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

Oct 2021

Project Reference Number

NIA_CAD0075

Project Registration

Project Title

FI-0004 HyNet – Management of Additional Sources of Hydrogen Supply

Project Reference Number

NIA_CAD0075

Project Licensee(s)

Cadent

Project Start

July 2021

Project Duration

1 year and 7 months

Nominated Project Contact(s)

Damien Hawke – Cadent Gas Ltd
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Project Budget

£50,000.00

Summary

This NIA funding is requested to support existing UKRI funding on developing a roadmap for a net zero cluster

to be developed in the North West by 2040, making this this the first net zero cluster in the UK. Cadent is working

a range of other key stakeholders from industry, academia, public organisations and an electricity DNO to develop

a credible roadmap. Cadent's role within the consortium is to develop options for hydrogen transportation in the region.

This work was initiated at the start of 2021 and is due to finish by the end of 2022. This will be followed by a period of dissemination before the project is closed.

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

Very deep emissions cuts are required across sectors to meet the Government's legally binding deep emissions reduction target of 'Net Zero' by 2050. The UK currently relies predominantly on three energy vectors; electricity, gas and oil, for the decarbonisation of the power, heat and transport sectors. Progress has been made in reducing the carbon intensity of power generation but, as stressed by the Committee for Climate Change (CCC) in its 2020 'progress update' to Parliament, very little progress has been made in reducing the carbon intensity of heat, in particular, industrial heat.

Cadent is a partner in a consortium which has been awarded a contract by UK Research and Innovation (UKRI) to develop a North West Cluster Plan, funded under the Government's Industrial Decarbonisation Challenge Fund (IDCF). The focus of this 2-year contract is upon delivery of a net zero industrial cluster across the North West of the England by 2040. The consortium partners include Peel,

Scottish Power Energy Networks, Engie, Progressive Energy, Uniper and the North West Business Leadership Team – all under the banner of Net Zero North West.

Cadent is partnering with Progressive Energy on delivering Work Package B1 'Industrial Decarbonisation Systems' within the Cluster Plan programme. The focus of this work is upon the determination of how industrial demand for hydrogen by 2040 can be met by increasing levels of hydrogen supply (and carbon capture and storage). The funding under this NIA will represent the match-funding requirement for both Cadent and Progressive Energy and will leverage a further £100,000 of funding from UKRI.

Method(s)

The project can broadly be split into the following three work packages:

1. Analysis of opportunities to extend the hydrogen pipeline network to incorporate additional sources of 'green' hydrogen from offshore wind and tidal energy to supply industry

2. Analysis of opportunities to extend the hydrogen pipeline network to incorporate hydrogen production from nuclear energy to supply industry

3. Analysis of opportunities to extend the hydrogen pipeline network to incorporate additional sources of blue hydrogen produced from natural gas to supply industry

As set out below, the work will require a range of approaches to development of evidence in respect of the tasks defined above:

· Analysis and review of all modelling of future industrial hydrogen demand developed in previous studies:

o The key time horizon for analysis in the Cluster Plan is 2040. This may require some further extrapolation from existing data which has been developed for the scoping of HyNet out to 2030.

o It should be noted that that although the Cluster Plan is specifically for industrial decarbonisation, the wider sectoral decarbonisation plans will be an integral part of the Plant to ensure that cost efficient infrastructure is developed.

· Market engagement with organisations considering the development of new hydrogen production facilities in the North West to supply industry;

o Existing contact networks, including the network surrounding the North West Hydrogen Alliance and Net Zero North West, will be used to identify relevant hydrogen producers.

· Analysis of sites for hydrogen production proposed by project developers:

o This analysis will focus on the suitability of sites from a network extension perspective and in respect of their suitability for industrial supply.

Measurement Quality statement includes the fact there are a variety of specialist consultancies, a number of additional partners including a leading university and two network licensees involved in the project who will constantly measure the quality output of the entire project. This will also be reinforced and further scrutinised by the project steering committee, which will compromise of a number of experienced energy industry professionals who will regularly monitor the output of the project. There is also expected to be a regular interface with the BEIS and the UKRI on this project who monitor the output through an independent monitoring officer.

Scope

The study will be focussed upon opportunities in the North West of England and North East Wales, and specifically upon the area defined in the HyNet 'expansion' report (NIA_CAD0035). This area has a current natural gas use of 37 GWh/annum, which equates to a significant proportion of total gas use across Cadent's entire North West distribution network. It also extends into areas currently served by WWU.

Industrial hydrogen demand for process heating, space heating and combined heat and power (CHP) will be included within the scope of the analysis. Some sites may include demand for just one type of heating, whilst others have demand across all three types of heating.

The analysis will focus on the production of hydrogen for industrial supply, derived from:

· Green sources, including:

o Both planned and existing major offshore wind and tidal electricity generation projects;

o Sites with existing connections to the electricity national transmission system (NTS), which might host significant hydrogen production from biomass ('bio-hydrogen').

· Nuclear energy focused exclusively on existing nuclear generation sites, at which new plant are being considered for development;

o This might include production of hydrogen by way of electrolysis or via high temperature process heat.

· New major blue hydrogen production sites, which are either already connected to or located on the existing local transmission system (LTS) or located near to the national transmission system (NTS).

Other potential sources of hydrogen, such as those from onshore wind, solar and bio-energy may in the future also connect to the HyNet network. However, these are not sufficiently large sources as to justify any major additional stretches of pipeline or changes to routing, and are therefore outside of the current scope of the analysis.

