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

Jun 2021

Project Reference Number

NIA_CAD0074

Project Registration

Project Title

FI-0002 Hydrogen Village Consumer Research

Project Reference Number

NIA_CAD0074

Project Licensee(s)

Cadent

Project Start

June 2021

Project Duration

0 years and 7 months

Nominated Project Contact(s)

Debbie Mitchell – Cadent Gas Ltd Sally Thomas – WWU Stella Matthews - NGN Lorna Archer – SGN

Project Budget

£419,000.00

Summary

The UK Government's Ten-Point Plan targets the need for a hydrogen village by 2025. A successful hydrogen village trial requires consumers to take part. It is vital that we engage with consumers and businesses in the right way, addressing concerns and understanding their wants and needs throughout the trial lifecycle. This project provides a unique opportunity to explore with consumers and businesses what they would require in a trial when their energy choice is limited to hydrogen or electrification. The project will research attitudes, behaviours and perceptions towards hydrogen for heating, cooking and the impact of conversion including meter replacement. This is a vital and important step to understand and create the consumer and business information needed to enable a successful hydrogen village trial.

Preceding Projects

NIA_CAD0072 - FI-0001 HyNet Homes – Understand Phase (technical)

Third Party Collaborators

Savanta group Limited

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

The UK has mandated that it shall reach Net Zero emissions no later than 2050. The UK was the first major world economy to set this target and it shows the UK's commitment to tackling climate change for future generations. This mandate has put the UK on an accelerated programme to reduce emissions across our entire society whether this is industry, transport, agriculture or the way we

create our power and heat our homes. To achieve Net Zero by 2050 will require a co-ordinated effort across the whole of the economy and by individuals who will be required to make technology choices and behaviour changes to live more sustainable lives.

The Climate Change Committee (CCC) have looked into the pathway to reach Net Zero with a series of carbon budgets the most recent of which is the 6th carbon budget. This carbon budget stipulates that there will need to be a 68% reduction in carbon emissions compared to 1900 by 2030 and then up to 75% reduction by 2035, this will require significant action and decisions to be made in the early 2020s. To reach these targets the Government is looking at a range of technology options in order to decarbonise and how policies can be implemented to create the conditions for these technologies to be successful deployed. A recent example of this success is the deployment of off-shore wind which has enabled widespread emissions reductions in the power sector.

In order to further accelerate the UK's path to NetZero, the Government have set out a Ten-Point Plan for a Green Industrial Revolution, which includes support for driving the growth of hydrogen. The policy impacts have been identified as:
- Aiming to generate 5GW of hydrogen production capacity by 2030 in partnership with industry
- Lower carbon heating and cooking with no change in experience for domestic consumers through hydrogen blends and reducing the emissions of natural gas by up to 7%.

The Ten-Point Plan also published some targeted milestones which included the prospect to begin a large village hydrogen heating trial by 2025 and set out the plans for a possible pilot hydrogen town before the end of the decade.

The UK is currently positioning itself at the forefront and as a world leader in investigating the use of hydrogen for heating. This has been partly achieved through the emergence of projects such as HyDeploy, H100 and H21 that have evolved during RIIO-GD1 period. During RIIO-GD2 the next stage is to demonstrate the use of hydrogen on a large scale. This is a critical step for policy makers and establishing the role that hydrogen has to play in the energy transition process, enabling policy decisions to be made in the 2020s.

The extent to which hydrogen plays a part in a low carbon heating future will be determined by a combination of technical and economic factors; and consumer attitudes and preferences. The attitude of domestic consumers and businesses towards hydrogen conversion and their preferences is an area that has not yet been explored fully. A hydrogen village trial will require repurposing the existing gas network to transport hydrogen and therefore, consumer choice will be limited to converting to hydrogen or electrification. There is currently very little evidence that sets out the current consumer perception of conversion, behavioural attitudes, choices and preferences, emotional understanding, consumer psychology and drivers to have hydrogen as an energy solution at home or in the work place.

A number of stages are required in order to be ready for a large village hydrogen heating trial in 2025 and this project signifies an important step in being ready for the trial. This NIA project is an essential stage in understanding consumer attitudes, preferences and behaviours towards hydrogen, leading to a successful hydrogen village trial where domestic consumers and businesses are engaged in the right way and most engaging way, suited to their needs.

Method(s)

Cadent will be the lead GDN for the project and will be collaborating with Wales and West Utilities, Northern Gas Networks and SGN. The project team are experienced in conducting consumer research and engagement and have accumulated experience on hydrogen projects such as HyDeploy and HyDeploy2. Britain Thinks and Savanta are expert consumer research and engagement partners who have been appointed to deliver the different stages of research.

