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

Dec 2024

Project Reference Number

NIA_CAD0109

Project Registration

Project Title

Safety Assessment of a Non-Distributed Gas GB Energy System and Usage

Project Reference Number

NIA_CAD0109

Project Licensee(s)

Cadent

Project Start

November 2024

Project Duration

0 years and 5 months

Nominated Project Contact(s)

George.brookfield@cadentgas.com

Project Budget

£77,261.00

Summary

This project will produce a Safety Assessment report to cover a non-distributed gas Great Britain energy system and usage scenario. This work builds on previous work as part of the GB QRA project (NIA_CAD0096) where the risk across Great Britain was quantified for hydrogen distribution and utilisation in the network, in houses, flats, and non-domestic buildings. The previously modelled scenarios included the application, or increase in application, of gas alternative solutions for cooking and heating. These could be electrical and other hydrocarbon fuel appliances. This project seeks to identify and qualify any risks introduced as a result of these gas alternative solutions on a national and individual scale.

Preceding Projects

NIA_CAD0096 - Great Britain Hydrogen Distribution QRA

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

A national-scale quantitative risk assessment (the 'Great Britain Hydrogen Distribution and End-User QRA', also referred to as 'GB QRA') and supporting work has being delivered to determine the risk of distributing and using 100% hydrogen instead of natural gas. The GB QRA focuses on fire and explosion risks of hydrogen and natural gas, as well as fatality and injuries from carbon monoxide poisoning.

The GB QRA has included the safety impact of non-distributed gas solutions and the reduction in distributed gas fires and explosions, but an assessment of the introduced risk (of non-gas solutions) is not in scope for the GB QRA, nor was it in scope for any previous iterations.

This has led to the questions:

· What is the overall risk of not having distributed gas in the GB's future energy system?

· What is the potential safety impact on individual properties?

Method(s)

This section should set out the Method or Methods that will be used in order to provide a Solution to the Problem. The type of Method should be identified where possible, eg technical or commercial.

For RIIO-2 projects, apart from projects involving specific novel commercial arrangement(s), this section should also include a Measurement Quality Statement and Data Quality Statement.

The project will be split into 3 tasks, intended to maximise opportunities to collect and evaluate a hazard identification and risk assessment of gas alternatives.

Task 1: DNV to prepare materials for the workshop e.g. scoping of scenarios

Workshop including hazard identification to be held.

Task 2: Gap Analysis- DNV to review workshop outputs

Task 3: Risk predictions – DNV to draft final report

Scope

This project covers the alternatives to distributed gas system and usage up to but excluding Local Transmission System across Great Britain.

All common types of alternatives energy solutions are in scope, including electrification, solid fuel burners, and liquid petroleum gas (LPG), for heating and cooking only. Process uses are not in scope.

The project will need to acknowledge many risks are related, such as safety, economical, environmental, and reputational. However, only risk to safety is to be assessed (unless, by close dependency, other risks needs to be commented on to fully explore safety risk).

Objective(s)

The key objective of this project will be to provide a safety assessment which covers the following areas:

- The safety risk of differing energies' security and resilience (e.g. on critical public-service buildings such as hospitals, and other national infrastructure)

- The safety risk of slow re-energisation of heat (e.g. following energy interruption, linking to Excess Winter Mortality and electrics vs gas instantaneous heat outputs)

- Safety risk of physical harm (electrocutions, explosions, fires, CO poisoning, etc.) of different energy vector appliances (e.g. electrical appliances, solid fuel/LPG heating)

- Safety risk associated with theft of different energy (or rather the risk of improper use of alternative energy vectors).

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This project will deliver an appraisal of the societal risk of not including gas or hydrogen in a future energy scenario. As part of the GB QRA on the safety of hydrogen, several mitigation measures include simply removing or reducing the amount of gas/hydrogen distributed and used, swapping to alternative energy solutions. This has the effect of reducing hydrogen risk but does not necessarily reduce net risk overall. The net change in risk is currently unknown. To ensure we protect vulnerable customers and do right by all our customers, it is important we understand the full extent of what we are proposing.

Success Criteria

A successful project will have addressed the gaps in the GB QRA and be able to answer:

- What is the overall risk of not having distributed gas in the GB's future energy system?
- What is the potential safety impact on individual properties?

