Promoting choice and value for all gas and electricity customers

# Gas Quality Scenario Development and Economic Regulation workstreams - Conclusions

**Document type:** Conclusions

**Ref: 17/07**

**Date of publication**: 30 January 2007

**Target audience:** This document will be of interest to gas shippers and suppliers both in GB and in the European gas market, network owners and operators, LNG operators, LNG importers, interconnector owners and customers, and other interested parties.

**Overview:**

The quality specifications for gas entering the Great Britain (GB) system are largely based on the quality of indigenous supply sources, which have historically met most of GB's gas supply needs. As our indigenous supplies decline, more gas will need to be imported to meet demand, the quality of which may not comply with GB specifications. Following recent studies, the Department of Trade and Industry (DTI) has confirmed the current quality specifications will not change until 2020 at the earliest.

In September 2006, Ofgem hosted a work shop to discuss the short to medium term issues and risks posed by differences between GB's gas quality specifications and those in other markets. Although significant uncertainty exists regarding the extent to which gas quality may in future constrain GB gas supplies, it is important that appropriate commercial and regulatory arrangements are in place to facilitate potential investment in gas treatment facilities. This document sets out the key findings and conclusions of the two industry led workstreams Ofgem formed to consider these issues.

**Contact name and details:** Clare Sibly (Project Leader), Vanja Munerati (Scenario Development), and Hannah Cook (Economic Regulation)

**Tel:** 020 7901 7436

**Email:** wholesale.markets@ofgem.gov.uk

**Team:** Wholesale Markets

## Context

The composition of natural gas varies widely between sources of origin, and this means gas 'quality' does also. In Great Britain (GB), gas is only allowed to enter the gas network if it complies with the quality specifications determined by the Health & Safety Executive (HSE). If the quality of gas were to be outside of this range, it would have implications for the safe operation of the estimated 50 million gas appliances in GB as well as the pipeline networks themselves.

GB gas quality specifications are based on the quality of gas from the UK Continental Shelf (UKCS) in the North Sea - to date, Britain's traditional source of supply. With the likely further decline of gas from the UKCS, in the future more gas might flow from continental Europe to Britain. However, gas quality specifications in continental Europe are broader than in GB. This means that in the future there is a risk that gas flowing to GB will not comply with the GB standards. In a recent study, the DTI has determined that GB gas quality specifications will not change until 2020 on the basis of cost - a broader gas quality range would require the replacement or adaptation of all British gas appliances. An alternative approach would be to construct gas processing facilities at those entry points to the GB network that might receive gas that does not comply with the GB standards.

This document summarises the key findings of two industry workstreams examining this topic. The Gas Quality Scenario Development workstream assessed the likelihood that the quality of gas coming to GB in the future might not be consistent with the current GB standards. The Economic Regulation workstream considered what regulatory framework might apply to any gas processing facility constructed to address these potential concerns in the future.

## Associated Documents

- Advantica Report: Blending at Bacton Terminal: 26 July 2006.
http://www.nationalgrid.com/NR/rdonlyres/2CAD68F8-1323-4C8B-ACC1-18DD39CB0D01/8111/BactonBlendingPublicVersion.pdf

- Future Arrangements for Great Britain's gas quality specifications - a public consultation: 29 December 2005. Department of Trade and Industry.
http://www.dti.gov.uk/files/file15296.pdf

- Importing Gas into the UK- Gas Quality Issues: November 2003. ILEX energy consulting report, prepared for DTI, Ofgem and HSE.
http://www.dti.gov.uk/files/file20961.pdf

- Gas Transportation Ten Year Statement 2005, National Grid: December 2005.
http://www.nationalgrid.com/NR/rdonlyres/D3D26B85-FE66-49E3-AD28-1C054EC7C1AB/6017/TenYearStatement2005.pdf

- The EASEE-gas Common Business Practices
http://www.easee-gas.org/common%2Dbusiness%2Dpractices/approved%2DCBPs/

# Table of Contents

## Summary

Natural gas is made up of a mixture of hydrocarbon gases and this mixture can vary widely between sources. The 'quality' of a given amount of natural gas is determined by the relative quantities of these hydrocarbon gases, and therefore also varies considerably. In Great Britain (GB), domestic and industrial appliances are designed to operate within a certain gas quality specification range. The current gas quality standards are based on the quality of gas sourced from the UK Continental Shelf (UKCS) as this has traditionally been the prime source of supply for the GB market.

Due to the gradual decline of indigenous gas supplies, GB is likely to become increasingly reliant on more diverse sources of gas, some of which may be outside of the quality specification allowed in GB. A possible solution to this potential issue is to treat gas that does not comply with the GB standards just prior to entry onto the British gas network.

In light of these potential problems, Ofgem asked the industry to participate in an assessment and consideration of two particular issues, namely:

- how likely it was that the gas flowing to GB in the future would be of a quality that was outside of that allowed to flow onto the British network; and

- the most appropriate regulatory treatment for any gas processing facility required to treat gas to ensure that it is within the GB specifications.

Ofgem established two separate workstreams, formed from industry participants across the value chain, to examine these issues.

The group assessing the likelihood that gas flows in the future would be impacted by quality issues concluded that this was highly uncertain. Ofgem thought that buyers and sellers of gas in the competitive market place as importers of gas might be best placed to understand the quality of the gas that they are likely to source in the future and, therefore, whether it will be compliant with the GB standards. However, most were unwilling and/or unable to assess the extent to which this might be an issue going forward, with some citing commercially confidential contract information as a reason why they could not disclose this information.

The high degree of uncertainty about whether a gas processing facility would actually be needed in the future creates a stranded asset risk, where a facility might be constructed but then not actually used. The second group considered carefully how this risk should be managed. The group agreed that the best approach would be one in which the future users of the facility, National Grid Gas (NGG), and to some extent, GB customers share the risk were it decided that one should be built. As such NGG would invest in a facility in response to user signals regarding the need for this service and these users would provide commitment to purchase capacity at the facility. A further feature of the approach was that NGG would have the ability to invest over this volume if it considered this was economic and efficient.

The next steps will be for Ofgem to initiate a process of consultation on the changes to NGG's gas transporters licence necessary to support the proposed approach and for NGG, or others, to raise any required modifications to the Uniform Network Code.

# 1. Introduction

**Chapter Summary**

This chapter describes the purpose of this document, provides some background to gas quality issues in Great Britain and briefly outlines the objectives of the two gas quality workstreams. The chapter then outlines the proposed way forward for this area of work, and the structure of this document.

1.1. This document presents the conclusions of two independent, industry led workstreams, the Scenario Development workstream and the Economic Regulation workstream, which were established by Ofgem to consider the issues associated with gas quality in Great Britain (GB).

## Background

1.2. Natural gas is made up of a mixture of hydrocarbon gases, and this mixture can vary widely between sources. The 'quality' of any given amount of natural gas is determined by the relative quantities of these hydrocarbon gases, and therefore also varies considerably.

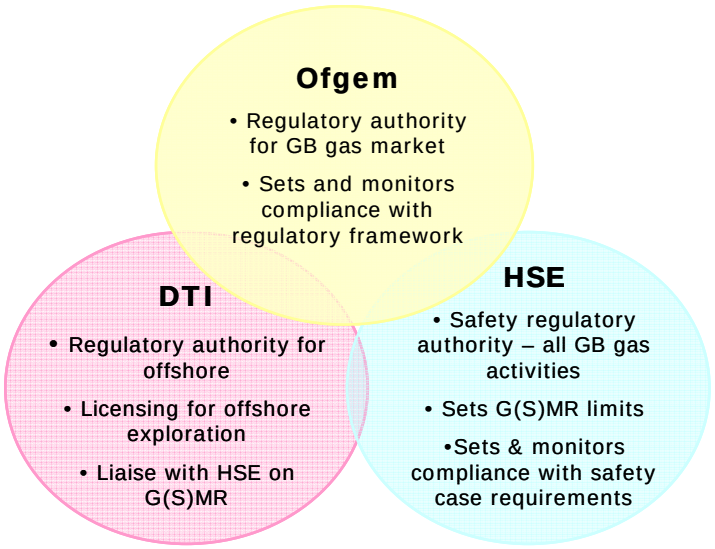
1.3. In GB, gas appliances are designed to operate within a certain range of gas quality specifications. If gas flowing onto the National Transmission System (NTS) does not comply with these parameters there will be implications for the safe and secure operation of the NTS as well as the safe operation of those appliances both directly and indirectly connected to the NTS.

1.4. To manage these safety concerns there are legal gas quality parameters in place which prescribe the allowable range of quality specifications for gas entering into and leaving the NTS. Oversight of all aspects of gas quality are managed by three public bodies:

- The Health & Safety Executive (HSE) which sets the quality levels of gas,
- The Department of Trade and Industry (DTI) which regulates the offshore regime and liaises with the HSE on gas quality matters, and
- Ofgem, which regulates the onshore gas market and monitors compliance with the onshore regulatory framework.

1.5. Figure 1.0 below sets out more fully the roles and responsibilities of the three bodies.

**Figure 1.0: Roles and responsibilities for regulation of gas quality**




1.6. The allowable range for the quality of gas that can be transported on GB's gas network is set out in the Gas Safety (Management) Regulations (GS(M)R)) and is specified by the HSE. These standards are underpinned by NGG's safety case[1]. Under the GS(M)R, NGG is prohibited from conveying gas on the NTS unless the gas complies with the specifications set out in the GS(M)R[2].

1.7. The current GB gas quality standards are based on the quality of gas sourced from the UK Continental Shelf (UKCS), as this has traditionally been the primary source of supply for the GB gas market. Due to the gradual decline in indigenous gas supplies, GB is likely to become increasingly reliant upon imports of gas. Gas that is sourced from other global locations is generally of a different gas quality specification to that of the UKCS.

1.8. A recent study by the DTI examined the issue of future gas quality specifications and concluded that the GB specifications will not be amended until at least 2020[3]. This conclusion was reached on cost grounds - to revise the GS(M)R so that a broader quality range of gas could be accepted onto the NTS would require the existing 50 million UK gas appliances to be replaced or adapted (and estimated to cost in the range of £2.0bn - £14.5bn, in 2005 net present value terms[4]).