The project will follow a rigorous project management framework to ensure that the project remains on track, its outputs are of a sufficient standard, the material and planning for the project's next stage is undertaken and is fully aligned with RIIO-GD2 funding mechanisms.

The project will be undertaken in 3 distinct stages. This is to ensure that the findings from each stage help to frame the next stage and that work is not duplicated.
• Stage 1 (Inform) will include a comprehensive and detailed study, consolidating existing research; identifying any research gaps that need to be considered.
• Stage 2 (Qualitative) seeks to understand the consumer perspective to understand 'what' people think of the transition to hydrogen as an energy solution and 'why'.
• Stage 3 (Quantitative) will test at scale the output of the inform stage along with the themes and findings of the qualitative research.

The Measurement Quality Statement and Data Quality Statement include the fact that there will be expert consumer engagement partners and one network licensee involved in the project who will constantly measure the quality output of the project. Expert engagement partners will be required to have their own quality assurance process in place. This will also be reinforced and further scrutinised by the project management board, which will compromise of a number of experienced gas industry professionals and engagement specialists who will regularly monitor the output of the project. There is also expected to be a regular interface with the

BEIS hydrogen trials team, through the HyNet Homes (Technical Research) project, who will have full access to the documents available and will be able to provide comment.

Any consumer data gathered throughout this project will be anonymised and will be compliant with General Data Protection Regulations (GDPR) and the UK Data Protection Act. Any compliant data can be made available for review upon request.

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 low level of data assumptions.

No additional peer review is required for this project.

Scope

This project is an important step to creating the consumer information needed to enable a successful hydrogen village trial and understand how domestic consumers and businesses are likely to respond to converting to hydrogen. This project is fundamental in understanding how we best engage with consumers and how we can maximise the adoption of hydrogen by residents in a trial area.

This project will understand consumer attitudes, behaviours and perceptions towards the use of hydrogen as a solution for heating, cooking and the impact of conversion including meter replacement. This research will be vital to the success of the village conversion and presents a unique opportunity where consumer choice will be limited to converting to hydrogen or electrification. Without this research is it likely that the overall hydrogen village trial would be unsuccessful in understanding consumer needs and gaining the support of the communities connected to the gas network.

The research is critical in establishing the full evidence base required to enable Government to decide about the role of hydrogen and the gas network, in a low carbon heating future in the UK.

The consumer research will be carried out in three stages:

Inform (Stage 1)
The purpose of this stage is to consolidate existing research, including but not limited to research from the UK, Europe and Australia. This stage will include a comprehensive and detailed study of existing data, previous research, literature, academic studies, trials including HyDeploy, HyNet, H100, H21 and industry expertise. This stage will also identify any research gaps that need to be considered in the qualitative (Stage 2) research.

Qualitative (Stage 2)
This stage of the research will seek to understand the domestic consumer and business perspective through qualitative methods to understand ‘what’ people think of the transition to hydrogen as an energy solution and ‘why’.

It is important that consideration is given to the following:
• Use of online or remote methods: Covid-19 has meant that many engagement methods have moved from face to face to online. We are proposing that the majority of research methods will be online or remote rather than face to face for this project.

• Deliberative engagement: Hydrogen conversion is of low interest for the majority of consumers. Consumers will need to be taken on a journey to understand what hydrogen conversion means and how it applies to them in order to provide an informed response. Deliberative engagement will provide participants with the opportunity to consider hydrogen conversion in-depth, bringing consumers together to discuss and develop an informed view.

Recommended approach for consumers:
The main approach for the qualitative stage will be a short-term online deliberative community of 100 consumers indicatively representing a broad UK consumer base. The community will come together at the beginning and at the end of the research and will have opportunities to interact in between. Whilst the online community will be inclusive for most, it will be supplemented with in-depth interviews with niche groups of consumers and businesses, e.g. consumers who are non-digitally savvy, in a vulnerable situation or are in fuel poverty; and small and medium businesses.

Recommended approach for Stakeholders:
Online communities are not suitable for stakeholders and a different qualitative approach is recommended. Key stakeholders will be asked to take part in a round table discussion with the view to forming a stakeholder group for the length of the project. Stakeholder interviews will also take place where appropriate.

Quantitative (Stage 3)
The purpose of carrying out quantitative research is to test at scale the output of the inform stage along with the themes and findings of

the qualitative research. The quantitative stage will provide the views of a large-scale sample of the UK's consumer base.

