short notice and supports the system for a short period of time until shippers deliver a more sustainable solution.

It provides us with flexible gas when the market actions are not expected to be delivered in time to keep the system within its safe operational limits.

We only use OM gas on rare occasions to maintain NTS pressures in the immediate period following operational stresses and before market-balancing measures become effective. Some OM is also held in reserve to manage the orderly run-down of the system if there's a network gas supply emergency. These services have an 'option and exercise' element.

How are financial costs and benefits associated with residual balancing managed?

As we mentioned in the previous sections, there are monetary values associated with market-balancing actions and the cash-out process. For market-balancing actions the net daily cost or benefit is 'smeared' (via neutrality) back to shippers that used the system on the day the action was taken. A shipper's individual portion of this cost or benefit will depend on the amount of gas it delivers and/or offtakes from the system. In both circumstances, National Grid NTS won't earn or lose money.

National Grid's incentives

To imitate the commercial pressures that would normally apply to a company in a fully competitive market, we have a number of performance incentives. These System Operator incentives aim to maintain and improve our daily operational efficiency and are renegotiated at set intervals. The incentives are developed by Ofgem and then agreed with us.

These are some of the incentives that relate to balancing activity.

Residual balancing

This financial incentive encourages us to balance supply and demand on the Gas Day and to minimise the impact we have on the market when we need to trade gas to balance the network.

Demand forecasting

We publish national gas demand forecasts over a range of timescales to help industry organisations make efficient decisions around balancing their supply and demand positions. Financial incentives in this area measure the accuracy of these forecasts and encourage us to improve the accuracy of these forecasts.

Operating margins

Operating margins is the gas used to manage the short-term impact of operational stresses (such as a supply loss) before the market responds. This avoids the need to declare a gas deficit emergency. We have a reputational incentive to buy our operating margins requirements in an economic and efficient way, and to promote competition in the provision of operating margins to the licensee.

Information provision

We provide operational and forward-looking information to the market. This incentive requires us to publish information on our website in a timely way and to include information on what the outlook will be for the coming summer and winter (as appropriate) for gas, forecast levels of demand, forecast levels of supply; plus information on the National Transmission System and the overall security of supply position, and operational data that will aim to reduce market uncertainty and increase transparency.

Shrinkage

The NTS shrinkage incentive scheme encourages us to minimise the energy costs associated with operating the network. As shrinkage provider we are responsible for managing the end-to-end service of forecasting, accounting for, procuring and supplying energy to satisfy the daily NTS shrinkage requirements. See '**Shrinkage provider**' for more.

How do we report the balancing actions we've taken?

We publish a System Management Principle Statement (SMPS) that describes how we will determine when a system-balancing action is needed and the appropriate balancing tool to use. The SMPS recognises that we have a licence obligation to operate the system in an efficient, economic and co-ordinated way and that we have a suite of commercial incentive schemes to encourage and reward such actions. The SMPS is reviewed annually with our stakeholders.

The SMPS sets out the principles and criteria by which we will determine, at different times and in different circumstances, which system-management services we will use. These tools are designed to deliver flow-rate changes for management of the system and include balancing.

The SMPS indicates which system management tools we should prioritise, may deploy, and the timing of such actions. We also make our operational decisions based on information from a number of sources within the Gas Day, including shipper nominations and their own assessments of system demand.

We also publish procurement guidelines which provide information on the system-management services and tools that we may buy as part of our residual balancer role. The guidelines cannot cover every possible situation that we may encounter, but they represent a generic statement of the procurement principles and tools that we will use in respect of gas, energy and/or capacity management

Gas supply emergency

This chapter provides an overview of the actions we can take to keep the National Transmission System operating safely in an emergency.

What is a gas supply emergency?

A gas supply emergency is defined as a potential or actual emergency endangering lives caused by a loss of pressure on the National Transmission System.

There are three categories of Gas Supply Emergency:

- a Gas Deficit Emergency can occur when the demand on the NTS is greater than the supply available through commercial actions i.e. due to insufficient supplies;
- a Safety Monitor Breach is when storage gas levels fall below the storage safety monitor; or
- a Critical Transportation Constraint happens when an issue on the National Transmission System prevents gas from reaching a certain part of the network

What legislation is in place to govern a gas supply emergency?

The legislation which governs the responsibilities and how to manage a gas supply emergency are contained in the relevant Licences, the Gas Safety (Management Regulations) (GS(M)R), Uniform Network Code (UNC) and our Safety Case.

How can we prevent an emergency?

The Gas Network Control Centre can use a number of different actions before a Gas Deficit Warning which include:

- reconfiguring the network using gas compressors to move gas around the country;
- use of linepack gas;
- trading to move prices and encourage the market to balance;
- enforce contractual limits e.g. capacity and ramp rates;
- scaleback off peak capacity and stop releasing firm exit capacity;
- trade with shippers to reduce demand:
    - buying back exit capacity;
    - reduce offtake flows; and
    - locational trades.

