



Evolution of Third Party Access to Gas Transportation Infrastructure in Great Britain

Gas Distribution Networks

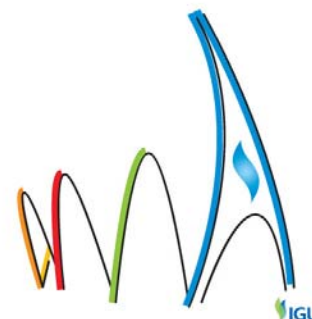


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Background

Third party access to gas transportation infrastructure in Great Britain has its roots in the 1980's with the issue of the Oil & Gas (Enterprise) Act in 1982 and the subsequent privation of the British Gas Corporation in 1986 following the publication of the Gas Act 1986. The Gas Act 1986 introduced obligatory third party access to the mid-stream gas sector in Great Britain and created a regulatory authority, the Office of Gas Supply (Ofgas), to oversee non-discriminatory access to gas pipeline infrastructure. In later years, following several competition authority investigations into the competitiveness of the gas market, the unbundling of British Gas plc into separate transportation & storage and trading arms in 1994, the publication of the Gas Act 1995 and the Network Code in 1996 created the environment for full regulated third party access to the entire gas transportation infrastructure across Great Britain. This third party access regime has been a key underpinning factor in the development of a fully liberalised and competitive gas supply market.

Aim

This paper provides a chronological overview of the evolution of third party access to gas transportation infrastructure in Great Britain since the early 1980's to the present day, the structural changes within the industry that facilitated the development of transparent and non-discriminatory third party access and the subsequent development of a competitive gas supply market for all gas end-users.



Methods

The current arrangements for third party access to gas distribution networks in Great Britain (GB) have been influenced primarily in two ways. Firstly, the developments in the legislative background and structural reforms to the gas industry in GB and, secondly, the physical characteristics of the gas transmission and distribution networks that are used for the conveyance of gas to customers.

Legislative Background and Structural Reforms

The process of gas market liberalisation in GB began well in advance of the first European drive towards gas market liberalisation in the midstream and downstream sectors when the first EU Directive 98/30/EC concerning common rules for the internal market in natural gas was issued in 1998. However, the British gas market liberalisation process did not arise from a government desire for a fully liberalised and competitive gas market in Britain, but as a consequence of the (then) Conservative Party agenda for privatisation of the nationalised industries during the 1980's.

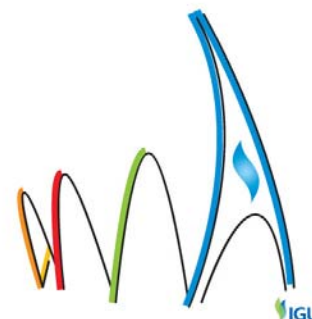
The pre-privatisation British Gas Corporation (BGC), formed in 1972, was comprised of 12 Area Gas Boards each with its own chairman and board structure, and the Gas Council, which was established to act as a liaison between the 12 Area Boards and the (then) Ministry of Fuel and Power. BGC held effective monopsony (purchasing) and monopoly (selling) rights for all gas purchased and sold to customers in Britain and entered into long-term purchasing contracts with North Sea offshore producers. Meanwhile, downstream gas prices were subject to a regime that used the weighted average cost of gas (WACOG) as a basis for the supply tariff in addition to a charge for transportation (transmission and distribution) plus an agreed profit margin.

The Oil & Gas Enterprise Act 1982

In 1982, the Thatcher Government published the Oil & Gas (Enterprise) Act aimed at liberating the gas market in Britain by establishing common carriage provisions, which, *in principle*, allowed alternative suppliers to transport gas through BGC's pipeline network. The 1982 Act was intended to effectively end BGC's monopsony rights over North Sea gas but there was a legal requirement that all gas produced on the United Kingdom Continental Shelf (UKCS) should be landed in the UK. This requirement, combined with an almost complete absence of alternative gas suppliers and clear rules around common carriage, meant that there was no option but to sell the landed gas to BGC.

The Gas Act 1986

In May 1985, the Thatcher Government announced its intention to sell shares in British Gas to the public and the Gas Act 1986 was published paving the way for privatisation of BGC in



its entirety as British Gas (BG) plc – i.e. as a fully vertically integrated company operating from wellhead to burner tip. The 1986 Act also: (i) removed BG's monopoly to supply very large (industrial and commercial) customers consuming in excess of 25,000 therms per annum (732,000 kWh) per annum; (ii) introduced obligatory third party access to other gas suppliers wishing to transport gas through BG's pipeline network; and (iii) established the Office of Gas Supply (Ofgas) as the regulator for the onshore gas industry in GB.

