Gas Quality Blending Services at NTS Entry Points

Industry Consultation

September 2020

nationalgrid

Contents

1. Introduction

This consultation is issued by National Grid Gas (NGG), in its role as owner and operator of the National Transmission System (NTS) in Great Britain. Its purpose is to seek industry views on various issues that would need to be addressed for NGG to offer gas quality blending services at NTS entry points as part of its regulated business. In this document, we outline the type of service we envisage and the factors we have been considering in relation to its introduction.

Under the Gas Safety (Management) Regulations 1996 (GS(M)R), NGG is obliged to not convey any gas on its network that does not comply with the gas quality specification described in Schedule 3 of those Regulations. In order to comply with this obligation, at present, NGG enters into contractual arrangements with Delivery Facility Operators (DFOs) at NTS entry points that oblige the DFO to deliver GS(M)R-compliant gas at the custody transfer point between the DFO's system and the NGG system.

Several parties that deliver gas have expressed interest in NGG developing gas quality blending services, enabling an operator to deliver off-specification gas provided that NGG could achieve a compliant blend before the gas exits its terminal onto the NTS pipelines. Given that NGG has no control over the flows from DFOs at NTS entry points, we think that the service could only be offered on an interruptible basis. We are not at present contemplating the installation of gas processing capability that would be needed in order to offer a firm service but do not rule this out in the longer term if stakeholders were to indicate that this might be of value.

The locations we currently consider to be most suitable are Bacton and St Fergus, where multiple sources of supply co-mingle within an NGG terminal before exiting onto NTS pipelines – where the 'network' begins for GS(M)R purposes. The suitability of Bacton for this purpose has received particular focus recently due to Uniform Network Code (UNC) Modification Proposal 0714[1], which proposes to enable a blending arrangement on a short-term basis. However, we wish to seek industry views in relation to all NTS entry points in this consultation.

1.1 Potential Benefits

We envisage that such a service could:

- Be an economic alternative to the installation of gas processing equipment at NTS entry points;
- Provide an additional means of getting gas to the GB market;
- Enhance the availability of existing gas fields where mid-stream / upstream blending solutions are unavailable, unreliable or uneconomic;
- Encourage the development of new, more marginal specification gas fields in the UK Continental Shelf (UKCS), enabling additional volumes of gas to enter the NTS;
- Contribute to the UK Government's strategy of Maximising Economic Recovery of oil and gas reserves from UK waters[2];
- Benefit GB security of supply;
- Contribute to lower gas prices for end consumers; and
- Develop operational blending capability within NGG which may prove beneficial in the longer term in relation to the introduction of hydrogen.

1.2 The Project

We have established an internal project which has three streams of work:

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[1] https://www.gasgovernance.co.uk/0714

[2] https://www.ogauthority.co.uk/news-publications/publications/2016/maximising-economic-recovery-of-uk-petroleum-the-mer-uk-strategy/

Please note the 2016 is the current document however following a recent consultation looking towards net zero, is likely to be reviewed and updated in the next few months.

1. **Technical feasibility**
   We have commissioned DNV-GL to complete a feasibility assessment using our Network Innovation Allowance (NIA) funding. The assessment has been limited to two entry terminals: St Fergus in Scotland and Bacton in East Anglia. These terminals have been selected as they receive gas via multiple incoming pipelines from several DFOs which comingles in a NGG terminal before being discharged onto NTS pipelines. For both terminals, DNV-GL will develop detailed gas flow and composition models that accurately replicate terminal infrastructure dynamics, configurations and control processes. Projections of future gas flow and quality will then be applied on the modelled pipeline incomers to the NGG terminal and results observed about whether a GS(M)R compliant blend is achieved, thereby providing statistical evidence of the terminals' blending capability.

2. **Safety assurance** –In parallel, we are conducting our own operational assessment about the feasibility of such a service, looking in particular at the operational risks and potential mitigations. The current gas quality specification is set out within the Gas Safety Management Regulations (GS(M)R) (1996). GS(M)R requires NGG to prepare a Safety Case document and for the Safety Case to be formally accepted by the Health and Safety Executive (HSE). The Safety Case reflects the controls NGG have put in place to prevent non-compliant gas reaching the network. If a gas quality blending service is offered, NGG would need to agree to amend the limit of the relevant parameter that currently appears in the relevant Network Entry Agreement to a value outside the current GS(M)R specification, whose effect would be to remove a key control which is currently designed to stop non-compliant gas reaching the network. We could not offer this service without a change to the NGG GS(M)R Safety Case being approved by the HSE, therefore this workstream is looking at whether and how additional controls can be implemented, and the Safety Case amended so that gas quality management arrangements under a blending arrangement are at least as safe as the current arrangements.

3. **Commercial & regulatory changes** –This workstream is needed to develop business rules governing how the service might be offered, in respect of which parameters, who the service would be offered to, the charging structure and regulatory framework including any changes to our Gas Transporter's Licence and UNC.

This consultation document aims to progress workstreams 2 and 3 by seeking views from our customers and stakeholders in relation to:

- NTS entry points where the service could be offered;
- How the regulatory framework might need to change;
- Operational impacts and safety considerations; and
- Commercial issues, including charging.

Please email your response using the template provided published alongside this consultation to box.gsoconsultations@nationalgrid.com. The consultation shall be open for eight weeks and will close on 13th November 2020. Following this consultation, we will publish a consultation report in December 2020 that will summarise the responses received, our response to the issues raised and set out our proposed next steps.

We will publish all consultation responses that we receive on our website at https://www.nationalgrid.com/uk/gas-transmission/data-and-operations/transmission-operational-data/commercial-regulatory-change unless a party specifies that their response or part thereof should be treated confidentially.

We will also be hosting an industry webinar to explain our thinking on this topic and answer any questions you may have on 13th October 2020 from 9:30 - 11:00 am. You may register for this webinar via the following link: https://www.eventbrite.co.uk/e/gas-quality-blending-consultation-webinar-tickets-121339903919

We are also willing to discuss the content of this consultation with parties on a bilateral basis; please contact either Phil Hobbins on 07966 865623 or by email philip.hobbins@nationalgrid.com or Rachel Hinsley on 07811 762440 or by email rachel.hinsley1@nationalgrid.com.

2. Current Gas Quality Arrangements

2.1 GS(M)R Compliance

Regulation 8 of GS(M)R covers the content and characteristics of gas; this includes the requirement that UK gas transporters are not permitted to convey gas in their networks that is outside the limits detailed in Part 1, Schedule 3.

GS(M)R requires UK gas transporters to prepare a Safety Case document and for the Safety Case to be formally accepted by the HSE. The Safety Case details the arrangements that are in place for ensuring compliance with the GS(M)R including gas quality.

2.2 Contractual Relationships

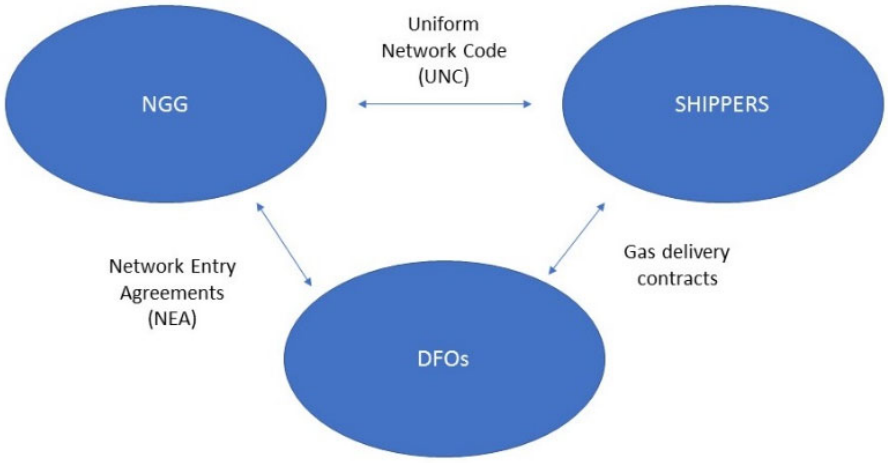


Diagram 2.0 Contractual relationships between industry parties

Diagram 2.0 illustrates the relationships between the industry parties as they pertain to gas quality.

- The terms for conveyance of gas are set out in the Uniform Network Code (UNC). Shippers are obliged under UNC not to deliver gas at an NTS entry point that does not comply with the gas quality limits / ranges contained within the relevant Network Entry Provisions for that point.
- UNC shippers, who are contractually responsible for the delivery of gas, contract with DFOs to physically deliver gas at NTS entry points.
- Gas quality parameters for most NTS entry points that deliver gas into the NTS are set out in Network Entry Agreements (NEAs) between NGG and each DFO. There are a few terminals which do not have a NEA with NGG, and which operate on the basis of the gas

quality limits that were in place in respect of that location at the inception of the Network Code in 1996. We refer to these as 'legacy' terminals.