[1] Section 15 of NGG NTS's safety case
[2] Section 8(1) of the GS(M)R
[3] The DTI launched a three-phase exercise in 2003 to assess gas quality issues. Phase 1 included a scoping study to assess the implications of future gas specification issues, phase 2 was a consultation regarding the appropriate policy response to these issues and phase 3 incorporated a further consultation which concluded that the GB gas quality specifications would not be changed. A copy of each of these consultations can be found at www.dti.gov.uk
[4] http://www.dti.gov.uk/files/file15297.pdf

1.9. It is the responsibility of NGG as Transmission System Operator (TSO) of the NTS to ensure that the gas entering its transmission system complies with the GB gas quality specifications. If, at any point of entry onto the NTS, the flow of gas is outside of the gas quality specifications as set out in the GS(M)R, our understanding is that NGG will cease gas flow at this entry point to prevent it from entering the system. Therefore, in the future, variations in the quality of gas flowing from import sources may mean some gas cannot be accepted onto the NTS. Whilst it is the responsibility of NGG to ensure that gas entering the system complies with its safety levels, it is not responsible for ensuring that gas delivered to the point of entry is compliant. Rather, by ensuring that it is well understood that NGG will only accept gas that is compliant with GS(M)R specifications, it is assumed that buyers and sellers of gas that wish to bring gas into the GB to meet its customers' needs will ensure that its gas is within the specifications set by the HSE.

1.10. It is, however, possible to treat gas that does not comply with GS(M)R specifications prior to entry onto the NTS. Treatment of gas typically involves blending or ballasting the gas at a gas processing facility just prior to the point of entry onto the network to alter its chemical composition. This document therefore considers the extent to which gas flowing to GB in the future is likely to be outside of GB's quality specifications and how the costs of any expenditure incurred in treating gas to make it compliant with existing UK specifications should be recovered and, potentially, the regulatory treatment of such costs.

## Associated European issues

1.11. In addition to the gas quality issues currently being considered in GB, there are a number of initiatives being undertaken in Europe.

1.12. An industry group, the European Association for Streamlining of Energy Exchange GAS (EASEE-gas), has proposed the adoption of gas quality specifications that will differ (and will be wider) from current GB specifications (known as the standards). Although the EASEE-gas proposal is not legally binding a large number of TSOs on the continent are already using its suggested gas quality specification. It is not clear at this stage whether legally binding requirements for gas quality specifications will be developed and if so what form they would take.

1.13. The European Commission is also currently working on an "Interoperability Project" with respect to the gas markets in Europe[5]. This is intended to gain a better understanding of the interoperability issues between connected EU gas networks and includes the issue of differences in gas quality specifications and also others such as day-to-day operational issues. The first stage in this project is to identify interoperability issues at interconnection points and the most significant interoperability issue identified to date is the UK-Continent gas quality issue. The

5 http://www.grid-interoperability.org/index.html

second step of the project will be to look at potential solutions to ensure that the flow of gas is not distorted.

1.14. A European Regulators' Group for Electricity and Gas (ERGEG) taskforce has also been formed with the objective of looking into issues associated with interoperability; Ofgem is leading on this area of work. The main focus of this work will be to develop a framework for effective and non-discriminatory access to gas blending and conversion services (and facilities). It is expected that ERGEG will publish an initial consultation in the coming months. It is therefore important that we continue to feed into these discussions to ensure that any regulatory framework developed in GB is compatible with solutions adopted by ERGEG in order that these arrangements do not distort trade between Member States.

**Industry led workstreams**

1.15. Ofgem notes the DTI's work which concluded that there should be no change to GB gas quality specifications until at least 2020, as well as the various European issues, and recognises the potential implications that this could have for flows of gas to GB in the future. In light of this, and the continuing decline of indigenous supplies from the UKCS, we think it is critical to consider the scope of potential gas quality constraints in GB, and possible solutions to these challenges, as a priority.

1.16. Given that market participants, particularly those contracting for imports of gas to be delivered to GB, are in a position to have the best perspective on the extent to which variations in gas quality could be an issue for GB in the future, we consider that the industry's perspective is critical.

1.17. It was for this reason that Ofgem chose to initiate close engagement with industry players on gas quality issues through a collaborative work shop held in London on 13 September 2006[6]. It was agreed by attendees at this work shop that the importance of these issues, particularly with respect to the implications of gas quality for security of supply in GB, justified taking this work forward in the form of focussed workstreams.

1.18. To assess the full suite of options available to the GB market, from retaining the status quo to investing in the necessary facilities to treat non-compliant gas, work shop attendees agreed that it would be necessary to establish the materiality of the gas quality issue, and the regulatory principles which should govern any solution. It was with these outcomes in mind that the two workstreams were established. The purpose of these workstreams were:

[6] Further information about this workshop can be found at http://www.ofgem.gov.uk/ofgem/work/index.jsp?section=/areasofwork/wholesalemarketmonitoring.

- **Scenario Development workstream** – to develop and assess a range of scenarios capturing the potential impact on GB's gas supply of gas quality requirements in GB being more restrictive than those in connected markets; and

- **Economic Regulation workstream** – to identify, through examining a range of options, the most appropriate regulatory framework to apply to any gas treatment facility developed to remedy gas quality issues.

1.19. An open invitation to participate in these workstreams was issued by Ofgem in September 2006[7] and the two groups convened for the first time shortly after this. The objectives, participants, work programmes and conclusions of these groups are detailed in the following chapters.

## Way Forward

1.20. With respect to the Scenario Development workstream, we recognise that further work could be undertaken to forecast better the impact on future GB supplies of gas quality constraints. Although we would be happy to take part in any further assessment of these issues, we believe the industry should decide if and how this analysis should be progressed.

1.21. Ofgem considers that further work will be required to develop the detail of the high level regulatory principles agreed by the Economic Regulation workstream. To facilitate this, it may be appropriate for a subsequent industry-led forum to be established. A possible outcome of this forum could be the publication of an Initial Views document on the appropriate regulatory framework to support investment in gas treatment facilities.

1.22. We invite the views of market participants on our proposed way forward. In particular, we are keen to hear views relating to the scope of work that should be undertaken with respect to:

- Further assessing the impact on GB's gas supply of gas quality specifications in GB being more restrictive than those in connected gas markets; and/or

- Developing the regulatory framework that should apply to any facility developed to address gas quality constraints.

## Structure

1.23. This conclusions document consists of four chapters. This chapter provides some background regarding the issues associated with gas quality and outlines the

[7] http://www.ofgem.gov.uk/ofgem/work/index.jsp?section=/areasofwork/wholesalemarketmonitoring

work that has been undertaken to date to address these potential constraints. It also sets out the structure of the document and a proposed way forward.

1.24. In Chapters 2 and 3 we summarise the work undertaken by the Scenario Development and Economic Regulation workstreams respectively and the main conclusions reached in each of these workstreams. Chapter 4 briefly summarises the way forward.

# 2. Scenario Development workstream

**Chapter Summary**

This chapter details the purpose of the Scenario Development workstream, which was to assess the impact on GB's gas supply position of variations in the quality of gas flowing from potential gas import sources. The chapter proceeds by outlining the approach adopted by the workstream, including the development of a range of different scenarios for the future supply of gas to GB. Finally, the chapter sets out the conclusions reached by workstream participants with respect to the volume and quality of gas that is likely to flow to GB under each of these supply scenarios.

## Objectives and desired outcomes of workstream

2.1. To understand better whether the quality of gas flowing from various European and global sources could restrict supplies of gas to GB, it is important to establish where GB is likely to source its gas from in the future. Combining information about the volumes of gas flowing to GB from the various potential import sources, with information about the quality of these gas flows, will determine the extent to which gas destined for GB could be prevented from entering the NTS because the quality of the gas does not comply with GB specifications.

2.2. Historically, the majority of GB's gas demand has been met by indigenous supplies from the UKCS. However as a result of the ongoing decline in UKCS gas, GB's dependence on gas imports appears set to increase. Given the considerable uncertainty regarding which import sources will meet GB's gas demand, the workstream considered it appropriate to develop a set of supply scenarios that allow for a range of possible supply profiles in GB. These supply scenarios, combined with information on the quality of the gas from each supply source, would then determine the extent of any gas quality supply constraints in GB in the future.

2.3. On this basis it was agreed that the objective of the Scenario Development workstream was to develop and assess a range of realistic gas supply scenarios for the GB market in the medium to long term. The scenarios considered the various sources from which GB gas supplies may flow in the future, and what the quality of these gas flows could be. The workstream then determined the extent to which gas flows to GB might be restricted because of the tighter gas quality requirements applying in GB relative to connected markets.

2.4. We considered that an industry led workstream would be best placed to develop these scenarios given that market participants, and in particular those contracting for gas imports to GB, are likely to have an informed view on the extent to which gas quality issues could constrain flows of gas to GB. It was also anticipated that engaging industry participants in these issues through a collaborative workstream would build on the wider industry's understanding of the scale of gas quality issues.

2.5. Workstream participants agreed on terms of reference, which defined the objective and scope of the workstream[8]. Workstream participants considered that it would be appropriate to develop the scenarios in a smaller work group within the workstream, which included representation by TSOs, shippers, producers and LNG importers[9]. The full workstream would then review and provide feedback on this work.

## Scenario Development

2.6. This section presents the initial set of supply scenarios developed by NGG as part of its Ten Year Statement (TYS), and used as a starting point for this workstream exercise. We then outline the key parameters agreed by workstream participants to focus the scope of the scenario development work. These initial considerations led to the construction of a scenario development 'straw man', which is also discussed in some detail, as is the input received from TSO's and other workstream participants. Finally, the section outlines the conclusions reached by the scenario development workstream with respect to the likelihood of each of the possible gas supply outcomes occurring.

### NGG's supply scenarios

2.7. As a basis for developing the supply scenarios, the workstream recognised that NGG develops it own supply scenarios as part of its TYS, and that these scenarios are likely to be well-informed given NGG's role as TSO. In the TYS 2005[10], NGG published three scenarios of possible gas flows over the period 2004/2005 to 2014/2015. The scenarios described how GB demand is to be met from the various potential gas supply sources, including LNG imports, gas from the UKCS, Continental Europe, and Norway.

2.8. The three scenarios developed by NGG were the Transit Link, Global LNG and Auctions Plus scenarios. These were considered by the workstream, and are described briefly below:

- **Global LNG**: The main assumption underlying this scenario is that the majority of LNG potentially destined for the UK is diverted to alternative markets. Therefore, LNG supplies are not a feature of this scenario and this is justified by stronger gas prices outside of GB. Consequently, the supply shortfall in GB is met through alternative sources of supply. The scenario assumes high import volumes, mainly from Norway, and to a lesser extent from the Continent.