Should these actions fail to resolve the issue, the Network Emergency Management Team (NEMT) will be assembled to prepare an emergency strategy and the Network Emergency Co-ordinator (NEC) role is enacted. The NEC manages everything from supply of gas onto the network, through to the meter at a domestic property.

The NEC is responsible for directing all the flows on and off the network and has to ensure that those who would be in the greatest danger if their gas supply was lost are protected. Failure to abide by the NEC's direction can result in prosecution under criminal law. The NEC will act as an independent body to ensure the safety of the public'

What are the emergency stages?

A Gas Deficit Warning is issued to all users via a messaging system when there is insufficient gas available compared to the end of day forecast.

Emergency Stages				
	Stage 1	Stage 2	Stage 3	Stage 4
Actions	■ National Transmission System linepack usage; ■ Distribution Network co-operation; ■ Use of storage; ■ Assessment and acceptance of Demand Side Response (DSR) offers; and ■ Public appeals to reduce gas usage.	■ Demand Side Response remains off (where an offer has been accepted); ■ National Grid suspends participation in the OCM; ■ Maximise supplies on to the NTS; ■ Commence firm load shedding i.e. reduce or stop using gas; ■ Public appeals to reduce gas usage; and ■ Customer contacted in order of load size except for priority end-users such as hospitals; ■ Very large end-users e.g. large industrial users or power generation including interconnectors; ■ Large end-users (daily metered sites).	■ Demand Side Response (DSR) remains off (where has an offer been accepted) see below for further information; ■ Distribution Network allocation (reduction) and isolation including domestic loads; and ■ Public appeals to reduce gas usage.	■ Emergency over; ■ A notice is issued to withdraw the Gas Deficit Warning; and ■ Restoration of gas supplies begins.

It is important to note that Shippers are subject to increased incentives to balance during a gas emergency as a result of changes to cash-out arrangements during an emergency. This was implemented as part of the Gas Security of Supply Significant Code Review to take measures to reduce the likelihood, severity and / or duration of a GDE. There have not been any Gas Deficit Emergencies declared on the National Transmission System.

Testing of the emergency arrangements

In accordance with the NEC's Safety Case obligations, there is an annual test of the emergency arrangements involving the industry to ensure that they are robust and duty holders are aware of their responsibilities. We continually improve our procedures and systems based on the learning from the exercises.

Industry participants who take part in the emergency tests are:-

- Health and Safety Executive (HSE)
- Department for Business Energy and Industrial Strategy (BEIS)
  - Oil and Gas Licensing and Upstream Resilience Planning
  - BEIS Downstream Emergency Response Team
- National Grid o Network Emergency Management Team (NEMT)
  - Electricity National Control Centre (ENCC)
- Gas Distribution Network Operators (GDNO)
- Very Large Daily Metered Consumers (VLDMC's) NTS Directly Connected Loads
- Terminal Operators and Liquefied Natural Gas (LNG) Importation Terminals
- Storage Facility Operators
- Interconnector Operators
- Shippers

What is Demand Side Response and when can it be used?

Gas Demand Side Response (DSR) is a service implemented in October 2016, and developed alongside industry, to ensure the right commercial incentives are in place to encourage gas consumers to voluntary reduce their demand ahead of a gas deficit emergency. By providing DSR, large consumers (> 2 million therms / annum) could protect their critical loads by turning down other, less critical ones and receive compensation for doing so. This has the potential to minimise the cost of demand interruptions and reduce the likelihood of entering into an emergency.

What is the DSR process?

Gas DSR Service predominately involves a four way interaction between gas Consumers, gas Shippers, gas Suppliers and National Grid. The role of each party is summarised below:

- Consumer – Eligible gas consumers contract their gas supplier / shipper and offer to reduce gas consumption for a fee. If instructed gas consumption will be reduced.
- Supplier – If involved the supplier acts as an intermediary between the consumer and the shipper.
- Shipper – Following consumer agreement the DSR offer is posted onto a central trading system which only National Grid can accept. Consumers will be informed if their offer is accepted.
- National Grid – Subject to gas emergency circumstances, National Grid will accept the offer informing the gas Shipper.

A more detailed overview of Gas DSR can be found on the National Grid website and Gas DSR Brochure.

For more information on Gas Supply Emergencies – **Prodedure for Netwotk Gas Supply Emergency**.

Summary & contact details

National Grid Gas plays a pivotal role in the GB gas market. We own and operate the gas National Transmission System (NTS), a high-pressure gas network that transports gas throughout England, Scotland and Wales. As owner and System Operator (SO), our primary concern is the safe operation of the NTS.

