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

Oct 2024

Project Reference Number

NIA_NGT0250

Project Registration

Project Title

ATEX Mechanical Ignition Risks

Project Reference Number

NIA_NGT0250

Project Licensee(s)

National Gas Transmission PLC

Project Start

November 2024

Project Duration

0 years and 7 months

Nominated Project Contact(s)

Matthew Hammond, box.GT.innovation@nationalgas.com

Project Budget

£200,000.00

Summary

National Gas Transmission (NGT) are actively engaged in developing the gas network to support the future decarbonisation of the National Transmission System (NTS) by transporting low-carbon hydrogen, as part of the broader energy transition. To support this transition, NGT have the objective of re-purposing the NTS for hydrogen. This brings uncertainty as to the operational functions and safety of mechanical assets used on the NTS with hydrogen. NGT are aware of the current ignition risk and mitigations for NG however there is still work to be done to understand them for Hydrogen. There has been previous work completed by the Hydrogen ready electrical and instrumentation assets project however this did not look at the mechanical equipment.

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

Currently there is a Mechanical Risk assessment (MRA) and Mechanical Ignition assessment (MIA) document that is used for Natural Gas (NG). This is yet to be updated for the transmission of Hydrogen.
With the lower ignition point of Hydrogen, when compared to NG, there is sufficient need to understand the risks associated with the ignition of Hydrogen on ATEX mechanical equipment. There is need to understand which equipment poses an inherent risk, what those risks might be, what are the possible mitigations National Gas will need to incorporate to make it safe and how it will impact any policies and documents inside of National Gas.

Method(s)

Measurement Quality Statement
The measurement approach used to meet Data Quality objectives will be through the identification of high calibre

project partners who are experts in their given field. 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.
Data Quality Statement (DQS)
The project will be delivered under the NIA framework in line with the agreed Energy Networks Innovation Process document and 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 stakeholder

Scope

Step 1 – Analyse current documentation surrounding Mechanical ignition risks and see if applicable for hydrogen standards and regulation review.

Analyse current risk assessment form for Mechanical Atex ignition risks

Step 2 – Identify possible hydrogen ignition risks for Mechanical Atex equipment

Identify and understand the current risk mitigations

Step 3 – Check the applicability of the current mitigation measures for hydrogen

Step 4 – Update mechanical risk assessment to cover hydrogen

Step 5 – Identify changes/what new mitigation measures need to be in place for hydrogen

Step 6 – Implementation plan of the new mitigation measures

Step 7 – Final report and risk assessment form

Objective(s)

1. To update the MRA and MIA documents to support the transmission of Hydrogen.
2. To collate the risks for NG and Hydrogen for ignition on ATEX mechanical equipment.
3. To include the possible mitigations that National Gas will need to explore for the ignition risks.
4. TO understand if any policies will need to be changed with the identification of the ignition risks.

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

The project will require a complete risk matrix of all ignition risks and mitigations for all compressor sites and terminals on the NTS. The data for which will be supplied to the relevant supplier.

There will also be a closure report required and a policy report stating which policies will be required to be updated regarding the Hydrogen transmission.

Project Partners and External Funding

Tutis Energy are the project partners.

Potential for New Learning

This will provide information on the associated ignition risks for ATEX mechanical equipment at compressor and terminal sites on the NTS. It will allow National Gas to understand what possible mitigations can be implemented to allow for safer flowing of Hydrogen and to reduce the risk of self-ignition. There will also be some level of learning with the new MRA and MIA documents that will allow for routine maintenance by sites and terminals.

Scale of Project

This is a small scale 7-month project which will support the safety case. It will provide a full risk matrix of potential ignition risks to mechanical ATEX equipment at compressor and terminal sites only. This will not look to implement new technology or to change existing risk mitigations, it is a research project to re design a document and to allow for categorisation of potential new risks with Hydrogen.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL6 Large Scale

Geographical Area

This will look at all compressor and terminals on the NTS.

Revenue Allowed for the RIIO Settlement

This is a desktop research project as such there is no revenue.

Indicative Total NIA Project Expenditure

£200000

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:

With transitioning to a Hydrogen transmission system there needs to be relevant safety procedures in place. Before this can occur National Gas first need to understand any potential risks. This project looks at the ignition risks with the ATEX equipment for variable blends and a full Hydrogen transmission system. When the risks have been identified then the project will also identify potential mitigations for the risks.

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)

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 a calculation of the expected benefits the Solution

Value tracking

Data Point	Data Point Definition

Maturity: Current ignition risks for Natural Gas are already documented in an MRA and generically in an MIA form saved in ECM.

The process is to update both of these for hydrogen, to make sure they incorporate the risks for ignition for hydrogen, updating both the MRA and MIA.