[8] A copy of the terms of reference can be viewed at Ofgem's website www.ofgem.gov.uk
[9] The notes of each meeting as well as associated meeting materials, can be found on Ofgem's website at www.ofgem.gov.uk
[10] Gas Transportation Ten Year Statement 2005, National Grid, December 2005, http://www.nationalgrid.com/NR/rdonlyres/D3D26B85-FE66-49E3-AD28-1C054EC7C1AB/6017/TenYearStatement2005.pdf
It is worth noting that NGG has since published TYS2006.

- **Transit UK:** Under this scenario the UK is used as a hub for mainland Europe by the international LNG players. The scenario assumes an aggressive and ongoing build-up of imports from Norway and through LNG terminals, implying a surplus of supply in the GB market. Considerable exports to the Continent are therefore a feature of this scenario.

- **Auctions Plus**: This scenario is driven by NTS Long Term System Entry Capacity (LTSEC) auction results and planning forecasts. The main principle underpinning this scenario is that capacity is booked at the NTS entry terminals on a long term basis, and this is considered a good indication of where gas will come from in the future. Based on the LTSEC auction results through to December 2004, the supply profile is projected across all NTS entry points. The projected scenario results in a build up of imports from Norway and LNG, whilst UKCS supplies continue to decline.

2.9. Workstream participants decided early on in the process that the Auctions Plus model was an unrealistic option for future gas supply, however it was agreed that the Global LNG and Transit UK models should be considered further.

**Key parameters**

2.10. A number of key parameters were agreed by the workstream initially, to focus the scope of the analysis.

2.11. The scenario development analysis was limited to considering gas flows to GB during two, discrete, one-year periods. The workstream recognised that the construction of any infrastructure (such as a gas treatment facility) at an import terminal would have a considerable lead time. Workstream participants agreed that 2009/10 would be the earliest appropriate period to consider in developing the supply scenarios. It was also agreed that the scenarios should consider the supply position in GB in 2013/14 given the greater uncertainty regarding how GB gas demand will be met at this time.

2.12. It was agreed by workstream participants that the scenarios would not include LNG imports on the basis that LNG import facilities are built with their own gas treatment facilities, and therefore the gas from these facilities would always fall within GB quality specifications.

2.13. While the workstream considered that all four gas import terminals (St. Fergus, Bacton, Theddlethorpe and Easington) are important in terms of understanding the potential for gas quality issues to constrain flows of gas to GB, it was decided that the Bacton terminal should be the focus of this scenario development exercise. This is because wider gas quality specifications in Continental Europe mean gas flowing to Bacton through IUK and/or BBL might be outside of GB requirements, depending on the exact source. For example, gas flowing from certain Norwegian fields tends to vary in terms of quality and therefore may not comply with GB requirements, whereas Dutch gas tends to largely be within GB gas specifications.

2.14. Based on these assumptions, and the two NGG supply scenarios considered relevant by workstream participants, it was decided that Ofgem and NGG would construct a scenario development straw man, which would allow further assessment of the supply scenario possibilities for the Bacton import terminal. This straw man is discussed in the next section.

**Scenario Development straw man**

2.15. This section provides a high level summary of the construction of the scenario development straw man. The straw man helped facilitate further assessment by workstream participants of the supply scenarios through Bacton for the years 2009/10 and 2013/14[11]. This led to determining the appropriate gas quality parameter to focus on, and finalised the key characteristics of the various supply scenarios.

2.16. The workstream agreed that the analysis, from a gas quality perspective, should focus only on the Wobbe Index[12]. The Incomplete Combustion Factor (ICF), a gas quality parameter also included in GS(M)R, was considered initially however the group concluded that it would not be appropriate to include ICF as it is effectively derived from the Wobbe Index.

2.17. The workstream noted that the Wobbe Index value of potential gas supplies flowing to the GB market through Bacton was more likely to breach the upper bound of the GS(M)R specifications, rather than the lower bound, and therefore this upper bound should be the primary focus. As such, the volume of imports which exhibited a Wobbe Index above the upper bound of the GB specifications (high Wobbe gas) was considered for all supply sources, apart from new UKCS supplies where it was considered more likely that the gas would be of a Wobbe Index below the lower bound of the GB specification (low Wobbe gas).

2.18. Following subsequent workstream discussions, and drawing on the straw man developed by Ofgem and NGG for assessment purposes, it was agreed that the Transit UK and Global LNG scenarios should be developed further, and that two additional scenarios (Equilibrium and Design Limits) should be included. A brief overview of these four scenarios is provided below:

- **Transit UK:** A surplus of supply in the GB market is still a feature of this scenario. A high level of LNG imports and imports from Norway, in preference to

[11] Both the 'straw man' and the accompanying notes providing more background to the assumptions have been made available on Ofgem's website.
[12] The Wobbe Index is defined as the calorific value (CV) of gas, divided by the square root of the relative density. It is one key property that determines whether gas can be safely burned in industrial and domestic appliances without giving rise to safety, environmental and appliance function concerns. The Wobbe Index range for the UK is set at 47.2 – 51.41 MJ/sm3 under GS(M)R, and 47-54 MJ/sm3 for EASEE-gas.

Continental options, implies a shortage of gas on the Continent. The interconnectors will be exporting for most of the year, and even during winter imports to GB will be relatively low despite GB experiencing high demand and/or high prices. Based on the relatively high level of exports and a surplus of gas in the domestic market for most of the year, this scenario assumes depressed GB prices, and therefore development of additional UKCS supplies is marginal.

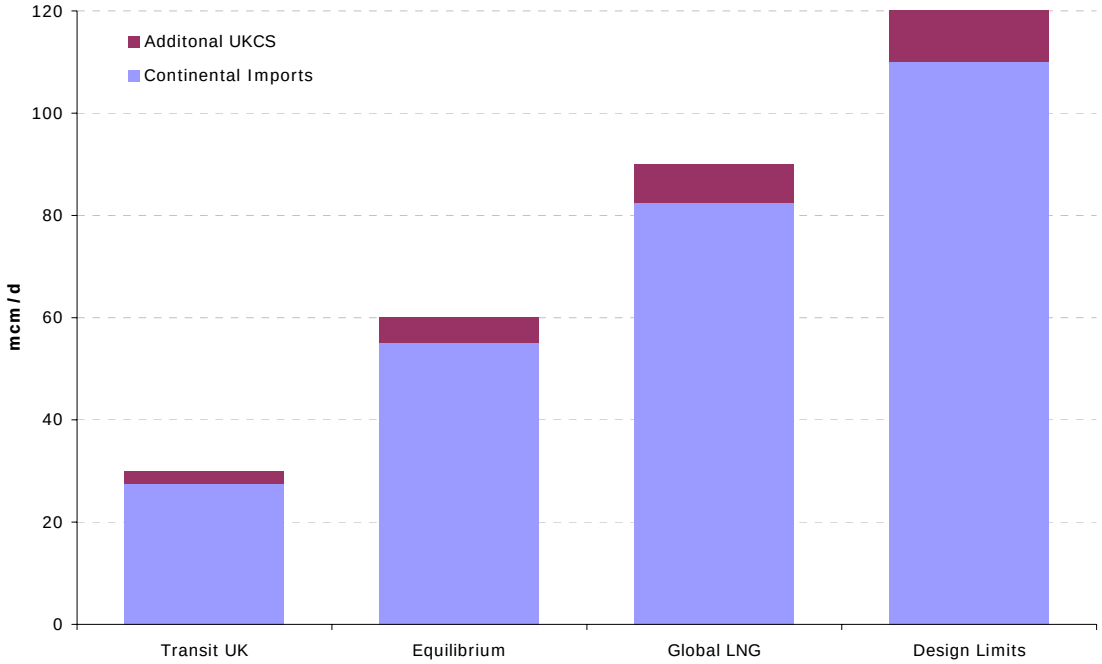
- **Equilibrium:** The main feature of this scenario is an increased need for Continental European gas to flow to GB, as a result of lower levels of LNG imports and imports from Norway. Instead, Norwegian and LNG supplies are made available to the Continent, increasing the level of available supplies on the Continent. GB gas prices in this scenario are higher than in Transit UK, thus influencing further development of additional UKCS supplies.

- **Global LNG:** This scenario assumes that despite LNG being shipped to alternative markets, imports of Norwegian gas to GB are also lower than anticipated in the 2005 TYS due to contractual commitments, or greater Continental needs arising from the loss of a supply source. To meet the supply shortfall GB receives relatively high volumes from the Continent. The availability of Continental supplies for GB imports is relatively high due to development of all proposed Continental LNG terminals and additional Norwegian supplies being delivered. Additional UKCS supplies are prompted by high GB gas prices in this scenario.

- **Design Limits:** Under this scenario, all Continental and Norwegian imports to GB flow at full capacity. The main feature of this scenario is the assumption that certain economic circumstances arise which justify such extreme flows to the maximum capability of the entry terminal. In the same manner, high levels of additional UKCS supplies are assumed.

2.19. Based on support at the workstream for these four supply scenarios, and their view of the importance of the Bacton terminal, the gas supply profiles under each scenario for the 2 periods 2009/10 and 2013/14 were constructed. These profiles include the import flows through Bacton from Continental Europe (ie. BBL and IUK), as well as the additional UKCS flows coming through Bacton. The flows are described in terms of average flows per day in the relevant periods (mcm/day). The results for 2009/10 are presented in Figure 2.0 below:

**Figure 2.0:**




## Feedback on scenario development straw man

2.20. Given workstream participant's understanding of the likely sources of supply meeting GB gas demand in the future, we considered that their input would allow development of a more robust picture of the volume and quality specification of gas flowing to the GB market. This section summarises the feedback received during the scenario development process.

*Input from TSO's*

2.21. TSO's provided their best estimate of the likely volume of flows to the Bacton terminal in future years, and the associated quality of these flows. The views were characterised with a high level of uncertainty regarding both the volume and quality of the gas that may flow through IUK and the BBL pipeline.

- BBL - In 2009/10 it was considered likely that the majority of gas coming through BBL will be within the GB specifications, as this would be sourced from local Dutch gas (which is of a similar specification to GB standards). During 2013/14 gas through BBL may continue to be sourced from local Dutch gas and therefore remain largely within the GB specifications. However if these flows were to come from Norway, the gas would predominately be out of GB specification.