2.3 Blending Points

From time to time, a DFO may experience operational difficulty which results in gas outside the Schedule 3 Part I GS(M)R requirements being tendered for delivery to the NTS. Whilst we will take immediate action through our Transportation Flow Advice (TFA) process to deal with this, it may be that the off-spec supply can fortuitously co-mingle with other on-spec supplies at a designated 'blending point' that results in no off-spec gas getting on to the GS(M)R network.

These 'blending points' are designated in our Safety Case as being points or areas of pipework that are as close to the upstream terminal as possible. There are no domestic gas offtake points between the blending point and the DFO's terminal. Blending points are different dependent on the configuration; for example, at locations where we have a manned terminal where gas from multiple sources comingles, the blending point is the NGG terminal and where there is a single source of supply the blending point will be a point downstream where gas from that supply meets other gas on the network. We monitor gas quality at these blending points so that we know whether or not we have transported any off-spec gas on the network.

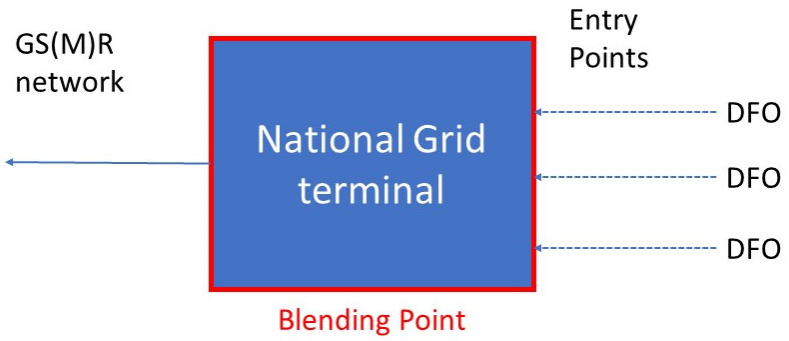


Diagram 2.1 - Blending Point at an NTS entry location with multiple DFOs

At locations where multiple DFOs deliver gas, the blending point is the NGG terminal and fortuitous co-mingling may occur to bring any off-spec gas into compliance by the time it enters the GS(M)R network, i.e. the NTS pipelines that leave the NGG terminal. Bacton and St. Fergus are good examples of this type of entry point.

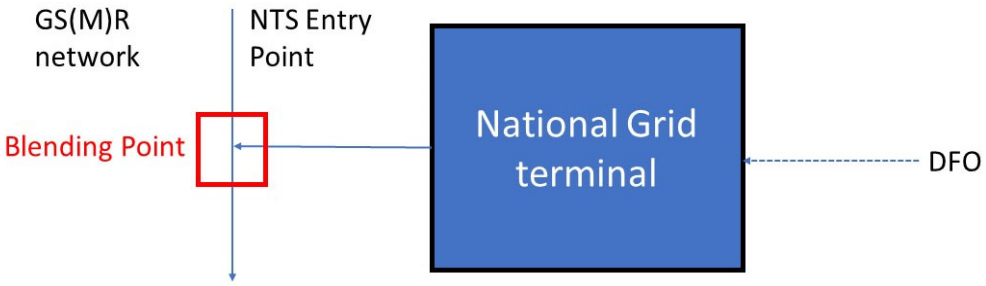


Diagram 2.2 - Blending Point at an NTS entry location with a single DFO

At NTS entry points with a single supply source, the 'blending point' is the nearest suitable junction with the NTS and blending takes place at the junction.

2.4 Transportation Flow Advice

We constantly monitor the content and characteristics of gas at each individual NTS sub-terminal and blending point. Within the current arrangements, when a DFO supplies gas which is recorded as being non-compliant a TFA is issued to reduce the flow of the non-compliant supply source. This is issued to the DFO setting out the flow reduction required up to the point where action is taken to curtail non-compliant gas.

3. Service Concept and Link to GS(M)R Review

3.1 Gas Quality Blending Service Concept

We are considering offering an interruptible gas quality blending service to enable pre-defined off-spec gas to be admitted at a suitable NTS entry point provided that sufficient flow and quality is available from other DFOs at that location such that the co-mingled gas is GS(M)R compliant by the time the gas reaches the 'GS(M)R network'. We currently envisage that such a service would be provided as part of our regulated business activities because it would be delivered using existing assets at entry terminals that are included in our Regulated Asset Base.

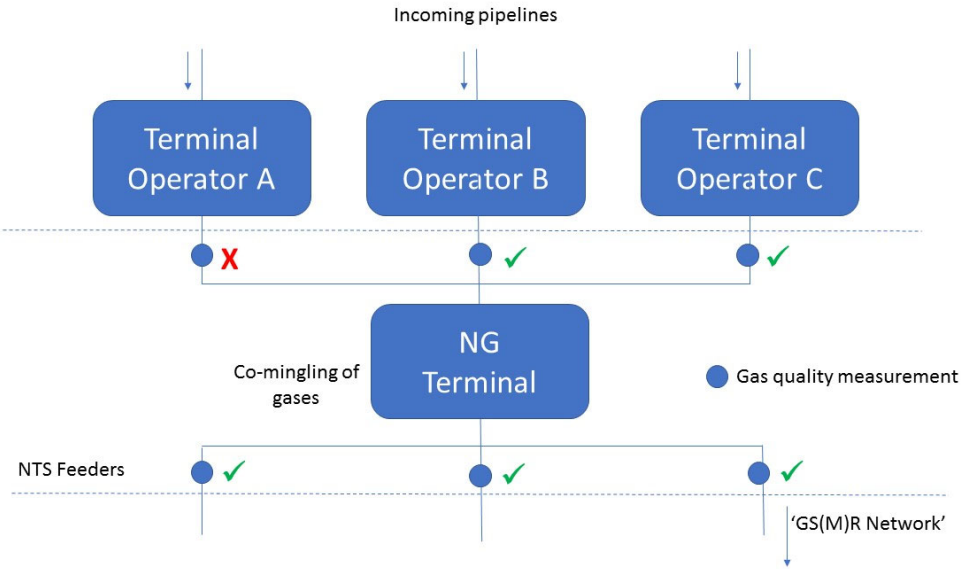


Diagram 3.0 - Gas Quality Blending Service Concept

In this scenario, DFO A has delivered gas which is not compliant with a particular GS(M)R parameter. The gas is co-mingled within the NGG terminal and then fed onto the NTS as a compliant comingled gas. As stated in the previous section, this scenario can happen today under 'upset' process conditions upstream; the difference with a blending service would be that DFO A would have a contractual right to deliver the off-spec gas provided that a compliant blend could be achieved within the NGG terminal. If this were not the case at any time, we would take curtailment action under our TFA process.

The service is proposed as interruptible because NGG has no control over the flows from DFOs at NTS entry points and may therefore have to curtail acceptance of off-spec gas if flow and/or quality from other supply sources at that location reduce.

We recognise that commercial arrangements operate upstream of the NTS to facilitate the delivery of gas that would otherwise be non-compliant. We are not seeking to disrupt these arrangements; rather to offer DFOs another option that may be useful to bring their gas into compliance.

To offer such a service, the current gas quality arrangements would need changes including:

- Changes to the regulatory framework including how the activities can fit into NGG's activities, UNC and / or NEA amendments
- New operational monitoring arrangements, potentially including additional measurement devices such that we can monitor the comingled gas quality within our terminal, enabling us to demonstrate that the new service offering will not increase the risk of off-spec gas getting

onto the network. An amendment to the NGG GS(M)R Safety Case would need to be prepared by NGG and be approved by the HSE;
- Operational and procedural changes.

The subsequent sections of this consultation document explore the different elements of change which may be required.

3.2 GS(M)R Review

An industry wide GS(M)R Review was set up in 2016 following SGN's 'Opening up the Gas Market' network innovation project[3]. Two workstreams were established: a review of the gas quality specification led by Institution of Gas Engineers and Managers (IGEM) and SGN and a review of the remainder of the Regulations led by ENA.

IGEM recently published a consultation document which proposed to amend the UK gas quality specification and to transfer it out of GS(M)R into an IGEM standard.

Following the consultation, IGEM's Gas Quality Working Group will assess the responses and we expect IGEM to then finalise the new gas quality standard via its internal governance procedure which will focus on technical and safety criteria. HSE will then lead a Government consultation and wider impact assessment of the proposed changes, before ministerial engagement seeking parliamentary time for this change to legislation. According to our current estimate of timescales, we do not expected that any wider spec gas will be delivered onto the NTS before 2023 given all the changes required, including contractual amendments.

The IGEM consultation recommendations for change were:

- Increase the upper limit for Wobbe Index from 51.41 MJ/m^3 to 52.85 MJ/m^3
- Reduce the lower limit for Wobbe Index from 47.20 MJ/m^3 to 46.50 MJ/m^3
- Remove the Wobbe Index emergency limits
- Remove the Incomplete Combustion Factor parameter
- Remove the Soot Index parameter
- Introduce a Relative Density upper limit of 0.7
- Increase the upper limit for oxygen from 0.2mol% to 1.0mol% on below 38 bar systems.

