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## NIA Project Registration and PEA Document

### Date of Submission

Mar 2019

### Project Reference Number

NIA\_SGN0144

## Project Registration

### Project Title

Assessing the Gas Network Decarbonisation Pathway

### Project Reference Number

NIA\_SGN0144

### Project Licensee(s)

SGN

### Project Start

February 2019

### Project Duration

1 year and 0 months

### Nominated Project Contact(s)

Colin Thomson, Matt Hindle, Oliver Lancaster, Lorna Millington, Keith Owen or Neil Rowley

### Project Budget

£519,877.21

## Summary

There are major challenges across our energy system to deliver the UK's carbon budgets and 2050 decarbonisation targets, particularly around heat and industrial decarbonisation. These challenges were set out in the Committee on Climate Change (CCC) 2018 Progress Report to Parliament, and will require coordinated action to find affordable, deliverable solutions. BEIS and CCC have suggested that major strategic decisions on heat policy will need to be taken by government in the mid-2020s, and that evidence should be built now to support policymakers in this process.

This project will evaluate the decarbonisation pathway set out by the gas networks, including the level of decarbonized gas delivered, system cost and price control implications, security of supply/system resilience, safety & risk management, economic benefits and emissions savings potential at different stages (including against carbon budgets). It will build on existing knowledge of decarbonised gas generation, transportation to set out and appraise the pathway for gas network decarbonisation and build knowledge and understanding in the following areas

### Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

## Problem Being Solved

There are major challenges across our energy system to deliver the UK's carbon budgets and 2050 decarbonisation targets, particularly around heat and industrial decarbonisation. These challenges were set out in the CCC 2018 Progress Report to Parliament, and will require coordinated action to find affordable, deliverable solutions. BEIS and CCC have suggested that major strategic decisions on heat policy will need to be taken by government in the mid 2020s, and that evidence should be built now to support policymakers in this process.

Gas pipeline infrastructure is increasingly recognised as an attractive means of delivering decarbonisation, using a range of renewable and low carbon gasses, particularly as the system evolves to become more flexible and support decentralised gas production. Several existing NIC and NIA projects are currently exploring the technical implications of decarbonising gas networks, including the widening of gas quality, changes to billing methodologies, the impact of hydrogen blending on existing networks, and the feasibility of conversion of the networks for 100% Hydrogen. These are complemented by research and innovation led by academia,

and government-sponsored projects such as Hy4Heat.

However, increasing volumes of decarbonised gases and changing policies and procedures to deliver them require significant coordination between gas transmission and distribution networks, the wider energy industry and consumers. A high-level pathway for gas network based decarbonisation has been developed, wherein each step either enables or delivers decarbonisation. This pathway also potentially allows for whole system decarbonisation and development, including transport and power. While studies to date have largely focused on the 2050 targets and focused on one sector, applied research including real options analysis is required across all sectors, which considers the case studies across the UK. This project will explore the whole system opportunities for decarbonisation the gas networks can deliver through this pathway. To do so it will map the changes and decisions required, identify policy and regulatory barriers, carry out real options analysis, recommend a programme of further work and support development of a clear strategy for the future of the gas networks.

## Method(s)

The project will:

- Evaluate the decarbonisation pathway set out by the gas networks, including the level of decarbonized gas delivered, system cost and price control implications, security of supply/system resilience, safety & risk management, economic benefits and emissions savings potential at different stages (including against carbon budgets).
- Identify and map the changes required and identify key technical, regulatory and policy barriers.
- Explore, develop and propose strategic investment mechanisms and models that maximize carbon reductions and minimize cost and disruption to consumers and government.
- Analyse the deliverability of the pathway and its constituent steps, including through “Real Options” analysis and in comparison, to alternative approaches to decarbonisation.
- Conduct a significant stakeholder engagement exercise with policymakers, the energy value chain and consumer groups.
- Set out conclusions in an accessible report which can be provided to the full spectrum of stakeholders, including customers, policymakers as well as network licensees, through a concise dissemination of the learning from the project.