To facilitate a rapid collection of data at scale, we propose the use of an online survey of circa 1,800 consumers supplemented by circa 200 in-depth telephone surveys with niche groups of consumers and businesses, e.g. consumers who are non-digitally savvy, in a vulnerable situation or are in fuel poverty; and small and medium businesses.

Objective(s)

The purpose of this project is to conduct consumer research with domestic consumers and businesses to understand their wants and needs when taking part in a trial when their energy choice is limited to hydrogen or electrification. The research will cover pre, during and post-trial and will understand consumer opinion, attitudes and beliefs; and capture questions consumers have as well as their hopes, fears and concerns in taking part in a hydrogen village trial.

The project will explore what a hydrogen trial will mean to domestic consumers in their home and businesses in their place of work, including meter replacement and appliance swap out considerations. It will also capture insights on what consumers require to take part in the trial and views on incentivisation, compensation and mandating hydrogen adoption.

The project findings are fundamental to the success of a hydrogen village trial and maximising the adoption of hydrogen by residents in the trial area. We want to make sure that during the hydrogen village trial domestic consumers and businesses are engaged in the right and most engaging way. The research, insights and data gathered will enable the industry to shape and tailor the engagement approach of the trial, addressing concerns, preparing answers to consumer questions and look at how we can minimise any disruption.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

The research will understand the impact of hydrogen transition based on a diverse and representative sample of the UK population and how consumer attitudes, behaviours and perceptions towards the use of hydrogen differ. This sample will include niche groups of consumers, e.g. customers in vulnerable situations and those in fuel poverty. Our engagement approach will be tailored to the needs and circumstances of all consumer groups. Customers in vulnerable situations will be asked how they would like to be engaged, for example, over the phone or online, and whether they would like anyone to be present such as a carer or family member. The needs of customers in vulnerable situations will be brought out as an individual section in any reporting provided.

Success Criteria

Inform (Stage 1) - Outputs
• A synthesis of existing studies, looking at what is already known and completing a literature and academic review.
• An understanding of all social, attitudinal and behavioural research conducted so far on consumer transition to hydrogen.
• Any research gaps will be identified and will help frame the next stage of research.

Qualitative (Stage 2) - Outputs
• An understanding of what hydrogen conversion means to consumers, pre, during and post-trial; and what the attitudes and beliefs are of consumers, including their perception of safety.
• An understanding of the impact of hydrogen transition on niche groups of consumers, e.g. customers in vulnerable situations and those in fuel poverty.
• An understanding of consumer views on changing meters, heating and cooking solutions.
• Identification of appliance swap out considerations for different consumer demographics and segments.
• Insight into:
o What questions consumers, businesses, communities and stakeholders have about the transition to hydrogen as an energy solution.
o What are their needs, fears, concerns and hopes?
• An understanding of consumer views on incentivisation, mandating and compensation.
• All outputs will frame the quantitative research (stage 3).

Quantitative (Stage 3) - Outputs
• Findings from the inform and qualitative stages will be quantified at scale, providing numerical data, usable statistics and additional supporting qualitative data.
• A baseline of opinion on a national scale of the likelihood of taking part in a trial based on cost neutrality, incentivisation and mandating change.

Project Partners and External Funding

Project partners:

Research and engagement suppliers: BritainThinks and Savanta.

No external funding.

Potential for New Learning

This project presents a unique opportunity where, the gas distribution network will be repurposing the existing gas network to transport hydrogen and therefore consumer choice will be limited to converting to hydrogen or electrification. There is currently very little evidence that sets out the current consumer perception of conversion, behavioural attitudes, consumer choices and preferences, emotional understanding, consumer psychology and drivers to have hydrogen as an energy solution at home or in the work place.

Scale of Project

The project will be based on a nationally representative sample of the population and will include engagement with circa 2,000 consumers, businesses and stakeholders.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The project will be UK wide with the ability to segment the data so that the findings can represent a hydrogen trial village and other demographics.

Revenue Allowed for the RIIO Settlement

Not applicable

Indicative Total NIA Project Expenditure

Cadent external: £149,150 Cadent internal: £49,875 WWU external: £39,250 WWU internal: £13,125 NGN external: £62,800 NGN internal: £21,000 SGN external: £62,800 SGN internal: £21,000 TOTAL: £419,000

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:

The consumer research will provide insight needed to trial a hydrogen village as described in the Government's Ten-Point Plan and enable widespread hydrogen deployment in the UK.

