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

Nov 2020

Project Reference Number

NIA_NGN_270

Project Registration

Project Title

H21 Initial Hydrogen Supply Strategy

Project Reference Number

NIA_NGN_270

Project Licensee(s)

Northern Gas Networks

Project Start

November 2020

Project Duration

0 years and 11 months

Nominated Project Contact(s)

Mark Danter

Project Budget

£90,000.00

Summary

Northern Gas Networks, National Grid Transmission and Wales and West Utilities have committed to work with the stakeholders and the government to work towards a strategy to convert the gas distribution network to hydrogen, including the H21 100% hydrogen project. In order to achieve the H21 live trials and any future conversion projects, we will need to source enough hydrogen to operate the Local Transmission System (LTS) on hydrogen and to undertake initial conversion.

The strategy for providing hydrogen to the LTS network to allow staged conversion has not been fully developed. The current thinking on converting the National Transmission System (NTS)/LTS over to hydrogen is expected to not fully align with the requirements for staged conversion and still being able to supply natural gas to customers awaiting conversion.

In order to progress this, the various potential sources of hydrogen to the LTS needs to be investigated to confirm how hydrogen will need to be supplied to the network to meet the requirements of conversion and supply. This will have an influence over the strategy for conversion and so this project will also develop recommendations for the future conversion planning based upon the various options for hydrogen supply.

The project will need to:
Review the current NIA/NIC projects on supplying hydrogen to LTS Networks, such as HyNTS
Review other potential hydrogen supply options including local storage
Review how these potential solutions may be applied to the networks
Review how the various solutions will impact on the conversion process and what issues they may cause
Review the conversion process for the NGN network, based upon this research and make recommendation for mitigating these issues that will need to be included in future conversion planning. These recommendations will also be applicable for other networks to learn from.

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Northern Gas Networks, National Grid Transmission and Wales and West Utilities have committed to work with the stakeholders and

the government to work towards a strategy to convert the gas distribution network to hydrogen, including the H21 100% hydrogen project. In order to achieve the H21 live trials and any future conversion projects, we will need to source enough hydrogen to operate the Local Transmission System (LTS) on hydrogen and to undertake initial conversion.

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- Review how the various solutions will impact on the conversion process and what issues they may cause
- Review the conversion process for the NGN network, based upon this research and make recommendation for mitigating these issues that will need to be included in future conversion planning. These recommendations will also be applicable for other networks to learn from.

Method(s)

The project will be delivered in two phases:

Phase 1 - To review current NIA/NIC projects and other potential sources of hydrogen to ascertain proposed plans for transmission of hydrogen
Phase 2 - Review and report on how the current plans will affect the planning of hydrogen conversion of NGN distribution network and its end users and make recommendations for any mitigation or further development of solutions required.

Scope

The project will build upon the H21 North of England (NoE) report in relation to delivering hydrogen and the effects of this on the distribution network conversion planning and will:

- Review the H21 NoE Report
- Communicate with other NIA/NIC projects relating to hydrogen transmission
- Review current NIA/NIC projects to ascertain current proposed plans for providing hydrogen
- Review other potential sources of hydrogen and how they may be delivered to the LTS network and fit in line with the planned conversion process.
- Apply the current plans for hydrogen transmission and how that will likely affect the planning and implementation of conversion
- Make recommendation to mitigate or develop solutions to any issues raised.

Objective(s)

Review all current information relating to hydrogen transmission and produce the output report reviewing the various ways being considered.
Review the suitability of the various proposed hydrogen transmission solutions to evaluate the impact/influence on the future conversion process suggesting mitigation/further development needed to mitigate any issues

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Delivery of a report detailing the current plans for hydrogen transmission and how this will affect the planning of hydrogen conversion of NGN distribution network and its end users and make recommendations for any mitigation or further development of solutions required.

Project Partners and External Funding

NGN will lead the project as part of the H21 NIC bid consortium with support from the wider H21 NIC project partners. Primarily: DNV GL.
National Grid Transmission
Wales & West Utilities

Potential for New Learning

As part of the future conversion of the gas networks to hydrogen, including the trial projects for H21, further research is required into the current proposed options for the production and supply of hydrogen to the Local Transmission Systems for the conversion process and then for continuous supply to the customers.

The various proposals for the supply of hydrogen to the Local Transmission Systems have progressed since the production of the H21 North of England report and therefore need to be reviewed. The current thinking on converting the NTS/LTS over to hydrogen is expected to not fully align with the requirements for staged conversion and still being able to supply natural gas to customers awaiting conversion. This review will ascertain how the current proposals may affect the current planning being developed for the hydrogen conversion process and supply. The review will provide an overview of the current thinking and suggest mitigation or further development that is needed to resolve any issues found.

Scale of Project

This project inputs into the success of the future hydrogen projects, including the H21 Project, which will provide critical information applicable to the entire UK gas system when considering conversion to 100% hydrogen incrementally over time.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project will be based in the NGN network and National Grid transmission areas but will be applicable and deliver learning appropriate to the entire UK gas distribution and transmission system.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

Project costs:
External funding = £55,000
Internal cost = £35,000

Total Cost = £90,000

NGN costs:
External = £18,334
Internal = £22,778

NGGT costs:
External = £18,333
Internal = £6,111

WWU costs:
External = £18,333
Internal = £6,111

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 project is one of a suite of projects to enable a conversion of the UK gas grid to hydrogen. Repurposing the UK gas networks with hydrogen to support the challenge of the climate change act has the potential to save £46 billion with minimal gas customer disruption verses alternative decarbonisation solutions

Please provide a calculation of the expected benefits the Solution

The project will support the challenge of the climate change act has the potential to save £46 billion with minimal gas customer disruption verses alternative decarbonisation solutions.

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

The research and learning undertaken as part of this project is applicable to all Gas Distribution Networks (GDNs) within the UK as the networks have the same construct and design parameters and so will assist with future Hydrogen conversion projects.

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

This project will feed into a wider project dealing with the conversion of the gas network to hydrogen, the roll out of cots of these are yet to be defined but this project will help to establish the most expediated way to commence conversion.

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

The review of the various potential sources of Hydrogen for the conversion and supply to customers for the NGN LTS and the recommendations made from this project will be applicable to other future conversion projects by other Network Licensees including the UK GDNs and the UK NTS.

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

Future of the gas networks

☑ 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.

The research and review of the various hydrogen sources and how they will applicable to the NGN LTS network will build upon the initial review by the H21 North of England report, with the review being specific to the NGN network's individual requirements. This project has been discussed at all industry forums e.g. Gas Futures Group (GFG), Hydrogen Programme Development Group (HPDG) etc. to ensure effective collaboration.

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

This project will build on the original work of the H21 North of England report and the H21 Phase 1 & 2 NIC projects and provide valuable knowledge and learning to inform the future planning of conversion and supply projects

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

This project is in the interests of UK and is not specific to business as usual operations of the network with no allowance within regulatory business plans. Whilst the benefits are undeniable there is no guaranteed benefit back to gas customers without regulator and government support– projects associated with 100% hydrogen are at the cutting edge of gas network innovation.

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

The project would only be undertaken with support from NIA funding, it is in the interests of gas customers, the regulator and the UK government and realization of any benefits are outside the control of the gas networks. There is no allowance in BAU business plans for this type of work and the commercial benefits and technical/operational risks associated with these type of 100% hydrogen projects are outside the traditional environment of any gas distribution network or its shareholders.

This project has been approved by a senior member of staff

☑ Yes