- IUK - Only the quality of gas through Eynatten, an entry point to the Belgian gas network, is known with certainty. Considering the possibility that other sources of IUK flows (i.e. Zelzate, Zeebrugge and LNG terminals) will be outside the

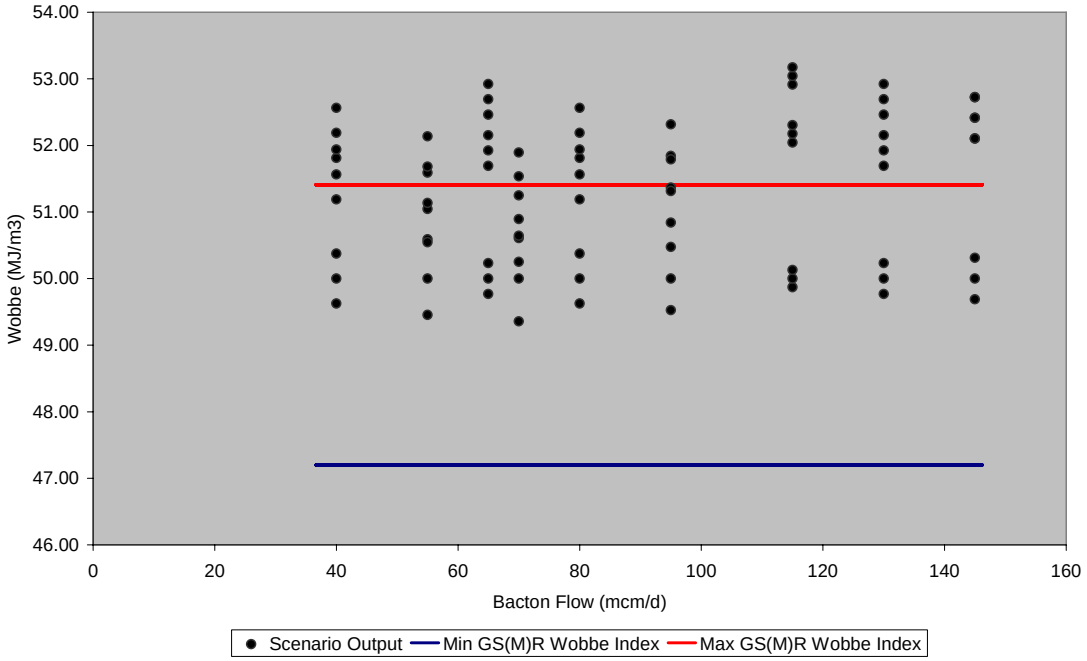
range of allowable GB gas quality specifications, it follows that in 2009/10 as little as 35% of gas coming into the UK through IUK will be consistent with GB's gas quality specifications.

2.22. Following workstream discussions, it was agreed that the Design Limits scenario was not as realistic as the other three supply scenarios, on the basis that having all import infrastructure flowing at full capacity is not very likely. It was determined that only the Transit UK, Global LNG and Equilibrium scenarios should be taken forward for modelling purposes.

2.23. Based on these three supply scenarios, and input from the TSOs, a simulation model was run by NGG to generate 81 possible gas quality supply outcomes. These supply outcomes are essentially a set of all the considered combinations of gas volumes and Wobbe Index values. These outcomes include a range of high, medium and low estimates (in terms of volume) for gas supplies from the UKCS and the Continent, and also consider, for both UKCS and Continent flows, high, medium and low estimates for the Wobbe Index associated with these flows. The spread of outcomes can be seen in Figure 2.1, and more background to the development of these 81 supply outcomes can be found on Ofgem's website[13]. The graph shows that 42 (52%) of the 81 supply outcomes fall outside the GS(M)R gas quality specification (i.e. the Wobbe Index value of gas coming to GB is too high). We note that this outcome should be interpreted with extreme caution - it is not clear that each separate supply outcome is equally likely, meaning the absolute number of outcomes in breach of GS(M)R might not be a true indication of the likelihood of gas flows to GB being out of specification. This issue is dealt with in the following section.

[13] http://www.ofgem.gov.uk

**Figure 2.1:**




## Assigning probabilities

2.24. The next step in this scenario development exercise was to attach probabilities to the various gas supply outcomes; i.e. to determine with what probability each outcome was likely to occur. It was hoped that these probabilities would allow the development of probability distribution curves which would reflect where on the spectrum of all possible volume/quality combinations, GB's gas supply position was most likely to settle. This distribution would then give market participants an indication of the likely impact of gas quality constraints on GB gas supply.

2.25. TSOs quickly recognised significant uncertainty and difficulties in relation to determining these probabilities. The TSOs emphasised that they had no particular special information regarding the likely dispersion of flow of gas to GB. Rather, it was suggested by some of the TSOs that buyers and sellers in the gas market were in the best position to understand the future flows of gas to GB and that, therefore, they would be able to have a better understanding than any other constituency as to the extent to which it was probable that the quality of gas flowing to GB may become an issue in the future.

*Input from Competitive Market Participants*

2.26. The modelling results were put to other workstream participants (i.e. those from the competitive market) for their views. These workstream participants did not have strong views in relation to the likelihood of the 81 possible supply outcomes, and added no further information. Workstream participants highlighted difficulties in sourcing the necessary data to determine the required probabilities, and also noted

that they would have concerns about disclosing commercially confidential contract information. Some participants suggested that the provision of additional information to Ofgem on a confidential basis might be a potential solution. However, Ofgem was keen to keep the scenario development process as open and transparent as possible.

2.27. It was suggested that an independent market survey of potential future deliveries could be commissioned to resolve some of these information difficulties, however workstream participants did not have strong views in regards to this option and it was decided not to take this forward.

2.28. Given no further information was forthcoming to determine the likelihood of each possible supply outcome, workstream participants concluded that each outcome should be given the same probability of occurring.

## Conclusions

2.29. The main finding of the Gas Quality Scenario Development workstream was that there is considerable uncertainty surrounding the likelihood of any particular supply outcome in the future and, therefore, uncertainty as to whether the quality of gas destined for GB will be outside of GB specifications. It was also clear that NGG, as TSO, is not privy to any "extra" information in this regard. Similarly, Ofgem has no special view on whether it is likely to be an issue.

2.30. Difficulties in sourcing the data that could unlock this uncertainty were highlighted. Buyers and sellers of gas operating in the competitive market, considered to be the most likely to have some knowledge of the problem given their own individual portfolio of contracts, could also not bring additional clarity to bear on this matter. This was because they could not source the necessary data and/or were not willing to divulge confidential contractual information.

2.31. The workstream determined that any further delays that might come from putting the gas quality scenario development issues out to a consultative process would serve no purpose going forward, bearing in mind the importance of delivering a timely solution to the challenges posed by gas quality.

# 3. Economic Regulation workstream

**Chapter Summary**

This chapter explains the rationale underpinning the establishment of the Economic Regulation workstream. It also provides details of the options considered by the workstream with respect to regulatory frameworks that could be applied to any gas processing facility developed to address gas quality issues. In addition, it outlines the conclusions reached by the workstream in relation to appropriate high level principles that could be applied to the regulatory framework underpinning any gas quality processing facility.

## Objectives and desired outcomes of workstream

3.1. As outlined in Chapter 1, there is a possibility that in the future some gas delivered for import onto the GB gas network may be outside of the quality specifications allowed and, therefore, would not actually be permitted to enter the system. A possible solution to address this problem would be to develop blending or ballasting facilities (or a combination of the two treatment facilities) at entry points to the NTS. This would enable imported gas that fell outside of the GB specifications to be treated to be consistent with the GB standards prior to entry onto the NTS.

3.2. An issue that needs to be considered prior to investment in any gas treatment facility is the regulatory framework that would be put in place to support its development, construction and operation. To explore this further the Gas Quality Economic Regulation workstream (constituted from industry members and guided by Ofgem) considered and assessed a range of regulatory frameworks that could apply to this type of facility.[14]

3.3. This chapter summarises the key discussions and conclusions of the Economic Regulation workstream. For further detail regarding the specifics of these discussions please see the minutes of the workstream, available on our website.

## Approach adopted

3.4. Ofgem considered it appropriate to develop the potential regulatory framework with a group of industry representatives on the basis that the services offered at a gas processing facility might potentially be used by many of these industry participants (as importers of gas). The group met on three occasions to discuss and develop potential options for a regulatory framework for a gas processing facility constructed to convert imported gas to GB specifications for gas quality. At the first workstream meeting, a range of approaches were discussed to ensure that all

[14] A copy of the terms of reference of the group can be viewed at Ofgem's website www.ofgem.gov.uk

potential solutions were considered; at the second workstream, the detail of the remaining approaches was discussed; and, at the final workstream, the approach considered the most appropriate was developed further. The following section provides an overview of this process.

## Initial considerations

3.5. To ensure that a full range of potential frameworks were considered by the group, Ofgem presented three broad options for the regulatory treatment of a gas processing facility. For all options the group assumed that the same type of service would be provided, namely that the facility would adjust the Wobbe number of gas entering the GB system to bring it within the range set out in the GS(M)R.

3.6. The three regulatory options considered were a pure regulated approach, an unregulated approach, and a "hybrid" option, and are summarised below in table 3.0[15].

**Table 3.0**

| | Regulated | Unregulated | Hybrid |
|---|---|---|---|
| **Features** | ▪ Facility built by National Grid Gas (NGG)<br>▪ Forms part of its regulated asset base | ▪ Third party constructs a gas treatment facility<br>▪ No revenue guaranteed for facility operator | ▪ Facility built by NGG and forms part of its regulated asset base<br>▪ NGG only invests in response to firm signals from market participants buying rights to use service into the long term |
| **Cost recovery** | ▪ Service forms part of Transmission price control<br>▪ Costs of facility recovered via transmission charges | ▪ Costs borne by developer of facility<br>▪ Developer recovers costs from users of facility | ▪ NGG sells rights to use the facility Therefore those buying the right to use the facility incur its costs |

3.7. The workstream considered that the most significant advantage of the regulated approach was that it would provide certainty that the facility would be constructed given that NGG would receive a guaranteed revenue stream to cover the capital and operating expenditure of the facility if it undertook the investment. This certainty means that gas would potentially be available from more sources of supply, thereby

[15] For further details of the scenario's discussed please see the presentations from the first meeting of the workstream which are available on the gas quality economic regulation workstream area of work on the Ofgem website www.ofgem.gov.uk

arguably improving security of general gas supply. In this way, any gas processing facility would be funded by the generality of customers and would "insure" customers against the risk that the quality of gas constrains some flows of gas coming to GB.

