Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Apr 2016

Project Reference Number

NIA_NGN_162

Project Registration

Project Title

Hystart

Project Reference Number

NIA_NGN_162

Project Licensee(s)

Northern Gas Networks

Project Start

April 2016

Project Duration

0 years and 5 months

Nominated Project Contact(s)

Adam Madgett - Northern Gas Networks; Andy Lewis - National Grid

Project Budget

£246,420.00

Summary

The GS(M)R limit for hydrogen may provide a significant limitation on the possibilities to introduce hydrogen into the gas distribution network. This project aims to provide an initial study to provide support to any required exemption to the current 0.1 mol% hydrogen concentration limit. It is suggested that a reasonable hydrogen limit based on other studies performed around Europe, and also early work in the UK on the development of the GS(M)R is 2 -3 mol%. However this study will aim to look at levels as high as 20% hydrogen.

The technical report aims to identify what is required in the areas below.

- Literature survey and gap analysis
- Impact of hydrogen on gas industry procedures
- Gas entry unit design
- Rhinology testing
- Network modelling and operation
- Quantitative Risk Assessment

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

The UK has committed to substantial carbon savings; heat contributes to a third of its current emissions. Delivering low-carbon heat via hydrogen over the gas grid provides a customer-focused solution, but is limited by onerous UK limits.

The current legislation limit for hydrogen in the natural gas grid is 0.1 mol%, as detailed in the Gas Safety (Management) Regulations {GS(M)R}, and this limit is often seen as a barrier for introduction of hydrogen.

Method(s)

A desktop/Laboratory study will be undertaken to identify what areas need addressing to enable an increase in GSMR limits for Hydrogen, the key areas that the study will look at are outlined below.

Scope

The GS(M)R limit for hydrogen may provide a significant limitation on the possibilities to introduce hydrogen into the gas distribution network. This project aims to provide an initial study to provide support to any required exemption to the current 0.1 mol% hydrogen concentration limit. It is suggested that a reasonable hydrogen limit based on other studies performed around Europe, and also early work in the UK on the development of the GS(M)R is 2 -3 mol%. However this study will aim to look at levels as high as 20% hydrogen.

The technical report aims to identify what is required in the areas below.

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• Quantitative Risk Assessment

Objective(s)

To provide solid evidence which will identify key areas that need addressing before a GS(M)R exemption for hydrogen can be granted.

The outputs of this NIA project aims to feed into a combined NIC demonstrator collaboration project between NGGD and NGN.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The information that is collated from this project will provide a platform for all future projects around Hydrogen. It is hoped that the inclusion of this NIA project within the joint NIC demonstrator bid will provide the necessary portfolio of research to ensure that the NIC bid is successful.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project will mainly be a desktop study. Its aim is to inform a series of subsequent hydrogen projects.

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

n/a

Indicative Total NIA Project Expenditure

NGN £92,500 (external)
£30,710 (internal)

NGGD £92,500 (external)
£30,710 (internal)

Total £185,000 (external)
Total £ 61,420 (internal)

Overall Total: £246,420

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)

This work does not immediately give savings, but does have the potential to allow for a more diverse gas mixture which will lead to significant carbon reduction throughout the gas distribution networks.

Please provide a calculation of the expected benefits the Solution

This is a Research Project.

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

The project addresses an industry-wide issue and its results will therefore be of benefit to all other Network Licensees.

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

The project is a Research Project which will identify work streams whose costs are unknown at this stage. An estimate for rolling out the method across the GB can therefore not be provided.

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

Ultimately the end goal of this study is that it will feed into a joint NIC bid with NGGD which will prove that it is safe to inject increased levels of hydrogen within the distribution networks leading to significant reduction in carbon emissions across the DN's.

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

Exploring the potential for hydrogen to deliver low-carbon heat forms a key part of NGN's strategy area of *Future Role of Gas*. The project seeks to identify work streams that need to be carried out in order to safely increase the percentage of hydrogen allowed into networks (GS(M)R exemption).

☑ 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.

n/a

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

n/a

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

n/a

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

n/a

This project has been approved by a senior member of staff

☑ Yes