Objective(s)

The overarching objective of this work is review existing data relating to future industrial hydrogen demand to identify and map future sources of hydrogen production so that this can inform potential future design of the HyNet hydrogen network. To support this objective, there are a range of task-oriented sub-objectives, which can be summarised as follows:

To produce an output which can be integrated into the wider NW Cluster Plan.

· Review and assessment of previous studies focused on modelling of industrial hydrogen demand.

· Market engagement with organisations considering the development of new hydrogen production facilities in the North West.

· Analysis of sites for hydrogen production proposed by project developers.

· Determination and analysis of additional suitable sites for hydrogen production.

· Review of the potential to extend the hydrogen network to enable connection of additional sources of production to enable supply of hydrogen to industry.

· To produce an output, which can be integrated into the wider NW Cluster Plan

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This project does not specifically consider consumers in vulnerable situations but does look to devise least cost solutions in a net zero economy, which will invariably support customers in vulnerable situations

Success Criteria

The success criteria of the project are as follows:

· Identification of suitable sites for bulk production of hydrogen into the HyNet network

· Determination of any potential extensions to the future HyNet network to incorporate these hydrogen production sites;

· Determination of any amendments to the future design of the HyNet network to incorporate these hydrogen production sites;

· Delivery of a suite of recommendations in respect of network extension and design to enable future growth in industrial hydrogen demand to be met by suitable forms of production.

· Integration of the analysis into the wider NW Cluster Plan alongside the 10 other work packages being developed by the consortium partners.

Project Partners and External Funding

Progressive Energy Ltd are partnering with Cadent on WP B1 'Industrial Decarbonisation Systems' within the Cluster Plan programme.

External funding is being provided to Cadent from UKRI by IDC comes to £9956.50

Potential for New Learning

This project is the first time that a series of industrialists, energy networks, universities, local authority organisations have come together to develop an energy road map, which aims makes the North West cluster the first net zero cluster by 2040. The potential for new learning is therefore considerable and this learning will be widely disseminated. This dissemination has already begun through a series of webinars, a final report will be produced that will be publicly available.

Scale of Project

The project will be a desktop study. It is imperative we understand the current and future situation as regards supply of hydrogen from additional sources (to the core HyNet blue hydrogen production plant) within the NW to enable decarbonisation of industry. The project will encourage use of the network by organisations seeking to produce hydrogen from either renewable or nuclear electricity and at additional blue hydrogen production sites. As a consequence, a greater number of suppliers will connect to the network, therefore reducing costs for all network users.

The project also forms part of the wider NW Cluster Plan and is leveraging 200% of additional funding to support the development of this wider Plan.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project will be entirely desk based but will cover the entire North West area of England. This covers an area as far north as Cumbria and as far south as Staffordshire. It includes the major urban areas of Manchester and Liverpool and the surrounding areas.

Revenue Allowed for the RIIO Settlement

Not applicable

Indicative Total NIA Project Expenditure

Not applicable

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:

This project follows the government's ambition to have a Net Zero cluster by 2040. This project looks to co-ordinate an early plan to realise this ambition, it is therefore an integral step to facilitating an energy system transition from fossil fuels to a zero-carbon future.

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

Not applicable

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

The learning developed by creating this roadmap could potentially be replicable to other areas of the UK. This is not because the roadmap can be directly applied to different regions (as there will be differences in geography and geology) but, because new technologies are being investigated for use in the North West could be considered for other regions also.

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

Not Applicable. As discussed, other regions have been allocated UKRI money to develop roadmaps for their own regions.

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 consider how gas networks can be best configured to accept hydrogen from a range of additional resources to enable the widespread decarbonisation of industry.

It is also envisaged that the above information can be used by relevant Network Licensees to determine the attractiveness of the production of hydrogen from renewables and nuclear. In addition, it will help Network Licensees to quantify and realise the potential benefits of such supplies of hydrogen.

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

Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.

Not applicable

Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<

No constraints identified

Please justify why the proposed IPR arrangements provide value for money for customers.

The aim of the project is to enable dissemination amongst the GDN's, other Network Licensee Holders and wider industry stakeholder, so this represents value for money for the customers as learning can be shared

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 first-of-a-kind (FOAK) project in respect of Network Licensees' consideration of hydrogen supply from renewables and nuclear. 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

Bulk hydrogen production from renewables and nuclear at scale has only very recently become a feasible option as a result of the potential deployment of the HyNet network, supplied by a major blue hydrogen production plant. Without the HyNet network, such sources of hydrogen would not be sufficiently reliable or low cost to warrant analysis.

Relevant Foreground IPR

not applicable

Data Access Details

not applicable

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

The HyNet project is progressing quickly, but is not sufficiently developed to attract commercial funding for analysis of additional sources of hydrogen production aside from the central blue hydrogen production plant. The outputs from this work, however, will potentially enable future project development funding from both the network licensee and external investors.

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. Commercial risks to be overcome, which require NIA support, include the current absence of a relevant support mechanism for hydrogen production. Such a mechanism is currently under consideration by Government, but in the meantime, any network licensee would struggle to justify investment of this nature. However, support in the short-term for this project under the NIA, will allow all licensees to manage commercial risk and then move quickly at the relevant time to deliver maximum benefits to customers in the form of enabling connection to the network for new hydrogen producers.

This project has been approved by a senior member of staff

☑ Yes