The OFT and MMC Investigations 1988 to 1993

In 1987, one year after privatisation, the Office of Fair Trading (OFT) referred BG's contract gas business to the Monopolies and Mergers Commission (MMC) who found evidence of extensive price and transportation discrimination by indexing of gas prices to alternative fuels and inadequate and non-transparent information concerning common carriage. The MMC also found that producers were completely dependent on BG who ensured that new fields were exploited, guaranteeing acceptance of gas produced for the life of the gas field and financing via take-or-pay obligations. Market entry for newcomers was also very difficult as BG had negotiated and signed individual contracts with its customers.

A subsequent report published by the MMC in 1988 recommended changes to promote transparency and to reduce the potential for discrimination by BG against third party entry into the industry. The key changes were the requirement that BG: (i) cease discriminating between customers and publish the prices charged to industrial and commercial customers; (ii) purchase no more than 90% of the gas produced by new fields; and (iii) publish the terms under which other gas suppliers could transport their gas through BG's pipeline network.

Further investigation by the OFT in 1990 on competition in the gas industry resulted in: (i) agreement to separate the transportation and trading arms of BG; (ii) reduce the competitive market threshold to 2,500 therms per annum (73,200kWh) per annum; and (iii) BG to reduce its share of the contract gas market to 40% by 1995.

Further reviews and investigations of BG's gas market activities by the OFT, MMC, the Department for Trade and Industry and Ofgas between 1991 and 1993 eventually resulted in the 1994 unbundling of BG's business into a number of separate subsidiaries including: (i) a transportation & storage business (Transco); (ii) public gas supply (domestic customers); (iii) business gas (industrial and commercial customers); (iv) retail (appliance trading); and (v) service (servicing and installation).

The Gas Act 1995

The Gas Act 1995 was undoubtedly the most effective legal instrument for gas market liberalisation as it introduced the requirement for competitive gas supply to the domestic sector together with a timetable for the phased roll-out of full domestic competition across



Great Britain between 1996 and 1998. The 1995 Act also established a new licencing regime for gas market participants, including: (i) public gas transporters; (ii) gas shippers; and (iii) gas suppliers. It also opened the gas connections and extensions market to competition by providing for the licencing of independent gas transporters to compete with Transco in extending the gas network and for the provision of gas connections by self-lay installers.

A key aspect of the 1995 Act was the development of the Network Code, introduced in 1996, which was a binding agreement between the gas transporter and any gas shipper wishing to use the gas transportation and storage system. The purpose of the Network Code was to establish the rules and procedures allowing for a safe and efficient use of the pipeline network within the context of the new regulatory regime as set out in the Gas Act 1995. It defined the rights and responsibilities of the participants in the gas transportation business and set out the rules under which Transco transported and stored gas on behalf of its customers, the gas shippers. Formal gas trading arrangements were also introduced in 1996 and incorporated into the Network Code whereby gas shippers purchased entry and exit capacity on Transco's transmission pipeline system, whilst the Network Code made Transco responsible for maintaining an overall physical system balance. Although individual shippers were responsible for maintaining its daily balance of inputs to and offtakes from the system, Transco could use the flexibility mechanism to buy and sell gas to maintain overall system balance and to address localised capacity constraints. The gas trading arrangements were updated in 1999 and the flexibility mechanism was replaced by the on-the-day commodity market (OCM), which is an anonymous, screen based trading system used as a system balancing tool by the NTS System Operator.

The EU Directives

The requirements of EU Directives of 1998 (98/30/EC), 2003 (2003/55/EC) and 2009 (2009/73/EC) were already enshrined in the gas market within GB as there was full unbundling with legally separate TSO, DSO's, regulated third party access and a fully competitive market, including domestic customers, by 1998.

Uniform Network Code

Following the divestment by National Grid of four of its eight gas distribution networks in 2005 to new owners and operators, the Uniform Network Code (UNC) was introduced on a much improved basis from the 1995 version of the Code and enabled gas shippers and the transmission system operator to balance more effectively. The UNC also introduced the Distribution Network Operator (DNO) and the concept of offtake capacity at the boundary of the National Transmission System (NTS) and the Local Distribution Zones (LDZ's), which can be used by a distribution network user to take gas off the NTS. The DNO's are also



obliged to inform the NTS operator (National Grid Gas) of their LDZ stock information to allow NGG to balance the system more efficiently and cost effectively.

