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

Jan 2018

Project Reference Number

NGNGN04

Project Registration

Project Title

H21

Project Reference Number

NGNGN04

Project Licensee(s)

Northern Gas Networks

Project Start

January 2018

Project Duration

3 years and 0 months

Nominated Project Contact(s)

Northern Gas Networks Innovation Team

Project Budget

£15,172,000.00

Summary

The UK, as with most other countries around the world, recognises the challenge of climate change and has resolved, by 2050, to reduce carbon emissions by 80% of their level in 1990. In the UK this is a legal obligation defined under the terms of the Climate Change Act 2008. Climate change is one of the most significant technical, economic, social and business challenges facing the world today. Following the completion of the H21 LCG NIA project there has been growing interest in the opportunity to decarbonise the gas network by converting to 100% hydrogen, a solution that appears to be technically and economically viable.

Decarbonising UK heat, which is predominantly provided by the gas network, is particularly difficult due to the large inter-seasonal swings in demand, distributed nature of the consumer appliances (boilers, fires, ovens etc.) making localised decarbonisation impractical, and established significant customer preference within the UK. Decarbonising the gas network with hydrogen has the potential to be the single biggest contribution to the deliverability of the Climate Change Act.

All the technology to convert the UK gas distribution network to hydrogen can be evidenced across the world today (steam methane reformers, salt caverns, hydrogen appliances). However, the primary obstacle to progressing with such a decarbonisation pathway is the lack of quantitative safety evidence. The H21 LCG study has confirmed the below 7 bar UK gas distribution network has adequate capacity with minor reinforcement for conversion (the above 7 bar would not be effected). However, a significant programme of work is required to prove this part of the gas network in its 2032 condition, i.e. following completion of the Iron Mains Replacement Programme, presents a comparable and acceptable risk whether transporting 100% hydrogen or natural gas.

Quantifying this risk is a significant challenge, the range of below 7 bar asset in the UK gas networks in 2032 including pipe, fittings, connections, district governors (pressure control equipment) etc is extensive. Designing an appropriate testing regime that provides confidence that this range of assets is safe operating on 100% hydrogen is a challenge which requires a dedicated programme of strategically targeted work, large amounts of funding and high levels of expertise.

Preceding Projects

NIA_NGN_269 - H21 - Understanding Industrial & Commercial Customers

NIA_NGN_268 - H21 Occupied Trials – Phase One

NIA_NGN_270 - H21 Initial Hydrogen Supply Strategy

NIA_NGN_275 - H21 – Hydrogen Ready Services

NIA_NGN_302 - H21 - Wider Impacts of Hydrogen

NGN_NIA_344 - H21 Ignition Consequence Research

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Method(s)

Scope

Objective(s)

The H21 LCG report recommends circa £100m of funding is required to de-risk a hydrogen for heat pathway. This can be broken down into three core evidence requirements; safety, customer acceptability and Front End Engineering Design. This was set out in the `H21 - Executing the roadmap' document presented to OFGEM and BEIS in December 2016. The H21 NIC project will provide the safety based evidence part of the roadmap. This project is the first NIC project that has been collaboratively funded, supported and, subject to successful award, executed across all GDNs.

The below 7 bar UK gas distribution network in 2032 will be predominantly polyethylene (circa 90%). However, there will still be some retained metallic iron and steel mains. Furthermore there will be a range of different PE pipe ages, transition fittings (between PE, iron, steel, different diameters etc.), services, service connections, buried valves, service governors and district governors.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

n/a

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

n/a

Geographical Area

Revenue Allowed for the RIIO Settlement

Indicative Total NIA Project Expenditure

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)

n/a

Please provide a calculation of the expected benefits the Solution

n/a

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

n/a

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

n/a

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

n/a

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

n/a

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

Is the default IPR position being applied?

☐ Yes

Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.

Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<

Please justify why the proposed IPR arrangements provide value for money for customers.

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