

NIA Project Registration and PEA Document

Date of Submission

Aug 2019

Project Reference Number

NIA_NGGT0148

Project Registration

Project Title

Gas Quality Blending Services

Project Reference Number

NIA_NGGT0148

Project Licensee(s)

National Gas Transmission PLC

Project Start

August 2019

Project Duration

1 year and 8 months

Nominated Project Contact(s)

Phil Hobbins, James Gudge

Project Budget

£151,250.00

Summary

Test the feasibility of NG offering a blending service at a multi-stream gas terminal, using existing assets. Test the feasibility that small NTS connections can supply non-GS(M)R spec gas by using an additional asset.

Third Party Collaborators

DNV

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

Operators that deliver gas to the National Transmission System (NTS) are currently required to meet the legal specification for gas quality at the point at which their pipeline enters National Grid's terminal. Multiple sources of gas enter the NTS at St Fergus and Bacton which co-mingle within National Grid's terminal infrastructure before onward transmission on NTS pipelines out of the terminal. Some parties that deliver gas at those locations have expressed interest in National Grid developing interruptible gas quality blending services, enabling an operator to deliver off-spec gas provided that National Grid could achieve a compliant blend before the gas exited its terminal onto the NTS pipelines.

The properties of gas blending are well known, but in order for this service to be considered viable, the capability of the specific terminal structure, implications on NTS assets and National Grid's ability to meet its obligations under GS(M)R must be fully understood. Equally, users of the service will expect proven technical capability to forecast and manage any gas blending service in order to enter into commercial arrangements.

Method(s)

1 - Modelling Study

Phase 1: Model Development and Validation Deliverables

- Terminal Models.
- Technical Report detailing functionality and evidence validation against historical data, including the use of specific test cases highlighting the specificities present at each terminal, demonstrating terminal blending capability

Phase 2: Gas Quality Scenario Assessment Deliverables

Technical report using forecast terminal flows and gas quality based on scenarios specified. Including:

- likelihood of service interruption
- Terminal blending capability
- Gas quality breach reaction timescales
- Asset impact assessment
- Scenario data output

2 - Feasibility Study Report

This will include all relevant outputs from the modelling study along with any other considerations considered critical in order to provide a clear GO/NO GO decision to move forward with the next steps of the project and eventual implementation.

Scope

The Gas Safety (Management) Regulations 1996 (GS(M)R) place a number of obligations on all UK gas transporters which include the need to have a safety case approved by the HSE, and to ensure the content and characteristics of gas conveyed in the system are within certain limits. This specification is designed to ensure gas burns completely and safely and the supply pipework is not exposed to contaminants or corrosives. These limits are monitored closely at system entry points by National Grid and terminal operators.

National Grid require the curtailment or cessation of flows of gas with characteristics outside of GS(M)R specification.. We also require entry parties to comply with certain other parameters that are not specified in GS(M)R but which are important to the operation of the NTS and downstream consumers.

Gas supplies to the NTS have developed over time, with UKCS, Norwegian, LNG and interconnector flows all contributing to the mix to meet GB demand to varying degrees. New sources of supplies such as biomethane, shale and hydrogen may further diversify the picture. As historical sources decline and new discoveries are made, the ability for offshore producers to meet the GS(M)R specification at all times for some fields is becoming more challenging. At the Bacton and St Fergus entry terminals, there are multiple streams of gas that come together before entering the NTS therefore offering a wider range of blend gas than may be available to upstream parties.

The Gas Blending Services concept is to allow certain Delivery Flow Operators (DFOs) that operate onshore such as upstream gas terminals upstream of National Grid's infrastructure to deliver 'off-spec' gas to National Grid as long as the commingled flow measured at the point of entry into the NTS pipelines remained 'on-spec'. This is intended to increase the resilience (in the form of improved uptime/availability) of upstream producers or terminals that currently suffer periodic restrictions due to outages from other upstream infrastructure.

