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 2018

Project Reference Number

NIA_NGTO021

Project Registration

Project Title

Decarbonisation vision for South Wales

Project Reference Number

NIA_NGTO021

Project Licensee(s)

National Grid Electricity Transmission

Project Start

November 2018

Project Duration

0 years and 9 months

Nominated Project Contact(s)

Amrit Sehmbi

Project Budget

£131,000.00

Summary

This project will examine the sources of carbon emissions in South Wales from the use of all energy vectors, (electricity, gas and oil) and seek to identify the opportunities for substantial cost effective reductions. The use of decarbonised gas and the reduction of industrial emissions are a particular focus.

The aim is to produce a roadmap for achieving significant decarbonisation of the area and to identify the role of each energy vector.

The project will also aim to better understand the interaction of combined gas and electricity distribution networks with transmission networks as we move into a whole energy networks future.

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

South Wales is a heavily industrised area with substantial emissions (~18mte CO2/yr from industry alone). A strategy is required to reduce emissions at minimum cost. Solutions will require changes in the established role of each energy vector in meeting consumer demand. Innovative changes are required that can be deployed. Renewable generation is becoming more established and other solutions, such as low carbon hydrogen are promising. Their application in South Wales needs to be examined so that appropriate investment decisions can be made in the energy supply.

By 2050 emissions need to be reduced by 80% compared to those in 1990. To achieve the UK emissions reduction targets all energy vectors are required to substantially decarbonise. To date most progress has been made in the electricity vector. Little progress has been made in reducing:
a. The carbon intensity of heat, primarily provided by natural gas
b. Industrial CO2 emissions
c. Transport emissions, primarily by oil derivatives

Method(s)

This work will review the current status of carbon emissions in the energy sector in South Wales and the opportunities and options for their reduction. This will include an examination of the industrial, power generation and domestic sectors and seek to identify opportunities for fuel switching.

The use of low carbon hydrogen will be examined and promising hydrogen production sources will be identified.

The evidence produced will be combined to produce a 'roadmap' for the role of decarbonised gas in particular in meeting emissions reduction targets, together with identification of the major opportunities for R&D.

Scope

1. Identify opportunities for fuel substitution and related options for carbon capture
2. Establish options and opportunities for carbon transport and CO2 storage infrastructure
3. Establish opportunities for the production of decarbonised hydrogen
4. Review the opportunities for the use of hydrogen and other decarbonised fuels in the transport sector in South Wales
5. Produce a roadmap for the use of decarbonised gas in South Wales
6. Consider the opportunities for energy storage needed to meet variable energy demand and integrate this into the roadmap
7. Provide a high-level review of the application of existing R&D in supporting the roadmap

Objective(s)

The aim is to produce a roadmap for achieving significant decarbonisation in South Wales recognising the opportunities for fuel substitution across electricity, gas and oil to achieve the 2050 carbon reductions.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will be deemed successful if a roadmap for decarbonision in South Wales is produced.

Project Partners and External Funding

Tata Steel

Potential for New Learning

Electricity transmission network licensees will be able to better understand the interaction of combined gas and electricity distribution networks with transmission networks as we move in to a whole energy networks future.

The work will also provide knowledge of value to the Gas and Electricity Distribution operators in Wales.

Scale of Project

It is considered that a desk based study is adequate to meet the objectives of this project. The work requires consideration of market sectors supplied by electricity, gas and oil and the programme has been structured to provide a high-level review but with sufficient depth to enable future work to be defined and decisions to be made.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

This is desk based work.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£131,000

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:

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)

If all the problems are solved a significant reduction in emissions can be achieved and the impact electricity, oil and gas companies have on the environment reduced. This would provide a paradigm change in terms of the impact that electricity networks have on their greenhouse gas emissions and result in the provision of more environmentally sustainable electricity to UK consumers and lower the cost of their bills.
The work to be undertaken is still at proof of concept level therefore financial benefits can not be quantified.

Please provide a calculation of the expected benefits the Solution

It is not possible to quantify this yet as this is early research and we don't know the potential degree of environmental and costs.

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

This is a research project

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

This is a research project

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

The role of gas, electricity and oil in meeting energy demand will need to change significantly to meet future energy demand with very little greenhouse gas emissions. This work will provide evidence to help each licensee define a future strategy.

The project will provide an understanding of interaction and operational capabilities in order to allow networks licensees to plan their future investments.

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

This project fits within the Managing Assets and Service Delivery value areas of the Electricity Innovation Strategy.

☑ 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.

A search on the ENA portal has identified a number of NIA projects that look at decarbonisation. The differences are listed below:

- there has been no work to date to look at the potential to provide a low carbon gas supply into, and reduce the carbon intensity of, the Welsh network cost effectively.
- the mix of demand is unique – a very large integrated steel works, two oil refineries and LNG terminals as well as a wealth of other industry with a relatively low population and geographically distributed housing.
- the potential for low carbon gas production is very different – the access to CCS infrastructure (needed for bulk supply of low carbon gas) is very different from elsewhere and has not been examined before.
- the relative feasibility and cost effectiveness of options for decarbonisation of the gas and electricity networks is unique to Wales as detailed above.

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 involves consideration of sectors not normally supplied by the network, consideration of decarbonised gases for which there is little experience, and is specifically designed to provide new leaning in a geographic area whose characteristics differ from other areas. Reducing emissions by 2050 is the target for all sectors. This project creates value by helping identify ways emissions can be reduced in a cost-effective way. There is currently no strategic plan for this to be achieved. The project will look at combined

networks for the future as opposed to separate gas and electricity networks which will support the whole uk energy transition.

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

This project drives potential long term benefits which can only be delivered in future regulatory periods.

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 should be funded through the NIA as there are potential environmental benefits which may be exploited if we can gain sufficient understanding on how emissions can be reduced by 80% by 2050. Without the NIA funding we would be unlikely to pursue this research and consequently we risk not achieving the government target.

This project has been approved by a senior member of staff

☑ Yes