It will also provide a complete risk matrix for the current Natural gas risks and mitigation's and the Hydrogen risks and mitigation's.

There will be an assumption made that all components are in full working order, with no current leakage issue present, or any other issues. This is a key assumption otherwise the system may not be compliant under DSEAR.

Opportunity: the innovation opportunity exist to create a new MRA and MIA form for Hydrogen. This is a from that details all the DSEAR ignition risks generically for Hydrogen, the equipment that is likely to have an inherent source of ignition for Hydrogen and also the mitigation's required. There will also be a creation of a new risk matrix which will collate all this along with the NG version of the data also.

Deployment costs: As this is creating an internal document there is no deployment cost. It will be stored on the company sharepoint with access given to all sites and NGT

Innovation cost: The cost to create the documents is £150000 for external supplier spend to create the documents and risk matrix, create the reports and policy standard reports, and also to verify the risks against a selection of sites.

£35000 for internal SME costs to steer the project, read reports and make relevant changes.

Financial Saving: The project will not directly save costs however with the creation of a MRA and MIA document for Hydrogen then there will be savings on the routine maintenance of compressor sites. This project will support that.

Safety: currently there are no ignition risks and mitigation's document for Hydrogen transmission. This project will be a 100% improvement on what exists. We are aware of them for NG and this project will define inherint ignition sources of ATEX equipment, the generic risks for Hydrogen ignition on the equipment and the mitigation's needed to make the sites compliant. These can then be used to run routine maintenance on sites. The risk matrix will also show what policy and procedure the risk may impact.

Environment: As this project is focusing on the ignition risks there is no direct C02 saving. It will support the case for decarbonising the future and flowing of Hydrogen so will have an impact in the over all saving of a Hydrogen transmission system.

Compliance : To be compliant with Net Zero 2050 we need to have an understanding of the ignition risks for the ATEX Mechanical equipment on each comperssor site. We currently have an understanding of these risks for NG and the mitigation's for them therefore to also be compliant with flowing Hydrogen we need to have this for blends of 5%, 20% and 100%

Skills & Competencies: a new risk matrix for ignition risks on mechanical ATEX equipment may mean new mitigation's. This will mean that site wide the relevant engineers and technicians may require further training. This will increase the skill level of employers and require newer competent people to be trained. This will also require the change of the competent persons training to be changed for Hydrogen transmission.

Future proof: By understanding the ignition risks to mechanical ATEX equipment for blends of 5,20 and 100% Hydrogen then the relevant risk mitigation's can be implemented and created ahead of time. This will allow to future proof the transmission of Hydrogen on the NTS.

Assuming the compressors are in perfect working condition with no leaks to the system then the risk matrix and mitigation document that the project creates will be able to be used ongoing with the transmission of Hydrogen. It will also be able to be redesigned with minimal effort for de-carbonisation or the flow of any other gas.

The net benefits delivered so far are… With forecast benefits to be delivered in …

To understand the current MRA and MIA documents and identify the risks and risk mitigations for ignition on Natural Gas ATEX mechanical equipment

To update the MRA and MIA documents to identify risks and sources of igniution for Hydrogen transmission and blends

To identify ignition risks for Hydrogen transmission and blends

To identify possible mitigations for the Hydrogen risks

To create a risk matrix detailing the ignition risks for both Natural Gas and Hydrogen including blends

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

With the creation of a updated MRA and MIA the plan is to roll this out to all sites. Creating the MRA and MIA template will allow all sites to use this for its routine maintenance when flowing blends and full Hydrogen. The risk matrix will also be able to be submitted for the saftey case.

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

There is no cost to roll this out outside of the innovation project cost.

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

Mechanical ignition and all sort of ignition risks raised from switching to hydrogen is a topic of interest to all gas networks who are considering hydrogen including the GDN's, so the learnings could be used by all the gas networks in UK

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 hydrogen transportation and enabling work to support the energy transition

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 MRA and MIA documents for natural gas were created specifically for National Gas, there is currently no MRA and MIA for Hydrogen and blends therefore this is a brand-new document. This will provide valuable safety process for routine maintenance. It will also give ignition risk information for the HSE safety case.

Relevant Foreground IPR

Details of expected Relevant Foreground IPR which will be generated in the Project. If applicable, this must also explain if Background IPR will be required to use the Relevant Foreground IPR.

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

National Gas Transmission are not funded for Hydrogen related projects through business as usual funding, and so this project must be funded through the Network Innovation Allowance.

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

Funding this project through NIA gives an opportunity to share the findings with other network licensees to enable their own progression of hydrogen transportation related activities.

This project has been approved by a senior member of staff

☑ Yes