Physical Characteristics of the Gas Transportation Networks

The National Transmission System

The National Transmission System (NTS) in Great Britain is owned and operated by National Grid Gas (Transmission) and consists of c. 7,800 kms of high integrity, welded steel pipeline operating at a pressures in the range 70-94 barg and 26 compressor stations that supply gas to power stations, a small number of very large industrial and commercial customers. The majority of the NTS was built in the late 1970's and early 1980's for a 70 barg operating pressure and was subsequently uprated for operation at 85 barg following an extensive safety review. Substantial new pipelines have been constructed in recent years to accommodate the newly-constructed LNG terminals and changing importation flows from North Sea gas fields.

The NTS operates on the basis of an entry/exit regime whereby gas is received into the NTS at 9 entry points, comprising beach terminals and LNG re-gasification plants, on the system and is transported to the 13 LDZ's (exit zones) via 106 NTS offtake stations. Figures 1 and 2 below show the configuration of the NTS and the LDZ's respectively.



Figure 1: NTS (entry points)
(source: National Grid Gas Transmission)



Figure 2: LDZ's (exit zones)
(source: Energy Networks Association)

The Gas Distribution Networks

The gas distribution networks convey gas from the NTS to the distribution connected customers within the LDZ's. The 13 LDZ's are owned and operated by 4 Gas Distribution Network Operators: (i) National Grid Gas (Distribution); (ii) Scotia Gas Networks (comprising Scotland Gas Networks and Southern Gas Networks); (iii) Northern Gas Networks; and (iv) Wales and West Utilities. Figure 3 below shows how the 13 LDZ's are grouped together under ownership and operation of the GDNO's:

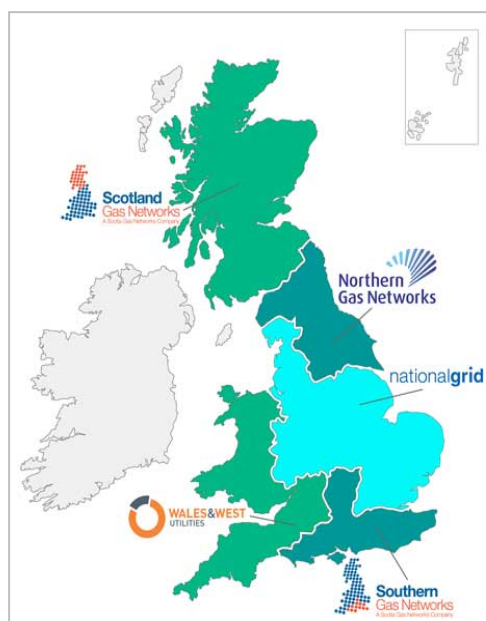


Figure 3: Gas Distribution Network Operators

The LDZ networks comprise:

- offtake stations supplying gas from the NTS into the LDZ networks;
- high pressure (HP) pipelines operating between 7 and 70 barg;
- pressure reducing installations that supply gas into the < 7barg networks;
- a network of intermediate pressure (IP) and medium pressure (MP) pipelines operating in the pressure range 7barg to 2 barg;
- district pressure governing installations that reduce the gas pressure to c.75 mbarg; and
- an extensive network of low pressure (LP) mains and service pipes operating at c.75mbarg and below conveying gas to predominantly domestic end-users.

There is a small and reducing amount of diurnal gas storage available within the LDZ's.

Figure 4 below shows the configuration of the NTS and LDZ boundary and assets.