3.8. However, the workstream recognised that although this approach would provide certainty on the provision of a processing facility this could also be a disadvantage as it was not at all clear that a processing facility would actually be needed, as demonstrated in Chapter 2. As such, the workstream recognised that there was a significant risk that any gas processing facility would not be fully utilised and could be a stranded asset. Under a pure regulated approach it was generally agreed by the workstream that this stranding risk would fall entirely upon GB customers in that, were it constructed and not required, NGG would still receive income to cover the costs of the facility from GB customers through transmission charges. Furthermore, it was not clear, given the uncertainty of the potential level of risk, whether customers would want the "insurance" implied by this approach.

3.9. NGG also recognised the stranding risk, but had a concern that, rather than fall upon customers, under this approach the cost of any stranded asset might be borne by NGG shareholders. This might arise as, were NGG to make an investment that was actually not required, Ofgem might not allow NGG to recover the costs of the stranded asset through the price control on the grounds that the investment would be deemed "inefficient".

3.10. Further weaknesses of the regulated approach that were articulated by the work group were that:

- there was a risk that any unregulated solution would be "crowded out" given the more favourable terms that the guaranteed revenue stream implied by the regulated approach would offer;
- there would not be any incentive for parties to secure gas that met GB specifications. In turn, this might increase the volume of gas delivered to GB that was not compliant with GB standards, increasing costs of processing;
- given the extent of the issue was unknown, investment under this approach might be inefficient as it would be unlikely that NGG would have full knowledge of the scale of the service required to address gas quality issues;
- as under any regulated approach, asymmetry of information between the regulator and the regulated, means that it is difficult to assess the extent to which NGG has been efficient in its provision of the service (i.e. there is, to some extent, a risk of "gold plating");
- the approach may unduly discriminate against LNG import terminals, given that, to bring LNG within GB quality specifications, terminal owners must make significant capital investments at their sites; and

- NGG were concerned that, to address non discrimination issues, it might have to provide the same types of facility at every import terminal of the UK, resulting in additional costs to GB customers.

3.11. In light of these drawbacks, workstream participants decided that it would be appropriate for discussions to focus upon the hybrid and unregulated approach. However, Ofgem recognises that the decision not to take forward further development of the regulated approach at this time does not mean that it could not be considered as a potential solution in the future, should other options prove not workable.

**Development of straw man**

3.12. In order to facilitate further discussion amongst workstream participants regarding both the hybrid approach and the unregulated approach, Ofgem developed a straw man regarding these potential solutions[16]. The straw man outlined the way that these approaches may work in practice and were intended to stimulate discussion regarding both the appropriateness of the principles as well as the potential for further development of these solutions.

3.13. The following section outlines the options that were developed by the workstream following circulation of the straw man and therefore provides details of the hybrid and the unregulated approaches.

*The unregulated approach*

3.14. Under an unregulated approach a third party may choose to invest in a gas treatment facility with the expectation of receiving a payment stream from gas importers for the provision of gas processing services that more that covers its upfront investment and ongoing operating costs. As the facility would not be explicitly regulated there would not be any guaranteed returns and therefore the risks associated with investment would fall upon the third party making the investment. However, this risk could be shared to some extent if the third party were able to obtain firm bids from market participants that committed them to the purchase of this service over the long term.

3.15. Given that it would be unregulated, the arrangements put in place would be determined through commercial decisions of the developer and subject to normal competition law. There are a number of precedents in the UK on how access to energy assets that are unregulated (or exempt from regulation) is allocated to users - for example, open season application processes have been used at some LNG terminals. Under this approach, the facility could be constructed by any interested third party although, if NGG were to initiate the provision of this service, amongst

[16] A copy of the straw man can be found at Ofgem's website

other things, associated asset transfer would need to be undertaken and business separation arrangements would need to be put in place.

3.16. Workstream participants recognised that a key advantage of this approach was that normal commercial incentives would operate upon any party that chose to invest in such a treatment facility and, as such, there would be very strong incentives to ensure efficient and economic investment was made. However, there was a concern that signals from potential gas importers to a potential investor might not be strong enough and therefore such an investment would be too risky to encourage investment into the facility in sufficient time to ensure that gas quality issues were addressed at the right time.

3.17. For this reason, the group did not consider that it would be necessary to develop the unregulated approach any further.

*The Hybrid approach*

3.18. Workstream participants considered two variations on the hybrid approach. Under both approaches NGG would conduct a tender process which would provide the opportunity for market participants to buy rights to use the facility into the long term. However:

- Under the Hybrid 1 approach, investment in the treatment facility would be based solely upon the signals provided to NGG through the tender process. As such, the investment made by NGG would be backed fully by commitments from its future users and the asset stranding risk would therefore fall upon those parties committing to use the facility. A potential advantage of this approach is that it is most likely to be these parties that are best placed to assess the extent to which they will require the use of a facility in the future. That is, of all possible parties, buyers and sellers of gas would appear to be better placed than either NGG or the generality of GB customers to assess the extent to which imports of gas are likely to require gas processing facilities in the future. Therefore, passing the risk of stranding back onto these parties might have the advantage of incentivising these parties to consider carefully whether such assets will actually be required. However, some participants in the workstream thought that even buyers and sellers of gas would not know the future quality of the gas. Under this approach, if importers of gas were not prepared to commit, financially, to the future use of the terminal in the tender then there would be no investment in a gas processing facility by NGG.

- Under the Hybrid 2 approach, NGG would invest in response to signals provided through the tender process as per the Hybrid 1 approach, but would, in addition, have the discretion to invest in additional capacity at the facility if it considered this appropriate.

3.19. Under both the Hybrid 1 and Hybrid 2 approaches, NGG would earn a standard cost of capital, consistent with that determined through the transmission price control, for capacity in which it invested in response to the signals from future users

received in the tender. The difference between these approaches is that, under the Hybrid 2 approach, NGG would have the opportunity to undertake investment in a gas processing facility even if it were not backed by user signals. If NGG chose to invest over and above a capacity level implied by signals from users in the tender, then it would earn additional returns on this investment if it was demonstrated that, in the event, this additional capacity was actually required by gas importers. Conversely, in the event that additional capacity was invested in which was not actually utilised, NGG would earn a reduced return on this investment.

**Table 3.1**

| | **Hybrid 1 (units)** | **Hybrid 2 (units)** |
|---|---|---|
| **User Commitment Capacity** | 200 | 200 |
| **NGG extra investment** | n/a | 50 |
| **Total capacity invested** | 200 | 250 |
| **Capacity utilised** | 120 | 120 |
| **Stranded capacity** | 80 | 70 |
| **Costs to Users** | **80** | **80** |
| **Costs to NGG** | **0** | **50** |

3.20. Table 3.1 above provides a stylised example to highlight the differences between the two approaches. In this example, under both the Hybrid 1 and Hybrid 2 approach, NGG would receive bids through a tender process for 200 units of capacity at the facility. This would provide the successful bidders with the right to have gas that is outside of the GB gas specification limits treated in a processing facility for a set period of time (e.g. 10 years). Given this sale of firm rights to users, NGG would invest to meet the aggregate requirements of users.

3.21. Under the Hybrid 1 approach NGG would invest solely in line with the signals provided by tendering parties and therefore, in this example, would size the processing facility to be able to treat 200 units of gas. Under the Hybrid 2 approach, however, NGG would have the discretion to invest in greater (or lesser) processing capacity if it considered this would be appropriate to meet the needs of users.

3.22. If there was under-utilisation of capacity at this facility under the Hybrid 1 approach, the costs would be borne by those users who booked the capacity but did not use it. In the example above, therefore, as the bidders had paid for 200 units of capacity in the tender but only used 120 units of it, the costs of the unused 80 units would still be borne by the bidders. NGG would receive a standard regulated rate of return for the 200 units of capacity it had invested in.

3.23. Under the Hybrid 2 approach, NGG would have the option to invest over and above the capacity signalled in the tender and, in the same example, NGG would choose to invest in an additional 50 units. If the facility was underutilised, as in the example, users would continue to bear the cost of any capacity they booked but did not use. In addition, NGG would also bear some of the costs associated with the

additional investment that it had made that was not backed by a commitment from future users and was not actually used. In the example therefore, users would bear the costs associated with 80 units of unused capacity at the facility as they had paid for the rights to use it in the tender. NGG would receive a standard rate of return for the 200 units of investment underpinned by this user commitment. However, NGG would receive reduced returns for the 50 additional units of capacity in which it chose to invest at the facility that was not supported by a user commitment and was, in the event, not used.

3.24. Potentially, under the Hybrid 2 approach, NGG would also have the opportunity to invest in less capacity than that committed to by users through the tender process, whilst receiving a return for the volume signalled in the tender. It might choose to do this, for example, if it expected that co-mingling might reduce the net requirements for processing capacity. However, in the event that NGG invested in less capacity and had insufficient processing capacity to fulfil its obligations to parties that had purchased rights to the service in the tender, it would engage in buy backs for some of the previously sold capacity.

3.25. Workstream participants did not consider fully the rates of return that NGG would be exposed to under a Hybrid 2 approach if it were it to make additional investment that was not backed by signals from users. However, the high level principle was agreed that NGG would receive a rate of return over and above its regulated rate of return for investment that was undertaken that was not supported by a user commitment and subsequently was shown to be required. Conversely, NGG would receive a lower rate for an investment not backed by user commitment that was subsequently shown not to be required. Indeed, this lower rate might be zero.

3.26. In this way, under a Hybrid 2 approach the stranding risk of the assets is shared by both future users of the facility and NGG. However, it is worth noting that, if NGG is not exposed to the full cost of its decisions (for example, if its total exposure was capped and collared or it received a non-zero rate of return for unutilised assets) then the stranding risk would also be borne, to some extent, by GB customers.