This gas quality blending service project is being progressed in parallel to the wider industry GS(M)R Review. It appears to us that some of the gas quality challenges that upstream operators are facing would be resolved if the IGEM proposals, as drafted, were implemented. However, a blending service may still be of value if it encourages the development of more marginal fields.

[3] https://www.sgn.co.uk/sites/default/files/media-entities/documents/2019-07/SGN-Oban-Gas-Market-Report-Executive-Summary-2016.pdf

Consultation Questions:

1. What are your thoughts on the service concept outlined in this section 3?

2. Do you foresee any positive or negative impacts of NGG offering such a service on your business? If so, please explain.

3. Do you consider there to be any risks that may arise from such a service?

4. Wobbe Index and Incomplete Combustion Factor are the parameters that stakeholders have so far indicated to us could be useful to have a relaxation on as a blending service. Do you see a need for this service to cover any other parameters and if so, which parameter(s) would you like to be considered and why?

5. Do you consider that the GS(M)R Review negates the need for a gas quality blending service or should the topic continue to be explored?

4. Applicable Terminals

In order for NGG to offer the blending service that is currently envisaged, multiple supplies of gas must be present at an NTS entry point. All terminals that are identified as potentially suitable would need to be subject to a risk assessment to ensure that there is no degradation in safety by offering the service.

All current NTS entry locations have been considered against the requirements. The entry points considered for gas quality blending differ with varying levels of infrastructure and components. In this section 4, we outline the configuration of each of them and provide our initial view about whether each one falls into one of three categories:

1) Terminals most suitable to offer a gas quality blending service, where either limited or no asset investment would be required;

2) Terminals potentially suitable for such a service where more substantial asset investment is likely to be required; and

3) Terminals which we think are currently unsuitable for such a service.

(On the diagrams below the letter Q within a box denotes where the gas quality measurement equipment is located).

4.1 Terminals most suitable to offer gas quality blending services

We have identified Bacton and St Fergus as the terminals most suitable to offer a gas quality blending service.

Bacton

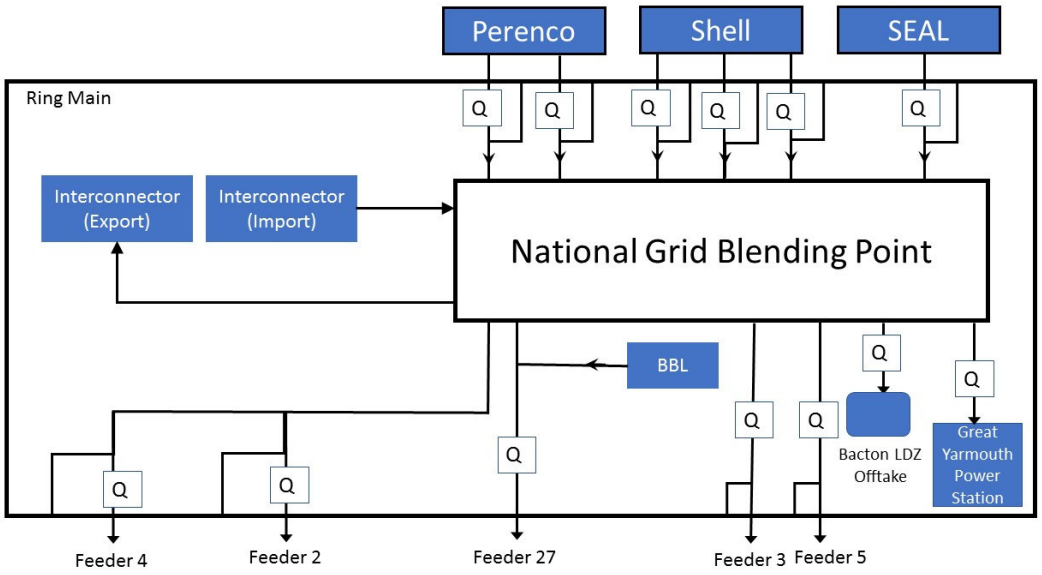


Diagram 4.1 – Bacton

Bacton has been identified as a terminal that may be suitable to offer a gas quality blending service on the basis that there are multiple DFOs flowing gas into the NGG terminal which itself serves as a 'blending point' in our GS(M)R Safety Case. In addition to the blending point there is a 'ring main'

around the perimeter of our terminal which could potentially be used to route any off-specification gas and subsequently blend with on-specification gas to meet compliance ahead of the gas leaving the terminal. We measure gas quality on each incoming pipeline and each NTS feeder to analyse the gas and ensure compliance.

We consider that it may be more likely that UKCS terminals utilise the service rather than the interconnectors, IUK and BBL. Multiple offshore fields flow into sea-lines which feed the the UKCS terminals and if sources of blend gas offshore are unavailable, quality at the beach could be affected, whereas interconnectors link two transmission systems and are therefore less likely to deliver off-spec gas because the interconnector operators need to be sure that the gas they accept in at one end of the pipe can be evacuated at the other. Therefore, an interruptible service may be unattractive for these operators. There are also physical limitations for offering a blending service for BBL gas at Bacton due to the connection configuration whereby limited mixing occurs; the majority of BBL gas goes straight into feeder no.27.

St Fergus

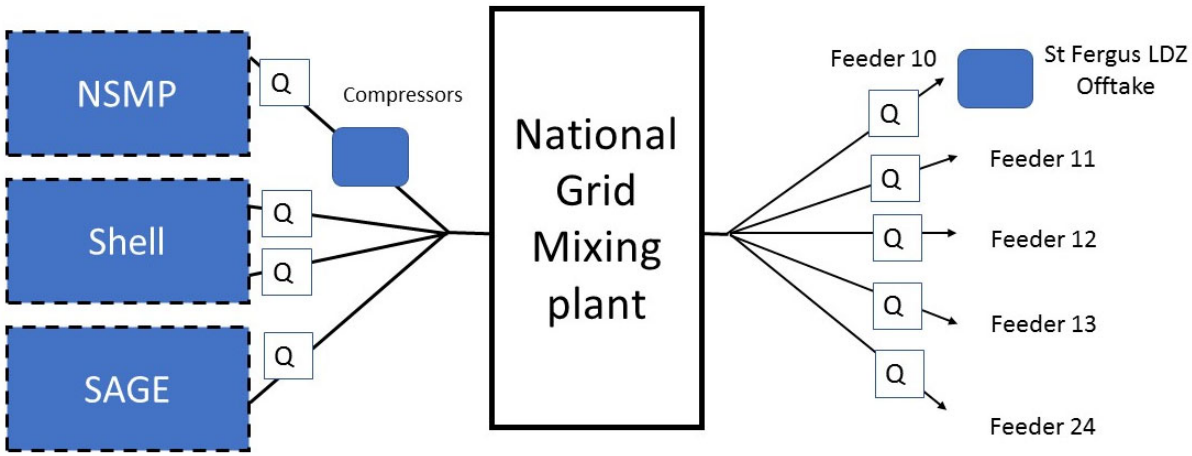


Diagram 4.2 - St Fergus

St Fergus has been identified as another terminal that may be suitable to offer a gas quality blending service on the basis that there are multiple DFOs flowing gas into the terminal and, ahead of the start of the GS(M)R Network, there is a mixing plant. This could allow for off-specification gas to be blended prior to entering the GS(M)R Network. As with Bacton, we measure gas quality from each DFO as it enters our terminal and, on the outlets, to ensure compliance.

4.2 Terminals potentially suitable to offer gas quality blending services

The following terminals have been assessed as potentially suitable for a gas quality blending service, however additional infrastructure and / or components are expected to be required.

Easington

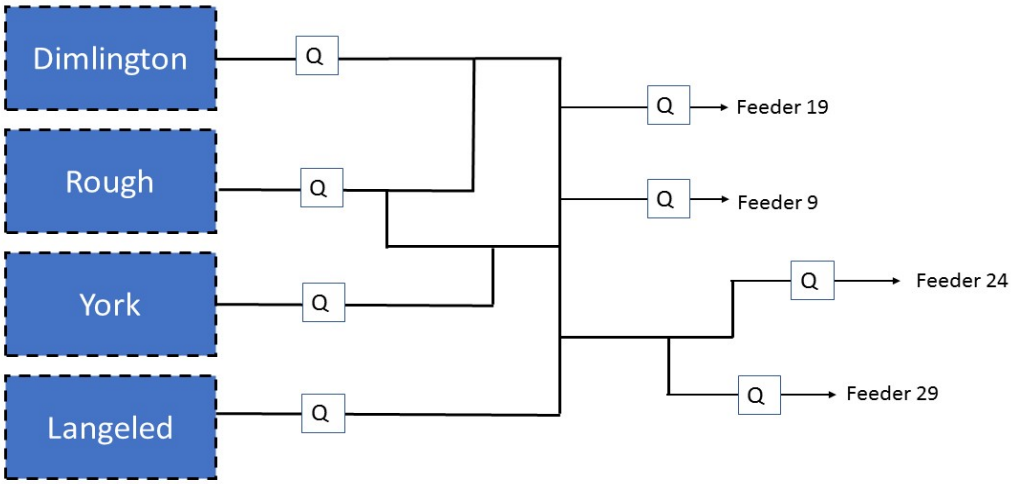


Diagram 4.3 – Easington

Easington has multiple sources of gas, however there is no NGG terminal where all the streams mix together. In addition, one source of gas – Langeled – is delivered in significantly larger volumes than the others which may make a blending service impractical.