Gas shippers are incentivised to encourage them to balance inputs and outputs every day – what goes in must equal what comes out. In our role as residual balancer, if we think the system is likely to move outside of the acceptable range of balance, we can carry out a market-balancing action. When we do this, we're attempting to change the physical flows of gas into or from the system through market trades. This places a greater financial incentive on gas shippers to balance the system themselves.

In our role as residual balancer we have incentives that encourage us to balance supply and demand on the Gas Day and to minimise the impact on the market when it's necessary to trade gas to balance the network.

Finally, information is essential. Without it, neither we nor shippers can understand the status of the gas market, and so can't take the appropriate actions needed to balance it. The market needs supply and demand information in close to real time, so we publish public domain gas flow information at transmission system entry points in that timescale. This means that market participants can quickly react to any change in market conditions.

Contact details

For any questions about this document or balancing the NTS, please contact

box.gas.market.devel@nationalgrid.com

Glossary and information sources

Cash-Out
Actions taken for energy balancing purposes incur a cost. Parties who are not in balance incur charges that reflect the costs incurred addressing the imbalance. These charges are known as cash-out prices. Cash-out prices are designed to provide market participants with strong commercial incentives to balance their contractual and physical positions and avoid exposure to cash out prices.

Critical Transportation Constraint
An issue on the National Daily Transmission System prevents gas from reaching a certain part of the network

Demand Side Response
Daily metered consumers offer to reduce their gas demand during times of system stress. More information is available on the **website**

DM – daily metered
Typically large industrial customers whose daily gas consumption is measured and transmitted to shippers or to National Grid.

Distribution system
A lower-pressure network of mains owned and operated by a number of different companies.

DN – distribution network
A gas transportation system that delivers gas to industrial, commercial and domestic consumers within a defined geographical boundary. There are currently eight DNs, each consisting of one or more local distribution zones (LDZs). DNs typically operate at lower pressures than the NTS.

DNO – distribution network operator
DNOs own and operate the distribution networks that are supplied by the NTS.

FES – Future Energy Scenarios
FES website

Gas Day
A period of 24 consecutive hours starting at 5am on a given calendar day and ending at 5am on the next.

Gas Deficit Warning
A warning given based on the impact of a significant supply or demand event which instigates a material risk to the physical end of day balance. Sign up to receive **Gas Deficit warnings** via ANS

Gas Deficit Emergency
When the demand on the NTS is greater than the supply available due to insufficient supplies.

Gas producer
A company that explores for gas, drills the wells, and flows the gas from the sea bed. It sends the gas along undersea pipelines and hands it over to terminal operators.

Gas Supply Emergency
Is a potential or actual emergency endangering lives caused by a loss of pressure on the National Transmission System

GSMR – Gas Safety Management Regulations
Website

Gas Ten - Year Statement
Information available on the **website**

GT – gas transporter
Formerly public gas transporters (PGTs), GTs, such as National Grid, are licensed by the Gas and Electricity Markets Authority (GEMA) to transport gas to consumers.

Interconnector
A pipeline transporting gas to another country. The Irish Interconnector (operated by GNI) transports gas across the Irish Sea to both the Republic of Ireland and Northern Ireland. The Belgian Interconnector (operated by IUK) transports gas between Bacton and Zeebrugge. The Belgian Interconnector is capable of flowing gas in either direction. The Dutch Interconnector (operated by BBL) transports gas between Balgzand in the Netherlands and Bacton. It is currently capable of flowing only from the Netherlands to the UK.

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

Linepack flexibility
The acceptable range over which the amount of gas in the network can vary and the ability to further compress and expand this gas.

LNG – liquefied natural gas
Gas stored and/or transported in liquid form.

LDZ – local distribution zone
A geographic area supplied by one or more NTS offtakes. Consists of LTS and distribution system pipelines.

There are 12 LDZs that take gas from the high-pressure transmission system for onward distribution at lower pressures.

Margins Notice
Information provided to all NTS users, indicating a potential supply/demand imbalance for the coming gas day. A margins notice is issued from 13:00 D-1, following an assessment of the expected available supply level against forecast total system demand. If demand is greater than supply (of any value), a margins notice will be issued via ANS.

Market-balancing action
An action taken by National Grid to change the gas flows onto and/or off the transmission network.

MIPI – Market Information Provision Initiative
A publication **platform** that gives gas participants a wide-ranging view of data relevant to the operational behaviour of the gas network.

NBP – National Balancing Point
A virtual point on the UK gas supply system through which all gas passes in accounting and balancing terms.

NEC - Network Emergency Co-ordinator consistency
The NEC is responsible for co-ordinating actions across the affected parts of the gas network to take action to prevent a supply emergency developing, and where it cannot be prevented, to take timely decisions in order to minimise the safety consequences. More information is available on the **website**

Network Emergency Management Team
Provide support to the NEC during an emergency.