**Preferred approach**

3.27. Workstream participants considered that, of the options available, the hybrid approach would be the most appropriate to develop further through the Economic Regulation Workstream due to concerns that, under the unregulated approach, there may not be a sufficiently strong signal for parties to invest. However, workstream participants also had similar concerns regarding the Hybrid 1 approach. These concerns related to the use of a tender process as the sole means to provide NGG with investment signals. The specific concerns were that:

- Parties might not be able to forecast accurately their requirements for access to gas processing facilities and therefore might be unable to signal this appropriately to NGG or might not be willing to provide user commitment where they had

uncertainty about their requirements. As such, under this approach NGG may not receive any firm bids for capacity at the facility meaning there may not be sufficient signals for them to invest in a treatment facility and therefore the facility may not be constructed or the required service be made available; and

- NGG, as system operator, may have a level of understanding as to the likely scale of gas quality issues and therefore would have the ability to invest appropriately in the required capacity at the facility.

3.28. In light of these concerns, workstream participants considered that the Hybrid 1 approach did not offer sufficient flexibility to parties using the service or to NGG and that these concerns would be addressed by the Hybrid 2 approach. In this respect, workstream participants thought the Hybrid 2 approach had the advantage of sharing risks between parties and that it would offer greater flexibility as it would place incentives upon NGG targeted to encourage appropriate investment into the facility.

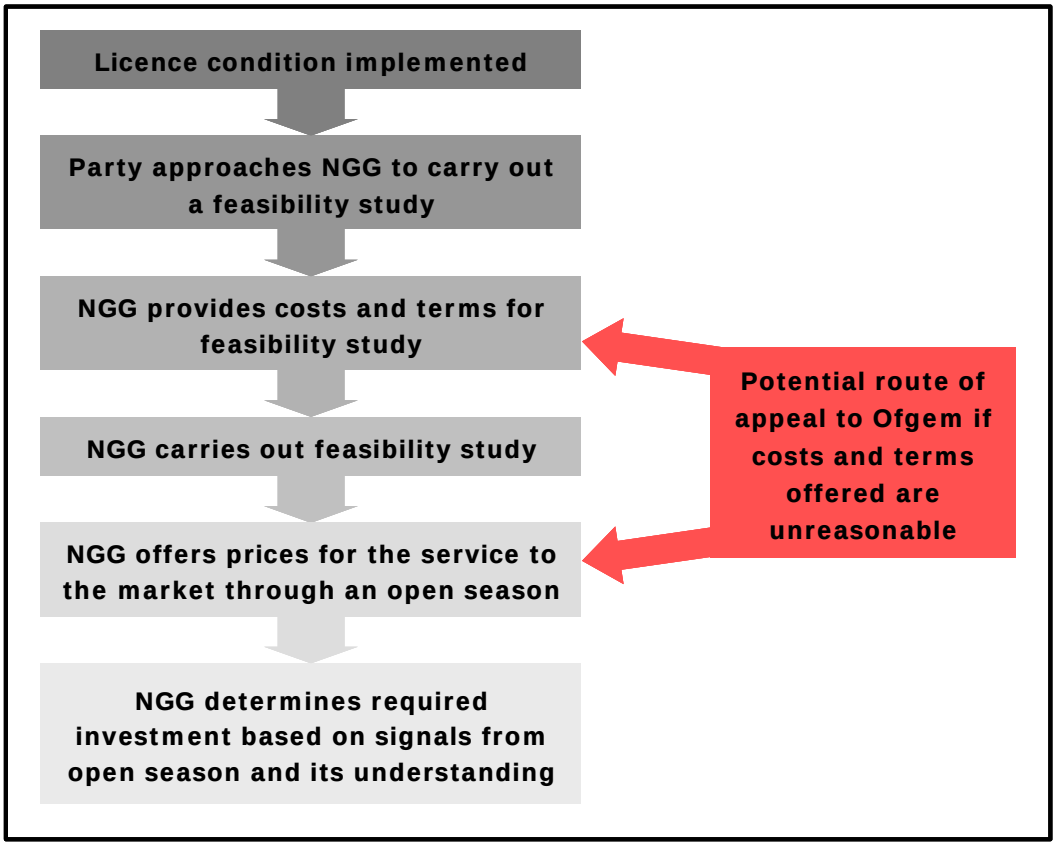
3.29. Going forward, Ofgem intends to consult on the details of an NGG incentive scheme which will inform, amongst other things, how the risks of any gas processing facility are shared across all parties under this approach.

3.30. The group recognised that it was also possible for the unregulated approach to operate alongside a hybrid approach by enabling independent parties to make commercial investment in the future and effectively follow an unregulated approach even if a hybrid approach had already been adopted. They considered that if NGG were to construct a facility under a hybrid approach, this may provide investment signals to potential investors regarding the demand for such a service. The workstream recognised that, if this were the case, the existing NGG facility would provide a cost benchmark against which any interested investor could measure the competitiveness of their own plans to construct a facility.

## Development of the Hybrid 2 approach

3.31. Workstream participants thought that it would be appropriate to develop further the arrangements that would be put in place to support a Hybrid 2 approach. The diagram below outlines the arrangements that could be implemented and the associated process that would be followed in the event that a party were interested in the construction of a gas processing facility at a particular location on the NTS.

**Figure 3.2**




**Licence condition**

3.32. To ensure that all interested parties had the opportunity to access gas processing services, the workstream thought it appropriate to place a licence condition upon NGG requiring it to enter into discussions regarding the construction of a gas processing facility when approached by a third party. The licence condition would place an obligation upon NGG to quote a fee to a third party to cover the reasonable costs of undertaking a technical feasibility study for a gas processing facility at a particular entry point to the NTS.

3.33. Workstream participants considered that the licence condition should incorporate a route of appeal which would allow parties to refer the matter to Ofgem in the event that NGG did not offer reasonable terms and costs to carry out a feasibility study. NGG would have to be able to demonstrate that they had behaved in an economic and efficient manner in assessing the costs of a study (such as running a tender of third parties to undertake the study). Furthermore, parties would be able to raise concerns with Ofgem, if there was a perception that NGG were to discriminate unduly in terms of either providing access to this service or in terms of the services offered.

**Process to assess feasibility of a facility**

3.34. On the basis of the quote provide by NGG, a third party may decide to instruct NGG to undertake the feasibility study. Workstream members recognised that, in the event that a feasibility study led to the construction of a facility and the offering of capacity at that facility, it would be unfair for one party to incur all of the costs associated with the study. The workstream therefore concluded that, if capacity at this facility were offered through a tender process, it would be appropriate for the cost of the feasibility study to be smeared across parties that obtained capacity at the facility. If, following the feasibility study, the third party decided not to proceed, the party requesting the study would be required to pay NGG in full for the provision of this service. This approach might therefore place an incentive upon those parties considering approaching NGG to undertake a feasibility study, to canvas interest from other market participants to determine whether this risk could potentially be shared.

3.35. NGG's feasibility assessment would examine the practicality of constructing a treatment facility and assess the costs of providing gas processing service at a particular location. Following this assessment NGG would provide the third party with its findings from the feasibility study as well as details of the costs and terms and conditions associated with the provision of a treatment service at this location. Based on NGG's assessment the third party would reach a decision regarding whether it would like this service to be made available to the market through a tender process. In the event that the party did not think that it would be appropriate for NGG to take forward a tender process for this service, it would be required to pay for all of the costs associated with the feasibility study that NGG had carried out.

**Provision of the service to the market**

3.36. If the third party agreed that it would be appropriate for NGG to undertake a tender for the provision of treatment services at a certain location, NGG would offer the treatment services to the market along with prices for the service and associated terms and conditions. This would be carried out through an open season process with a price schedule offered to parties reflective of the costs of the processing service as well as the smeared cost of the feasibility study.

3.37. There would be a further route of appeal to Ofgem at this point which would enable parties to approach Ofgem in the event that they considered that NGG did not offer reasonable terms and costs for the provision of these services. The provisions underpinning this would be contained within the licence condition.

3.38. Discussions at the workstream highlighted that it may be appropriate for NGG to make information available to interested parties regarding the investment hurdle that would need to be reached for them to choose to invest in the facility. However, under the Hybrid 2 approach, on the basis of the open season process and its own views, NGG would take a decision on the extent of an investment in a processing facility, if any. In addition, workstream participants considered that it would be appropriate for NGG to provide parties with an indication of the anticipated

construction time for the facility. In this regard, they suggested that it could be sensible to put in place a structure of rewards and penalties for early or late delivery of the facility.

**Cost targeting**

3.39. A general issue that arose in the discussions was the extent to which costs incurred as a result of the construction and operation of a gas processing facility should be targeted back upon those parties that are using the facility or, alternatively, smeared across GB customers.

3.40. The main argument in favour of cost targeting is now well understood in the energy industry, in that it would encourage an efficient use of the resource as users would consider the impact of, in this case, the cost of a gas processing facility when deciding where to source gas from. Furthermore, it would help maintain a "level playing field", between sources of gas that are compliant with UK gas quality standards and those that are not. If the costs of processing non-compliant gas are not factored in to the overall cost of the gas there is a risk that non-compliant gas would appear unduly favourably priced relative to gas that already meets the GB quality standards. In turn this would encourage greater use of gas processing facilities at greater overall cost compared to a regime in which the costs are passed back to those importing the non-compliant gas.

3.41. The main argument in favour of a cost smearing approach is that it is difficult to define exactly which parties are those that are bringing in gas that is non-compliant. This problem might arise because the interconnector will carry gas from a number of sources - some of which are compliant with the UK specification and some of which are not. If, as a result of the off specification gas, the gas entering the UK through the interconnector, in aggregate, requires processing, it will be difficult to define exactly which party should pay the costs of the gas processing.

3.42. Ofgem's view is that in the interests of efficiency (and therefore to protect GB customers) it is best to target costs as accurately as possible. In this particular case, it might be appropriate to visit the costs upon those participants using the interconnector. This might not, in the first instance, perfectly target the costs in that some participants who are utilising the interconnector might be charged despite have contracted for gas that is within the GB specification. It would, however, encourage those shippers as well as the infrastructure provider to develop rules and processes to identify the parties that are shipping gas that is outside of the GB specification and, moreover, pass on the charges to that particular subset of participants. It was noted that some parties considered that this would create additional complexity and that it might be difficult in practice for the arrangements to "tie up" with other contractual arrangements in place. Whilst Ofgem recognises these concerns, it remains of the view that, in the first instance, it would be better to target these costs as accurately as possible.