National Grid considers that such a service could help maximise the production potential for parties that experience challenges in meeting the required gas quality specification for NTS entry. We also see potential for wider benefits which include aiding the Government's strategic goals of Maximising Economic Recovery from the UKCS, thereby improving UK gas security of supply, reducing end consumer bills and embracing gas specification diversity.

Objective(s)

To determine the technical feasibility of a gas quality blending service at the St Fergus and Bacton entry terminals.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Demonstration that gas quality blending services at St Fergus and Bacton are technically feasible.

Project Partners and External Funding

Project Partner – DNV GL

External Funding – (nil)

Potential for New Learning

This project could significantly deepen the understanding of the capabilities of the NTS and natural gas assets in terms of gas blending capability. Learning could also help determine future terminal development, produce a framework for other blending solutions that may

be required smaller scale connections. Innovative processes, controls, communications or systems that are developed with the wider industry.

Scale of Project

This project will be limited to a desktop study.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

UK

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£147250

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

The full commercial benefits of such as service are yet to be defined, but such a service could help maximise the production potential for parties that experience challenges in meeting the required gas quality specification for NTS entry. We also see potential for wider benefits which include aiding the Government's strategic goals of Maximising Economic Recovery from the UKCS, thereby improving UK gas security of supply, reducing end consumer bills and embracing gas specification diversity.

Please provide a calculation of the expected benefits the Solution

This study will demonstrate whether gas blending at two of National Grid's main sites are feasible, this will include all relevant outputs from the modelling study along with any other considerations considered critical in order to provide a clear GO/NO GO decision, it will then be possible to ascertain what degree of savings will be made.

Please provide an estimate of how replicable the Method is across GB

Although the study is based on specific infrastructure, the process, learnings, framework and solution produced could be applied in any situation where the blending of multiple streams of gas can be facilitated. In future this may be applicable to further gas transmission or gas distribution entry points.

Please provide an outline of the costs of rolling out the Method across GB.

This is a feasibility study and it is not possible to provide indicative implementation costs before this work has concluded.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

- A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).
- A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)
- A specific novel operational practice directly related to the operation of the Network Licensees system

- A specific novel commercial arrangement

RIIO-2 Projects

- A specific piece of new equipment (including monitoring, control and communications systems and software)
- A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven
- A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)
- A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology
- A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution
- A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

Although the study is based on specific infrastructure, the process, learnings, framework and solution produced could be applied in any situation where the blending of multiple streams of gas can be facilitated. The development of biomethane and hydrogen supplies is considered to be highly relevant at distribution level infrastructure, due to the lower pressure levels required for connection.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

Enabling changing gas flows.

Embracing gas specification diversity.

- Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

- Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

There are no known projects investigating the potential for a Gas Quality Blending Service.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The project will provide a feasibility assessment for offering a service that is not currently available at the Bacton and St Fergus entry terminals. This study has a specific focus and is intended to produce outputs and findings from which the next steps can be defined and deployment can be facilitated. This will involve new commercial arrangements, regulatory change and operational risk management tools. Risks exist that the forecast future flow volumes and gas qualities mean that the service would not be viable and that a successful revised safety demonstration in our Safety Case cannot subsequently be achieved. The outputs and learnings are also expected to be able to inform innovative solutions to gas quality management for smaller connections, both on the NTS and DN networks.

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

Gas quality blending services is a complex issue requiring detailed analysis on specific terminal infrastructure. The initial stages of this work at a transmission level sits outside the normal activities of the business and National Grid has no allowance through which to fund this work. There is no in-house capability to complete the necessary work. Funding the work through the NIA framework ensures that the programme is provisioned appropriately and the results are made available to all stakeholders.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

Gas Quality Blending Services at Bacton and St Fergus Entry Terminals requires detailed expertise in modelling of above ground installations that is not available to National Grid in-house. Such independent review is also necessary to demonstrate that all the major technical, operational and safety challenges and risks have been considered. The NIA framework offers a robust, open framework to support this work and ensure the results are available to all stakeholders.

This project has been approved by a senior member of staff

Yes