



Single Approach to Gas Quality

Consultation Paper

CER/08/101

20th June 2008



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1.0 Introduction

As part of the Common Arrangements for Gas (CAG) the Commission and the Utility Regulator (the Regulatory Authorities) are assessing a single approach to gas quality. The two jurisdictions currently operate under different gas quality specifications which would create significant difficulties operating the networks as one given the potential incompatibility between gas either side of the border.

On 24th April, 2008 Bord Gáis Networks (BGN) submitted a report¹ to the Commission on the issue of gas quality in the Republic of Ireland (ROI) which forms the basis of much of this Consultation Paper and has been published for comment. The report has two sets of recommendations, gas quality specifications and measurement arrangements, which are outlined in section two of this paper.

Gas quality does not currently present a safety issue as, irrespective of the actual specifications, the gas brought on-shore from Inch and Great Britain (GB) is all of the same quality. This may change as other gas fields are exploited and in particular is likely to change with the introduction of LNG.

The purpose of this paper is to consult on the merits of harmonising the gas quality arrangements in both jurisdictions, specifically bringing the ROI specifications in line with those of Northern Ireland (NI) and GB. Several issues are raised by a single approach to gas quality and by BGN's report such as the arrangements to measure the quality of gas entering the network, the provision of information to gas-fired generators, and the issues surrounding the treatment of gas which is outside the specifications.

It should be noted that Northern Ireland gas quality specifications adhere to the Gas Safety (Management) Regulations (Northern Ireland) 1997 which falls within the remit of the Health & Safety Executive (Northern Ireland) (HSE(NI)). Therefore any implementation of recommendations will require HSE(NI)'s involvement.

1.1 Consultation Background

Gas quality has become an increasingly important issue for European gas markets. As indigenous gas resources in Europe are depleted and as interdependency between European countries increases, European countries are becoming increasingly dependent on gas from diverse external sources. This introduction of gas from non-traditional sources raises the issue of gas of varying quality specifications entering the network. To ensure gas from different sources is used safely and effectively by end customers, controls and if necessary, corrective measures, must be in place. Therefore, gas quality can serve as a barrier to trade with different quality specifications restricting the shipping of gas that may be compliant in one country but not in another. The European Association for the Streamlining of Energy Exchange (EASEE-gas) developed a gas quality standard in

¹ "Report on Gas Quality Arrangements in Republic of Ireland" BGN, 24th April, 2008

an attempt to overcome this difficulty. The idea being that gas compliant with the EASEE-gas standard should be accepted at the border and treated further if necessary. However, the EASEE-gas standard has not been adopted and has met some resistance as several countries have difficulties with it. In particular the UK has voiced objections on the grounds of safety and is not considering widening its specifications until 2020 at the earliest.

In 2003, the Department of Trade & Industry (DTI) in GB launched an in depth review of gas quality issues. This review was commissioned as a result of GB's dwindling natural gas reserves and the fact that the quantity of imported gas was (and is) forecast to increase significantly over the forthcoming 5-10 years. This work concluded that the costs and safety concerns regarding the replacement/modification of downstream appliances far outweighs the costs of treating non-compliant gas prior to entry to the transportation network. Where treatment is required, co-mingling with other gases or Nitrogen Ballasting were identified as the viable options. In 2004 the UK Government announced that there would be no change to the Gas Safety (Management) Regulations (GS(M)R) until at least 2020, to provide regulatory certainty for import projects that were underway. In 2007, the UK government also confirmed that it is planning no changes to this decision post 2020.

In January 2007, the European Commission gave a mandate² to the CEN to draw up standards for gas quality parameters for H-gas³ that are the broadest possible while not compromising safety or being prohibitively expensive to implement in terms of additional processing etc. The mandate is projected to be completed by 2012. Phase 1, which will take place over at least two years, is to create an overview of the existing population of relevant gas appliances within the EU, including the types of appliances, estimated populations, safety, efficiency, and emissions. Phase 2 will involve using the results of phase 1 and integrating this into the Cost-Benefit Analysis of the overall EASEE-gas project.

At present, ROI imports over 90% of its gas from GB via the interconnector pipelines. UK gas quality specifications adhere to the Gas Safety (Management) Regulations, 1996 as outlined in the Gas Act 1997. Other gas imported to Ireland from domestic fields conforms to these specifications through Connected Systems Agreements (CSAs). Gas in the Northern Ireland system conforms to the Gas Safety (Management) Regulations (Northern Ireland) 1997, which are the same as those in the UK. With the proposed introduction of LNG to Ireland and the development of indigenous gas fields, there is the possibility that gas with wider WI than currently may enter the Irish system as currently permitted under the Code of Operations. New gas fields and LNG will, however, reduce Ireland's dependence on imports from the UK and strengthen our security of supply.

