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

Sep 2023

Project Reference Number

NIA_NGT0221

Project Registration

Project Title

HyNTS Pipeline Dataset - Database & Automated Assessment

Project Reference Number

NIA_NGT0221

Project Licensee(s)

National Gas Transmission PLC

Project Start

September 2023

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Corinna Jones, box.GT.innovation@nationalgas.com

Project Budget

£1,590,414.00

Summary

National Gas Transmission (NGT) are committed to reducing emissions from the operation of the National Transmission System (NTS) and eliminating emissions by 2050. A key technology in this transition is hydrogen as an alternative for carbon fuels in heat, transport, and industrial uses.

Before transitioning the network a fundamental step is to verify that they can be safely repurposed. This requires the networks to attain and assess network asset data against a hydrogen impact assessment. The first critical step is a deeper understanding of the current condition of pipeline assets, material properties, and defects.

HyNTS Dataset focusses on the development of a data assessment platform for hydrogen gas networks, determining the datasets required to repurpose natural gas assets in a timely manner.

Third Party Collaborators

ROSEN

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

When looking to repurpose methane pipelines for hydrogen there is a requirement for us to have improved understanding of our pipeline assets; material type and smaller defects such as cracks become critical for hydrogen embrittlement effects and need to be

understood prior to hydrogen injection, and whilst in use.

Hydrogen will play a significant role in the energy transition required to meet net zero emissions targets by 2050. One cost-effective method for hydrogen transportation is to repurpose existing methane pipelines, however, before transitioning the network a fundamental step is to verify that they can be safely repurposed. This requires the networks to attain and assess network asset data against a hydrogen impact assessment.

The first critical step is a deeper understanding of the current condition of their pipeline assets, particularly material properties, defect populations and the handling and management of large datasets.

HyNTS Dataset focusses on the development of a data assessment platform for hydrogen gas networks, determining the datasets required to repurpose natural gas assets in a timely manner.

Method(s)

The aim of this project is to develop the tools and processes to determine the state of National Transmission System (NTS) pipelines, and their capability to carry Hydrogen.

To achieve this the project will examine the scope of requirement via engagement with IT, data teams and assets teams to determine the datasets needed with a focus on minimising manual intervention. The NGT data team will be harnessed to gather data (physical and digital). The supply with optimise the storage medium to support this.

A storage database will be developed and expand beyond previous projects to include AGI and compression assets. To accelerate the population of the database automated tools and techniques will be explored. This will then be brought together with a demonstration on a section of Project UNION feeder. The project will result in a technical report summarising the work undertaken and the outputs including business case and cost benefit analysis.

Data Quality Statement (DQS):

The project will be delivered under the NIA framework in line with the agreed Energy Networks Innovation Process document NGT internal policies. Data produced as part of this project will be subject to quality assurance to ensure that the information produced with each deliverable is accurate to the best of our knowledge and sources of information are appropriately documented. All deliverables and project outputs will be stored on our internal SharePoint platform ensuring backup and version management. Relevant project documentation and reports will also be made available on the ENA Smarter Networks Portal and dissemination material will be shared with the relevant stakeholders.

Measurement Quality Statement (MQS):

The methodology used in this project will be subject to our supplier's own ISO 9001 certified quality assurance regime and the source of data, measurement process and equipment as well as data processing will be clearly documented and verifiable. The measurements, designs and economic assessments will also be clearly documented in the relevant deliverables and final project report and made available for review.

Scope

The project is split into 8 work packages detailed below:

Work Package 1 – Engagement with NGT IT, Data teams & Innovation Projects
This phase will set the scene for the creation and deployment of the data management system for the hydrogen programmes. The focus of this phase will be on minimising manual intervention with the data through smart connections with BAU data systems. Whilst NG are still progressing separation activities it is likely that the outcome of this project will be unable to fully demonstrate this capability but will determine how phase 7 will be enabled.