Any required asset investment, infrastructure and / or components would delay the implementation of the service and increase its costs.

Teesside

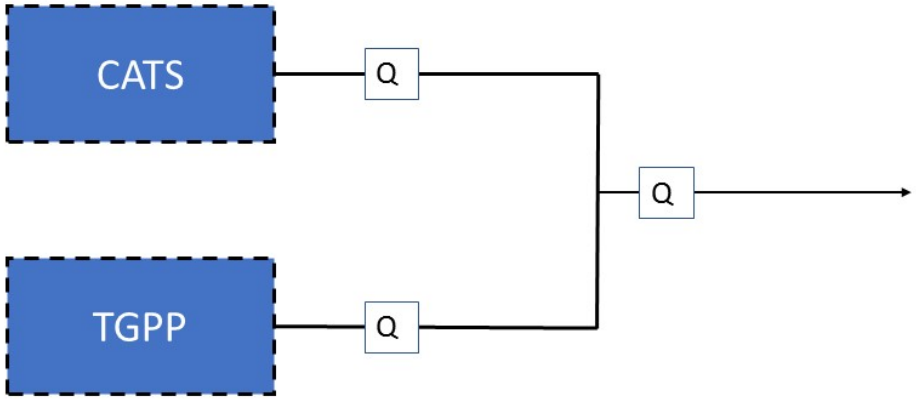
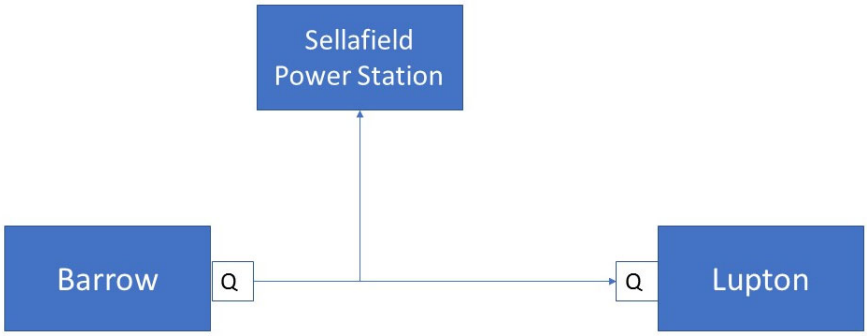


Diagram 4.4 – Teesside

Teesside has multiple sources of gas and co-mingling does occur prior to the start of the GS(M)R Network. There is less NGG pipework available for this to take place than at St Fergus and Bacton, but a service is therefore potentially viable at Teesside.

4.3 Terminals where a gas quality blending is not currently feasible

We think that the terminals described in this section 4.3 would be unsuitable as locations for us to offer a gas quality blending service.



Barrow

Diagram 4.5 - Barrow

Barrow was originally constructed as two terminals: Barrow North (which had a compliant gas quality spec) and Barrow South (which was permitted to deliver gas with a Wobbe Index below the GS(M)R lower limit. It was therefore possible for the NTS pipeline between Barrow and Lupton to contain non-GS(M)R compliant gas, which was permitted to flow provided that we could achieve a compliant blend with gas from St Fergus travelling south at the Lupton multi-junction. However, due to the prospect of new storage projects in the Irish Sea and the 'null point' of flow rising further north in GB due to the advent of major new sources of supply in the south of the country, Barrow has now been converted into a single GS(M)R compliant entry point and as it stands would be unsuitable for a NGG blending service.

Burton Point

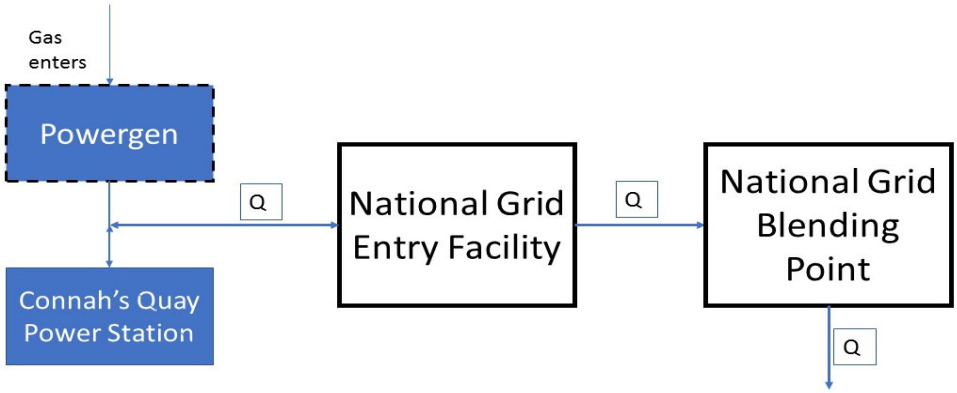


Diagram 4.6 Burton Point

The gas flowing into Burton Point can either be sent to Connah's Quay power station or into NGG's entry facility. Burton Point only has one source of gas which contributes a low volume in NTS terms and we have no means to offer a blending service ahead of the start of the GS(M)R Network. For this reason, we do not currently consider that Burton Point would be suitable for offering a gas quality blending service.

Isle of Grain

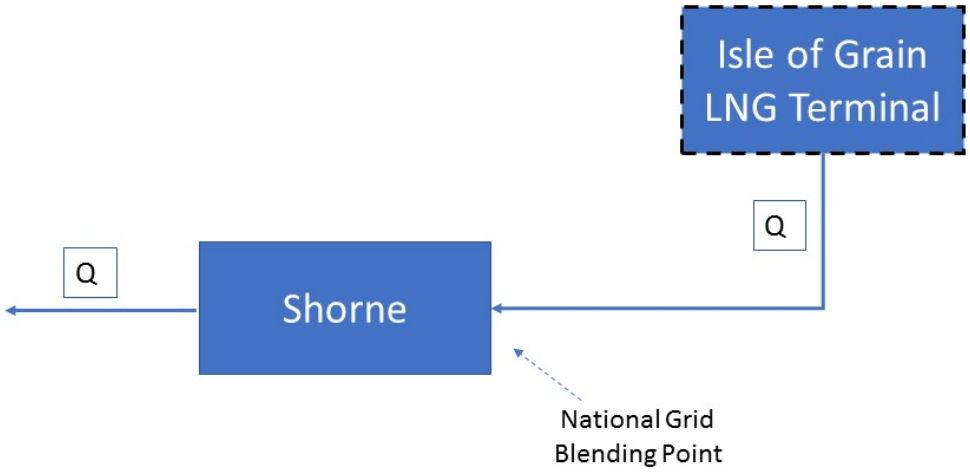


Diagram 4.7 - Isle of Grain

The Blending Point at the Isle of Grain is beyond the start of the GS(M)R network, therefore the gas that arrives at the blending point is required to be GS(M)R complaint. Although there are two physical

entry points at Grain, the gas is delivered by the same DFO. For these reasons, our initial view is that Isle of Grain is not suitable for offering a gas quality blending service.

