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

NIA_NGN_225

Project Registration

Project Title

H21 – Field Trials Design

Project Reference Number

NIA_NGN_225

Project Licensee(s)

Northern Gas Networks

Project Start

July 2018

Project Duration

2 years and 9 months

Nominated Project Contact(s)

Neil Travers

Project Budget

£777,935.00

Summary

The 2017 H21 NIC project, when completed in full, will undertake an experimental testing programme which will provide the necessary data to quantify the comparative risk between a 100% hydrogen network and the natural gas network. This is required for the UK to make a policy decision on decarbonisation of heat in the early 2020s and to allow live trials to progress in 2020/21 when combined with the results of the BEIS programme.

The project was awarded two thirds of the requested funding (£10.3m) by ofgem to complete phase 1a and 1b (controlled testing) but not funding for the field trials (circa £5m in total). Although the H21 NIC project was written in 2 phases i.e. controlled testing (Phase 1A and 1B) and field trials (Phase 2) it is the field trials will provide the critical pieces of evidence. The phases were developed to help the non-gas industry audience understand the project as per the requirements of the NIC governance document. The field trials will provide the evidence required to justify the live trials or gain consensus that a 100% hydrogen gas grid conversion would be possible and ensure that significant delays to the live trial and subsequent policy decision requirement were avoidable.

This NIA project will develop the design and master testing plan for a subsequent field trial should the funding be made available. This will ensure no delays in the field trial execution and subsequent live trial and therefore no delay in a government policy on decarbonisation of heat.

Undertaking the design of the field trials alongside the H21 NIC project and other H21 NIA projects also allow economies of scale for delivery of the design phase saving on total cost.

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

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make a policy decision on decarbonisation of heat in the early 2020s and to allow live trials to progress in 2020/21 when combined with the results of the BEIS programme.

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Method(s)

As with all testing, definitive conclusions can only be obtained with field trials. Field trials are essential to provide the final evidence requirement corroborating the results of the testing obtained in the controlled environment. To provide definitive test results for the distribution network a test is required which doesn't interfere with the supply of gas to customers. This means a test on real network above and below ground assets which are not providing natural gas to customers.

To undertake these tests the H21 project team is already working closely with the West Yorkshire Combined Authority to identify demolished/derelict sites where mains networks still exist. Using these types of sites will ensure no gas supply disruption to customers and a safe, but 'real-life' environment for carrying out field trials. This NIA project will identify an appropriate site for field trials, resolve legal agreement with the council/land owner to undertake the trials, develop the detailed design and safety assessments for the site and develop the master testing plan i.e. what will be tested.

The design and site selection will be undertaken in line with the detail set out in the 2017 H21 NIC bid document. Subsequent build and testing works following the final design are not part of this NIA project, these works will only be undertaken if funding (circa £4.5m) subsequently becomes available. The design work will be progressed in line with governmental strategy ambitions and time lines for a live trial involving conversion of customer's premises. It should be noted that a field trial (i.e. a test with 100% hydrogen on a part of the network not affecting gas supplies or customers) will be an essential pre-requirement for any subsequent live trial. The field trail will justify the deviation to network safety case for a live trial and this NIA will ensure the networks fully understand the requirements to execute a field trial and no delays are incurred for such a trial to take place should funding be made available.

Scope

1) Working with the West Yorkshire Combined Authority (WYCO) identify a range of suitable sites for a future field trial as defined in the H21 NIC bid document.
2) Undertake the design of the Field trials site including, temporary works, additional pipework, Hydrogen supply, scenarios for testing, safety systems, E&I/Civil requirements, governor requirements, Network modelling, meter installation
3) Undertake network analysis on the final design to predict flow parameters.
4) Consider end use application of hydrogen used for testing e.g. flare/vent/use.
5) In conjunction with the existing H21 NIC team (including the HSL and DNV GL) develop the master testing plan for site testing requirement for the fields trials
6) Develop operational testing designs for field trials area i.e. areas to simulate and repair leaks etc.
7) Develop the legal framework for acquiring the site off the WYCO.
8) Develop a detailed price for the build of the works and overall costs of the field trial.

Reason for extending the project
To allow for peer review of the reports and detailed work generated to date with the HSE by DNVGL which will take place during January of 2021 we are extending the project by 3 months too allow this to take place to ensure we deliver the best outcomes of the project.
Continuing with the project is deemed a credible option and therefore the project completion date is now extended to 31st March 2021.

Objective(s)

1 – Identification of a suitable site in which to undertake field trials as defined in the H21 NIC bid document.
2 – Development of a detailed design in which to undertake the works. If a site cannot be identified and/or legal confirmation of site access can not be agreed a generic design based on a suitable example site (as per the H21 NIC bid) should be developed from which the master testing plan can be confirmed.

3 – Development of a master testing plan for the work
4 – Confirmation of mains soundness testing for identified site
5 – Development of the commercial agreement for access to site to facilitate testing
6 – Development of detailed costs for future build and test work.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Final design and design assurance for a specific (or generic) testing site
2. Agreement from all the H21 NIC bid partners (DNV GL and HSL) that the master testing plan when completed is appropriate to develop and support a safety case deviation for future live trials.
3. As a minimum identification of at least one suitable site and agreement of commercial framework for access with local authority.

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 – As defined in the H21 NIC bid document
• HSL – As defined in the H21 NIC bid document
In addition, West Yorkshire Combined Authority will support directly in identification of suitable site locations.

Potential for New Learning

The element of the 2017 H21 NIC project approved by ofgem (phase 1a and 1b – controlled testing) will only provide the controlled environment testing results to support a 100% hydrogen gas grid conversion. All stakeholders (including the HSL, DNV GL, GDN Asset Directors and Local Authorities) agree that, as with all controlled testing, definitive assessment can only be corroborated with in-situ testing. This NIA will develop the design aspect of the field trials study in preparation for a future build / test phase (phase 2 of the H21 NIC bid) should the funding be made available. This will reduce any future delays of a field trial, firm up the requirements and costs and develop a design and master testing plan so the industry and its stakeholders understand what is required in more detail. Ultimately field trials will confirm the results of the controlled testing undertaken in Phases 1A and 1B, i.e. that the results obtained and modelled in controlled conditions could be used to accurately predict field conditions.

A subsequent field trials (subject to funding being made available) is the definitive evidence required to justify a change to the safety case for a subsequent live trials and gain consensus that a 100% hydrogen gas grid conversion would be possible.

Scale of Project

This project will provide critical information applicable to the entire UK gas system when considering conversion to 100% hydrogen incrementally over time.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will be based out of the H21 office in the NGN area but will be applicable and deliver learning appropriate to the entire UK gas distribution system.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

External Project costs £583,451
Internal project costs £194,484
Total project costs £777,935

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 £300billions with minimal gas customer disruption verses alternative decarbonisation solutions – see appendix B 2017 H21 NIC bid document for detail of cost justification.

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 – whilst the design and master testing plan would be applicable and adaptable to other sites in the UK the field trial application would only be required once by the industry to justify the safety case deviation for a live trial. It is anticipated a subsequent live trial could be funded by government.

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

All evidence associated with the conversion of the UK gas distribution networks to 100% hydrogen is applicable to all GDNs within the UK as the networks have the same construct and design parameters.

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.

A design for a field trial application of hydrogen in an area of the existing gas network has never been undertaken before

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 Leeds City Gate project and provide valuable knowledge and learning to inform some of the next steps identified in the H21 road map. A design for a field trial application of hydrogen in an area of the existing gas network has never been undertaken before.

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 plc and is not specific to BAU 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