Work Package 2 – Data Gathering & Storage Structure inc. interfaces

The NG data team are collating information from physical and digital sources, Rosen will support in identifying the most relevant data and optimise the storage of this for interaction with the database.

Work Package 3 – Database Development & Deployment inc. Pipelines, AGIs and Compressor stations

The HyNTS Pipeline Dataset database is limited to select AGI assets and pipeline assets and requires expansion to consider all network assets for Project Union. This Work package will further develop the database to enable this.

Work Package 4 – Automated data extraction, population & Reference

Continuation of the work undertaken in the SIF Discovery and Alpha projects, this work package will deploy options for accelerating the population of the network database and consider the interface with the GIS tools currently utilised in the business.

Work Package 5 – Automated Assessment

Working alongside the NIA_NGT0217 process development, this work package will determine optimum ways to manage and assess the information whilst providing robust auditable data flows. NIA_NGT0217 will be looking to support the Union FEED study by trialling the repurposing process, this work package will support this and further develop the system to enable optimisation.

Work Package 6 – Union Section 1 Demonstration

Alongside NIA_NGT0217 this work package will demonstrate the system capability on an example section of the Project Union route.

Work Package 7 – Database implementation

Determine the approach for deploying this system across multiple feeders and sites and ensure the user interface is appropriate to enable assessment of each network section against both blends and 100% hydrogen. Ensure a robust implementation plan is in place to enable the data teams to manage its use.

Work Package 8 – Reporting

Close out the project documenting all aspects fully and appropriately for the NIA funding mechanism.

Objective(s)

The prime objective is to deliver a robust digital database and assessment tool to facilitate the repurposing of UK network assets to hydrogen. Accelerating the timeline for assessment and ensuring robust auditable data.

The supporting objectives are:

- To demonstrate the capability on a section of Project UNION
- To deliver the project within time, cost, quality

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

An assessment of distributional impacts (technical, financial and wellbeing related) for this project has been carried out using a bespoke assessment tool, which assesses the project as having a positive, negative or neutral effect on consumers in vulnerable situations. To help inform the assessment, this tool considers the categories of consumers identified in the Priority Services Register. This project has been assessed as having a neutral impact on customers in vulnerable situations. This is because it is a transmission project.

Success Criteria

- Database delivered that can be utilised for pipelines, sites and compressors for the entire network
- User Interface that is easy to use and access
- Automation of data upload and assessment to accelerate assessment and ensure easy change management

Project delivered to time, cost, quality

Project Partners and External Funding

ROSEN

Potential for New Learning

The project will provide understanding and demonstration of pipeline asset data capture via novel techniques and population of this data, automated, into a new database systems which can be customisable and interoperable. The learning should enable improved decision making and retrieval of asset data.

The findings from the project will be uploaded to the ENA Smarter Networks portal and will be shared via National Gas innovation social media.

Scale of Project

The project will predominantly involve desktop development of the database with a demonstration on a selected section of the Project UNION route.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL6 Large Scale

Geographical Area

United Kingdom

Revenue Allowed for the RIIO Settlement

None – hydrogen focused innovation project.

Indicative Total NIA Project Expenditure

£1,192,811 – External

£397,603 – Internal

£1,590,414 – Total

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:

The project will enable the accelerated decarbonisation of the UK transmission network facilitating the energy transition for power and industry and supporting other applications such as heat and transport. We will be unable to transition the network without clear evidence and data the network is capable of transporting hydrogen, this project will ensure that robust approach and potentially enable further savings through the reduction of asset replacement.