Milford Haven

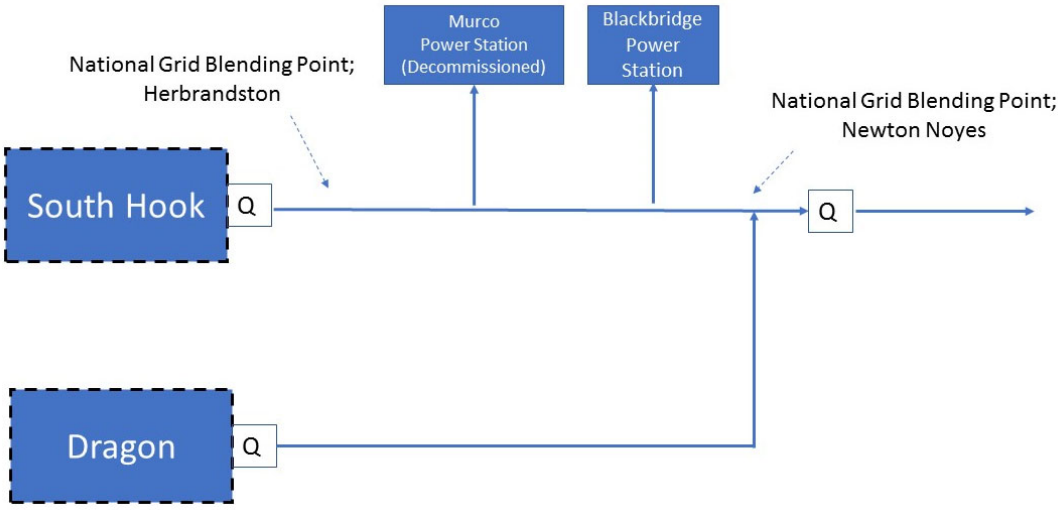


Diagram 4.8 - Milford Haven

There are two separate terminals at Milford Haven which are several miles apart and each feed gas onto NTS pipelines which co-mingle at Newton Noyes. Since there is no current infrastructure available for blending South Hook gas and Dragon gas prior to entry onto the GS(M)R network, our initial view is that that Milford Haven is not suitable for offering a gas quality blending service.

Storage Points

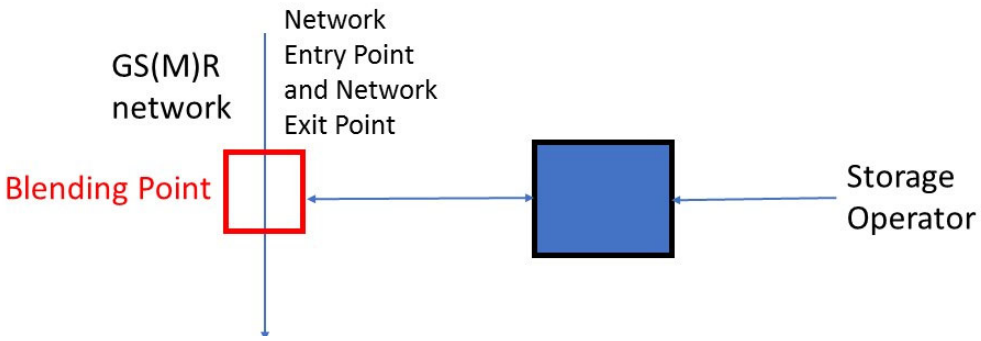


Diagram 4.9 - Storage

Gas that is offtaken by storage sites will be GS(M)R compliant as it has travelled within the GS(M)R network. However, once gas enters the storage facility it has the potential to become non-compliant;

for example, salt caverns can increase the water dewpoint levels and oil caverns can increase the hydrocarbon dewpoint and hydrogen sulphide levels. Storage operators may therefore be interested in a gas quality blending service.

However, storage facilities are akin to a single source of supply at a beach terminal; the only source of blend gas for storage injection into the NTS is NTS gas itself. For this reason, our initial view is that a blending service is unlikely to be feasible for storage sites.

Biomethane Connections

Whilst most biomethane connections are connected to gas distribution networks, we do now have one connected to the NTS and more may follow. However, these are currently expected to be single source entry points and unlikely to be suitable for the gas quality blending service that we are currently envisaging. If the number of such connections increases in a particular area, we could then reassess feasibility.

Consultation Questions:

6. Do you agree with our initial views on the categorisation of NTS entry points contained in this section 4?

7. Teesside and Easington would require additional infrastructure and components to be able to offer a gas quality blending service, which would mean additional time and costs to implement. Would you support NGG further exploring this?

8. Would you potentially be interested in a NGG gas quality blending service? If so, please advise the location where your gas is delivered, indicative volumes per day for blending and the parameter(s) you may wish NGG to consider **(NOTE: Unless you specify otherwise, responses to this question 8 will be anonymised in our subsequent consultation report, i.e. we would say that 'x' number of respondents indicated a potential demand for 'y' volumes of gas to be blended at 'z' number of locations).**

9. Do you think that the service is more suited to UKCS terminals rather than interconnectors?

5. Operational Impacts

Before we can offer a gas quality blending service, we would need to be able to demonstrate that there are no increased safety risks compared to the service we offer today. The HSE will need to be convinced that where we have relaxed any existing controls, suitable and sufficient new controls are put in place.

We are currently reviewing the operational impacts and safety controls as a result of UNC Modification 0714[4], *Amendment to Network Entry Provision at Perenco, Bacton Terminal* - was raised in February 2020. This is an 'enabling' modification to temporarily amend the Wobbe Index within the Network Entry Provisions between Perenco and NGG at Bacton, from 47.2MJ/M^3 to 46.5MJ/M^3.

The proposal, aimed at supporting a specific gas quality challenge with the Cygnus field which has a lower Wobbe Index, sets out that the lower Wobbe limit gas would only be accepted into the NGG terminal where a compliant blend of gases can be achieved. Our work on this proposal has and is providing learning for the wider gas quality blending project.

We have considered the operational impacts to give effect to Modification 0714 across several areas which include:

- Risk of off specification gas on the network
- Reduction in operational flexibility
- Asset reliability
- Upstream processing

5.1 Safety Controls

To give effect to UNC Modification 0714, the following measures are being considered to minimise risks and maintain controls:

- Creating pre-set minimum flow and quality requirements, ensuring sufficient flow and quality from on-specification supplies to deliver a compliant blend within the NGG terminal. The intention is to monitor whether there is sufficient blend gas to achieve GS(M)R compliant gas. This considers frequent monitoring frequency and in which scenarios blending may not be available and the TFA process may be enacted.

- We have needed to assess operational tolerances and analyse different flow and quality scenarios.

- For an enduring solution the two bullets above need to be considered. It is anticipated we would need to consider flow, quality, tolerances and unforeseen loss of on-spec supplies. Where we do not consider there is sufficient blend gas, we would need to interrupt the service. In some scenarios e.g. an upstream trip we would need to consider the protocols for reducing or curtailing any off-specification gas.

- The Gas National Control Centre (GNCC) and Bacton terminals operate with alarms to highlight any risks that need addressing. Additional alarms are being considered to highlight when low flows from on-specification supplies are experienced.
    - Alarms would also need to be considered for an enduring service to highlight any increasing risk of non-compliant gas reaching the network. Responding to the alarms initiates operational measures to stop any GS(M)R breach on the feeders.

[4] https://www.gasgovernance.co.uk/0714

- For an enduring gas quality blending service, we would need to determine whether additional gas quality monitoring equipment would need to be installed and the frequency with which analysis and gas quality readings may need to occur.

- The contractual arrangements pursuant to Modification 0714 would need to allow NGG the ability to suspend the arrangement and reinstate the relevant GS(M)R limit if circumstances mean that NGG could no longer meet its obligations under GS(M)R.
    - This control would also be needed to for any short term or enduring gas quality blending service.

- Accountabilities, roles and responsibilities of all relevant parties involved in facilitating the temporary blending arrangement parties will be agreed and documented.
    - This control allows understanding throughout all relevant parties in either a short term or enduring arrangement to make clear what is required from each party.

The controls required for implementing UNC Modification 0714, if approved, are still being assessed. For example, we are trying to establish whether enhanced communications between NGG and DFOs at Bacton could be a sufficient control to deal with an unforeseen trip of an on-spec supply. UNC Modification 0714 is proposed as a temporary solution. Such controls may, or may not, be sufficient for an enduring gas quality blending service.

UNC Modification 0714 is limited to amending the Wobbe Index. Whilst this is proposed as a 'trial' arrangement, we will look at the outcomes from this Modification to inform an enduring gas quality blending service arrangement. Any gas quality blending arrangement would also need to consider any operational or safety impacts of blending other parameters than Wobbe.

Our future strategy for Bacton includes a significant rebuild of the site. It is anticipated that there will be no diminution of blending capability at Bacton following completion of this work in 2025, which itself is subject to an appropriate financial allowance being granted in RIIO-2. Our current view is that any new infrastructure or components that are installed at Bacton to support a gas quality blending service would not become stranded assets following the rebuild.

The gas quality blending service proposal does not feature within our RIIO-2 business plan because the project is currently at an exploratory phase.

6. Regulatory Treatment

6.1 Licensee Activities

The regulated activities that NGG undertakes in relation to gas transportation are set out within our Gas Transporter Licence. If we offer a gas quality blending service in the future it would use our regulated assets and therefore may require Licence amendments to reflect this. Currently, we are contemplating offering this service through NGG as part of our regulated business, using our regulated assets.

Whenever a new service or activity is identified which we may want to provide, there are a number of routes open to us to enable that service to be implemented from a regulatory perspective. These are:

- Consented;
- De-minimis;
- Excluded Services; and
- Licensed business activities.