² European Commission, "Mandate to CEN for standardisation in the field of gas qualities" (M/400 EN), 16 January 2007

³ "H-gas" is the high calorific value gas supplied by the pipe-line in most of those EU member states with piped gas; the main exceptions are limited areas of the Netherlands and Belgium, supplied from onshore Dutch fields.

However, there are potential safety concerns with allowing wider WI specification gas onto the network. This is due to changes in combustion performance. At higher Wobbe Index (WI) limits, incomplete combustion can occur and appliances tend to emit higher levels of carbon monoxide (CO) and consequently present increased risk of injury by CO poisoning. At low WI, flame lift can occur and flames can become unstable and may detach or even extinguish, leading to emission of unburned gas.

1.2 Gas Quality Issues in Ireland

The BGN report highlights CO emissions concerns that may arise in gas appliances should wider WI specification gas be allowed into the Irish Network. The report also concludes that the cost of replacing/modifying downstream appliances to accept wider WI gas is prohibitive, outside the scope of BGN's capabilities and will not necessarily ensure all appliances are future proofed. These findings are based upon a separate report commissioned by BGN and conducted by Advantica regarding the impact of Gas Quality on Gas Appliances and are consistent with previous work undertaken by Advantica in the UK. This concluded that the Irish and UK gas boiler & water heater appliance populations are comparable in type and that the UK Governments concerns regarding appliance safety in the UK with WI gas outside the GS(M)R are equally applicable here.

2.0 Bord Gáis Networks Report Recommendations

This consultation should be read in conjunction with Bord Gáis Networks April 2008 Report on Gas Quality Arrangements. The Regulatory Authorities are minded to implement the recommendations as outlined in BGN's report on Gas Quality Arrangements and invites comments on the proposals contained therein. The BGN proposals are summarised below.

Gas Quality Specification

Based on the potential safety issues of accepting gas outside GS(M)R WI limits, BGN recommends that:

- the default Gas Quality Specification in the Code of Operations for existing and new Entry and Offtake Points should to be aligned with the GS(M)R Wobbe Index range (47.2 – 51.41 MJ/m³);
- gas destined for the Republic of Ireland market with a higher than acceptable WI limit should be treated by Nitrogen Ballasting prior to delivery to the Transportation System to ensure compliance with the gas quality Entry Specification;
- Consideration should be given to an Emergency gas quality specification in line with the GS(M)R Emergency WI range (46.5 – 52.85 MJ/m³) . This would apply under emergency situations either in the UK or Republic of Ireland markets.

Gas Quality Measurement Arrangements

Given the potential for Non-Compliant Gas to be delivered at Entry points, BGN recommends that revisions to the gas quality measurement arrangements are made, as summarised below. More detailed measurement arrangements can be viewed in BGN's report.

- The Upstream Operator will have two primary chromat, and will provide BGN with repeat signals for gas quality parameters.
- BGN will install a secondary chromat at each Entry point, to verify the repeat signals from the Upstream Operator, and ensure compliance with the gas quality specification.
- At each Entry point, Local Operating procedures will be put in place and agreed to include instrument accuracy, measurement range and sampling frequency etc.
- Ensure calibration checks on gas quality measurement equipment are witnessed on a regular basis and at the very least occasional audits of the calibration checks.
- BGN recommend that industry rules / Entry point arrangements are developed to ensure as far as possible that the consequences of Non-Compliant gas being delivered at an Entry point are fully specified.
- BGN recommend that at each Entry point, Local Operating Procedures will be put in place and agreed to include :
 - o Limits and timings at which gas quality alarms will be triggered
 - o Confirmation and Validation of gas quality signals / data.
 - o Notifications.
 - o Curtailment.
 - o Mitigation Steps.
 - o Reinstatement.

3.0 Treatment of Non-Compliant Gas

3.1 Wobbe Index and Gas Quality Specifications

In BGN's report, it was identified that Irish and UK gas boiler and heater appliance populations are comparable in type with similar leading manufacturers and models. In this respect, safety concerns highlighted by BSRIA's⁴ report for the UK Government are equally applicable to the Irish gas appliance population. The Regulatory Authorities are in agreement with BGN's conclusion that the downstream option of replacing/modifying appliances to cope with Code of Operations WI gas is too costly (€876m) and is unlikely to fully resolve the safety issue. By bringing the Unified Code of Operations specifications in line with the GS(M)R specifications, these potential safety concerns would be addressed. If the GS(M)R were adopted, the Regulatory Authorities are in agreement with BGN's conclusion that the upstream solution of treating non-compliant gas prior to entry to the transportation system is the most suitable option.

