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NIA Project Registration and PEA Document

Date of Submission

Oct 2021

Project Reference Number

NIA_WWU_2_05

Project Registration

Project Title

Switching vulnerable consumers to hydrogen

Project Reference Number

NIA_WWU_2_05

Project Licensee(s)

Wales & West Utilities

Project Start

October 2021

Project Duration

0 years and 11 months

Nominated Project Contact(s)

Nigel Winnan

Project Budget

£139,960.00

Summary

The project will fund the design of a practical, safe process for switching vulnerable customers from natural gas to hydrogen.

Nominated Contact Email Address(es)

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Problem Being Solved

To realise Net Zero emissions in 2050 and meet the UK's interim Carbon Budgets, the way we use, store, convert and transport energy across the country will need to change dramatically. Every sector and energy vector will need to change, including network companies.

The UK has an extensive network for Transmission and Distribution of natural gas, delivering around 600TWh of the fuel to Domestic, Commercial, and Industrial consumers, and almost 300TWh to generate power. In energy terms, the UK uses around three times more gas than electricity. Around 85% of households use gas as their primary source of heating.

WWU have taken initial steps towards decarbonisation but whilst uncertainty remains around the mix of technologies and gasses in the network required to reach Net Zero. Much work has been undertaken by the Energy Networks Association, including the 'Pathway to Net Zero' and 'Gas Goes Green' to establish credible pathways for UK gas networks. However, limited work has been undertaken to understand how switching vulnerable customers to hydrogen could impact their daily lives during the process.

Experts believe the switch from natural gas to hydrogen could leave homes without gas for up to 1-2 days. Clearly this presents risks to any vulnerable customers who need gas to stay healthy. It will be impossible to avoid vulnerable customers as they live in all areas and in every type of home. This presents a major problem. Perceived risks to vulnerable customers could put the UK off using hydrogen for heat. Showing how to manage these risks well could prove crucial to a successful roll out.

Method(s)

In summary, the project is split into five work packages:

- Work package 1 initiates the plan and manages delivery.
- Work package 2 maps out the current maintenance process and the planned hydrogen switch process. This forms part of the Discovery stage along with Work package 3.
- Work package 3 defines the risks through customer research and an expert workshop.
- Work package 4 is the Alpha stage. It generates and tests ideas for mitigating risks with experts and vulnerable customers.
- Finally, Work package 5 documents and disseminates the process to build confidence vulnerable customers can safely switch to hydrogen.

Data Quality Statement

The Energy Systems Catapult (ESC) will apply their Quality Management System (QMS) to make sure that the data collected and used is of sufficiently high quality to deliver the project objectives.

Measurement Quality Statement

This project will collect data on what consumers perceive to be the risks of switching them from natural gas to hydrogen and how to manage them effectively. It applies several techniques, procedures, and mechanisms to ensure results are traceable, reliable and comparable, namely:

1) Service blueprints

These map out WWU's operational process for managing any supply interruptions caused by switching homes to hydrogen or maintaining the gas grid. They will be used to focus subsequent activities and updated to highlight how mitigations can be implemented. This enables recommendations to be traced to their original source.

2) Parallel workstreams

Involving both vulnerable customers and experts increases the reliability of findings. Including a range of participants with diverse experience improves the data collected.

3) Prioritisation tasks

Experts and customers will compare different risks and proposed mitigations according to various criteria (e.g. severity/desirability, technical feasibility, and commercial viability). Variation in ratings provide another estimate of reliability.

The project is rated low in the common assessment framework detailed in the ENIP document after assessing the total project value, the progression through the TRL levels, the number of project delivery partners and the high level of data assumptions.

No additional peer review is required for this project.

Scope

At this stage we are defining vulnerable customers as those on WWU's priority services register, with the aim to include a diversity of participants with a range of vulnerabilities and views. The project will also include a wide range of experts from WWU.

The project will look to define a process that vulnerable customers endorse and key energy sector stakeholders support.