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

Value tracking

	Data Point	Data Point Definition
Maturity	TRL5-6	The project continues work from previous SIF Dataset projects and develops the work to be demonstrated on a section of Project UNION pipeline.
Opportunity	>50% or multiple asset classes	The database will be designed to capture data on all assets. For the purposes of this project the data capture will be geared to support ECH of Project UNION.
Deployment costs	£83,493,333	Deployment costs for dataset assessment should be minimal once the database is created through the project. Max cost as per financial saving.
Innovation cost	£1,590,414.67	Cost of innovation work
Financial Saving	£85,533,333	Potential saving for the whole NTS. Approach costs for 1.5% of the NTS

Current approach = £2,535,400, Revised dataset assessment approach = £1,252,400. This equals a saving of £1,283,000 per 1.5% of the NTS

Safety	20%	Some intangible links to safety as a better understanding of the NTS will generate better decision-making and a safer approach.
Environment	-	This work will not directly generate CO2 savings however the output can enable the energy transition and associated environmental benefits of hydrogen.
Compliance	Support compliance	-
Skills & Competencies	Individual	Individuals will need to be trained on the developed software.
Future proof	Supports business strategy	The project outputs have the potential to influence future Project UNION design And the RIIO-3 business plan.

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

The findings form the project could be applied across the NTS and other gas networks in the UK. Moreover, the learnings and understandings from this work could be applied to other networks across the globe looking to transition or manage their data in a novel manner.

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

At the start of this study the roll out costs are not known – this is a research project. An assumption has been made in the above assessment.

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 data captured with inform decisions about the energy transition for the NTS, specially on areas surrounding repurposing of assets and route selection for Project UNION. This combines to inform NGT's hydrogen strategy.

The means to capture the data as well as the means to store and make interoperable the data will support and inform NGT's network

digital strategy.

The need to better understand an organises data is broadly universal and the learning from this project can be applied to other networks and industries.

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

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 project proposal has been shared with the gas industry to avoid duplication. There will be no duplication of activities done as part of this program. This project will address a gap in National Gas' ongoing innovation work looking at data capture, population and storage.

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 study is innovative in two key aspects:

1) The development of data systems to store and make interoperable pipeline and AGI data to enable the energy transition at pace and reduce manual time.

2) The development automated assessment tools/procedures for hydrogen enabling improved visibility and access to pipeline information.

Relevant Foreground IPR

This is a research project and it is not foreseen that the project will generate new foreground IP. The solution could be deployed on other networks and the principles replicated for other applications.

Data Access Details

Details on how network or consumption data arising in the course of an NIA funded project can be requested by interested parties, and the terms on which such data will be made available by National Gas can be found in our publicly available "Data sharing policy relating to NIA projects" at www.nationalgas.com/gasinnovation. National Gas data access is managed IAW provisions under 2.15-2.18 for the current NIA Governance Document.

National Gas already publishes much of the data arising from our NIA projects at www.smarternetworks.org. You may wish to check this website before making an application under this policy, in case the data which you are seeking has already been published.

Data Quality Statement (DQS):

The project will be delivered under the NIA framework in line with the agreed Energy Networks Innovation Process document NGT internal policies. Data produced as part of this project will be subject to quality assurance to ensure that the information produced with each deliverable is accurate to the best of our knowledge and sources of information are appropriately documented. All deliverables and project outputs will be stored on our internal SharePoint platform ensuring backup and version management. Relevant project documentation and reports will also be made available on the ENA Smarter Networks Portal and dissemination material will be shared with the relevant stakeholders.

Measurement Quality Statement (MQS):

The methodology used in this project will be subject to our supplier's own ISO 9001 certified quality assurance regime and the source of data, measurement process and equipment as well as data processing will be clearly documented and verifiable. The measurements, designs and economic assessments will also be clearly documented in the relevant deliverables and final project report and made available for review.

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

Energy transition projects and research is not catered for in the current RIIO-2 settlement and the project is high risk and low TRL which would not be considered for BAU funding. The development of a hydrogen ready assessment tool is novel in its own right and not something that would be considered through the RIIO-2 business plan.

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

Energy transition projects and research is not catered for in the current RIIO-2 settlement and the project is high risk and low TRL which would not be considered for BAU funding. NIA funding reduces this exposure to the risk and enables early stage development to be carried out.

This project has been approved by a senior member of staff

☑ Yes