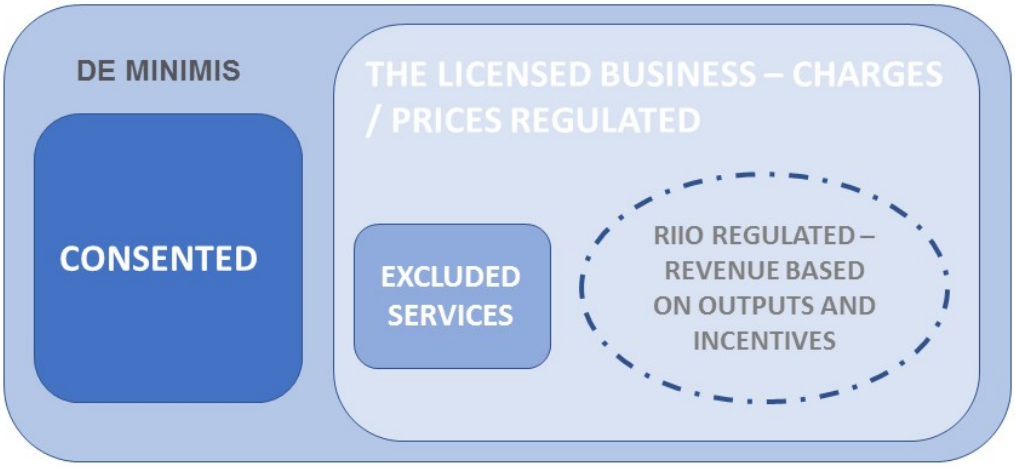


Diagram 6.1 Schematic of NGG Regulated Activities

The majority of our activities are licensed transmission activities, regulated by Ofgem. These activities are carried out as part of our regulated business using our regulated assets for which Ofgem sets allowed revenues that we may recover through our transportation charges levied on gas shippers.

In addition to RIIO licensed business activities we may also engage in 'consented' activities, de-minimis activities and excluded services.

- A Licence consent enables NGG to carry out an activity or perform a particular function, which is not part of the licenced transmission function. Licence consents will have conditions and must be complied with by NGG for the period of time for which it is granted. They may be considered as appendices to the NGG Licence, with each being a separate document in its own right. There are a number of Licence consents granted by Ofgem to NGG on a number of topics, over a period of time.

- De-minimis activities allow NGG to provide services that are not material enough to require explicit consent from Ofgem. The total revenue that NGG can receive for all de-minimis must

be less than 2.5% of annual licensee turnover and involve less than 2.5% of licensee capital. Both de-minimis and consented activities are for services outside industry codes that are subject to their own commercial arrangements.

- Excluded services are a defined set of licenced transmission services provided by NGG with revenues excluded from the price control annual allowed revenue. We report on our excluded services to Ofgem on an annual basis.

6.2 Consented

A consent may be granted by Ofgem in the event that NGG requests to perform an activity which is currently not described within its Licence. We can carry out an activity or perform a particular function, which is not included in the Licence itself if Ofgem agree with the business case associated to the consent requested by NGG. Licence consents are extensions of the Licence and must be complied with by NGG for the period of time for which they are granted.

The table below presents our thoughts on the advantages and disadvantages of treating a gas quality blending as a consented arrangement.

PROS	CONS
Allows flexibility for both NGG and Ofgem	Created through a bi-lateral arrangement; does not usually allow for a formal consultation period but the consent will be published on Ofgem's electronic public register once approved by Ofgem
Provides clarity on the scope and regulatory treatment of the service. The consent will set out how the costs and revenues of the service should be recorded along with any other conditions i.e. actions that National Grid must take to deliver the service	
Allows for the service to be time bound with periodic reviews	

6.3 De-minimis activities

De-minimis activities are broadly defined as those activities which are not related to the permitted purpose activities of the licencee (i.e. gas transportation). Since our primary role is to develop, operate and maintain the NTS as a monopoly low risk business, de minimis activities are capped at 2.5% of the annual turnover of NGG or 2.5% of share capital.

Both de-minimis and consent arrangements are conducted within commercial contractual arrangements.

6.4 Excluded Services

Excluded services are detailed within Special Condition 11 of our Licence. We provide a number of services within this category and the costs and revenues are excluded from our transportation charges, and SO incentives because the services are broadly bilateral in nature between NGG and the customer who requested the service.

However, since SC11 does not currently include an exhaustive list of excluded services, we could deem gas quality blending to be an excluded service, but in that case, would need to include the costs and revenues of any such service within the annual Regulatory Instructions and Guidance (RIGS) pack, in accordance with Standard Special Condition A40, each year. In order to expand the current list of Excluded Service categories within SC 11C to include gas quality blending, this would require a consultation on this particular part of the Licence.

The table below shows the advantages and disadvantages that we have identified of treating gas quality blending as an 'excluded service'.

PROS	CONS
Once gas quality blending appears as an excluded service it is open and transparent to Ofgem and industry	If the costs are treated as MS8 Miscellaneous under SC11, the costs and revenues associated with delivering the service will be captured within RRP/RIGS, but this will not provide an opportunity to consult on the standards of service for blending, since NGG will submit the RRP pack to Ofgem in any case

6.5 Licenced Activity

The gas quality blending service could be proposed as a new licenced activity for NGG to perform.

The process to include a service as part of a licence condition includes a consultation process. Where this is envisaged to be a major issue of wide interest the consultation process is a maximum of 12 weeks, for any issues with narrower impact and of more specific interest, the consultation process could be reduced.

Should Ofgem determine through the consultation process that the gas quality blending service should be added as a Licence condition, the service would be regulated alongside other NGG licence conditions and the costs and revenues managed through the RIIO framework.

PROS	CONS
It is open and transparent to Ofgem and industry within the licence	A longer period of consultation would be required compared to other options.
Industry is consulted in advance on the proposed content of the new Licence condition	

6.6 Treatment of revenue and costs

The treatment of revenue and costs is dependent on the preferred regulatory process.

If the service is consented, de-minimis or excluded then any revenue is non-regulated. Non-regulated revenue is recognised in the year it is made.

- Consented services do not form part of regulated revenue and therefore allow us to arrange the commercial terms of the service. The revenues and costs are reported to Ofgem through our annual Regulatory Reporting Pack submission.
- Excluded services do not form part of regulated revenue which is directed by Ofgem, therefore this is outside the Maximum Allowed Revenue (MAR). Excluded services are for the specific benefit of a third party; no NGG profit is made on excluded services.
- De-minimis services include a 2.5% cap of transmission turnover on revenue. Whilst a blending service would be unlikely to exceed the 2.5% cap, de-minimis is not suitable in scenarios where the service is sizeable, ongoing or provides a constant revenue stream.

Whilst reporting varies between consented, de-minimis or excluded, all are reported to Ofgem.

If the service becomes a Licence condition all costs and revenue become regulated revenue. For the gas quality blending service, we currently consider that we would factor this service line into our allowed revenue, recognising the expected revenue in-year and then adjust over time, depending on whether this was under/over recovered within a 2-year period.

6.7 UNC changes

Within section I of the UNC Transportation Principal Document, the requirements for shippers to deliver compliant gas are set out. Shippers are responsible for delivering gas that complies with the 'Gas Entry Conditions' that apply at the relevant NTS entry point. Section I includes the conditions for 'Special Delivery Arrangements' which may be suitable to use in the context of a gas quality blending service.

DFOs, who deliver the gas physically on behalf of shippers, sign Network Entry Agreements (NEAs) with NGG which specify the parameters of gas they will deliver. There are a few sub-terminals which do not have a NEA with NGG, and which operate on the basis of the gas quality limits that were in place in respect of that location at the inception of the Network Code in 1996.

In order to introduce a gas quality blending service, it is possible that we could use the 'Special Delivery Arrangement' provisions in UNC.

6.8 NEA changes

For a DFO to deliver gas which is not compliant with GS(M)R parameters a contract would need to be in place. This contract would specify the parameters for the gas quality blending service. The contract could be an amendment to the NEA or a separate contract.

The NEA is a contract between operators; it is an operator to operator agreement. At present NEAs do not include any commercial arrangements and they do not include liabilities. As such, if the NEA is amended to cover the gas quality blending service it would change the nature of the contract.

Consultation Questions

10. In your view, which regulatory mechanism should NGG pursue to obtain regulatory approval for this service and why?

11. The DFO contract may need to be amended to offer the service; do you believe this should be done within the NEA or a different contract put in place?

12. What are your views on the suitability of UNC TPD Section I3.5 'Special Delivery Arrangements' to serve as UNC basis for NGG to offer the service? Are there additional changes you believe will be required within UNC?

7. Charging

There are various options for the charging structure. We also need to establish how the resultant revenues would be treated within the regulatory accounts; this section explores these considerations.

7.1 The case for a chargeable service

At present, in the event of any non-compliant gas being delivered by a DFO into a terminal, our normal practice is to instigate curtailment actions and, where possible, seek to blend this gas out with other compliant gas to avoid any GS(M)R breach on the NTS feeders leaving the terminal. Such action is taken at no charge to the DFO that has delivered the non-compliant gas.