In a net zero society, natural gas will no longer be combusted for heat as it emits CO_2 which can accelerate climate change, as a result alternatives must be found to natural gas and one of these options could be hydrogen subject to its safe transportation and utilisation being adequately demonstrated. This project looks at consumer's attitudes and behaviours of using hydrogen as an energy solution where choice is limited to either hydrogen or electrification.

The output of this project will help to shape the next stage of a hydrogen village trial following this NIA project.

How the Project has potential to benefit consumer in vulnerable situations:

The research will understand the impact of hydrogen transition based on a diverse and representative sample of the UK population and how consumer attitudes, behaviours and perceptions towards the use of hydrogen differ. This sample will include niche groups of consumers, e.g. customers in vulnerable situations and those in fuel poverty; and will understand the attitudes, behaviours and perceptions of customers in vulnerable situations towards the use of hydrogen as an energy solution for both heating, cooking and meter replacement. This will help to shape the next stage of a hydrogen village trial and will enable any specific measures in place to support customers in vulnerable situations.

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)

Not applicable

Please provide a calculation of the expected benefits the Solution

Not applicable (this is a research project)

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

This project includes a national representation of the population and therefore the data could be used by other networks for future projects. The methods used to gather data will be shared and would be replicable across the entire GB network.

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

Roll out costs are currently an unknown, these will be become clearer in future projects.

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

All network licensees will potentially be converting their networks to hydrogen, possibly as soon as the mid-2020s. This then means that the research that is produced from this project can be used by all Network Licensees to understand the attitude of consumers towards hydrogen conversion, their associated behaviour and preferences; and maximise the adoption of hydrogen by residents in a trial area. The projects aim is to facilitate the initial research into the first at-scale conversion of a network where consumer choice is limited to converting to hydrogen or electrification. The output of this project can then be used by Network Licensees to start building options for consumers, developing levers and potential incentives and create a consumer engagement journey.

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

Not applicable

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 FOAK project in respect of Network Licensees' with regards to developing a hydrogen village.

Cadent has discussed the project with other Network Licensees and can confirm that there is no duplication with either other historic projects or those currently being considered.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

Not applicable

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The Government's Ten-Point Plan has given the need to develop a hydrogen village and hydrogen town. The technology development curve for hydrogen is now at the point where a hydrogen village is required to demonstrate hydrogen at scale, this can then inform subsequent policy decisions which must be taken on heat in the mid-2020s. As a hydrogen village has not been developed to date, an area that has not yet been explored fully is the attitude of consumers towards hydrogen conversion, their associated behaviour and preferences when choice is limited to hydrogen or electrification. There is currently very little evidence that sets out the current consumer perception of conversion, behavioural attitudes, consumer choices and preferences, emotional understanding, consumer psychology and drivers to have hydrogen as an energy solution. This project is innovative and should not be viewed as BAU. This project should be viewed as a fundamental step in developing a suitable hydrogen village proposition, therefore is entirely innovative.

Relevant Foreground IPR

This project and the resultant outcomes/deliverables will conform to the default treatment of IPR as set out under the agreed NIA Governance (where the default requirements address two types of IPR: Background IPR and Foreground IPR).

Data Access Details

Data for this project and all other projects funded under the Network Innovation Allowance (NIA), Network Innovation Competition (NIC) or the new Strategic Innovation Fund (SIF) can be found or requested in a number of ways:

- A request for information via the Smarter Networks Portal at https://smarter.energynetworks.org, to contact select a project and click 'Contact Lead Network'. Cadent 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://cadentgas.com/future-of-gas
- Via our managed mailbox futureofgas@cadent.com

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

This project will understand consumer attitudes, behaviours and perceptions towards the use of hydrogen as a solution for both heating, cooking and meter replacement. The project will be vital to the success of a hydrogen village conversion to be developed by 2025, as per Government directive and presents a unique opportunity where consumer choice will be limited to converting to hydrogen or electrification. The success of this project will move the boundaries of the gas industry and thus cannot be regarded as business as usual.

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 conforms to NIA requirements. There are a number of commercial risks to overcome to enable transition to a hydrogen network, which are under consideration by Government. Therefore, any network licensee would struggle to justify related investment. Support in the short term under NIA will allow essential work to be completed to understand consumer attitudes, behaviours and perceptions of hydrogen as an energy solution. This is a unique piece of work and is essential to developing a hydrogen village trial. Enabling transition to a low carbon future is commensurate with NIA and therefore can be supported.

This project has been approved by a senior member of staff

☑ Yes