Project Partners and External Funding

The delivery partner will be DNV, who have delivered several critical safety and risk assessment as part of the hydrogen heating programme.

DNV is not only a gas specialist consultant but deliver work on behalf of the UK electricity system also. The project will benefit from input from across DNV's portfolio of energy experts.

Potential for New Learning

The project will build on the deliverables of the GB QRA and all the work delivered to date on energy solutions safety and risk assessments. It will tackle areas which are currently less mature than those of gas and hydrogen – their alternatives.

National risk assessments of this type are not currently available for direct comparison with natural gas and hydrogen, so the work will be novel.

The project closure report will include a summary of the outputs.

Scale of Project

The project should look to address safety at a national level, covering all of mainland Great Britain. Focusing on risks to members of the public. Many other risks could be considered but are out of scope, including: Political, Social, Economical, Environmental, Reputational. The only primary risk in scope is that of safety, i.e. fatalities and injuries of the British public. Risks to employees and those at work is out-of-scope of this piece of work.

The output will be a report, similar to that of the GB QRA. As this topic is less mature with evidence, it is likely to be less technical, and more qualitative.

This is a relatively low cost safety assessment which is not reflective of the value of the outputs. The outputs will help contextualise risks of gas and hydrogen and improve awareness of energy solution risks on a whole, to help improve holistic safety of energy systems and utilisation.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The scope and scale of the project cover all of Great Britain.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

The current proposed quotation for the required deliverables is £57,946.00 plus an additional £19,315.33 of contingency should it be required (£77,261.33 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 is required to contextualise natural gas or hydrogen safety risks, this in turn can be used to justify that hydrogen can be implemented and operated to acceptable limits of safety.

Without such safety assessment of the gas alternatives, the implications of safety to society and individuals is not fully understood. This work is a requirement of energy system transition.

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

The applicability of the outputs from this project run Great Britain wide.

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

This project is to model the safety implications of transitioning to gas alternatives. Although cost, deliverability, business appetite to effort, and perceived customer appetite for safety tolerances is considered, the exact costs associated with the application of the findings from this project will need to be determined separately.

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

Any and all learning from this project will help prepare the GB gas networks to transition to low carbon alternatives.

The specific findings that are linked to the tangibly benefits to Great Britain are around the ways in which we achieve safety criteria in line with GB standards and the publics expectations. Earlier iterations of the Hydrogen Distribution QRA have shown where additional safety mitigations are required when operating a hydrogen network as opposed to a natural gas network, but this negates the comparison with alternative energy solutions. In a decarbonised future, the comparison of natural gas and hydrogen becomes less useful, and a comparison of just decarbonised solutions is required. This project seeks to provide an indication of that for all energy transporters in the UK.

This type of information now can also assist GDNs prepare strategies and plans for conversion and operation in the future, as well as support a clean heat policy decision.

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.

This project is the next iteration and so is not repeating anything gone before (unless deliberately revalidating the past results). It will be done with appropriate levels of transparency to ensure concurrent projects scopes to not cause rise to duplication of effort. Which, given the project partners and industries awareness of this piece of work, is manageable.

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 represents the next iteration, addressing new concepts which are being identified by industry. It is the amalgamation of several pieces of knowledge and project outcomes that we are yet to have seen or attempted in Great Britain.

Relevant Foreground IPR

The foreground IPR will be limited to the results and findings of the safety assessment, plus any additional knowledge/IP gained as a result of carrying out said safety assessment.

Any modelling or software tool used by DNV, constituting the background IPR and foreground IPR modifications as a result of this project, are not going to be supplied as a product of this project.

Data Access Details

The data regarding the scope of the evidence being gathered will be captured.

Data for this project will be found or requested via the Smarter Networks Portal at https://smarter.energynetworks.org

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

This piece of works primary focus is to deliver results to feed into the HSE's CFA to help determine the viability and opportunity of repurposing the GB gas distribution networks to hydrogen. The primary benefactors are the GB government and the GB citizens.

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

NIA represents the requirement to do this piece of work collaboratively. We are required to show that hydrogen gas can be safely distributed and used throughout Great Britain.

As such, funding this type of work needs to be done to the maximise it's dissemination and minimise the burden on any singular population of energy consumers.

This project has been approved by a senior member of staff

☑ Yes