3.43. A further argument raised by some participants in favour of cost smearing was that targeting costs to import terminals benefiting from having gas processing

facilities on site might distort trade between Member States. Ofgem disagrees with this view - rather it could be argued for the reasons stated above that not targeting costs would distort trade between states as those sources of gas that are non compliant with the GB standard would obtain an unfair advantage.

3.44. The workstream also considered whether under a Hybrid 2 approach shippers or infrastructure providers should, in the first instance, contract with NGG for gas processing services. The group concluded that because the Gas Act 1986 requires that only shippers contract with NGG for the conveyance of gas, it was more likely that shippers would contract with NGG for gas processing services. However, it might be possible for an infrastructure provider to undertake these activities were it to be exempted from certain relevant provisions of the Act.

## Other issues

3.45. A general concern raised by some workstream participants related to the complexity of the changes that would be required to support the provision of this service. For example, if a processing facility were constructed at Bacton, allowing gas outside of GB quality specifications to flow through IUK, there would need to be changes to the quality specifications imposed with respect to the IUK pipeline. Corresponding changes to both shipper and Fluxys/Distrigas transit contracts would also be required to allow this gas to flow through IUK. As such, some participants questioned whether it would be logistically possible for all of the necessary changes to be complete and in place at the required time. Workstream members considered that such logistical issues might pose problems for a Hybrid 2 type approach.

3.46. Another concern expressed during workstream discussions was that NGG may not receive sufficient user commitment through any tender process to trigger investment into a processing facility. Specifically, workstream participants were concerned that, due to the perceived uncertainty of the likelihood that gas would fall outside of GB quality specifications in the future, users would not have an incentive to provide NGG with firm financial signals. In response to these concerns Ofgem outlined that in a competitive market, to maintain market share participants should have incentive to ensure that they sourced the gas required to meet their customers' demand at a competitive price. If it were possible to source gas that was not within the GB specification and the cost of this gas, together with the costs of treatment at the processing facility to ensure compliance with the GB quality regulations, was below the price prevailing in the GB gas market, then commercial incentives should encourage parties to purchase this gas and book long term for use of a gas processing facility.

3.47. Also, workstream participants considered that it would be necessary to develop arrangements to allow parties to trade their rights to the use of capacity at the treatment facility on a secondary market in the event that they did not intend to utilise the rights that they had acquired. The workstream did not reach agreement on the way that such a mechanism should operate but concluded that it would be appropriate for this to be developed and incorporated within any regulatory framework.

## Summary

3.48. Following discussions at the Gas Quality Economic Regulation Workstream, participants concluded that it would be appropriate to develop further the principles that would underpin a Hybrid 2 approach.

3.49. This will allow the targeting of costs back upon those parties importing gas that is not consistent with the specification of gas allowed upon the GB network. It also allows the stranding risk of the assets to be shared between users and National Grid. Subject to further consideration as part of Ofgem's consultation on licence changes required to implement this regime, it could also allow customers to bear some of the stranding risk.

# 4. Way Forward

**Chapter Summary**

This chapter briefly summarises the way forward for this area of work.

4.1. The two key conclusions of the workgroups on the issue of gas quality were that:

- **it is highly uncertain whether a gas processing facility sited at one, or more, import terminals will be required**. This uncertainty arises because TSOs and regulators are not well placed to understand the future actions of buyers and sellers of gas and whether they will contract to import gas that does not comply with the GB specifications. Moreover, partly for commercial confidentiality reasons, buyers and sellers of gas are not willing or not able to state whether gas they are contracting for is likely to be within or outside of the GB gas quality specifications;

- **a Hybrid 2 approach should be adopted**. This approach appears to have the advantages of allocating the risk of stranding between users of any facility and NGG. Also, to the extent that NGG's risks are capped and collared or shared, some of the risk will fall upon GB customers. It also had the advantage of targeting the costs of the gas processing back upon those parties using the facility.

4.2. The next steps in this area are therefore:

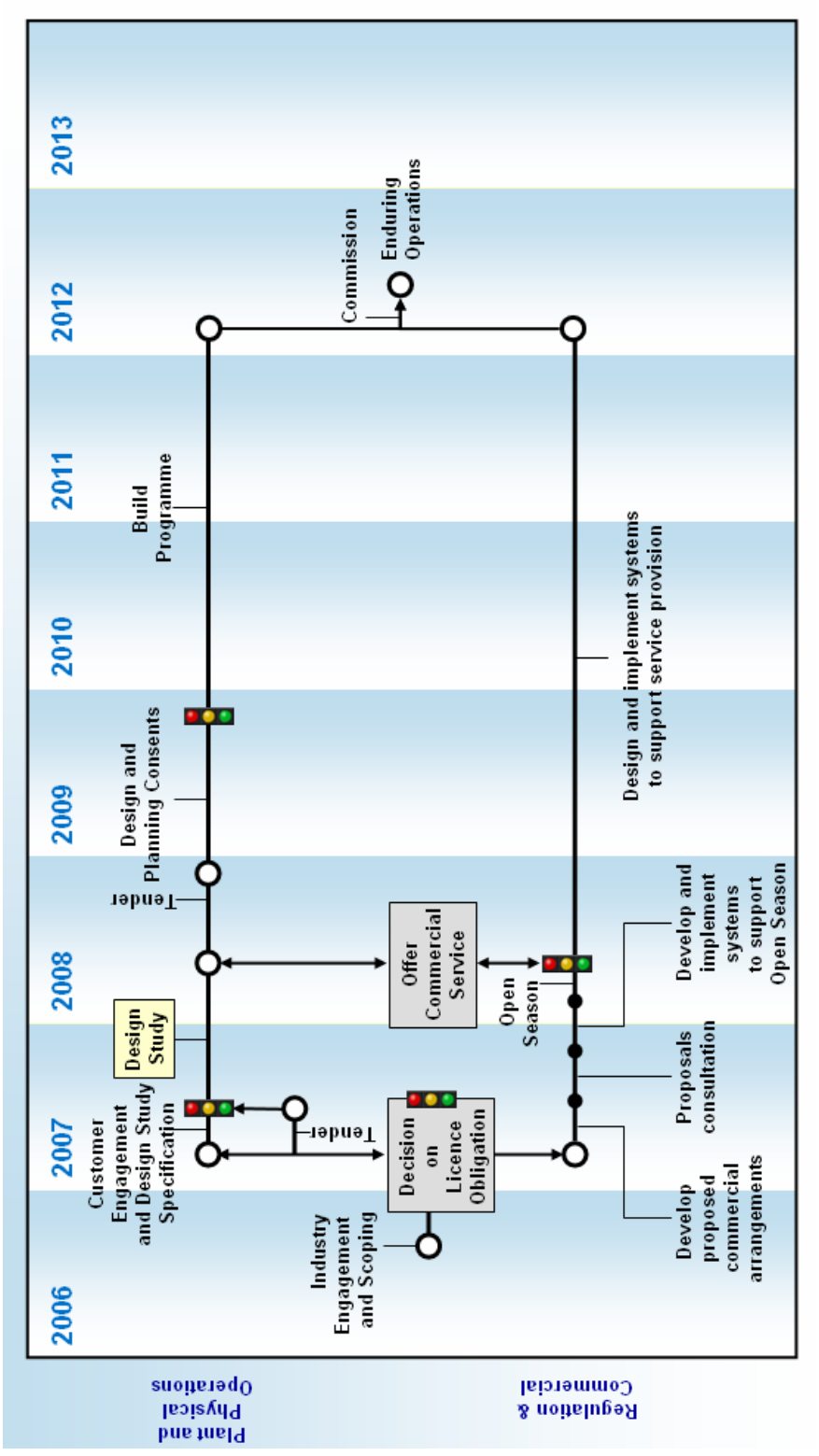
- for Ofgem to initiate the process of consultation on the licence changes necessary to support the proposed approach; and

- for NGG, or others, to raise modifications to the UNC to support the new regime.

4.3. The timeline in Figure 4.0 illustrates NGG's view of the processes that will need to run in parallel, in terms of both physical operations and regulatory issues that will need to be addressed prior to the commissioning of a gas quality processing facility. NGG have emphasised that this timeline represents a best case scenario for the timescales associated with the development of the regulatory framework as well as subsequent development and operation of a processing facility. As such, the timeline demonstrates that to the extent that market participants are interested in engaging with NGG for these services, these issues would need to be considered as a priority.

4.4. The framework for the feasibility study set out in this document should allow market participant to apply to NG for such a study should they require it. As such, it is open to shippers that have an interest in these services to speak directly to NGG regarding the relevant process that would need to be followed.

**Figure 4.0**


2006
2007
2008
2009
2010
2011
2012
2013
Customer Engagement and Design Study Specification
Design Study
Tender
Industry Engagement and Scoping
Decision on Licence Obligation
Offer Commercial Service
Design and Planning Consents
Build Programme
Commission
Enduring Operations
Open Season
Develop proposed commercial arrangements
Proposals consultation
Develop and implement systems to support Open Season
Design and implement systems to support service provision
Plant and Physical Operations
Regulation & Commercial

# Appendices

**Index**

# Appendix 1 - Feedback to Conclusions document

1.1. Ofgem welcomes feedback from interested parties in relation to any of the issues set out in this document.

1.2. Responses should be received by 27 February 2007 and should be sent to:

wholesale.markets@ofgem.gov.uk

1.3. Unless marked confidential, all responses will be published by placing them in Ofgem's library and on its website www.ofgem.gov.uk. Respondents may request that their response is kept confidential. Ofgem shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

1.4. Respondents who wish to have their responses remain confidential should clearly mark the document/s to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

# Appendix 2 – The Authority's Powers and Duties

1.1. Ofgem is the Office of Gas and Electricity Markets which supports the Gas and Electricity Markets Authority ("the Authority"), the regulator of the gas and electricity industries in Great Britain. This Appendix summarises the primary powers and duties of the Authority. It is not comprehensive and is not a substitute to reference to the relevant legal instruments (including, but not limited to, those referred to below).

1.2. The Authority's powers and duties are largely provided for in statute, principally the Gas Act 1986, the Electricity Act 1989, the Utilities Act 2000, the Competition Act 1998, the Enterprise Act 2002 and the Energy Act 2004, as well as arising from directly effective European Community legislation. References to the Gas Act and the Electricity Act in this Appendix are to Part 1 of each of those Acts.[17]

1.3. Duties and functions relating to gas are set out in the Gas Act and those relating to electricity are set out in the Electricity Act. This Appendix must be read accordingly[18].