NTS – National Transmission System
A high-pressure gas transportation system consisting of compressor stations, pipelines, multi-junction sites and offtakes. NTS pipelines transport gas from terminals to NTS offtakes.

Natural gas
Gas consisting mainly of methane and ethane. Occurs naturally in the earth's crust.

Nominations
A request for National Grid to receive or deliver gas to or from its system. Shippers submit daily (and sometimes within-day) nominations for the quantity of gas they wish to input to the system at each entry point, and the quantity of gas their customers are expected to take off the system.

Nominations Matching Process
The Nominations Matching Process is the exercise of comparing (and aligning where such values are different) Nomination quantities for a Shipper at both sides of a specific interconnection point, which results in consistent Nomination quantity for use by both Transmission System Operators at that Interconnection Point.

NDM – non-daily metered
All customers that do not have a daily meter-reading facility. We estimate demand for NDM customers based on a number of factors (including weather), and allocate NDM demand to shippers accordingly. Differences between actual metered demand and deemed demand may be resolved after the day through the reconciliation process.

NTS offtakes
Sites that directly offtake gas from the NTS, such as large industrial sites, power stations and distribution network offtakes.

OCM – On-the-day Commodity
Market This market constitutes the balancing market for GB and enables anonymous trading between market participants. Trading is cleared on the day.

Ofgem – Office of Gas and Electricity Markets
The regulatory agency responsible for regulating Great Britain's gas and electricity markets. Useful **information**

OM – operating margins
We contract for gas t to maintain system pressures either immediately after a supply loss e.g. in the event of plant failure, such as pipe breaks and compressor trips or a demand forecast change. OM gas is used before other measures become effective.

OTC – Over The Counter Trading
A decentralised market, without a central physical location, where market participants trade with one another through various channels such as the telephone, email and electronic trading systems.

PCLP – projected closing linepack
Linepack is the volume of gas stored within the NTS. Throughout a Gas Day, linepack levels fluctuate due to imbalances between supply and demand. As residual balancer of the UK gas market, we need to make sure that there is an end-of-day market balance where total supply equals, or is close to, total demand. The PCLP metric is used as an indicator of end-of-day market balance.

Residual balancer
If balance on the market is not expected to be achieved on any given day, then the System Operator, as residual balancer, will enter the market and carry out trades (buys or sells) to try to resolve any imbalance on the system.

RIIO-T1
Safety Case RIIO relates to the current Ofgem price control period which runs from 1 April 2013 to 31 March 2021. We refer to this as RIIO-T1.

Safety Case
The safety case establishes the arrangements for co-ordinating the actions to prevent a network supply emergency and for managing an emergency should it occur

Safety Monitor Breach
When storage gas levels fall below the storage safety monitor.

Shipper
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 includes gas used to operate the system e.g. compressor fuel and unaccounted-for gas.

Storage facility
Storage Safety Monitor Gas storage sites are comprised of depleted gas fields, aquifers, salt cavity storage, mined caverns and disused mines. Storage sites can be used to meet variations in gas demand, whether within-day or seasonal. These sites will often buy gas over the summer whilst the price is low, and then sell it over the winter while the price and demand are high.

Storage Safety Monitor
Gas is required in storage to protect small embedded industrial and commercial consumers, domestic consumers and supplies to Ireland.

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.

SO – System Operator
We are the System Operator of the National Transmission System (NTS) and have responsibility to transport gas from NTS supply points to NTS offtakes, subject to operational obligations in relation to safety and system resilience, environmental aspects, and supporting efficient market operation.

System average price
The volume weighted average of trades on the OCM. Also referred to as WAP (weighted average price).

SMPb – System Marginal Price Buy
The greater of SAP plus a differential value (revised and published each year by National Grid), or the highest priced National Grid trade on the OCM on that day.

Shippers that are short of gas on the day (their customers' offtakes exceed their inputs) must pay SMPb for short imbalances.

SMPs – System Marginal Price Sell
The lesser of SAP minus a differential value (revised and published each year by National Grid), or the lowest priced National Grid trade on the OCM on that day. Shippers that are long on gas on the day (their inputs exceed their customers' offtakes) are paid SMPs for long imbalances.

TPA – third-party access
Open and non-discriminatory access to the networks by those who do not own the physical network infrastructure.

Transmission system entry point
The point at which gas is delivered into the National Transmission System.

TSO – Transmission System Operator
Operator of a gas transmission network under licence issued by the Gas and Electricity Markets Authority (GEMA) and regulated by Ofgem.

UNC – uniform network code
The UNC is the legal and commercial framework that governs the arrangements between the gas transporters and shippers operating in the UK gas market. It is made up of different documents including the Transportation Principal Document (TPD) and Offtake Arrangements Document (OAD).