The aim of the project is not to see financial benefits but to develop helpful and necessary processes to assist vulnerable customers in the conversion to hydrogen. There is a lot of ongoing work to identify the most effective route to meet net zero in the UK and this project is one of many projects to evidence the major or minor role hydrogen will have in different scenarios. Repurposing the UK gas networks with hydrogen to support the challenge of the climate change act has the potential to save £millions with minimal gas customer disruption verses alternative decarbonisation solutions

Objective(s)

The objective of the project is to plan how to minimise the number and duration of supply interruptions and keep people safe and warm throughout a hydrogen switchover.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This project is expected to have a positive impact on vulnerable customers. The outputs of this project will be a report explaining the mitigations that can be implemented during a hydrogen switchover, so that vulnerable customers are not adversely affected. The report will summarise feedback from experts and vulnerable customers.

Success Criteria

A successful project will produce a report summarising how the impact of switching to hydrogen can be completed with as little impact on vulnerable customers as possible.

Project Partners and External Funding

The project partners for this project are the Energy Systems Catapult. The project will be wholly funded via NIA.

Potential for New Learning

This is the first project to design a practical, safe process for switching vulnerable customers from natural gas to hydrogen. It is designed to produce new learnings that different energy sector stakeholders will need to deliver net zero emissions and support vulnerable customers effectively.

All reports will be published on the ENA Smarter Networks Portal and the report will also be launched at a dissemination event.

Scale of Project

The project has been scaled back to the minimum needed to make findings reliable. It includes:

- A literature review to ensure it builds on existing knowledge;
- Draws on WWU to map out existing processes, rather than invent these from scratch;
- Includes suitably sized samples of vulnerable customers and experts

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

The project will focus on the WWU network, however findings will be applicable to all networks.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

External Costs: £104,700

Internal Costs: £34,900

Total Costs: £139,600

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:

This project has the potential to benefit vulnerable customers, by ensuring that any switchover process does not adversely affect them and plans what mitigations can be put in place to make the switchover as smooth as possible.

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

The aim of the project is not to see financial benefits but to provide societal benefits particularly to assist vulnerable customers in the conversion to hydrogen. There is a lot of ongoing work to identify the most effective route to meet net zero in the UK and this project is one of many projects to evidence the major or minor role hydrogen will have in different scenarios. Repurposing the UK gas networks with hydrogen to support the challenge of the climate change act has the potential to save £millions with minimal gas customer disruption versus alternative decarbonisation solutions

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

The method could be fully replicable across the UK, as any mitigations will not be constrained to a particular area.

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

Any roll out costs are not known at this stage, the project will look to balance mitigations with costs of technology.

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

RIO-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 networks are exploring the possibility of converting the gas network to hydrogen, so the report published as part of this project could be used by all networks to design their hydrogen switchover process.

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

No project of this kind has been completed by the networks. All gas networks were alerted to the project and no concerns were raised.

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 project focuses on the practicalities of switching areas from natural gas to hydrogen. There are many ways WWU could switch vulnerable customers to hydrogen and to work, the process must both meet customers' needs and work within physical constraints. For example one idea might be that residents should use temporary, public shower blocks during outages. However, this might prove difficult for some residents.

This project involves working with experts and customers to generate and test lots of ideas to create an effective process.

Relevant Foreground IPR

The project will produce a report that will be published and openly shared on the Smarter networks portal. WWU processes are categorised as background IP

Data Access Details

- A request for information via the Smarter Networks Portal at <https://smarter.energynetworks.org>, to contact select a project and click 'Contact Lead Network'. Wales & West Utilities already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
- Via our Innovation website at <https://www.wutilities.co.uk/about-us/our-responsibilities/innovation/>
- Via our managed mailbox innovation@wutilities.co.uk

Details on the terms on which such data will be made available by Wales & West Utilities can be found in our publicly available "Data sharing policy relating to NIC/NIA projects" [here](#)

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

Ofgem published its final determinations which included a variety of provisions to enable necessary development work on Net Zero projects but also to ensure vulnerable customers are thought about in any decision making. This project has the potential to facilitate the energy system transition, while also keeping vulnerable customers front and centre of our thinking and is therefore eligible to use the NIA funding mechanism.

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 the realisation 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 this type of hydrogen switching project 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