

NIA Project Registration and PEA Document

Date of Submission

Jan 2021

Project Reference Number

NIA_CAD0067

Project Registration

Project Title

I-0339 - Technical Review - KWA

Project Reference Number

NIA_CAD0067

Project Licensee(s)

Cadent

Project Start

December 2020

Project Duration

0 years and 5 months

Nominated Project Contact(s)

Lorna Millington – Future Networks Manager

Project Budget

£19,000.00

Summary

With the challenge of decarbonising heat, opportunities such as hydrogen blending are key to enabling reduction in our carbon emissions in the short term whilst minimising the customer impact. These low impact reductions are key to moving the UK towards its net zero target.

The technical challenges of blending hydrogen into natural gas have been explored in the Network Innovation Competition project HyDeploy 1 and 2. With the current projects providing the evidence to demonstrate the safety of blends within the network.

It opens up the wider question when considered alongside the work on 100% hydrogen for heat. Can appliances move between blends and 100% hydrogen, if not why not?

The development of hydrogen ready boilers is one angle, the deployment of these is not likely to reach large scale until the 2030's.

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

With the challenge of decarbonising heat, opportunities such as hydrogen blending are key to enabling reduction in our carbon emissions in the short term whilst minimising the customer impact. These low impact reductions are key to moving the UK towards its net zero target.

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Method(s)

The work will focus on two areas a technical analysis of the effects of hydrogen concentration on gas appliances.

Scope

The review will cover the effect of hydrogen content on UK gas appliances. This will include analysis of the impact of gas blends on a range of areas, including:

- Effect on Wobbe index and energy input to the appliance.
- Effect on Oxygen Depletion Sensors (ODS).
- Effect on flame ionisation probes for flame failure detection (FFD) and those with automatic gas/air ratio control.
- Risk of light back to the injector.
- Risk of flashback for appliances with pre-mixed burners.
- Effect on annual servicing and complexity of situation for GasSafe fitters. Additional risks arising from this.
- Effect on materials of construction.
- Effect on commercial catering.
- Effect on Industrial burners especially radiative vs convective heat exchange.
- Additional issues if H2 composition is fixed or varies according to summer/winter storage and management of these with UK use of morning and evening heating patterns.
- Known issues with very variable gas quality combined with 'intelligent' home network systems and internet connected appliances.
- Effect of increasing hydrogen content on risk of fire and explosion.

Objective(s)

The project objective is to review the effect of hydrogen content on UK gas appliances. This will include analysis of the impact of gas blends on a range of areas, identified in the scope.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria for the project is a technical report covering the impact on appliance design of changing hydrogen content over the whole range (from 0% to 100% H2). This will be against the background of a number of aspects:

- Design challenges.
- Research and development requirements.
- Practicality.
- Carbon Savings.
- Cost-effectiveness.

The review will concentrate on gas boilers (as these are the greatest gas consumers), however, gas fires and cookers will also be considered.

Project Partners and External Funding

n/a

Potential for New Learning

The project will give a fuller picture of the impact on appliances of a range of blends upto 100% .

Scale of Project

The project will be a desktop study.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

This project will be within the Cadent footprint.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

External cost - £15,828

Internal costs - £3,172

Contingency - £0

Total cost - £19,000

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)

Dependant on the outcome this could offer a wider range of decarbonization options for heat.

Please provide a calculation of the expected benefits the Solution

This is a research project.

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

This is a research project where the benefits are yet to be defined.

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

The information captured will be applicable to all Network licensees.

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

This relates to finding a way to utilise the current appliance population and prepare for decarbonisation

- ☒ 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.

This is a research project where the benefits are yet to be defined.

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 is building on the appliance testing from HyDeploy to detail a fuller picture of the variation in appliance behaviour across the full range of blends upto 100%.

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 relates to hydrogen blends and 100% hydrogen which are not yet BAU activities for the networks.

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

There are technical, operational and regulatory risks within this project that need investigating to understand the full range of impacts of blends upto 100% hydrogen.

This project has been approved by a senior member of staff

☒ Yes