If NGG offers a blending service, there are a number of reasons why we consider this type of service should be chargeable:

- The proposed service would provide a commercial benefit to the party receiving it compared to the other parties delivering gas at that location;
- NGG would incur costs to provide the service – people and processes, and potentially new control systems and assets with associated ongoing maintenance;
- The service would rely on use of NGG assets to operate;
- Creating an arrangement to admit off-specification gas would create an extra role for NGG in gas quality management
- Other DFOs have invested in processing / blending upstream to meet their NTS entry specification and therefore a 'free' blending service may be perceived as inequitable.

7.2 Who should be charged?

Three options have been considered:

(i) Charge the shippers who deliver the non-compliant gas (the shipper being NGG's customer)

(ii) Charge the DFO who delivers the non-compliant gas (the DFO being NGG's customer)

(iii) Cost recovery via the RIIO price control / NTS transportation charges

Our initial view is that NGG's costs of providing the service should be recovered from the parties requiring it, not socialised among UNC shippers. UNC requires the shipper to deliver compliant gas to the NTS for which the technical specification appears in the relevant Network Entry Agreement (NEA) / Interconnection Agreement (IA) between NGG and the DFO. Liability for delivery of non-compliant gas rests with the shipper.

Charging the shipper would align with the current regime whereby NGG has a commercial relationship with the shipper and an operational relationship with the DFO. However, it may be difficult to administer, given the multiple number of shippers active at each location and that they are subject to change. Additionally, those shippers may not all agree to the proposed commercial terms for the service, or even that a service is necessary at all. Rather, the requirement for a blending service would be known by the DFO as the physical party, whilst the commercial arrangements between shippers and DFOs may be assumed to reflect the costs to the DFO of any blending or processing required to deliver that gas to the NTS.

An allowance for provision of a blending service within the RIIO regulatory arrangements and cost recovery via NTS transportation charges would effectively socialise the costs of service provision among all NTS shippers. Whilst the proposed service could positively impact GB security of supply by maximising economic recovery from the UKCS and hence apply downward pressure to GB wholesale gas prices, our initial view is that it would primarily be a solution to production challenges for particular DFOs / field owners/operators and the shippers with whom they contract.

7.3 How should we charge for the service?

NGG will incur costs to provide the service, which may include, but are not limited to, initial set up costs, people and processes, potentially new control systems with associated ongoing maintenance asset investments, to guarantee safety standards, and ongoing costs of administering the service.

Options to charge include:

(i) Charge applies on every day during the service period;
(ii) Charge applies only on days when the service is available;
(iii) Charge applies only on days when the service is available and used.
(iv) An option fee could be payable each day and an exercise fee when the service was used.

The service might be available only for part of a day since it would be dependent on prevailing flows and quality from other supplies into the terminal. To charge based on when the service was actually used would require a check of actual gas qualities delivered within each gas day to determine whether and when the DFO was flowing non-compliant gas. A single charge regardless of use may be the simplest to administer.

7.4 Duration of service

The service duration that a DFO requires may depend on the life of particular offshore fields, legislative changes to the legal specification for gas quality and the availability and cost of other sources of blend gas. Service duration could be:

(i) Fixed term with an option to renew
(ii) Evergreen, subject to an ability for either party to terminate the service
(iii) Evergreen, subject to a minimum duration required for NGG to recover any investment costs of providing the service with an ability for either party to terminate the service thereafter.

7.5 Benefit share

If the DFOs providing the compliant gas at the terminals offering blending were to receive a benefit share from NGG's service income, it could be argued that competition in the delivery of gas to the NTS as a whole would be distorted because other DFOs that deliver gas at other NTS entry points are subject to the same GS(M)R delivery specification but would receive no such payment. Implementing benefit sharing would also make the implementation of any service more complex since commercial arrangements would need to be negotiated on a multi-lateral basis. In addition, the quantity of blend gas provided by other DFOs will vary depending on their prevailing flow rates and gas quality and some supplies may have a greater influence in blending out any non-compliant gas being delivered than others. The picture is further complicated by the interconnectors at Bacton, which may help with blending when in NTS entry mode but potentially remove sources of blend gas when in NTS exit mode.

On the other hand, NGG could not provide this service if it were not for other DFOs/shippers delivering compliant gas at a flow rate and quality that is sufficient to blend out the non-compliant stream. Whilst DFOs at all NTS entry points other than Bacton and St Fergus have equivalent obligations to deliver GS(M)R compliant gas and receive no payment from NGG for meeting this specification, no other delivering party benefits from this.

7.6 Offering the service

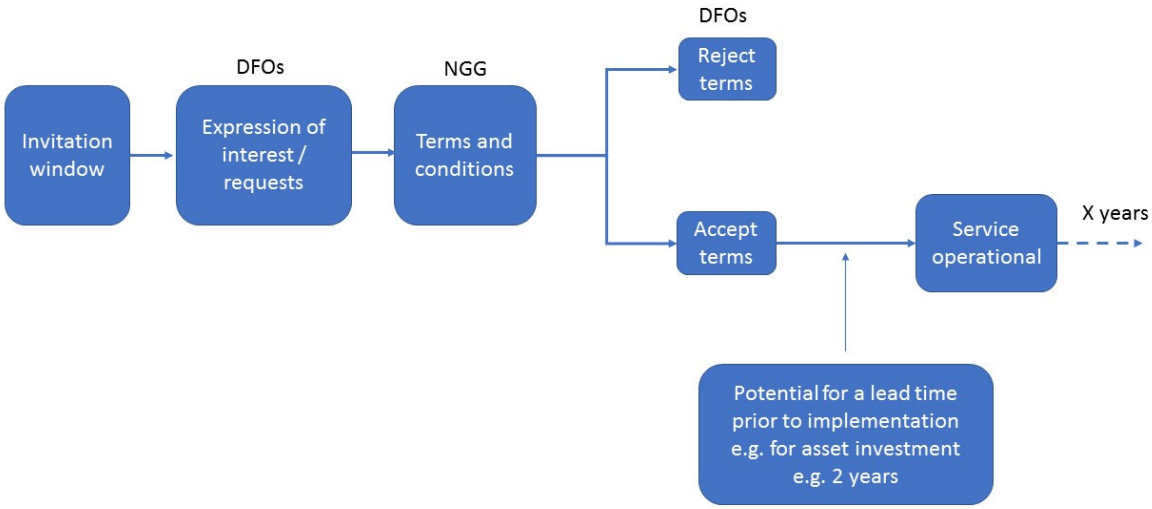


Diagram 7.1 Offering the Service

To offer a gas quality blending service, NGG may need to seek user commitments ahead of implementation. In the diagram above, NGG may seek expression of interests and requests from DFOs to assess the uptake of a service if it can be introduced. If parties are interested then NGG may set out terms and conditions, which if accepted may result in investments, for example additional analysers. User commitments may be required if significant investment is required to avoid stranded assets.

If NGG needed to install an additional Wobbe Index measurement system in order to provide a blending service, we estimate that this would cost around £300,000 and take 2 years to design, procure, implement and test. Additional components may need to be designed, installed and tested ahead of the service being operational. Timeframes will vary depending on what reconfigurations are required on site. This could be a barrier to offering the service and we will therefore be exploring whether additional assets are truly necessary.

A cost benefit analysis has not yet been conducted on offering a gas quality blending service because we are not yet clear on the number of parties who will request the service, at which locations and what assets may be required. We acknowledge that this is likely to be a requirement ahead of the introduction of this service and intend to progress this, subject to the outcomes of this consultation,

7.7 Security of Supply

An anticipated benefit from offering a gas quality blending service is to potentially improve security of supply as this service could provide an additional means of getting gas to the GB market. However, in the following scenarios we have identified potential risks that could threaten security of supply.

7.8 DFO Risk

DFOs often have multiple sources of gas from offshore shippers, receiving gas from multiple fields. The multiple sources of gas will comingle within the DFO terminal ahead of entry into the NGG

terminal. The DFO will have contracts in place with all the upstream parties and fields to ensure compliance with the composition of gas expected.

If an enduring gas quality blending service is to be offered a DFO will be able to offer to accept non-compliant gas from a field.