## Scope

This project will build on existing knowledge of decarbonised gas generation, transportation to set out and appraise the pathway for gas network decarbonisation and build knowledge and understanding in the following areas:

- Network investment to support the development of a more flexible, decentralised and decarbonized network.
- Implications for changes to gas quality regulations (building on the Opening up the Gas Markets project) and safety management.
- Mapping options for consumers, including domestic appliances, gas in transport and industrial & commercial users, and considering fuel poverty implications.
- Setting out the system developments required, including: billing implications for future networks (building on the Future Billing Methodology and Real Time Networks projects); smarter network management; supporting Whole System outcomes (e.g. flexible generation); control systems for decentralised low carbon gas.
- Developing hydrogen networks through increased blending and ultimately repurposed sections of the existing network, with reference to existing projects such as H21, Hydeploy, H100 and others.
- Identifying dependencies beyond the remit of network operators, such as policy options for biomethane, bio-SNG and hydrogen blending; development of CCUS (building on existing knowledge of biomethane markets, BioSNG, Hydeploy, Acorn St Fergus and other projects).

It will build on existing gas network innovation projects and avoid duplication by referencing work such as the rollout vision for H21. It will consider the potential impacts of macro-level changes to the policy and economic context for decarbonisation.

## Objective(s)

The objectives are:

- Support the development of policy and regulatory change around decarbonisation of gas networks.
- Develop a shared view of the pathways and decision points for changes to the networks, and their operation, to support decarbonised gas among the GB gas network licensees.
- Ensure that innovation and other activity to support decarbonisation is coordinated, and that real options analysis is independently evaluated for policy and decision makers.
- Ensure that policymakers and energy industry stakeholders are engaged in the process to develop pathways and options for decarbonising gas, complementing existing and planned activity.
- Ultimately, to support the decarbonisation of energy networks and the customers they serve.

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

### Success Criteria

- Detailed report published setting out conclusions in each area identified under 'scope'.
- Clear appraisal of carbon reduction potential and deliverability of steps towards gas network decarbonisation.
- Identification of further network and non-network research requirements.
- Wide stakeholder engagement activity carried out.

### Project Partners and External Funding

All GB gas networks and Energy Networks Association will be partners in the project.

### Potential for New Learning

New learning is expected to include:

- Regulatory and policy options to support decarbonised gas.
- A shared understanding of the pathway for gas networks in decarbonisation and required changes to operation.
- Independent assessment of the pathway for decarbonisation and real options analysis.
- New models for delivering network change to support decarbonisation.
- Identification of further network and non-network research requirements.

### Scale of Project

Feasibility-style study with stakeholder engagement.

### Technology Readiness at Start

TRL2 Invention and Research

### Technology Readiness at End

TRL3 Proof of Concept

### Geographical Area

The project will cover GB, though some case studies or project learning may be taken from particular GDNS or international examples.

### Revenue Allowed for the RIIO Settlement

This is a low TRL research project, therefore not applicable.

### Indicative Total NIA Project Expenditure

£519,877.21

## 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)

It is essential to provide real options to customers to determine the optimal way to decarbonise.

#### Please provide a calculation of the expected benefits the Solution

KPMG (2016) estimated that the incremental cost of meeting 2050 heat demand would be around £200bn less through a decarbonised gas pathway compared to an all-electric future.

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

Project is designed to be applicable to all gas network licensees.

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

See expected financial benefits above. Project seeks to define costs of future changes to the networks to support decarbonisation.

### 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 be directly involved in the project, and the learning will be used to inform future decision making across the UK.

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

The project will help address a number of challenges identified in the 'Future of Gas' chapter of the Gas Network Innovation Strategy, including Strategic Aims 2, 3 and 4. It can also help respond to challenges around 'Environment and Low Carbon' and 'Distribution Mains Replacement'.

- 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.

All networks are participating; scope designed to build on previous and current innovation projects.

### 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 is no common recognised pathway for decarbonising gas networks. The networks have developed a high level pathway that requires testing, evaluation and real options analysis.

### Relevant Foreground IPR

n/a

### Data Access Details

n/a

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

Government policy on the future of heat is uncertain, so there is no proven business case to develop such a pathway at present.

### 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**

This project did not form part of the RIIO GD1. It requires independent assessment.

**This project has been approved by a senior member of staff**

Yes