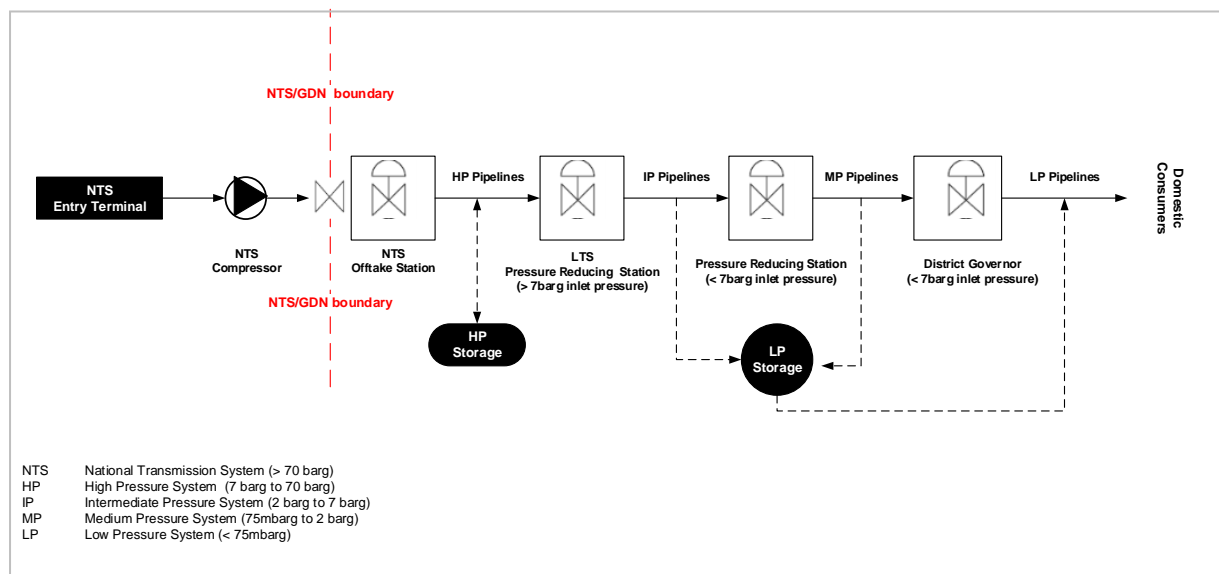


Figure 4: NTS/LDZ Boundary and Assets

The legislative and structural changes that the gas industry in Great Britain has undergone, together with the configuration of the gas pipeline system in GB, provides the backdrop for the current system of regulated third party access and charging arrangements that exist in the British gas market.

Results

Third Party Access and Charging Methodology

The Uniform Network Code (UNC) sets out the rules and procedures for regulated third party access to the gas distribution networks and gas shippers must comply with the requirements of the UNC in order to ship gas across the GDN's gas pipelines within the LDZ's. The LDZ charges are levied by the GDN's in order to recover their regulated allowed revenues as determined by the Ofgem regulatory price control¹. These LDZ charges are paid by shippers on behalf of GDN customers and comprise approximately 80% of the total gas transportation charge for customers in GB. The remaining 20% consist of transmission related charges for

¹ The RIIO-GD1 Price Control was introduced in April 2013 and sets out the revenue that the GDN is allowed to earn from consumers, as well as the outputs they have to deliver in return.



shipping gas across the NTS between entry point (i.e. beach terminal or LNG plant) and exit point (i.e. offtake station) at the NTS/LDZ boundary.

The gas transporter licence conditions require that the GDNO's develop and maintain use of system charging methodologies and these must explain the principles of, and methods used, to calculate LDZ charges. Furthermore, the gas transporter licence requires that the methodologies achieve certain objectives, for example, that charges are cost reflective, facilitate competition and take account of developments in the gas distribution businesses.

In addition to these licence objectives, the gas transporter has its own objectives with respect to the LDZ charging regime and these are that the distribution charging methodology should promote the efficient use of the transportation system, generate stable charges and be easy to understand and implement.

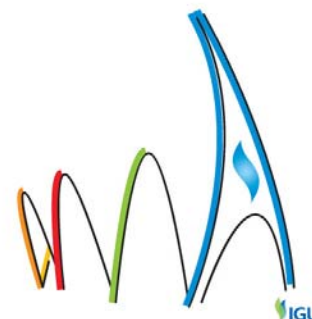
The structure of the total LDZ charges are based on a combination of LDZ System Charges (c.70%) and LDZ Customer Charges (c.30%).

LDZ System Charging Methodology

The principle underlying the LDZ System Charging Methodology is that charges should reflect the average use of the system for customers of a given gas load consumption, rather than the actual use made by a particular customer as this would be too complex to administer in a practical manner. There is a strong correlation between customer load size and their respective point of connection on the LDZ network – i.e. larger load (industrial and commercial) customers tend to be connected to the higher pressure (HP, IP and MP) tiers within the LDZ whilst smaller (domestic) customers tend to be connected to the lower pressure (LP) parts of the system.

The methodology calculates the average cost, as opposed to marginal cost, of utilisation for each of the pressure tiers of the LDZ system and, combining this with the probability of gas loads within a consumption band using that pressure tier, generates a tier charge for an average load within that band. The summation of these tier charges gives the total charge for a gas load within the consumption band to use the LDZ system.

