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_WWU_2_07

Project Registration

Project Title

SWIC: Assessment of potential hydrogen demand in 2030 - 2050

Project Reference Number

NIA_WWU_2_07

Project Licensee(s)

Wales & West Utilities

Project Start

October 2021

Project Duration

1 year and 0 months

Nominated Project Contact(s)

Henry James

Project Budget

£30,000.00

Summary

This project will assess the development of hydrogen infrastructure in South Wales under the SWIC Deployment Phase 2.

Preceding Projects

NIA_WWU_2_03 - SWIC Market-Accelerating Hydrogen Distribution and Storage

NIA_WWU_2_01 - SWIC Hydrogen Supply Pipeline Infrastructure

Third Party Collaborators

Progressive Energy Limited

Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

Problem Being Solved

The UK Government has committed to reducing greenhouse gas emissions to net zero by 2050. To support this, the UK Government has issued the “10 Point Plan to deliver a Green Industrial Revolution” by mobilising £12 billion of Government investment.

The SWIC is a consortium of some of Wales’ top industry, energy, infrastructure, law, academic and engineering organisations. SWIC is led by Costain alongside partners including WWU. In 2020 the project received an allocation of grant funding from Innovate UK that supported the first phase of the SWIC Roadmap and Deployment projects.

All future energy modelling identifies a key role for hydrogen (linked to Carbon Capture, Utilisation and Storage (CCUS)) in providing

decarbonised energy for heat, transport, industry and power generation. To enable the transition from natural gas to hydrogen, the gas networks will be required to provide the transportation and distribution infrastructure to supply hydrogen to customers in the future low carbon economy.

The scope of work for this proposal will contribute to the next phases of the development of the SWIC in respect to the role of gas distribution network infrastructure operated by WWU.

Method(s)

This project is a feasibility study to identify the main sites for supply and demand of hydrogen, together with an outline layout for hydrogen infrastructure, within the South Wales Industrial Cluster

The methods will include data gathering, development of our own datasets of likely sites for hydrogen production, sites of demand (including industry, power, transport and domestic), and existing transport infrastructure. We will also develop required models to understand patterns of movement of hydrogen in the system in response to supply and demand, to assess storage requirements.

The project will rely on public domain information and Progressive's own assessments of CO2 emissions, hydrogen demand and pipeline locations. It will cite data sources and identify any areas of uncertainty or known or likely inaccuracy. The project aims to deliver insights into the likely future location and capacity of gas pipelines and the composition of the gases they carry. The project does not involve measurement of existing data.

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

The outline scope of work for assessing the development of hydrogen infrastructure in South Wales under the IDC Deployment Phase 2 comprises:

1. Identify the main potential locations for bulk hydrogen demand and indicative size and seasonality/variability of demand and possible timing of development (snapshots 2030, 2040, 2050
    1. Industrial ETS Emitters capable of fuel switching from natural gas to Hydrogen
    2. Industrial ETS Emitters capable of repowering CHP plant from natural gas to Hydrogen
    3. Power station sites requiring a supply of flexible Hydrogen
    4. LDZ entry points, for injecting a blend to domestic/commercial customers
2. Location of appropriate supply points to satisfy this demand
    1. Sources of hydrogen (green vs blue
    2. Locations for hydrogen production
    3. Variability of hydrogen production depending on feedstock/energy supply
3. Outline development of H2 transportation system capable of satisfying the demands identified in 1).
    1. Assessment of re-use potential of NTS, LDZ pipelines
    2. Preliminary sizing and routing of new H2 supply infrastructure required to deliver hydrogen demands in South Wales
4. Identification of the magnitude of storage requirement for Hydrogen associated with the demands identified in 1)
    1. Storage demand
    2. Review of possible storage sites, including access, state of development, match to requirement

Objective(s)

The overarching objective of the study is to identify a preliminary layout for a necessary hydrogen infrastructure in South Wales, in the context of the wider SWIC Phase 2 work programmes.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This is a low impact project because it will identify hydrogen infrastructure in South Wales. When looking at decarbonisation options it is important that this is done not only with a technical focus but also with a focus on the consumer and the potential impact of change upon them. However this work will concentrate on the technical aspects of supplying hydrogen, further projects would look to assess the impact of any decision on all customers, including vulnerable customers.

Success Criteria

A successful project will produce a report to develop understanding of hydrogen production sites. As well as helping WWU understand hydrogen demand, storage and infrastructure

Project Partners and External Funding

The project partner is Progressive Energy. The total external cost of this project is £45k. This project has external funding from Innovate UK, who will contribute 50% of the external costs (£22.5k). The remaining 50% contribution will come from NIA funding (£22.5k).

Potential for New Learning

The potential for new learning will be twofold: the specific results, and the learnings

about modelling these issues.

The specific results will be the first attempt to determine, in any detail, the likely infrastructure requirements for hydrogen transport in South Wales. These results will obviously represent new learning, and the techniques and approaches to derive them will be applicable in other areas.

The modelling of hydrogen supply and demand, storage and transport will require development of new models and new approaches. These learnings will be available and relevant to other areas in the UK (and further afield).

All learning will be disseminated via reports uploaded to the smarter networks portal

Scale of Project

The project is a small, focussed effort, to be undertaken over a brief period of 6 months. It forms part of a much larger effort – the South Wales Industrial Cluster's Industrial Decarbonisation Challenge Cluster Plan and Deployment projects – which are to develop critical next steps in the decarbonisation of South Wales by 2050.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The project will cover the South Wales area of the Wales & West Utilities network

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

External: £22,500

Internal: £7,500

The 10% minimum contribution will be met by the IUK funding.

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:

All future energy modelling identifies a key role for hydrogen (linked to Carbon Capture, Utilisation and Storage (CCUS)) in providing decarbonised energy for heat, transport, industry and power generation. To enable the transition from natural gas to hydrogen, the gas networks will be required to provide the transportation and distribution infrastructure to supply hydrogen to customers in the future low carbon economy. This project helps WWU move towards a decarbonised network.

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)

N/A

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

All networks in Great Britain are looking to decarbonise heat and the methodology from this project may be applicable to other networks.

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

- ☐ 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 review of the demand and storage options across the South Wales region, and the recommendations made will provide learning and a methodology that may be applicable to other future conversion projects by other 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)

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.

All networks have been made aware of this project and no concerns over duplication has been 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's will develop the outline analysis on the likely sites of hydrogen production, sites of demand (including industry and power, where 100% hydrogen is likely to be used) and domestic (where a blend of hydrogen and natural gas is likely at first, migrating over time to 100% hydrogen).

The project will include modelling of storage requirements, to inform requirements for geological salt cavern storage of hydrogen.

This consideration of the future hydrogen infrastructure has not been undertaken before.

Relevant Foreground IPR

The relevant foreground IP, with be the report that is generated as part of the proejct.

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'. 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.wwutilities.co.uk/about-us/our-responsibilities/innovation/
- Via our managed mailbox innovation@wwutilities.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