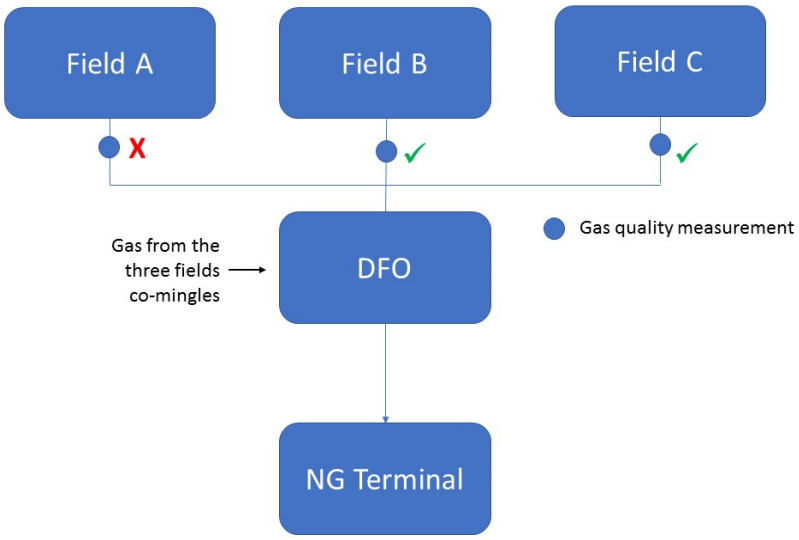


Diagram 7.2 DFO accepting off-specification gas

In this scenario, the DFO has contracted with and accepted off-specification gas from field A. Field A has been offered and accepted the proposal to deliver non-compliant gas based on NGG offering a gas quality blending service.

If field B and field C have an unplanned outage only off-specification gas will reach the DFO. The DFO would flow this gas into the NGG terminal.

We are proposing the service on an interruptible basis. If we cannot accept off-specification gas on this day, the DFO may not be able to flow the gas with adverse consequences upstream.

7.9 Terminal Risk

On a larger scale than the DFO risk if a terminal operator supplying on specification gas has an unplanned outage and there is insufficient blend gas available there is potential for the terminal to be unable to flow gas.

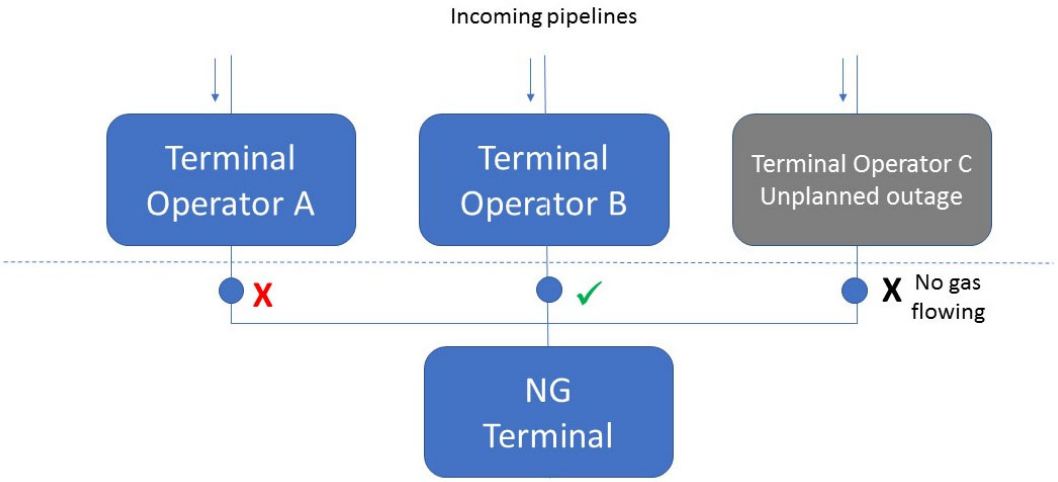


Diagram 7.3 DFO with unplanned outage

In this scenario, NGG has contracted with and accepted off-specification gas from terminal operator A. The gas which is flowing from terminal operator A is non-compliant but can be blended with the GS(M)R compliant gas from terminal operators B and C ahead of entering the network.

However, Terminal Operator C has an unplanned outage and no longer flows gas into the terminal; there is insufficient blend gas from terminal operator B to continue to blend the gas from terminal operator A and their gas is curtailed. There is potential in this scenario to reduce the flow of gas into the network compared to what would otherwise have been the case if no blending service had been introduced, thereby negatively impacting security of supply.

In a worst-case scenario both terminal operators B and C could have unplanned outages and therefore no gas would be available for blending or to leave the NG terminal.

Consultation Questions

13. Who should NGG's customers be – UNC shippers, DFOs, or potentially both?

14. If the DFO, this would create a commercial relationship that is currently purely operational. Do you envisage any problems with this?

15. Do you agree that NGG should charge for this service?

16. What minimum and maximum service durations would be appropriate?

17. Please share your thoughts on whether DFOs / shippers delivering on-specification gas at a terminal where a blending service is in place should receive a share of the revenue that NGG receives from the DFO delivering off-spec gas for providing the service

18. What is the maximum lead-time that would be acceptable to you between signing up for the service and it becoming available?

19. How should we make the service available?

20. How do you anticipate the structure of the charging to work?

21. Do you consider that the service would be useful to terminal operators if it is only offered with NGG reserving the right to interrupt at short notice?

22. Do you believe that an NGG gas quality blending service would be likely to result in a benefit or detriment to security of GB gas supply? Please explain your answer.

8. Summary

8.1 Gas Quality Blending Service

We are considering the introduction of a gas quality blending service to enable DFOs to continue to flow gas where it does not meet the GS(M)R requirements.

The service could be an economic alternative to the installation of gas processing equipment and may enhance the availability of existing gas fields where mid-stream / upstream blending solutions are unavailable, unreliable or uneconomic. It supports the UK Government's strategy of Maximising Economic Recovery of oil and gas reserves from UK waters. There may be a marginal benefit for end consumers as this may provide an additional means of getting gas to market which could contribute to lower gas prices. Learnings from this project will help develop capability in NGG which may be beneficial for blending hydrogen with natural gas in the future.

By issuing this consultation we would like to seek views on some of our ideas and key principles across a range of operational, commercial and regulatory topics. The responses we receive will help to shape the future of the project.

8.2 Next Steps

Please email your responses using the template provided to box.gsoconsultations@nationalgrid.com. If you have additional questions or comments and wish to discuss further please contact Phil Hobbins on 07966 865623 or by email philip.hobbins@nationalgrid.com or Rachel Hinsley on 07811 762440 or by email rachel.hinsley1@nationalgrid.com.

The consultation shall be open for eight weeks and will close on 13th November 2020.

We will publish all consultation responses that we receive on our website at https://www.nationalgrid.com/uk/gas-transmission/data-and-operations/transmission-operational-data/commercial-regulatory-change unless a party specifies that their response or part thereof should be treated confidentially. In addition, all responses to question 8 will be by default kept confidential within NGG and only reported on in aggregate as stated within that question. Following this consultation, we will publish a consultation report in December 2020 that will summarise the responses received, our response to the issues raised and detail the next steps.

9. Glossary

Term	Meaning
NGG	National Grid Gas, owner and operator of the National Transmission System (NTS) in Great Britain
NTS	is the pipeline system for the time being designated by National Grid NTS as such, and described in National Grid NTS's Ten Year Statement.
GS(M)R Parameters	Means the gas quality parameters stated in Schedule 3 of the Gas Safety (Management) Regulations 1996
DFO	Delivery Facility Operator providing gas to NGG terminals
UNC	Uniform Network Code, this is a legal document which sets out the terms for conveyance of gas. National Grid Gas, the Distribution Networks and all Shippers have signed the Uniform Network Code Framework Agreement
UKCS	UK Continental Shelf; is the region of waters surrounding the United Kingdom, in which the country has mineral rights. The UK continental shelf includes parts of the North Sea, the North Atlantic, the Irish Sea and the English Channel; the area includes large resources of oil and gas.
NIA	Network Innovation Allowance; The NIA is a smaller allowance each RIIO network licensee receives to fund smaller scale innovative projects which have the potential to deliver benefits to network customers
HSE	Health and Safety Executive; The Health and Safety Executive is a UK government agency responsible for the encouragement, regulation and enforcement of workplace health, safety and welfare, and for research into occupational risks in Great Britain. HSE approve the NGG Safety Case
System Entry Point	Means the point at which gas flow from the DFO passes from the DFO's system into the National Grid system.
GS(M)R Compliance Point	Means the point or points immediately downstream of the National Grid terminal at which the network begins for the purposes of National Grid's compliance with GS(M)R.
NEA	Network Entry Agreement, contractual arrangement between the DFO and NGG
TFA	Transportation Flow Advice given to DFOs to curtain or cease flowing of gas
IGEM	The Institution of Gas Engineers & Managers, IGEM, is the professional engineering institution supporting individuals and businesses working in the global gas industry
SGN	SGN is a gas distribution network SGN providing gas services to over 14 million people in homes and businesses across Scotland and southern England
ENA	Energy Networks Association represents the transmission and distribution network operators for gas and electricity in the UK and Ireland.
GNCC	Gas National Control Centre; the GNCC controls the movement of gas through the pipelines to customers and is critical to the UK gas economy.
GDN	There are eight gas distribution networks (GDNs), each of which covers a separate geographical region of Great Britain.

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