The charges for the use of each are split into capacity and commodity elements in the ratio of 95:5 respectively and the pressure tier costs are broadly as shown in Table 1 below:



Pressure Tier	Approximate % of Total LDZ System Costs
High Pressure 7-70 barg	10%
Intermediate Pressure 2-7 barg	5%
Medium Pressure 0.075-2barg	15%
Low Pressure <0.075barg	70%
Total	100%

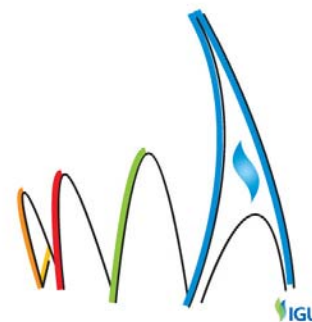
Table 1: Approximate Split of Charges by LDZ Pressure Tier

The probability of a unit of gas supplied to a customer of a given gas load size, having passed through the various pressure tiers of the LDZ system, is then estimated to calculate the average cost for customers in each gas load band of using a particular pressure tier. This is broadly the basis on which LDZ System Charges are applied.

LDZ Customer Charging Methodology

The LDZ Customer Charging Methodology reflect the costs directly associated with the supply point – i.e. the extent to which *service pipe* and *emergency service* costs vary with supply point size – whereby a total average cost per consumer is calculated, for a number of consumption bands, by adding together the unit costs of providing both service pipe and emergency service activities.

Charges for small, domestic supply points (< 73,200 kWh per annum) consist of just a capacity charge. Charges for smaller industrial & commercial supply points (73,200 to 732,000 kWh per annum) are based on a capacity related charge plus a fixed charge which varies with meter reading frequency. Charges for larger industrial & commercial supply points are based on a function that varies with supply point capacity.



The Role of Xoserve

Xoserve² is a joint gas transporter-owned agency that provides a range of centralised information and data services on behalf of all gas transporters in GB. These services include the transportation invoicing of all shippers who use the gas transmission and distribution networks in GB in addition to administering the customer switching process between suppliers that are connected to each GDNO network. The UK Link system operated by Xoserve comprises:

- A *sites and meters database* which contains the details of the 22 million customers that are connected to the distribution networks;
- A *transportation invoicing* system which generates capacity, commodity and reconciliation invoices that are sent to shippers for using the gas distribution network;
- A *supply point administration* system which allows shippers to control supply points;
- A *meter data exchange* system;
- A *billing* system which allows adhoc financial and volume invoices for adjustment charge types not billed by UK Link;
- A *distribution network link* web based application that allows the gas distributors to view certain data from their portfolios; and
- An *information exchange network* which facilitates file transfers between various critical systems and shippers

Xoserve also manages the Gemini system on behalf of National Grid Gas (Transmission) in support of its role as System Operator (SO) for the NTS. This includes gas nominations, gas trades, energy balancing, entry capacity booking and trading, exit capacity applications, transfers, assignments, auctions and invoicing. The establishment of a centralised agency such as Xoserve avoids un-necessary and expensive duplication of services in a multi-transporter, multi-shipper business environment.

² <http://www.xoserve.com/>



The Joint Office of Gas Transporters

The governance processes for the UNC is currently undertaken on a centralised basis by the Joint Office of Gas Transporters³ on behalf of all gas transporters and for the benefit of the wider gas industry in GB. This includes the UNC modifications process.

Conclusions

The requirement for regulated third party access to natural monopoly gas transmission and distribution networks has been key to the development of a fully competitive and liberalised gas market in Great Britain. However, the establishment of a regulated third party access regime and full gas market competition must be considered in the light of the significant gas industry structural reforms and regulatory interventions that occurred between 1982 and 1995/6 and subsequently to the present day. The privatisation and divestment of BGC in the mid-1980's, the legislative changes between 1982 and 1995 and the competition authority investigations between 1988 and 1993 were not altogether effective in introducing competition in the gas market in GB.

It was not until the mid-1990's that real gas market competition became established and the most important milestones by far were the unbundling of British Gas plc into separate transportation & storage and trading arms in 1994, the publication of the Gas Act 1995, the introduction of the Network Code in 1996 and the phased roll-out of domestic gas competition between 1996 and 1998.

The gas transportation sector continued to evolve post-1998 and in 2005 a multi-transporter environment in Britain developed when National Grid divested four of its regional gas distribution networks to new investors. This led to the need for certain centralised gas transportation services, namely agencies for transportation billing in the form of Xoserve and governance of a single Uniform Network Code (UNC) via the Joint Office of Gas Transporters.

The conclusions from the GB experience of the introduction of regulated third party access to gas transmission and distribution networks are that the essential components must include: (i) a truly independent regulatory authority with sufficient powers to set allowable transportation revenues, set out licence conditions, protect the interests of customers and promote competition; (ii) ownership unbundling and separate licencing for gas transporters, shippers and suppliers; (iii) a published, transparent and non-discriminatory system for transportation charging; and (iv) the cost effective provision of centralised information and data services for all market participants.

³ <http://www.gasgovernance.co.uk/>

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