1.4. The Authority's principal objective when carrying out certain of its functions under each of the Gas Act and the Electricity Act is to protect the interests of consumers, present and future, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the shipping, transportation or supply of gas conveyed through pipes, and the generation, transmission, distribution or supply of electricity or the provision or use of electricity interconnectors.

1.5. The Authority must when carrying out those functions have regard to:

- The need to secure that, so far as it is economical to meet them, all reasonable demands in Great Britain for gas conveyed through pipes are met;
- The need to secure that all reasonable demands for electricity are met;
- The need to secure that licence holders are able to finance the activities which are the subject of obligations on them[19]; and
- The interests of individuals who are disabled or chronically sick, of pensionable age, with low incomes, or residing in rural areas.[20]

1.6. Subject to the above, the Authority is required to carry out the functions referred to in the manner which it considers is best calculated to:

[17] entitled "Gas Supply" and "Electricity Supply" respectively.
[18] However, in exercising a function under the Electricity Act the Authority may have regard to the interests of consumers in relation to gas conveyed through pipes and vice versa in the case of it exercising a function under the Gas Act.
[19] under the Gas Act and the Utilities Act, in the case of Gas Act functions, or the Electricity Act, the Utilities Act and certain parts of the Energy Act in the case of Electricity Act functions.
[20] The Authority may have regard to other descriptions of consumers.

- Promote efficiency and economy on the part of those licensed[21] under the relevant Act and the efficient use of gas conveyed through pipes and electricity conveyed by distribution systems or transmission systems;
- Protect the public from dangers arising from the conveyance of gas through pipes or the use of gas conveyed through pipes and from the generation, transmission, distribution or supply of electricity;
- Contribute to the achievement of sustainable development; and
- Secure a diverse and viable long-term energy supply.

1.7. In carrying out the functions referred to, the Authority must also have regard, to:

- The effect on the environment of activities connected with the conveyance of gas through pipes or with the generation, transmission, distribution or supply of electricity;
- The principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed and any other principles that appear to it to represent the best regulatory practice; and
- Certain statutory guidance on social and environmental matters issued by the Secretary of State.

1.8. The Authority has powers under the Competition Act to investigate suspected anti-competitive activity and take action for breaches of the prohibitions in the legislation in respect of the gas and electricity sectors in Great Britain and is a designated National Competition Authority under the EC Modernisation Regulation[22] and therefore part of the European Competition Network. The Authority also has concurrent powers with the Office of Fair Trading in respect of market investigation references to the Competition Commission.

[21] or persons authorised by exemptions to carry on any activity.
[22] Council Regulation (EC) 1/2003

# Appendix 3 - Glossary

**B**

### Bacton Terminal

The Bacton gas terminal facility is situated on the Norfolk coast of England. Gas from offshore producers comes onshore and is distributed to UK customers via the Bacton terminal, or to the Belgian transmission system via IUK. Alternatively, gas from the Continent can flow to the Bacton terminal via IUK. The recently commissioned BBL pipeline also flows into Bacton, bringing gas to the UK from the Netherlands.

### Balgzand Bacton Line (BBL)

The 235km BBL pipeline links the Netherlands (at Balgzand) and the UK (at Bacton), allowing gas to flow from the Netherlands into the UK. The pipeline was built by N.V. Nederlandse Gasunie, under the authority of BBL Company. Flows through the pipeline commenced on 1 December 2006. The pipe has a capacity of 1.75 million cubic meters per hour.

### Ballasting

Nitrogen ballasting is a form of gas treatment. Ballasting gas with nitrogen allows derichment of the natural gas to bring it in line with prevailing gas quality specifications. Due to the large quantities of nitrogen required for this process, an on-site nitrogen production facility is often required.

### Blending

Gas not compliant with a quality specification can sometimes be mixed or “blended” with other gas sources so that the resulting mix is within the allowable gas quality specification range. Blending often takes place in upstream facilities where two or more gas sources are combined into a single pipeline and the gases mix during transportation prior to reaching the point where the problematic quality specification is enforced. At downstream locations, near to the consumer, it is sometimes necessary to install specific hardware to ensure that the gas streams are properly mixed prior to delivery.

**C**

### Co-mingling

Blending is sometimes referred to as co-mingling, particularly where blending is fortuitous consequence of natural mixing.

**E**

### Easington Terminal

The Easington terminal is a gas processing terminal at Easington, approximately 27 miles south east of Hull. Gas flows through the Easington terminal include Langeled (gas arriving in the UK from Norway via the Langeled pipeline), gas from UKCS fields and from the Rough storage facility.

### European Association for Streamlining of Energy Exchange GAS (EASEE-gas)

EASEE-gas was set up in 2002 to support the creation of an efficient and effective European gas market through the development and promotion of common business practices (CBP's) that intend to simplify and streamline business processes between the stakeholders. More information can be found at http://www.easee-gas.org)

### European Regulators' Group for Electricity and Gas (ERGEG)

ERGEG, established by the European Commission (The Commission) on 11 November 2003, is an Advisory Group of independent national regulatory authorities. The primary purpose of ERGEG is to assist the Commission in consolidating the Internal European Market for electricity and gas. Its Members are the heads of the national energy regulatory authorities in the 25 EU Member States. More information can be found at www.ceer-eu.org

### Eynatten

Evnatten is an entry and exit point on the Belgian gas transmission network, located on the Belgian-German border

**F**

### Fluxys

Fluxys is one of the Belgian gas transmission system operators (similar to National Grid in GB).

**G**

### Gas Regional Initiative (GRI)

On 25 April 2006 ERGEG launched a gas regional initiative, made up of four regional energy market projects (REMs) across Europe. The overall aim of the gas regional initiative is to push forward the development of regional markets in collaboration with industry, Member States, the European Commission and other stakeholders.

### Gas Safety (Management) Regulations (GSMR)

The legal parameters for gas entering into and leaving the NTS in GB are set out in the Health and Safety Executive's Gas Safety (Management) Regulations (GS(M)R)). NGG is prohibited from conveying gas on the NTS unless the gas complies with the specifications set out in the GS(M)R.

### Gas Transport Services (GTS)

GTS is the operator of the national gas transmission system in the Netherlands, similar to NGG in the GB.

**H**

### Hub

A hub is usually a trading office; often based on a physical location where traders can buy and sell gas. The physical location usually has multiple sources of gas and multiple exit points (sometimes linked with storage). Hubs draw supply from a variety of sources and enable operators to market gas to end-users

**I**

### Interconnector UK (IUK)

The IUK gas pipeline links the UK (at Bacton) and Continental Europe (at Zeebrugge). The pipeline provides bi-directional transport capability to facilitate energy trading in both markets. As of October 2006, the UK import capacity has been 23.5 billion cubic meters per year.

**L**

### Liquid Natural Gas (LNG)

LNG consists mainly of methane gas liquefied at around -160 C. Cooling and liquefying the gas reduces its volume by 600 times such that a tonne of LNG corresponds to about 1,400 standard cubic metres of methane in its gaseous state. LNG may be stored in tanks or transported by ocean going tankers or, in small quantities by road tankers.

### LNG importation facility

Facilities that permit an LNG cargo to unload and store its cargo before re-gasification and export in the form of gas to the transmission or distribution system

### Long Term Auction

An auction where capacity rights are made available on a long term basis (say 15-20 years into the future).

**N**

### National Grid Gas (NGG)

The licensed gas transporter responsible for the GB gas transmission system, and four of GB's regional gas distribution companies.

### National Transmission System (NTS)

IN GB this refers to the high pressure gas transmission system owned by National Grid Gas. The NTS consists of more than 6,400 km of pipe carrying gas at pressures of up to 85 bar (85 times normal atmospheric pressure).

### NTS Long Term System Entry Capacity (LTSEC)

NTS entry capacity available on a long term basis (up to 17 years into the future) via an auction process. Also known as Quarterly System Entry Capacity (QSEC).

**O**

### Open Season

A transparent and multilateral process in which the seller offers publicly a future product for sale. The seller then releases its product on the basis of bids received from potential buyers (on a transparent and non-discriminatory basis)

**R**

### Regulated Asset Value (RAV/RAB)

The value ascribed by Ofgem (or other regulatory bodies) to the capital employed in the licensee's regulated transmission or (as the case may be) distribution business (the 'regulated asset base').

**T**

### Transmission Price Control (TPC)

The price controls for transmission licensees in GB which will take effect in April 2007 for a 5-year period. The transmission price control applies to the licensed gas transporter responsible for the gas transmission system, NGG NTS

### Transmission System Operators (TSOs)

The entity responsible for managing the gas transmission system. NGG is the operator of the gas NTS in GB.

**U**

### United Kingdom Continental Shelf (UKCS)

The UKCS is the area of the sea bed over which the UK exercises sovereign rights of exploration and exploitation of natural resources. The limits of the UKCS are set out in orders made under section 1(7) of the Continental Shelf Act 1964.

### Uniform Network Code (UNC)

As of 1 May 2005, the UNC replaced NGG NTS's network code as the contractual framework for the NTS, GDNs and system users. The UNC is the contractual document that defines the relationship between NGG and users of the gas transportation system.

**W**

### Wobbe Index

The Wobbe Index is defined as the calorific value (CV) of gas, divided by the square root of the relative density. It is one key property that determines whether gas can be safely burned in industrial and domestic appliances without giving rise to safety, environmental and appliance function concerns. The Wobbe Index range for the UK is set at 47.2 – 51.41 MJ/sm3 under GS(M)R, and 47-54 MJ/sm3 for EASEE-gas.

# Appendix 4 - Feedback Questionnaire

1.1. Ofgem considers that consultation is at the heart of good policy development. We are keen to consider any comments or complaints about the manner in which this consultation has been conducted. In any case we would be keen to get your answers to the following questions:

1. Do you have any comments about the overall process, which was adopted for this consultation?
2. Do you have any comments about the overall tone and content of the report?
3. Was the report easy to read and understand, could it have been better written?
4. To what extent did the report's conclusions provide a balanced view?
5. To what extent did the report make reasoned recommendations for improvement?
6. Please add any further comments?

1.2. Please send your comments to:

**Andrew MacFaul**
Consultation Co-ordinator
Ofgem
9 Millbank
London
SW1P 3GE
andrew.macfaul@ofgem.gov.uk