In addition to the issue of safety harmonising the gas quality standards in ROI and NI will allow for gas to flow between the two jurisdictions. If different gas quality regimes exist in ROI and NI it would not be possible to operate the network on an all-island basis. Therefore, the Regulatory Authorities are of the opinion that there should be a single approach to gas quality in order to avail of the benefits offered by the CAG project.

3.2 Generators

Gas quality is also an issue for gas-fired power station operators, especially because modern turbines are particularly sensitive to fluctuations in gas quality. Of primary concern to power generators and turbine manufacturers is real time variation of Calorific Value (CV) and not receiving signals for gas quality changes in sufficient time. Equipment can be installed to manage changes in gas specification and the provision of gas quality signals in real time is important to enable effective management of generating plant. The Regulatory Authorities invite comments on the difficulties that gas-fired generators would face if either nitrogen-treated gas or gas outside the GS(M)R specifications were to be delivered to their offtake points or any other gas quality issues which may effect operation of power plants.

3.3 Gas Treatment Facilities

There are two options for treating non-compliant gas; blending or ballasting. The blending approach requires that a suitable separate stream of gas is available to mix with the high WI stream to produce a gas within the WI limit criterion. This is not feasible in Ireland due to our location at the end of European pipelines and lack of diversity in our gas imports. Nitrogen Ballasting is identified by BGN as the more suitable option to ensure WI correction. This involves injecting Nitrogen into a gas

⁴ BSRIA's *Assessment of Gas Quality on Domestic Appliances* report for the UK Government: <http://www.berr.gov.uk/files/file20977.pdf>

stream to lower the WI. Is Nitrogen Ballasting the most suitable way of treating non-compliant gas before it enters the system?

If the GS(M)R specifications are adopted in ROI, treatment facilities would need to be constructed at entry points where there is a possibility of non-compliant gas entering the system. In the BGN report it is estimated that the costs of constructing such a facility on a brown field site capable of 1000 tonnes/day would be approximately €16.5m. Is this estimate reasonably accurate? Comments on these costs are invited. With the proposed introduction of LNG to Ireland, there may be a need to construct Nitrogen Ballasting facilities.

International practice differs in respect of the funding of gas treatment facilities, in some cases it is the Transmission System Operator's responsibility and in others, for example the UK, it is the responsibility of the upstream producer. The Regulatory Authorities invite comments on the funding of treatment facilities and the circumstances under which facilities' capital costs should be funded by the general customer or whether the upstream producer should be responsible for the full capital costs of a treatment facility.

As identified in BGN's report, upstream treatment of gas prior to entry to the transportation system is the most cost effective and financially viable means of ensuring gas quality. If the upstream operator controls the flow, it is operationally preferred that the upstream operator would ballast the gas. Splitting processing activities between two operators would be inefficient and may also give rise to safety concerns. Accordingly, the Regulatory Authorities propose that the upstream operator would be responsible for the operation of the treatment facility. Also, as the upstream operator is in a position to control the flows and, in the case of LNG, quality of the gas and generally can optimise the efficient use of the facility the Regulatory Authorities propose the operational costs should be borne by the upstream operator.

4.0 Summary of Consultation Questions

- Should the recommendations in the BGN report be adopted?
- Should the Wobbe Index range in the Code of Operations be narrowed?
- Should the Wobbe Index range in the Code of Operations be brought in line with the GS(M)R range (including the GS(M)R emergency range)?
- Would narrowing the range restrict gas supplies?
- What is the impact on gas-fired generators and how should this be addressed?
- Is nitrogen ballasting the most effective method of treatment?
- Should the capital costs of the treatment facilities be funded by the upstream producer and on what basis?
- Should the costs and responsibility for the operation of the treatment facility lie with the upstream operator?
- Should the BGN recommendations in regards to measurement be implemented?

5.0 Next Steps

Responses to this paper and the accompanying BGN report are requested by close of business Friday 11th July, 2008, and should be sent to Robert O'Rourke by e-mail to rorourke@cer.ie or by post to

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An industry workshop will be held during the first week in July to discuss this consultation and all interested parties are welcome to attend. The date, venue, and other details for the workshop will be published on the CER website.