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 2020

Project Reference Number

NIA_CAD0060

Project Registration

Project Title

I-0321 Transport Pathways

Project Reference Number

NIA_CAD0060

Project Licensee(s)

Cadent

Project Start

June 2020

Project Duration

0 years and 9 months

Nominated Project Contact(s)

David Jones (Project Manager) - Cadent Neil Stovold – Wales and West Utilities Donal Kissane – Gas Networks Ireland Colin Thompson – SGN David Gill – Northern Gas Networks David Hardman – National Grid Celine Cluzel – Element Energy

Project Budget

£235,067.00

Summary

In 2019 the UK government announced a new emissions target of Net-Zero emissions by 2050 updated from the previous 80% of 1990 emissions that was previously written into the Climate Change Act in 2008. This change has drastically changed the way that UK industry is looking at the decarbonisation challenge with many sectors that were previously considered too hard to decarbonise now having to evaluate their own decarbonisation pathways. One such sector is the heavy transport sector.
Surface transport emissions contribute 27% of all GHG emissions and 23% of these are contributed by the heavy transport sector. Many companies are now investing in new emission reduction technologies with one of the key players being the utilisation of CNG. Large fleet operations have now began investing in CNG vehicles due to both the financial and environmental benefits (84% reduction compared to diesel when using biomethane meeting Climate Change Act 2008 Commitments) with many more fleets now looking to implement CNG having seen the success of current fleets.
The use of CNG is understood to be a strong enabler for transition to future “Net-Zero” gaseous fuels including hydrogen. However, the transition from the current operation as part of a gaseous heavy transport future is not well understood. This project aims to examine the transition from CNG today towards a hydrogen future providing insight into the technical challenges and potential short-term policy asks that will enable a no regrets approach to decarbonisation of the industry.
Within previous work there has been a focus on a high level whole system approach to decarbonisation however as industries and sectors move towards enacting their climate commitments a more detailed study into individual sectors will be required. Doing so will create a more detailed understanding of how businesses will achieve net zero and will ensure consumers do not see a drop in the standard of service and will not be put at risk due to uncertainty.
More specifically within the transport sector there is yet to be a consideration for the transition from CNG vehicles that met the UK’s targets under the original climate change act to hydrogen vehicles applicable within a net zero transition scenario. With substantial investment in CNG vehicles today, it is imperative that the associated costs and technical challenges of a future conversion to hydrogen are fully understood, and the potential for these CNG assets becoming stranded in the future avoided.

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

In 2019 the UK government announced a new emissions target of Net-Zero emissions by 2050 updated from the previous 80% of 1990 emissions that was previously written into the Climate Change Act in 2008. This change has drastically changed the way that UK industry is looking at the decarbonisation challenge with many sectors that were previously considered too hard to decarbonise now having to evaluate their own decarbonisation pathways. One such sector is the heavy transport sector.
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Method(s)

The key milestones that are to be achieved during this project are:
• Task 1: transport pathways to be modelled / agreed (Month 1)
• Task 2: Power, industry and heat pathways to be modelled / agreed (Month 2)
• Task 3: Interim Report Delivered (Month 3)
• Task 4: Presentation of Interim findings – Might include further external stakeholders (Month 4)
• Task 5: Presentation of Final results (Month 6)
• Task 6: Report Submission (Draft for Review and Final) (Month 6/7)
• Task 7: assessment of other regional opportunities complete

Scope

The proposed project is outlined below:
• Work-Package 1: Transport Transition Scenarios (Month 1-3)
o Examine uptake scenarios (HGV's and other segments) for different pathways
o Evaluating regional HGV uptake and CH4/H2 refuelling modelling across different phases and pathways.
o Examining policy and market landscape gaps to deliver transport pathways across each phase.
• Work-Package 2: Gas Production and distribution Pathways (Month 2-3)
o Define all H2 pathways – mix, costs, market status, deployment constraints
o Define all gas (Including BioCNG/BioSNG) pathways – Mix, costs market status, deployment constraints
o Aggregate data on RES location and network assets location
• Work-Package 3: Net-Zero Modelling (Month 2-5)
o Agree decarbonisation Pathways for heat, industry and power
o Adapt the net-zero pathway model to apply it for GB
o Run the net-zero pathway model
• Work Package 4: Whole System Modelling (Month 4-5)
o Prepare and run the integrated system dispatch model
o Run the multi-vector network analysis
o Combine the results and generate all outputs, refine transport outputs
• Work package 5: Recommendations and reporting (Month 3-7)
o Interim Report to support LEFT – Focus on the renewable gas phase
o Interpretation of results and recommendations – transport and energy systems
o Final Report (Draft and Final)

Objective(s)

The uptake of gas in heavy duty vehicles is strongly dependent on policy, economics and environmental performance. With many companies now looking towards bio-CNG fleets to achieve short-to-medium term environmental targets there is now an increased focus on how fleets can transition from this short-term reduction using renewable gas towards long term net-zero emissions targets using hydrogen.
The key objectives for this project are shown below:
Customer objectives: Improved understanding on the impact of implementation of CNG today on the role out of Hydrogen in the future including financial benefits of adopting CNG currently as part of a GB transition step.

Network objectives: Increased interest in the role of CNG as part of a transition will support further discussion of a hydrogen future and potentially increase the number of fleets converting to CNG now on the understanding that it will provide learning to enable a future transition. The project also aims to understand the impacts of increased gas/hydrogen role out in transport on the operation of the

network (e.g. gas consumption/consumption profile)

Environmental objectives: an understanding of the role hydrogen can play in the net-zero transition and how short-to-medium term decisions can impact role out of hydrogen in the future

Innovation objectives: a technical review of current CNG infrastructure and the ability/cost of adapting this infrastructure to deliver hydrogen.

This project also aims to support current gas strategy and further support the role out of CNG as part of a future gas transition whilst supporting the continuation of funding methods that assist in the uptake of BioCNG e.g. RTFO.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Understand the policy, economics and environmental performance of converting current CNG station to Hydrogen & produce a pathway for this to happen.

Project Partners and External Funding

Cross network collaboration involving: Cadent, Northern gas Networks, Wales and West Utilities, National Grid, SGN and Gas Networks Ireland

Potential for New Learning

Current pathways work has focused on a high level whole systems approach. This project aims to provide new insights by examining both the technical transition along with the network and policy transition that will have to take place specifically in the transport sector. These pathways for decarbonisation utilising gaseous transport fuels have not been thoroughly investigated previously.

Scale of Project

To assess the conversion of the gaseous transport sector to hydrogen whilst considering social, political and environmental changes within the industry will require a large amount of data/market analytics that could not be completed on a smaller scale. To ensure the reporting document is thorough enough to achieve impact with policy makers a national narrative must be conveyed which supports the production of a project at this size.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The Project aims to evaluate the conversion of GB Gaseous Transport Infrastructure to hydrogen with a consideration for the implication for the Isle of Ireland

Revenue Allowed for the RIIO Settlement

This project is funded via NIA, with an £8.4k contribution from GNI

Indicative Total NIA Project Expenditure

External Cost (as per contract)
Cadent: £75,555
SGN: £37,778
NGN: £18,889
WWU: £18,889
NGGT: £18,889
GNI: £8,400
Total 3rd Party Costs (sum of above GDN contributions) = £178,400
Total Internal Cost = £56,667
Total Cost = £235,067

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)

The specific cost savings of this project are difficult to quantify however it is recognized that development of hydrogen transport technologies could provide a market of £19-49 Bn pounds of additional growth within the UK market by 2050.

Please provide a calculation of the expected benefits the Solution

This project is at a low technical readiness level and hence the cost/financial impact cannot be quantified

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

This project covers the GB at a research level however a role out of Hydrogen refueling stations will not be covered.

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

This project only covers a research level understanding of the transition to hydrogen and therefor project rollout costs will not be applicable.

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

This project will provide the networks with learning that will allow them to assess their conversion suitability and inform long term strategy to ensure networks or “hydrogen ready” in the future.

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

☑ 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 work aims to complement previous work into whole system decarbonisation pathways focusing specifically on the transport sector. This work will also aim to support work being completed as part of the low emission freight trial and will ensure the existing body of knowledge is used to influence the final project report. No project of this kind has been completed by gas networks in Great Britain.

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

There have been significant studies that have focused on the end constraints for a net zero transport future however current reports have failed to focus on the pathway for achieving these. This project aims to describe this transition from current bio aspirations to a hydrogen future.

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

Due to the commercial, technological and policy-based uncertainties this project would not be funded 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

As well as the technical uncertainties with the project that make this suitable for NIA funding, the project will undertake research which will be applicable to a number of stakeholders. As the outcomes of the project are valuable to a wide number of stakeholders, NIA funding is most appropriate to allow sufficient project delivery capacity to maximise industry learning. In addition, the increasing utilisation and ease of access for the transport sector to gas networks promotes competition and cost efficiencies to the benefit of gas consumers. Using the NIA funding ensures that all findings will be made available.

This project has been approved by a senior member of staff

☑ Yes